Arms Trade and Economic Development
Theory, policy, and cases in arms trade offsets

Edited by
Jurgen Brauer and J. Paul Dunne

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Countries that spend scarce resources to import arms from abroad often require arms sellers to “reinvest” part of all of the proceeds back into the arms-importing country. These so-called arms trade offsets are therefore thought to enhance domestic economic development. But does this process actually succeed?

This book examines the theory and policy applications of arms trade offsets and looks at more than a dozen case studies drawn from across Europe, Africa, Asia, and the Americas. The chapters, based on original research and published here for the first time, are all written by top notch experts.

That an impressive, lucid, and cohesive volume such as this will interest defence economists can be taken almost for granted. The book will also be a useful and enlightening read for those interested in international development economics, military studies, and policymakers across the globe.

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Arms trade and economic development: Theory, policy, and cases in arms trade offsets
J. Brauer and J. Paul Dunne
ARMS TRADE AND ECONOMIC DEVELOPMENT
THEORY, POLICY, AND CASES IN ARMS TRADE OFFSETS

by

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LONDON AND NEW YORK
With appreciation and affection to our activist and professional friends and colleagues working to create a peaceful, equitable, and successful South Africa
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Preface

The idea for this book arose from an international conference on economic aspects of arms trade offsets, held 25–27 September 2002 in Cape Town, South Africa. The conference was sponsored by the South African and United States chapters of Economists Allied for Arms Reduction (ECAAR), the National Research Foundation of South Africa, the Institute for Social and Systemic Change at the University of Port Elizabeth, South Africa, the Center for Conflict Resolution and the School of Economics at the University of Cape Town, and Middlesex University Business School, London, UK.

Contributions to this book consist of selected conference papers and of invited papers, especially written for this book. As the proposal for the book itself, all work, selected and invited, was subject to the normal academic peer-review process and was revised before final inclusion in the book. All papers are published here for the first time.

We thank our various sponsors, our hosts in South Africa, our contributors, as well as our publishers at Routledge for their support. J.P.Dunne also thanks ESRC (grant #R00239388).

Jurgen Brauer
J.Paul Dunne
Introduction

Jurgen Brauer and J.Paul Dunne

Eight years ago, Stephen Martin published a widely-cited volume of papers on arms trade offsets (Martin, 1996), part of a series of studies in defense economics, then published by Harwood Academic Publishers (now Routledge). Since then, much has changed in the global arms market. This is confirmed not only by Routledge’s willingness to issue another volume on the topic but also by our contributors—many of whom had written for Martin’s book—who were keen to take an updated look at various offset theory and policy issues, and to illustrate these with case studies.

We chose to include papers by a set of international authors, economists for the most part, of diverse intellectual and political persuasions. A good number of them work for military academies (e.g., in Australia, in Belgium, in the UK) or for military or civilian research institutes (e.g., in Germany, Sweden, and the USA), others hold appointments at a variety of universities across the globe. No attempt was made to select contributions whose results all may have fallen in a certain direction. Yet, surprisingly, among the authors there is near unanimous consensus that arms trade offsets do not work as advertised. Even where we can explain why offsets are used by arms procurement agencies (or their governments), neither economic theory nor extant empirical evidence suggests that offset arrangements yield net benefits for a country’s economic development at large. Instead, it is generally acknowledged that arms deals with offsets are more expensive than arms deals without.

Logically, there are two extreme forms of arms acquisition. One is to design, produce, and purchase everything “at home”—an option that, realistically, only the United States can pursue; the other is to purchase everything “off-the-shelf” from elsewhere. In-between lie various possible levels of involvement, one of which includes the use of arms trade offsets. While governments are happy to highlight purported economic benefits, such as employment creation, they seem reluctant to evaluate them ex-post. Thus there is often very limited information available in the public domain, which is why it is important to produce a book that brings the available theory and evidence together.

What are arms trade offsets, and how are the presumed benefits advertised? The long answer is contained in the details of the chapters published in this book. The short answer runs something like this: A country that wishes to spend, say, $100 million to import arms from another country transfers $100 million worth of funds to the arms seller, the only value gained being the putative national security-value of the imported arms. To increase the exchange value, the importing country may stipulate that the arms exporting firm must take some portion of its $100 million revenue to set up arms coproduction facilities in the arms purchasing country, or else to commit itself to any of a variety of other possible activities that would secure a flow-back of some of the $100 million to the
arms importing country. If this flow-back is made part of the arms trade contract, we call this an offset. The advertised benefit is that the arms importing country not only obtains the arms it wishes to import but that some of the public funds expended on the arms purchase “remain” in the country and thus are expected to stimulate domestic economic development, just as if they had been spent domestically in the first place.

To be able to “double-dip”—to get the arms, and yet to keep the money at home—is seductive for politicians, especially in democracies, who must justify expenditure of public funds, usually in the face of crying social need. The logic sounds so convincing: sign a contract that requires the arms selling party to use some or all of the expended funds to set up arms production facilities in the purchasing country or to make non-military purchases in or from the arms acquiring country. Moreover, since arms sellers do compete fiercely by “sweetening” arms deals with offset offers, it would appear that the buyers have the upper hand and can extract substantial rents and benefits.

Economists are skeptical, on theoretical and on empirical grounds. To us, the offset idea sounds like a variant of the “free lunch” idea. As a matter of pure logic, lunch may be free to those invited but the host still has to pay the bill. The chapters assembled in this book take a collective look at who this host is that pays the bill. The answer is not easy to ferret out—in part because of the dearth of data—and is usually case-specific. But that something is amiss may be gauged from the fact that the World Trade Organization’s Agreement on Government Procurement generally forbids the use of offsets in government procurement. Exceptions are granted, in article 23, on account of reasons pertaining to national security and public health. The agreement, moreover, is “plurilateral,” meaning that not all WTO members have acceded to its provisions and therefore are not bound by them (see http://www.wto.org/).

The use of offsets is by no means restricted to the field of arms trade, nor even to intra-government procurement. Offsets, and related forms of countertrade, constitute a vast, pervasive business practice—involving tens of thousands of people around the globe, reaching far beyond the market for military-related items—and is variously estimated at ranging between five and thirty percent of world trade. There are plenty of offset-related conferences, and the literature numbers in the thousands of items, including those produced by academic specialists in international business, marketing, and economics (e.g., Hammond, 1990; Korth, 1987; Liesch, 1991; Martin, 1996). Nonetheless, much of the attention centers on the arms trade. Specialized trade publications, e.g., Countertrade Outlook, Countertrade & Offsets, and BarterNews are produced, publications such as Aviation Week and Space Technology and Jane’s Defense Weekly take a natural interest in the subject matter, academic journals such as Defence and Peace Economics and Defense Analysis frequently carry articles on the offset topic, and there are a large number of companies specializing in facilitating offsets as lawyers, consultants, financiers, and brokers, in addition to the offset offices housed within many of the affected corporations and government bureaus. At least one dedicated commercial web service exists solely to link offset-related buyers and sellers (http://www.e-offsets.com/). In 1995/96, US taxpayers alone shouldered the pay of some 6,500 federal government employees in connection with US arms exports (Hartung, 1996, p. 12), much of this associated with offsets.

There exists an American Countertrade Association (the ACA; see http://www.countertrade.org/)—countertrade here being used as a synonym for offsets—
whose seven member executive committee includes high-level employees of Motorola, GE, and Boeing, and a Defense Industry Offset Association (DIOA) consisting, in 1998, of 65 member companies, representing nearly 100 percent of the US military-aerospace prime contractors. ACA and DIOA hold joint biannual conferences (1998, 2000, 2002), the last one 22–25 September 2002 in Tucson, Arizona. In addition, even a cursory Internet search finds an International Reciprocal Trade Association, a National Association of Trade Exchanges, a Corporate Barter Council and, for deals gone bad, an offset Investment Recovery Association.

In the US one finds steady government interest in the issue, especially with regard to arms trade offsets, culminating in the formation, in 1999, of a Presidential Commission on Offsets in International Trade (http://www.offsets.brtrc.net/). Prior to that, the US Congress has taken sporadic interest in offsets, resulting *inter alia* in a number of requests to the US General Accounting Office (GAO) to report on various aspects of arms trade offsets in particular (see references). Congress also mandates the production of an annual arms trade offsets report, furnished by the Department of Commerce’s Bureau of Industry and Security.

Furthermore, the United States National Research Council’s Board of Science, Technology, and Economic Policy has produced two substantial conferences and reports (Wessner and Wolff, 1997; Wessner, 1999), the Federation of American Scientists (http://www.fas.org/) has an ongoing interest in the issue inasmuch as it impinges on international arms sales, and so do numerous other interested and disinterested parties, including of course the foreign policy and military sectors. For instance, the US Department of State publishes *Defense Trade News*, and the US Department of Defense sponsors a quarterly journal published by the Defense Institute of Security Management Assistance (*The DISAM Journal*; http://disam.osd.mil/Journal.htm) which frequently publishes on arms trade offsets.

These observations would suggest that arms trade offsets are part of normal trade relations among arms sellers and arms buyers. Certainly, offsets are common. But are they “normal”? What is normal practice from a business point of view may not be normal from an economist’s point of view. To help answer this question, inspect some examples of prevailing definitions of offsets.

“Offsets, coproduction, barter, and countertrade are compensatory trade agreements—agreements that incorporate some method of reducing the amount of foreign exchange needed to buy a military item or some means of creating revenue to help pay for it” (Neuman, 1985, p. 183).

“…an offset is a contract imposing performance conditions on the seller of a good or service so that the purchasing government can recoup, or offset, some of its investment. In some way, reciprocity beyond that associated with normal market exchange of goods and services is involved” (Udis and Maskus, 1991, p. 152).
“...an offset occurs when the supplier places work to an agreed value with firms in the buying country, over and above what it would have bought in the absence of the offset” (Martin and Hartley, 1995, p. 125); offsets “...are usually designed to achieve a relocation of economic activity from the country of the equipment supplier to the purchasing nation” (p. 127).

These definitions can be read, as many authors do, to hold in common some degree of coercion. In contrast, in an important article Peter Hall and Stefan Markowski (1994) argue that no seller can in fact be coerced to sell. One may lose a sale to a competitor, but one cannot be coerced to sell. The distinction between coerced and voluntary trade is important because in the former case, coerced trade leads to trade diversion and therefore to welfare losses, whereas in the latter case offsets are viewed as part of the negotiation over a complex package of goods and services which may include military and non-military items and may well be welfare enhancing, as all voluntary trade is (at least in pure international trade theory). For instance, if corporation S from country S offers to sell 50 military aircraft for three billion dollars to the government of B (the “primary contract”), but then on account of competition from another firm from another country offers a “compensating offset” purchase of $3 billion worth of agricultural products from country B, why indeed should the prospective buyer be prevented from extracting economic rent from among the competing would-be sellers?

Consequently, Hall and Markowski offer this definition:

“Offsets are simply goods and services which form elements of complex voluntary transactions negotiated between governments as purchasers and foreign suppliers...they are those goods and services on which a government chooses to place the label ‘offsets’...” (Hall and Markowski, 1994, p. 179).

The jab—that offsets are “those goods and services on which a government chooses to place the label ‘offsets’”—is correct in that there is no logical difference between a $3 billion primary aircraft contract with a compensating agricultural offset valued at $3 billion and a $3 billion primary agricultural contract with a compensating aircraft offset valued at $3 billion. That which we call the “primary contract” and that which we call the “compensating offset” is arbitrary and therefore interchangeable. “All that can really be said is that a joint purchase of two different elements is being made” (Hall and Markowski, 1994, p. 178). A big buyer demands respect Wal-Mart purchases millions of items from thousands of suppliers, but it also purchases changes in its suppliers’ operations. It purchases not only stationary and toys, but also demands supply-chain management changes. It purchases multiple products in one complex deal.

If we agree with this conceptualization of offsets as normal trade, then we might as well push it to its logical extremes. At one extreme, a weapon system’s R&D, testing, and production take place entirely in the US, say, and it is then transferred elsewhere in exchange for monetary compensation. At the other extreme, only the R&D is conducted in the US and everything else is outsourced to the buying country. (The offset here consists of licensed production.) In that case, the US sells military blueprints, and the...
buyer produces. The US sells, in a word, deadly ideas others wish to buy. Within the realm of pure economics, this is not unlike trade in endangered species and child pornography. Economists are not immoral, but economic science is amoral: a trade is merely a trade, and what is important is the efficiency, not the morality, of the trade. Accordingly, the starting point for Hall and Markowski is whether arms trade offsets are voluntary or mandated. If mandated— if purchasing governments insist on a particular offset percentage, be it 50 or 100 or 150 percent of the value of the underlying arms trade contract—then Hall and Markowski agree that there will be trade diversion, trade distortion, and welfare-diminishing effects. In chapter 3, they review their own argument, first made ten years ago, and place it on a firm theoretical base. Grouping offsets into three categories—countertrade, local content requirements, and bundling—their conclusion is straightforward and sound: mandatory offsets are not welfare-enhancing, but voluntarily agreed offsets might be.

Why do governments resort to offsets in the first place, whether mandatory or otherwise? Travis Taylor, in chapter 2, provides a new theoretical framework, based on transaction cost analysis, that not only explains at least a part of the puzzle but also provides a handy guideline for procurement officials of when to ask for what type of offset, if any. As it turns out, mandatory offsets are rarely advised. But even if voluntary offsets could be welfare-enhancing, at least in principle, Lloyd J. Dumas argues in chapter 1 that they are, nonetheless, antithetical to economic development. Offsets, even if welfare-enhancing in a narrow sense, do not, Dumas argues, overcome the welfare-diminishing effects of military expenditure that finances the arms trade in the first place. At best, although he doubts even that, offsets are one step forward after military expenditure on arms took the economy two steps backward. In chapter 4, Jurgen Brauer, reviews the variety of economic theories of offsets, the offset players, and the empirical evidence. Like Markowski, Hall, and Taylor, Brauer finds that while positive economic development effects from arms trade offset deals are not impossible, they are theoretically implausible and empirically improbable, especially for the case of developing states. Indeed, an unambiguous economy-wide net benefit has yet to be demonstrated for any offset deal ever concluded. Of course, data availability is in short supply, and Brauer closes his chapter with a call for states to establish arms offset audit teams to publicly account for the costs and benefits these deals involve.

Ann Markusen, a member of the US Presidential Commission on arms trade offsets discusses, in chapter 5, arms trade as illiberal trade. Her chapter explores “why the arms trade should remain illiberal, why it needs reinvigorated oversight, and why commercial interests must be subordinated to security concerns, including a return of lead responsibility for arms trade regulation from [the US] Defense and Commerce to the State Department.” In contrast, Ron Matthews, in chapter 6, attends to the practicalities of arms trade offsets. In this context, he identifies recent offset trends. In particular he notes that while offset agreements used to be struck between military firms—from military vendor to military buyer and coproducer—offset agreements then moved toward defense-civil offsets, i.e., military offset obligations were fulfilled by purchases from or investments in the civilian sector of the arms buying state. This eventually led to an increasing number of civil-civil offset agreements, and now, Matthews writes, we increasingly observe civil-defense offset agreements, contracts by which sellers of

civilian products and technology are asked to “reinvest” in the defense industry of the buying country.

The remaining chapters of the book consist of case studies on Britain and Germany (chapter 7), Britain and the Netherlands (8), the Nordic countries (9), Finland and Sweden (10), Belgium (11), Poland (12), Brazil (13), Argentina (14), India (15), Japan, South Korea, and Taiwan (16), Indonesia and Singapore (17), Australia and New Zealand (18), and South Africa (19 and 20).

The main ideas of the studies is captured in the abstracts supplied hereunder.
Abstracts

Chapter 1:

Do offsets mitigate or magnify the military burden?

by Lloyd J. Dumas

The offer of an offset package as part of a weapons procurement deal is intended primarily as a marketing tool, not as a means of encouraging development. But whatever the motive for offering such a package, it is important to ask what effects, positive and negative, intended or unintended, the offsets are likely to have on the process of economic development in the procuring nation. Keeping in mind the important distinction between economic growth and economic development, we begin by considering the economic impacts of military spending (and military production) on the latter. The analysis then turns to the political economy of offsets in general, and their impact on development in particular. The likely impact on development of indirect offsets is compared to that of direct offsets. Finally, in light of the preceding analysis, we consider how the availability and design of offsets should be taken into account in the process of military procurement, from the point of view of achieving economic development goals.

Chapter 2:

Using offsets in procurement as an economic development strategy

by Travis Taylor

In the conclusion of Udis and Maskus (1991, p. 163), the authors “recommend a serious effort to...distinguish between beneficial offsets and detrimental offsets before attempts at international control of the phenomenon are mounted.” This chapter develops a criterion to determine when an offset is an appropriate policy instrument for government...
procurement. It presents a policy matrix that offers general guidelines to government officials considering offsets as part of a broader procurement and development strategy. The matrix permits us to assess the comparative efficiency of offsets and other contracts under alternative settings. Using transaction cost theory grounded in the capabilities view of the firm, the chapter explains how offset efficiency hinges on the exchange setting and the institutions of the purchasing economy.

Chapter 3:

Mandatory defense offsets—conceptual foundations

by Stefan Markowski and Peter Hall

Defense offsets in the form of mandatory countertrade, local content requirements, and other compensatory arrangements, are widely used by government procurement agencies around the world. But there remains considerable confusion about what mandated offsets requirements can and do achieve. This chapter classifies offsets into three broad categories—countertrade, local content requirements, and bundling—and discusses conceptual issues underpinning their use. The approach is then applied in a discussion of Australia’s and New Zealand’s experience of defense procurement as a means of achieving trade and industry development objectives (see chapter 18) and also used to discuss recent Polish attempts to use offsets to transform its Soviet-style, defense-related enterprises into a more economically viable and strategically relevant industrial sector (see chapter 12).

Chapter 4:

Economic aspects of arms trade offsets

by Jurgen Brauer

The chapter addresses three sets of questions. First, why are arms trade offsets agreed to? What economic theory (or theories) would explain offsets? What are the economic rationales of the players involved? Second, are arms trade offset agreements economically efficient? Is social
welfare maximized? What is the benefit, net of cost, for whom? In a word, what is the empirical evidence? And third, what, if anything, should be done about arms trade offsets? Among the conclusions is a call for countries to establish *arms trade offset audits* whose task it would be to measure the full economic cost of each proposed and concluded deal (also see chapter 10 on the limited experience with offset audits in Finland and Sweden).

Chapter 5:

The arms trade as illiberal trade

by Ann Markusen

The chapter charts the proliferation and changing nature of relationships involved in international weapons trade, and postulates a set of economic and security outcomes that appear linked to illiberal arms trade practices and to the phenomenon of offsets in particular. These include national hyper-specialization, competitive disadvantages for the non-arms sector, the transformation of defense contractors into trading companies, faster weapons proliferation, and an exacerbation of the one-team arms race, world over-spending on arms, and the rise of an international military-industrial cartel. The chapter pays particular attention to the role of offsets in the arms trade, because they reveal the failings of a system that is both illiberal and one in which security concerns are subordinate to commercial aspirations. The damage from these forms of illiberal arms trade practices, in tandem with lax security oversight, is underestimated, severe, and increasing. Concerted multilateral and unilateral actions to curtail such practices by major market participants are in order.

Chapter 6:

Defense offsets: policy versus pragmatism

by Ron Matthews

The chapter identifies trends in defense offsets from defense-defense, to defense-civil, to civil-civil, and now civil-defense offset agreements. On what scant empirical evidence is available, the chapter finds that the
hoped-for economic benefits of defense offsets usually do not come to pass.

Chapter 7:

Comparing British and German offset strategies

by Jocelyn Mawdsley and Michael Brzoska

In many ways Britain and Germany share similar profiles as arms producers. But their policy on both import and export offsets are quite different. This chapter argues that only by considering the historical and cultural backgrounds to their procurement and arms export policies can their offset policy choices be fully understood. While Britain reluctantly accepts the existence of offsets to counteract imperfect markets (but tries to seek waiver agreements, especially in Europe), Germany has been able to use offsets creatively not only to develop its own industry but also to become a significant exporter. The chapter suggests that British attachment to competitive procurement and its strong export promotion network explain its relative dislike of offsets, while the historical background of the German defense industry has given it certain qualities that enable it to cope far more successfully with offsets.

Chapter 8:

Offsets and the Joint Strike Fighter in the UK and the Netherlands

by Keith Hartley

This chapter reviews the efficiency of European arms collaboration. Then it evaluates the UKs involvement in the Joint Strike Fighter (JSF) and the Netherlands’ decision regarding its F-16 replacement. Both the UK and the Netherlands case studies are based on original material. The chapter concludes by reviewing the JSF as a possible model for future international arms collaboration, a collaboration based on economic rather than political criteria.
Chapter 9:

Nordic offset policies: changes and challenges

by Björn Hagelin

The chapter describes and compares the national offset policies in Denmark, Finland, Norway, and Sweden. Offsets are discussed from the perspectives of importer, exporter, and cooperation partner. The chapter finds that, over time, Nordic policies have converged toward certain commonalities. In general, there has been a change from indirect civilian offsets to direct and indirect military offsets. In parallel there has been a move away from mixed industrial, regional, and other civilian aims. All Nordic countries have increased the use of offsets as a tool for military-industrial participation and relevant technology transfers. Still, problems with implementing offsets in small states are illustrated by Denmark in particular, and some countries still combine non-military and military-industrial offset aims. Cooperation among the Nordic countries has a long tradition. Recent intra-Nordic agreements go in the direction of mutual offset waivers.

Chapter 10:

Defense offsets: experiences from Sweden and Finland

by Elisabeth Sköns

Few countries evaluate the economic effects of offset arrangements. Finland and Sweden are among the exceptions. This chapter reviews official offset audits conducted in 1995 (Sweden) and 1999 (Finland) and applies its own criteria of what an offset audit should cover. The official audits point to numerous difficulties involved in the administration, implementation, monitoring, and evaluation of offsets, and the achievement of offset policy goals. Direct military offsets to support defense policy goals are relatively easy to specify, fulfill, implement, monitor, and evaluate. Their main limitation is their short contract duration. The use of indirect military offsets to support defense policy goals is more difficult to specify and implement but could, in principle, be
designed toward long-term objectives. Indirect civil offsets are also difficult to specify and implement and are very difficult to monitor and evaluate. It may be more expedient to design a number of well defined indirect offset projects than to demand a high offset share.

Chapter 11:

Offsets in Belgium: between Scylla and Charybdis?

by Wally Struys

Offsets are used as a means to develop or to maintain defense industrial activities and to improve their technical quality. They often succeed in doing this and also present attractive economic advantages in strengthening national defense firms in the short-run. But the other side of the coin shows a growing dependence on discontinuous defense orders and vulnerability to structural changes. Most of the time, offsets are also based as much on political considerations as on economic criteria. As a result, offsets and economics often conflict. The Belgian government decided in 1999 to abolish offsets for future defense acquisitions. This was followed by heavy lobbying from industry and political factions. The outcome of the dispute is still uncertain. To clarify the present situation, four possible solutions are examined, and the latest government decisions are discussed.

Chapter 12:

The defense industry in Poland: an offsets-based revival?

by Stefan Markowski and Peter Hall

This chapter discusses recent Polish attempts to use arms trade offsets to revive its defense-related industry. Under communism, the industry was relatively large and privileged, benefitting from preferential resource allocation and its, at least partial, export orientation. When communism collapsed, the industry became a “legacy” industry. Now it is technologically obsolete, strategically irrelevant, financially insolvent,
burdened with social welfare state obligations to its workforce, and still largely managed by a cadre of the former Soviet-style _apparatchiks_. Nevertheless, many Poles regard it as the fourth arm of national defense and view its sustainment as a strategic imperative. Since the early 2000s, changes have occurred that may transform the sector into a market-savvy and customer-focused industrial enterprise. Offsets applied to large-scale procurement projects are expected to secure a workload sufficient to keep the sector solvent in the short-run and attract the inflows of technology and foreign direct investment required to ensure its long-term future.

Chapter 13:

Offsets and the development of the 
Brazilian arms industry

by Sam Perlo-Freeman

At least since the 1970s, Brazil has systematically used defense procurement offsets as a means of developing its domestic arms industry through technology transfer, licensed and coproduction, and training of Brazilian engineers. This has been part of a long-term strategy to develop the arms industry based on a strong civilian industrial base and a gradual ascent of the technology ladder. In the 1970s and 1980s this enabled Brazil to produce all but the most advanced weapon systems. Success was heavily dependent on global market conditions, leading to the virtual collapse of the industry after 1988. Relative technological success has been accompanied by mixed commercial results, and has carried a substantial economic cost. This chapter traces the history of the Brazilian arms industry, and the role of offsets within it, and evaluates the successes and failures of this strategy.
Chapter 14:

The Argentine defense industry: an evaluation

by Thomas Scheetz

The chapter presents a brief history of the Argentine defense industry and the reasons for its growth and demise, most especially contrasting the exponential rate of growth of unit costs of arms versus the (at best) linear growth of fiscal income. The process of privatization during the 1990s is described, followed by a summary of the few small remaining arms industry ventures. The case of the lone remaining major arms producer is then analyzed in greater depth: the licensed production of aircraft and repair services by Lockheed Martin Argentina. Some conclusions about viable defense industries in LDCs are given. Presently, Argentina meets none of the requirements for a successful defense industry.

Chapter 15:

The role of offsets in Indian defense procurement policy

by Angathevar Baskaran

Between the 1940s and mid-1960s, India imported off-the-shelf military equipment, mainly from western Europe. After the Indo-China war in 1962, India made efforts—although in the absence of a formal offsets policy—to establish a domestic arms industry through licensing and technology transfer arrangements, particularly with the UK and the Soviet Union. It used countertrade, long-term credit arrangements, and rupee trade arrangements in an attempt to reduce the foreign exchange burden of arms imports. India’s experience with offset arrangements is mixed. While they helped to build a domestic defense industrial base of significant size, India failed to achieve its goal of arms self-reliance. It remains dependent on imports, particularly for latest-generation weapon systems. Offsets that were expected to reduce India’s foreign exchange
burden have helped India in the short-term, but appear less effective in the long-term.

Chapter 16:

Offset policies and trends in Japan, South Korea, and Taiwan

by Michael W. Chinworth

Japan, the Republic of Korea, and Taiwan have received increasingly advanced assistance through their overseas defense contracts—primarily with the United States—throughout the postwar era. The United States government in many cases has supported these arrangements to retain critical alliances, promote interoperability, and support US defense firms in their overseas sales efforts. Each country examined in this chapter has sought expanded offsets in part to promote the development of local defense industries. Motivations for increased local production include economic stimulus, uncertainties about the firmness of United States security commitments in the region, and political justification for expanded defense budgets.

Indigenous defense production has been achieved in varying degrees in each country, but all three still remain dependent to a large degree on foreign technology inputs into their respective defense industries. Korea could be well positioned to take advantage of globalization, while still pursuing traditional offsets to promote domestic industrial development with export markets in mind. Taiwan is more constrained, but has turned to international alliances where it can (for economic and political reasons). Japan is in the middle: government policies may or may not limit the extent of industry participation in new modes of global defense production, but continued insistence on indigenous development and production hamper its ability to adapt to new models that could be more beneficial to the country in the long-run.
Chapter 17:

Offsets and defense industrialization in Indonesia and Singapore

by Richard A. Bitzinger

Indonesia and Singapore offer both a cautionary tale and an interesting role model for other aspiring arms producers in the developing world. Indonesia’s experiences show that offsets offer no great shortcuts, either economic or technological, when it comes to achieving viable, self-sustaining defense industries. Indigenous, and often quite substantial, sources of financial, industrial, and human capital must also exist independently in order for a nation to make progress toward the independent development and production of advanced weapon systems.

Singapore can be viewed as a model of how repositioning oneself to play a subordinate role in a globalized division of labor may make considerable economic and technological sense. It is a cost-effective way to preserve and maintain national defense industries, it permits smaller arms industries to make maximum use of their few competitive advantages in the global arms market, and it keeps these arms industries open to cross-fertilization from foreign technologies. Indeed, one of the greatest drawbacks to autarky is the risk of inadvertently isolating one’s defense industrial base from innovative foreign technologies, foreign capital, and global markets.

Chapter 18:

Defense offsets and industry development objectives in Australia and New Zealand

by Stefan Markowski and Peter Hall

The chapter focuses on Australia’s and New Zealand’s experience in using defense procurement to achieve industry development objectives. Australia has used procurement (delivery) mechanisms, including best endeavors and mandatory offsets schemes, within the general program of Australian Industry Involvement. Its history of using defense procurement
to foster defense-related industry development and broader economic objectives is arguably richer than that in any other small industrial economy. The chapter draws lessons from this experience to comment on the effectiveness, in terms of desired industry and trade outcomes, of alternative procurement mechanisms. The chapter also describes New Zealand’s program of defense industry involvement.

Chapter 19:

Defense industrial participation: the South African experience

by J.Paul Dunne and Guy Lamb

South Africa is an important case study for research on the economics of offsets. It is presently involved in one of the world’s most controversial arms deals involving offsets and the degree of coverage, of transparency, and of debate is unprecedented. This has provided important and disturbing insights into the workings of the international arms trade. This chapter considers this experience and makes an attempt to evaluate the general impact of the arms deal. The purported economic benefits of the arms deal are being questioned, and the available empirical evidence suggests that the offsets are likely to have a much smaller impact on the local economy than expected and to have a high opportunity cost. There are considerable doubts about whether South Africa has benefitted from the deal, while costs in terms of the political fallout are clear.

Chapter 20:

Regional effects of South African arms trade offsets

by Richard J.Haines

The chapter examines the place of defense offsets within the context of South African regional development planning and discusses three offset cases in detail. It finds that defense offsets appear to reinforce rather than challenge existing regional disparities and inequalities, that substantial hidden offset project costs are not accounted for, and that possible offset
synergies with existing firms and regional strengths are neither pursued nor envisioned.

Notes
1. On the argument that relief of the country’s social ills commands higher priority than arms imports, the South African affiliate of Economists Allied for Arms Reduction (http://www.ecaar.org/) has a case pending before the country’s highest court to have the government’s most recent arms import contract canceled.
2. Governments and international organizations do not track the value of offset trade separately. All “estimates” are more or less informed guesses, and it is by no means clear how they are arrived at.
3. The Commission was scheduled to issue a final report in October 2001 but failed to meet to conclude its work (personal communication from Commission staff, 14 August 2002). For its status report, see US Presidential Commission, 2001.
4. Until April 2002, this was known as the Bureau of Export Administration (BXA; see www.bxa.doc.gov/press/Publications/bxachap2.pdf for an example).

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Part I
Theory and Policy
Introduction

Weapons contractors, like other profit-making corporations, are not particularly interested in the general economic development of the countries in which they operate or to which they sell. They are not inherently antagonistic to encouraging economic development. But their primary interest and motivation is in selling their products and making money. That is what they are in business to do. Consequently, from the weapons contractors’ point of view, cost offsets are a marketing tool, a way of building enthusiasm for or overcoming resistance to buying their products. Whether offsets encourage development or not is quite beside the point.

From the point of view of weapons purchasing countries, there are a number of possible motives for demanding cost offsets as a condition of purchase. They might consider offsets a straightforward means of raising the benefit/cost ratio of their weapons purchases by lowering net costs, providing additional economic benefits, or both. Alternatively, the governments could believe that offsets will give them political cover for what amounts to providing hidden subsidies to indigenous military industrial firms (or other domestic producers) that they wish to artificially sustain or promote, for reasons that might not be politically popular. Government officials might also believe that offsets will make it easier to “sell” relatively unpopular weapons purchases to a skeptical public (or opponents internal to the government)—purchases that the officials want to make for a range of political, social, and economic reasons. If it can be made to convincingly appear that there are great economic benefits to the public as a result of the offsets—whether those benefits are real or simply “smoke and mirrors”—any political opposition to the weapons purchase can be more easily overcome.

That the motivations and perspectives of the buyers and sellers of weapons in the international arms trade are so different certainly does not preclude the possibility that offsets may be designed in a way that satisfies both sets of interests. For that matter, it also does not preclude the possibility that offsets can be designed and implemented in a way that does make a real contribution to the economic development of the purchasing nation.

To better understand the meaning of offsets and their impact on economic progress, it is useful to begin by looking at a few more basic issues. First, we distinguish between two different concepts of such progress, economic growth and economic development. Next, we consider the economic distinction between military spending and military production. That allows a clearer view of the nature of the impact of military-serving...
activity on economic progress in general, and on the progress of less developed countries in particular. We will then be in a better position to analyze the costs and benefits of offsets.

**Economic growth and economic development**

Although the terms are often used interchangeably, “economic growth” and “economic development” are two entirely different concepts, each grounded in a fundamentally different view of the economy itself. “Economic growth,” as the term is conventionally used, refers simply to expansion in the size of the money economy. It is typically measured by the rate of change in gross domestic product (GDP) or gross national product (GNP), both of which are incomplete yet reasonable and generally accepted measures of the aggregate volume of money-valued goods and services produced. In contrast, “economic development” is a much more complex concept referring to continuing improvement in the material conditions of life of the vast majority, if not all, of the individuals in the population. Unlike economic growth, gauging economic development inherently requires attention not just to how much money-valued output is produced, but also to what is produced, and to how it is distributed among the population.

If we are interested in understanding not so much what is happening to the impersonal abstract entity called “the economy” but whether or not the real people who give a nation life are becoming materially better off, then we must move beyond focusing on the expansion of the money economy to the broader issue of economic development. In order to see more clearly how productive human activity is actually affecting material well-being, we must also leave behind the common fixation on money value as the arbiter of economic value, and look instead at the underlying question of how much any particular good or service contributes to that material well-being. It is the contribution an activity makes to the material standard of living, and not its money value, that defines it as having economic value in the first place.

All over the world, and especially in less developed countries, many goods and services that add greatly to material well-being are not exchanged for money (such as home-grown food, home-made clothing, do-it-yourself repair, and parental child care services). It makes no sense to exclude them from our count of economic activity for that reason alone. Nor does it makes sense to include in economic activity the production of goods and services that do not add to material well-being (though they may serve other socially useful purposes), simply because money is paid for them. Examples include those specialized goods and services that support the activities of the criminal justice system or the activities of churches and other religious institutions. Because such goods and services do not contribute to the material standard of living, they are logically not part of the economic system, whose fundamental purpose is to provide material well-being. The specialized goods and services that support military activity (such as fighter planes, battle tanks, and light weaponry) most assuredly fall into this latter category (Dumas, 1986).

Many believe that military forces are meant to secure the conditions of order and stability in the international arena that allow economic activity to proceed, just as domestic police forces are meant to create an atmosphere of law and order within a
country that serves as a necessary backdrop for a smoothly functioning economy. While that is a debatable proposition, even if it were true, the act of producing military-related goods and services itself would still not qualify as economic activity. Just as putting more locks on the doors does not add to the value of a house or its contents, military forces may protect what you have, but they do not and cannot themselves add to material well-being. Quite the contrary, spending resources on protection reduces the resources available to produce goods and services that do add to material well-being.

Goods and services that do not contribute to the material standard of living may have other forms of value, but they do not have economic value. It is logical that the output of goods and services that do not have economic value, should not be included in total measured economic output. But, as long as they are sold for money—as specialized military goods and services most certainly are—their production is included in GDP (GNP). As a result, the growth rate of GDP (GNP) is distorted as a measure of national economic progress.

It is admittedly much more difficult to measure economic development than to measure economic growth. Unlike growth, there is no single measure that can capture all the key dimensions of development. A complex of measures is required. That probably goes a long way toward explaining why there is such a strong tendency on the part of politicians and economists to use growth as a proxy for development. But the difficulty of measuring something has no particular relationship to how important that thing is. If economic development, rather than economic growth, is the concept most closely related to increasing the material well-being of the population, then it is development, and not growth, on which we should focus our attention.

Military spending and military production: the economic impacts

It is also important to distinguish between the economic impacts of military spending and those of military production. Military spending is the broader concept, ordinarily involving the use of financial assets, typically money, to purchase military goods (weapons, warning systems, etc.) and services (the expertise of commanders, the efforts of soldiers, etc.) from domestic or foreign suppliers. Military production involves the use of real productive resources (machinery, materials, factory buildings, engineering talent, skilled machinists, etc.), drawn from the pool of such resources available to the economy, for the purpose of actually producing specialized military goods and services.

For present purposes, it is useful to divide military spending into two broad categories: “operations and maintenance” (O&M), which includes the pay and operational support of the people who serve in the armed forces; and “procurement,” which includes the purchase from abroad or production at home of weapon systems and research and development (R&D) services. Both categories of military spending consume financial capital. But procurement has a much more powerful effect on the allocation of key types of industrial and technological labor and physical capital.

For the most part, the economic impact of spending on military O&M in the more developed countries (MDCs) is restricted to the tradeoff of that particular use of public funds against alternative uses, including the return of those funds to taxpayers in the form of reduced taxes. However, to the extent that it calls forth domestic military R&D and
weapons production, military procurement spending has much larger and more telling impacts on MDC economies, especially in the long run. In the short run, as we learned from Keynes, increased spending of any sort—including military procurement spending—can stimulate a slack economy and help move it out of recession. But, as I have argued elsewhere, in the long run, domestic military production and R&D has enormously negative impacts on a nation’s ability to efficiently produce goods and services that contribute to material well-being, precisely because it tends to divert economically critical labor and physical capital resources (Dumas, 1986; 1995).

In many less developed countries (LDCs), O&M spending has a greater potential impact than it does in the MDCs, primarily because the officer corps of the military is often one of the most promising career paths in terms of financial reward, social status, and power. As a result, there is a potentially larger diversion of more skilled and talented labor into military service itself than in MDC societies, where there are a much greater variety of career opportunities. Since skilled labor, one of the most critical economic resources, tends to be in short supply in LDCs, this diversion is particularly damaging to their prospects for economic development. To this burden must be added the same kind of opportunity costs implicit in the tradeoff against alternative uses of public funds as in the MDCs. Of course, the greater economic and social need of LDC populations make the pain associated with these opportunity costs much stronger than in MDCs, especially in terms of development-oriented uses of public funds.

Since relatively few LDCs have substantial indigenous military production capability, the economic impacts of military procurement in most LDCs include mainly opportunity costs similar in kind to those of O&M spending just discussed, together with the opportunity costs of the use of hard currency reserves for weapon purchases from abroad. The vast majority of LDCs do not have extensive hard currency reserves, and while local currency can be used for much of O&M spending (especially for paying armed forces personnel), military procurement from abroad requires hard currency. Lacking an extensive indigenous R&D capability or well-developed machinery industries, LDCs must also import much of the agricultural and civilian industrial technology and equipment they need if they wish to modernize these sectors of the economy. That too requires hard currency, making the tradeoff of military spending against development-oriented spending still more severe.

Yet to the extent that LDCs try to build their own domestic military production capabilities to conserve on their stock of hard currencies, they face an even larger diversion of critical skilled labor and physical capital resources. Such a diversion can and does seriously damage the economies of more developed nations in the long run. It is likely to be crippling to LDC economies in which these critical resources are much shorter in supply. Beyond this, because most LDCs cannot build an indigenous military production capability without importing the requisite machinery, equipment and technology (if they are even available), it may well be that the drain of hard currency reserves will be increased, not reduced, by this strategy, at least in the short run. None of this bodes well for LDC prospects for development.
The nature and political economy of offsets

The magnitude and type of impact offset agreements have on economic development depend on a number of factors, the most basic of which is the likelihood that the weapons seller will fully meet their offset commitments, once the weapons and the money have actually changed hands. With the exception of barter, all types of direct and indirect offsets may be stretched over an extended period of time. That being so, it is legitimate to be concerned about the possibility that changing political or economic conditions in the weapons supplying country, or in political and economic relations between the weapons supplying and purchasing countries, might interfere with the completion of the deal as originally agreed. To this must be added the possibility that a change in the business fortunes of the weapons contractor, or even outright bad faith, might also prevent the full offset from being realized.

To the extent that a country decides to pursue offsets in the course of its weapons procurement, there is thus a premium on finding ways to structure offset agreements that maximize both transparency and incentives for fulfilling offset obligations. Transparency may be more than usually difficult to achieve in matters of weapons procurement, because of the tendency toward less than complete openness in international arms dealing. Except for the threat of the loss of follow-on business (which may be more or less persuasive depending on the weapons purchasing country involved), it is difficult to know what kind of enforcement mechanisms and/or incentive systems are both feasible and effective. This is particularly true in the case of arms purchases by LDCs from the major weapons producers in the MDCs, because of the imbalance of economic and political power between the contracting parties.

There is also the question of whether offsets really represent new business, that is, business that would not have taken place anyway in the absence of an offset deal. For example, in the mid-to-late 1980s, the government of the United Kingdom agreed to buy seven airborne warning and control system (AWACS) aircraft from Boeing. The deal included the offer by Boeing of a 100 percent offset. Over 50 percent of the offset obligation was to be met by purchases of civilian aerospace products, including Rolls Royce engines to be used in civilian airliners. Since the civilian division of Boeing normally bought a substantial amount of aerospace products from UK suppliers anyway, there was considerable controversy as to whether the orders that Boeing wanted to count toward their offset obligation actually represented new business, or just a “creative reclassification” of business transactions that had nothing to do with the AWACS deal (Martin and Hartley, 1996, pp. 338–346). It can be uncommonly difficult to settle questions of this sort without access to information proprietary to the weapons supplier.

This problem is not restricted to direct offsets. Suppose, for example, the weapons contractor has offered to find a buyer for a specified value of civilian product from the purchasing country—or even an investor to build new production facilities there—as an offset to the arms deal. It is possible that the weapons supplier has located a third party that was already intending to buy that product or make that investment anyway, and offered them some incentive to provisionally tie that transaction to the arms deal. That is,
of course, much easier to arrange if the “third party” involved is actually a division or subsidiary of the weapons supplier.

Another equally important issue is the degree to which the purchase price of the weapons system has been artificially inflated to cover the cost of the offset. If so, the entire “offset” is not really an offset. It is either a partial product discount offered to the weapons supplier, or a second purchase by the weapons buyer. For example, suppose a supplier inflates by 30 percent the price of the weapons system that would normally sell for $100 million, and then offers a 60 percent offset in the form of a counterpurchase of oil products (oil prices being well established in international markets). The purchaser is therefore paying $130 million for the weapons system, and the weapons contractor, in exchange, is buying $78 million ($130 million times 60 percent) of oil. This is equivalent to the weapons purchaser paying the full normal price for the weapons system ($100 million), and engaging in a second transaction in which it is selling $78 million worth of oil products to the weapons supplier for $48 million ($78 million—$30 million)—almost a 40 percent discount. Alternatively, suppose the supplier inflates the price of the weapons system by 30 percent, and then offers a 60 percent offset in the form of finding a third-party buyer for clothing produced in the weapons purchasing nation. In that case, there are really two transactions involved, first, the weapons purchaser is buying the weapons system at full price and, second, the weapons purchaser is paying the weapons supplier an extra 30 percent in exchange for its services in marketing the agreed value of clothing.

Is the weapons purchaser getting a good deal? In the case where the weapons contractor is itself making the counterpurchase, the weapons purchasing country is only getting any real offset to the extent that it could not sell the oil products in question to anyone else at any price that is discounted less than 40 percent below the established world market price. If it could sell them with less than a 40 percent discount to someone else, it is not only buying the weapons system at full price, it is losing money on the oil transaction as well. In the case where the weapons contractor is serving as a sales agent for the clothing, the weapons purchasing country is only getting any real offset to the extent that it could neither market the clothing itself at a comparable price nor find someone willing to market the clothing for a smaller fee.

Is there any evidence that weapons suppliers do inflate their prices to at least partially cover the cost of offsets? In a discussion of two industrial contractor surveys carried out in the UK to investigate the impact of offsets (one relating to arms imports and one to arms exports), Stephen Martin reports that “the survey evidence suggests that offsets do cost more than off-the-shelf purchase and, not surprisingly, that vendors seek to include most of this premium in the selling price” (Martin, 1996, pp. 7–8; Martin and Hartley, 1996, chapter 13). Wally Struys argues that Belgium has had to pay an estimated 20 to 30 percent in “overcosts” in conjunction with offsets tied to its military procurement (Struys, 2004). Just how widespread this practice may be is difficult to tell.

The impact of offsets on economic development

Military spending in general, and arms procurement expenditures in particular, are detrimental to broader economic development (Brauer and Dunne, 2002). It is therefore
important to ask if offsets can be designed in such a way as to mitigate this negative impact. Clearly, although direct offsets may help create (or maintain) military sector jobs and the military industrial base, they are the least desirable in terms of real economic development, since the military sector itself does not produce economic value and diverts real productive resources from the kind of civilian production that does.

What about indirect offsets? Barter arrangements are actually not offsets at all. They are merely a way around the weapons purchaser’s financial resource constraints, which might be the result of a lack of hard currency or a disadvantageous international exchange rate. They are also generally less transparent than cash-based transactions, and hiding the true money value of the weapons transaction may be an advantage to both the weapons supplier and the purchasing government. Barter can speed up the transaction, since no time need be wasted finding a third party purchaser or waiting for the weapons buyer to sell enough of its own product itself to earn the hard currency it needs to complete the arms deal. None of this has any particular value, though, in encouraging economic development in the weapons purchasing nation. It therefore does nothing to mitigate the economic burden of military procurement.

Obviously, counterpurchase offsets only mitigate the negative economic impacts of military procurement to the extent that they add to the inflow of revenue (especially hard currencies) and/or to the creation (or maintenance) of economically productive civilian jobs from civilian exports that would not take place in their absence. They would add to revenues or jobs only if equivalent new business could not be generated or would be less profitable to generate by alternative means without the offset deal. If weapons suppliers are able to buy these civilian products and successfully resell them or find third party buyers to buy them in the first place, it is difficult to understand why the weapons purchasing countries could not sell those products on their own, or at the very least, with the help of a (most likely less expensive) MDC marketing agent.

The situation is similar with respect to counter-investment. However, if it is possible to get offset commitments from the government of the weapons supplying country (or the supplying company itself) in the form of outright grants for development-oriented infrastructure investment and the like—grants that would not be forthcoming in the absence of the weapons purchase—such offsets could provide a limited counterweight to the economic burden of the arms deal. This is one type of offset that has potential value in terms of softening the negative economic consequences of military procurement.

In principle, there are a number of ways in which offsets could be important to economic development, always assuming they represent activity that would not have happened anyway (or could only have been brought about at much higher marginal cost). The offsets could bring in fresh flows of investment capital, especially important to most LDCs, which are chronically capital short. They could create opportunities for work that would increase worker skills. Offsets can also be a mechanism for transferring MDC technology to LDCs, helping to modernize production practices and perhaps reinforce human capital investment.

It is not a foregone conclusion that offsets will be an efficient means of accomplishing any of these things. That depends on the nature of the offsets, and the way in which they are implemented. Let us consider each possibility in turn. Military spending represents a direct drain on financial capital, coupled with a drain on hard currency reserves as weapons and related systems are purchased from abroad. It would help to mitigate this
cost if the offset provisions led to a substantial net inflow of financial capital. But the mere fact that the weapons supplier has agreed to buy (or find someone else to buy) the products of the weapons purchasing country—or even to invest (or find someone else to invest) capital there, does not mean that they are adding to the stock of available capital. It is critical to ask how the offset activity is being financed. If it is fully financed by capital raised outside the weapons purchasing nation, then it is actually bringing in fresh capital. But if the weapons purchaser is an LDC, it is relatively easy for large MDC-based corporations to raise capital from sources inside the LDC in competition with domestic entrepreneurs. In that case, the offset not only fails to increase the net availability of capital for financing alternative productive activities, it actually exacerbates the shortage of financial capital facing domestic producers. The only way to avoid this possibility is to require that offsets be fully financed from external capital sources, a difficult requirement to monitor or enforce.

As to increasing worker skills as a contribution to economic development, there are two issues involved. First, if skills are increased by exposure to new production requirements in the case of direct offsets, there is the issue of transferability. Since military-oriented activity has no real economic value (as previously argued), the question is: to what extent are skills acquired in service of military-oriented production transferable to activities that are economically valuable and do contribute to development? This is not a simple question to answer. Not all skills relevant to performance-driven, relatively cost-insensitive, military-oriented production are easily transferable to civilian-oriented, more cost-sensitive production. Some skills may be transferable only after considerable reshaping, a potentially expensive process (Dumas, 1995; MacCorquade, et al., 1993). Even for the kinds of skills that can be relatively easily transferred, there is the question of whether the military-oriented environment is the most cost-effective way of acquiring those skills. Cost-effectiveness is always an important consideration, given LDC resource constraints.

Second, whether the offsets in question are direct or indirect, the mere fact that skilled labor is required for the contemplated offset activity does not mean that this activity will be adding significantly to the pool of worker skills. The question is, in effect, parallel to that raised above in the case of capital: does the offset activity actually acquire the skilled labor needed by raising the skill level of low-skilled workers through training programs, or does it simply hire already skilled workers from the limited pool available within the weapons-purchasing country? Assuming the skills are both relevant and transferable, the kind of human capital investment involved in raising worker skills through training programs is a real contribution to development. But if the workers hired are already among the most skilled labor available, the offset activity may in fact be preempting labor resources that are already critically short in supply to domestic civilian producers. Unless the offset activity itself has a significantly greater value to economic development than the alternative activities from which its skilled labor has been drawn, it will be interfering with development, not encouraging it.

It should be easier to answer this question empirically in terms of past practice with respect to skilled labor than it is for financial capital, and it is, after all, an empirical question. But in parallel to the case of capital, the only way to avoid draining the local pool of skilled labor is to require that the labor employed in the offset activity not be initially of the skill level required but be raised to that level by employer-financed
training programs. This may be an easier requirement to monitor for labor than for capital, but it is almost certain to generate much stronger resistance on the part of the weapons contractor and be very difficult to enforce.

There are also two key issues with respect to offsets as a means of technology transfer. The first is similar to that for labor. If we are dealing with direct offsets, there is an important question as to their transferability to applications that encourage real economic development, and not just GDP (GNP) growth. For all the talk about “spin-offs” or “spillovers” from military to civilian applications, it is a very problematic process. It is almost always much more cost effective to go after civilian technology directly than to rely on reshaping military-oriented technologies to fit civilian uses (Dumas, 1982). Even so-called dual-use technologies may not always transfer smoothly and efficiently. But even if the technologies in question are clearly directly applicable to civilian use, they still may not be fully compatible with the economic and technological environment in the weapons purchasing country, particularly if it is an LDC.

The ability of transferred technologies to function properly both from a technical point of view and in terms of contributing to real economic development depends on the physical, social, economic, and technological environment in which they must operate. This is an especially important issue when technologies are transferred from MDCs to LDCs. For example, MDC technologies are typically designed with an assumption that reasonably high quality utilities (clean water, reliable electric power, waste treatment facilities) are readily available, an assumption that cannot be taken for granted in the LDC context. They may also depend on interaction with other technologies (in the way that computers interact with high tech communications equipment) the availability of which may be problematic in an LDC. MDC technologies often assume that there is a sufficient supply of high-skilled maintenance personnel, equipped with state-of-the-art tools to keep the high tech equipment in good operating order. That may also be a problem.

There are many potential incompatibilities that can interfere with the smooth transfer of technologies. It is beyond the scope of this chapter to elaborate them. Suffice it to say that merely putting a technology into the hands of producers in a weapons purchasing LDC is no guarantee that the technology will have any positive impact on the receiving country’s economy, ecology, society, or its prospects for development. Properly designed indirect offsets have a higher likelihood of transferring technologies in a way that will have positive benefits than do direct offsets. However, care must still be taken in selecting the technologies that are to be transferred, with respect to compatibility and other contextual issues, as well as implementing the transfer.

**Offsets and the military procurement decision**

Given the negative long run economic implications of military spending and military production for development, there are no good economic reasons to engage in military procurement at all. Nevertheless, it does seem that there are circumstances in which military force might occasionally be useful or necessary in this troubled world. As long as we still believe that we need armed forces for purposes of security, we will feel the need to acquire the equipment and personnel necessary to keep the military option viable.
The presence or absence of offsets should not substantially affect the decision as to how much or even what kind of military equipment a nation wants to buy. If a particular offset package actually does reduce the economic cost of a type of military equipment considered necessary for security purposes, it should at most influence the quantity purchased at the margin. More likely, if comparable equipment is available from multiple sources under similar conditions of risk, offsets should only influence which particular supplier to choose.

The promised benefit of offsets has sometimes been used to overcome public opposition to purchases of military equipment that the weapons suppliers wanted to sell, and the weapons purchasing government wanted to buy, for reasons related only weakly, if at all, to legitimate security concerns. To the extent that there is a significant domestic arms industry, it may exert considerable influence on the government to press for direct offsets (which in effect subsidize local military industry) in connection with government arms purchases from abroad. Offsets have also been used to overcome the resistance of domestic producers of military equipment (and their workers) to purchases of military equipment produced abroad, or for that matter, of domestic civilian producers (and their workers) being disadvantaged by the use of limited national resources for military purposes.

Still, if the military equipment in question is to be purchased anyway, it is worth attaching the requirement for development-oriented offsets as a condition of purchase. To maximize their development value, they should be indirect offsets, designed either to bring in fresh capital flows and appropriate technology, as well as develop transferable skills in the domestic labor force, or to create markets for domestic products in excess of those that would exist in the absence of the offsets. Ideally, they should contribute to the strength and diversity of the domestic economy, without making it unduly dependent on continued external sources of supply of critical goods and technologies. It is also important to design the offsets package to be implemented in ways that assure transparency, to increase the chances that the full package will be realized.
Conclusions and implications

Since offsets cannot realistically be expected to fully compensate for the economic disadvantages of military procurement, let alone to produce net economic benefits, it is only sensible to ask whether there may be alternative non-military strategies for national security that are more compatible with economic development goals. Though this is a question worth raising anywhere, it is especially important for resource-constrained LDCs, where every opportunity to institute programs that meet more than one national goal at the same time should be carefully explored.

Fortunately, there are a number of nonmilitary security strategies available for which there is at least some empirical evidence of effectiveness. Civilian-based defense, for example, is a nonmilitary and nonviolent strategy for deterring and defeating (should deterrence fail) both internal military coups and external attack, thus keeping the nation secure. This strategy was developed and elaborated chiefly by Gene Sharp of the Albert Einstein Institution (Sharp, 1985; 1990). It may seem too idealistic to be generally effective in the tough world of realpolitik. Yet a version of civilian-based defense was used with great effectiveness to nonviolently overcome authoritarian regimes in the Philippines (in the mid-1980s) and in eastern Europe (in the late 1980s and early 1990s) as well as to defeat the 1991 coup that attempted to destroy the liberalization movement in the former Soviet Union.

Another nonmilitary security strategy, which comes at the problem of security from an entirely different direction, is the idea of building properly structured economic relationships among peoples and among nations as a means of providing strong positive incentives to keep conflict within the bounds of peaceful dispute and avoid war. The mere existence of economic relations between nations is clearly not enough to provide such incentives; it can actually have the opposite effect. The strategy depends on constructing relationships with certain particular characteristics, most crucially relationships that are at the same time mutually beneficial and balanced (Dumas, 1990; 2004). The European Union (EU) is one of the most obvious demonstrations of the proposition that balanced mutually beneficial economic relationships among nations can create powerful incentives for them to keep the peace with each other. One needs only to list the nations that make up the EU today—nations such as France, Germany, Italy, Spain, Portugal, and the UK—to appreciate how many wars they have fought with each other over the centuries. The strong economic bonds that now bind them together have not eliminated conflict, but they have clearly played a major role in making the idea of warring against each other virtually unthinkable.

These two nonviolent strategies are offered simply as illustrations of the breadth of effective security approaches conceivable once we begin to free ourselves from the trap of thinking of security—even physical and political security—in purely military terms. Both these approaches are far more compatible with the kinds of policies needed to spur real economic development than strategies that depend mainly upon military force. Interestingly, they are also completely compatible with each other, and both can also be used together with a greatly reduced military force structure in a comprehensive, multi-sided national security strategy.
Modern militaries are expensive. So are the kinds of human and physical capital investment projects that catalyze real economic development. It is difficult to see how countries of limited economic means can afford to do both. The availability of offsets attached to arms purchases does not fundamentally change this reality.

Over the last decade or so, a few global institutions such as the World Bank have finally begun to wake up to this economic fact of life and press for reductions in military spending among the LDCs (World Bank, 1997; 2001). More and more attention has been brought to bear on the enormous human and economic cost of militarism in the less developed world. That is all to the good. But most of the more developed nations have yet to fully recognize the price they have paid for their own romance with militarism, or the responsibility they bear for encouraging the less developed countries to waste their economic substance on the arms trade. It is not only a foolish policy in terms of both global economic well-being and security, it is an international disgrace.

Notes
1. There have been some interesting attempts at creating a single measure that captures the essence of the state of a nation’s development, such as the Overseas Development Council’s Physical Quality of Life Index (PQLI) or the United Nations’ Human Development Index (HDI). The latter is certainly a useful indicator, but still falls short of including all the most important aspects of development. (For a description of how the HDI is calculated, see United Nation’s Development Program, 2002, p. 253).
2. The R&D services involved may or may not be embodied in the weapon systems themselves or in the equipment needed to manufacture them.
3. For example, in 1992, Finland concluded an agreement with McDonnell Douglas Corporation of the United States for the purchase of 64 F-18 Hornet fighter aircraft, with a 100 percent offset requirement to be fulfilled over a ten-year period—longer than the term of the weapons purchase contract itself (see Sköns, 2004).
4. For example, in 2001, the sales revenue of Boeing Corporation was US$58 billion, larger than the GDP of many of its LDC government customers (see Brauer, 2004).
5. This work includes a number of interesting analyses of the impacts of military expenditure on development in the less developed countries, including both overviews and country studies.
6. Retraining and re-orienting even very highly-skilled workers is a critical part of the process of economic conversion, i.e., transfer of personnel and facilities from military-oriented to civilian-oriented activity.
7. For example, Sweden, Denmark, Norway, and Finland have all demanded direct offsets in the form of local assembly to offset job losses (see Hagelin, 2004).
8. Although the World Bank has approached this issue with great caution, it is encouraging that they no longer avoid it entirely. For example, the Bank refers to the ending of cold war tensions as “...providing an opportunity for nations to reduce military spending and reap the dividends of peace” (World Bank, 1997, p. 138), and states that “civil conflict is devastating for poor people: the bulk of conflicts are in poor countries.” It goes on to argue that, among other things, “...international action to reduce access to the resources to finance conflict and to reduce international trade in armaments is also necessary. If countries can get on to a path of inclusive economic development, they have the potential to shift from a vicious to a virtuous cycle” (World Bank, 2001, p. 11).
References


Notwithstanding the reported success of many offset arrangements (particularly from the buyer’s perspective), economists are understandably cautious of any policy that diminishes the role of prices in market exchange. Instead of competing in terms of price and quality, offsets encourage sellers to focus on benefits packages that may have no relevance to the procured good. In most settings, the exchange of goods for money in markets is more efficient than barter. Why, then, do governments accept in-kind offsets instead of price discounts for the procured good? Even if we acknowledge a role for government intervention when markets fail to transfer goods and services efficiently, it is not clear that the expected net benefits of offsets exceed those of other policy tools. Indeed, offsets may be helpful to an economy in some settings, but quite damaging in others. Commenting on the state of policy, Udis and Maskus (1991, p. 163) “recommend a serious effort to develop criteria to distinguish between beneficial offsets and detrimental offsets before attempts at international control of the phenomenon are mounted.”

This chapter develops a criterion to determine when an offset is an appropriate policy instrument for government procurement. I present a policy matrix that offers general guidelines to government officials considering offsets as part of a broader procurement strategy. The matrix permits a comparative-institutional analysis of several types of offset policy under alternative institutional environments. Using transaction cost theory supplemented by the capabilities view of the firm, I explain how the welfare effect of offsets hinges on the exchange setting and the institutions of the purchasing economy. The main finding of the chapter is that any attempt to use a mandatory offset policy for all government procurement limits the dimensions of the negotiation and may suffer from diseconomies of scale and scope. A more flexible offset policy, which requires offsets for a particular class of goods and relies on markets in other cases, is preferable in most settings. In this regard, the model developed here generalizes the point made by Hall and Markowski (1994) concerning the ambiguous welfare effects of offsets.

The first section of the chapter explains why governments might wish to use offsets in procurement. The second section develops a prescriptive model based on the exchange environment and the transactors in question. A procurement policy matrix is developed in section three. The matrix juxtaposes the net benefits of traditional market exchange with nonstandard contracts, including offsets, under various economic settings. The final section guides procurement officials through the offset selection process and summarizes the principal findings of the chapter.
Why offsets?

As a large buyer, government has bargaining power that allows it to extract rent from sellers earning supernormal profits. Usually buyers with some degree of market power will bargain for price discounts. In stark contrast, governments selecting offsets often receive benefits off the price margin: the offset calls for the seller to transfer some form of economic activity to the buyer’s domestic economy.

Offsets may implicitly lower the price of the total package (the base good plus the offset), \( P_{\text{total}} \), whereby \( P_{\text{total}} = (P_{\text{base}} + P_{\text{offset}}) \). Akin to bundling in this respect, the base good, the offset, or both may sell at a discount. When a government does not use its oligopsony power to achieve price discounts for the base good, it points to the existence of market imperfections and the importance of non-market activity. In two important papers, Williamson (1985) and Hennart (1989) show that nonstandard contracts often arise to combat poorly functioning markets.

Governments use offset policy because it is a convenient way to extract rent and to achieve multiple objectives. These objectives include acquiring new technology and capabilities, supporting key industries, gaining access to new markets, generating export earnings, and forming strategic alliances with established multinational enterprises (MNE). Offsets are politically attractive largely because the expected benefits are more visible than the expected costs. In especially hazardous transaction environments, offsets can also support exchange.

Of course, government can choose from a variety of policy instruments to achieve these objectives. Only after performing a detailed benefit-cost analysis among the policy instruments (e.g., tariffs, quotas, local content protection, subsidies, and offsets) should a government consider using offsets.

Procurement settings

Consider the government procurement agency in a developing country. In many markets, government is the single largest buyer. In the discussion that follows, I assume government has some degree of oligopsony power. If government wishes to use its oligopsony power in procurement, it can select any of the following policies: price discounts in markets, strategic alliances, turnkey contracts, offsets, or product-in-hand contracts. When, if ever, are offsets preferable to these other policy instruments?

Government purchases a large variety of goods, ranging from chairs, cafeteria food, and ashtrays, to satellites, advanced aircraft, and disembodied technology. Some markets approach the neoclassical model of perfect competition, while others clearly do not. In a world of positive transaction costs, bounded rationality, and asymmetric information, buyers and sellers encounter varying degrees of exchange hazard in markets. Let \( z \) be an index of exchange hazard in markets, where \( z \in [0,1] \). The definition here does not equate severe exchange hazard (\( z=1 \)) with monopoly. In this model, the variables that affect exchange are information and contract completeness. In markets that approach the textbook competitive model, buyers and sellers have perfect information about product quality, cost, and valuation. In addition, the parties can write complete contracts that cover every contingency. In this setting, we expect to see products with replicable
competences embodied in the production process and easily codified directions for product use and maintenance. Examples of this type of procurement include food items, light bulbs, pens, and so forth.

Exchange hazard tends to increase as the market structure approaches oligopoly. Oligopoly and monopoly markets are more susceptible to exchange hazard because many of the goods and services in these markets embody high technology and tacit information. These attributes, in conjunction with the information problems and positive transaction costs previously alluded to, increase the probability of opportunistic behavior on the part of the seller or the buyer. Note that market structure, *per se*, is neither necessary nor sufficient for exchange hazard to be high. It is conceivable that exchange hazard for a transaction under monopoly is lower than the same transaction under oligopoly. In fact, if we assume perfect information and contract completeness in monopoly and oligopoly, exchange hazard approaches zero under these market structures as well. When \( z = 0 \), markets function efficiently: governments usually use their bargaining power to obtain price discounts instead of nonstandard (offset) contracts.

In markets where transaction costs approach zero and contracts are complete, government procurement with offsets or other nonstandard instruments needlessly raises the cost of doing business. Costs rise by the amount of the administrative burden, plus the costs of rent-seeking from the government intervention. The perfectly competitive setting is the benchmark case from which we conduct the comparative-institutional analysis. Moving along the spectrum from the textbook competitive setting toward hazardous exchange, one might expect the role of offsets in procurement policy to change. In fact, this is precisely what we find.

Most markets are far from perfect. Information is often asymmetric, allowing for various forms of moral hazard and adverse selection to arise. Sellers may act opportunistically by shirking, fulfilling duties in a perfunctory manner, and engaging in expropriation when contracts are incomplete and the buyer invests in specific assets. Oligopoly and monopoly tend to house a higher degree of exchange hazard largely because the output embodies core competences possessed by only one or a small number of firms. Combined with imperfect information, the index, \( z \), tends toward one.

Apart from exchange hazard, the other variable in the policy matrix is an expected benefit index, \( B \), for the domestic firm(s) awarded the offset work. The value of the index depends on three factors: the reputational capital of the seller, the ability of the domestic firm to raise its profile in international markets from working with an established MNE (i.e., the recipient’s potential reputation), and the probability of continued interaction between the seller and the domestic firm(s) after the completion of the offset agreement. Increases in any of these factor raises the value of \( B \). The probability of future interaction depends on multiple factors, most notably the stock of capabilities in the purchasing economy. If local firms possess the requisite capabilities to fulfill the seller’s offset obligation with few extra costs, the firms are more likely, *ceteris paribus*, to strike a cooperative agreement in the future.

The benefit index varies considerably. At one end of the spectrum is so-called anonymous exchange: the seller has little or no reputational capital. In other words, if the purchasing government requires the seller to form an alliance with a domestic firm to fulfill an offset, the domestic firm will not benefit from any external reputation economies. Another scenario considers a foreign seller with positive reputational capital.
If awarded offset work, the domestic firm expects to benefit from association with the reputable MNE. Filling work orders (the offset) for an established seller helps the domestic firm in two critical ways. First, the offset may assist in the building of new capabilities. The firm that agrees to a subcontracting offset (even in a one-period game) has incentive to teach the local firms efficient production techniques. This is the \textit{a priori} reasoning, because if the seller does not teach the most efficient routines and quality-control methods, it is unlikely to minimize cost.\textsuperscript{5} The domestic firm may be able to leapfrog onto the incumbent’s learning curve, possibly averting mistakes in the early stages of production. Second, and equally important, the one-time offset work can raise the domestic firm’s international reputation. By satisfactorily completing the offset work for the seller, the domestic firm receives the crucial “stamp of approval” in third markets. The strategic alliance allows the domestic firm to economize on the transaction costs required to build a customer base and distribution network. In the absence of an alliance with a reputable MNE, firms in developing countries pay high transaction costs convincing distributors to make the desired specific asset investments.

A study for the General Electric Trading Company concluded that firms from developing countries face severe hurdles in export markets. Assistance from international trading companies and distributors is “highly expensive [for the export of] differentiated products and in countries offering products not traditionally exported” (Hennart, 1989, p. 143). Examples of alliances benefitting new, untested firms abound. Consider the case of IBM and Microsoft in 1982. IBM agreed to purchase a new operating system, MS-DOS, from a relatively unknown and innovative firm called Microsoft. Microsoft immediately gained credibility in the international markets from working with IBM (Teece, 1986). Cipher Data Products can tell a similar story. Cipher signed a contract with IBM to develop a new, lower-priced version of IBM’s 3480 half-inch streaming cartridge drive. Cipher’s vice president for strategic management explained that after successfully working with IBM, “you can sell into any arena” (Teece, 1986, p. 294). Clearly, reputational economies assist firms in entering new markets and lowering transaction costs.

In sum, domestic industries can derive long-term benefits from a single government purchase that includes a strategic alliance between the seller and competitive domestic firms. Nevertheless, one should not view this as a \textit{carte blanche} for offsets when the selling firm has some degree of reputational capital. Whether an offset is the appropriate policy choice for the procurement also depends on the exchange hazard (of the base good) and on the administrative burden of the offset. Having introduced the two variables that shape the policy matrix, the next section explains when offsets are preferable to other policy instruments.
Figure 2.1: Procurement policy matrix

Procurement policy is defined as the outcome of the social planner’s welfare maximization problem. The simple model discussed here focuses on the markets and hierarchies aspects of contract design in government procurement. To maximize welfare, procurement policy needs to adapt to multiple exchange environments. No single procurement instrument is efficient for all environments.

General recommendations for procurement policy can be made by varying the parameters of the matrix, namely the degree of exchange hazard \( z \in [0,1] \) and the expected benefit to the offset recipient of interaction with the seller \( B \) is low or high. Consider the scenarios in figure 2.1. Six distinct policy instruments are advisable for the six economic settings (cells in the matrix). An offset policy is advisable in only two of the six cases. Perhaps most importantly, a mandatory offset program is appropriate if, and only if, exchange hazard is high (approaches the index value of 1) and the expected benefit index, \( B \), is high as well. Let us examine the policy prescription for each economic setting.

**Arms-length exchange**

In the absence of impediments to the transaction, markets are the most efficient means of exchange. This economic setting comprises atomistic and largely anonymous sellers. The high-powered incentives of market competition, teamed with nominal transaction costs, make this form of procurement policy plausible for governments—irrespective of market power. If government does in fact possess some degree of market power, it can bargain for price discounts of the procured good. There is no \textit{a priori} reason to leave the price margin in this economic setting. This policy prescription holds irrespective of...
government’s overarching development strategy. Capabilities acquisition strategies, for example, function smoothly in markets when information is perfect. Employing offsets in a perfectly functioning market tends to reduce welfare for three reasons. First, sellers are already pricing at marginal cost (hence no opportunity for further rent extraction by government), second, technology is already transferring efficiently, and third, offsets incur an administrative burden. Examples of procurement in this category include food, paper clips, ball bearings, and so forth.

**Augmented markets (markets with alliances)**

Consider a scenario where markets function efficiently (z approaches zero, and B is positive). This scenario is common for the procurement of goods that embody medium technology in production. Table 2.1 ranks industries according to the technological intensity of the production process. The medium technology category of industries, which includes goods such as scientific equipment, petroleum refining, shipbuilding, and motor vehicles, is suitable for the augmented markets scenario. Although we can expect markets to perform well, a nascent industry in the purchasing government’s economy may benefit from a strategic alliance with an incumbent.

The social planner opts for markets but also encourages collaborative projects. Markets are preferable because information problems are non-existent, which greatly reduces the probability of opportunistic behavior in the exchange. However, if buyers generally display an allegiance to brand name capital, a strategic alliance may prove beneficial to the domestic firms. The government can use its bargaining power to encourage collaborative agreements without formally requiring them (e.g., an offset), thereby avoiding extra administrative costs.

If a seller agrees to form a strategic alliance, the purchasing government is essentially substituting content for price discounts. In short, we can make an argument for an industrial participation program in government procurement instead of price discounts, even when capabilities transfer at no extra cost in markets.

Importantly, the market is still the driving force behind the collaboration opportunity. Only domestic firms that possess the requisite capabilities can submit bids under this procurement program. The seller selects domestic firms based entirely on price and quality competition. Therefore, the high-powered incentives of market competition remain largely intact. Furthermore, encouraging the seller to form an alliance with an informal best-endeavors policy prevents administrative costs from rising much. The administrative burden of the augmented market policy exceeds that of pure markets (scenario 1), but not by a sizeable amount. Moreover, a best-endeavors approach provides sellers with leeway when confronted with a shortage of requisite capabilities in the purchasing government’s economy.

Governments are already experimenting with the augmented markets procurement policy. Matthews (1996, p. 234) finds that “a number of countries such as Greece and Spain are now encouraging the creation of long term business partnerships within their [procurement] programs.” The most popular collaborative instruments include joint ventures, licensed production, coproduction, and direct foreign investment.
Table 2.1: Industry ranking according to technology-intensity of production

<table>
<thead>
<tr>
<th>Level of technology and industry</th>
<th>ISIC</th>
</tr>
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<tbody>
<tr>
<td>High technology</td>
<td></td>
</tr>
<tr>
<td>1. Aerospace</td>
<td>3845</td>
</tr>
<tr>
<td>2. Computers, office machinery</td>
<td>3825</td>
</tr>
<tr>
<td>3. Electronics-communications</td>
<td>3832</td>
</tr>
<tr>
<td>4. Pharmaceuticals</td>
<td>3522</td>
</tr>
<tr>
<td>Medium-high technology</td>
<td></td>
</tr>
<tr>
<td>5. Scientific instruments</td>
<td>385</td>
</tr>
<tr>
<td>6. Motor vehicles</td>
<td>3843</td>
</tr>
<tr>
<td>7. Electrical machinery</td>
<td>383-to 3832</td>
</tr>
<tr>
<td>8. Chemicals</td>
<td>351+352+3522</td>
</tr>
<tr>
<td>9. Other transportation equipment</td>
<td>3842+3844+3849</td>
</tr>
<tr>
<td>10. Non-electrical machinery</td>
<td>382–3825</td>
</tr>
<tr>
<td>Medium-low technology</td>
<td></td>
</tr>
<tr>
<td>11. Rubber and plastic products</td>
<td>355+356</td>
</tr>
<tr>
<td>12. Shipbuilding</td>
<td>3841</td>
</tr>
<tr>
<td>13. Other manufacturing</td>
<td>39</td>
</tr>
<tr>
<td>14. Non-ferrous metals</td>
<td>372</td>
</tr>
<tr>
<td>15. Non-metallic mineral products</td>
<td>36</td>
</tr>
<tr>
<td>16. Fabricated metal products</td>
<td>381</td>
</tr>
<tr>
<td>17. Petroleum refining</td>
<td>351+354</td>
</tr>
<tr>
<td>18. Ferrous metals</td>
<td>371</td>
</tr>
<tr>
<td>Low technology</td>
<td></td>
</tr>
<tr>
<td>19. Paper printing</td>
<td>34</td>
</tr>
<tr>
<td>20. Textiles and clothing</td>
<td>32</td>
</tr>
<tr>
<td>21. Food, beverages, and tobacco</td>
<td>31</td>
</tr>
<tr>
<td>22. Wood and furniture</td>
<td>33</td>
</tr>
</tbody>
</table>

Source: Hatzichronoglou (OECD, 1997).

Australia’s Partnerships for Development (PfD) program is an example of a successful augmented-markets policy. Created in 1990, the PfD encourages foreign companies to undertake long-term investment in R&D and augment the industrial technological base.
The program waives “offsets requirements for foreign companies which agree to enter into strategic alliances with Australian companies in the information and telecommunications industries” (Capling, 1994, p. 12). It maintains a competitive bidding process for domestic firms wishing to participate, while using government’s market power to increase the stock of reputational capital in these industries. The PfD program is especially beneficial to Australian software manufacturers, “who have developed world class products but have not had sufficient resources to devote to worldwide marketing” (Capling, 1994, p. 12). By 1993, 21 multinational enterprises had signed agreements with the Australian government to participate in the PfD program (Capling, 1994, p. 12). This augmented-market policy is well conceived and appropriate for an environment with low exchange hazard and a positive reputation/future interaction variable.

**Turnkey contracts**

In a procurement setting exposed to moderate exchange hazard combined with little or no expected reputational economies from the seller, a turnkey contract supported by a performance bond is a sound policy choice.

Turnkey contracts lower exchange hazard by shifting risk from the buyer to the seller. The seller signs a contract to build an operational factory (or other good) for the buyer. By signing a detailed contract, the seller is legally responsible for the

**Table 2.2: Turnkey contracts in procurement**

**Advantages**

Ownership and control in the post-contract stage is retained by the owner or purchaser; Single, legally responsible seller reduces transaction costs for the buyer; Single seller generally ensures shorter time-to-completion for project; Less risk for the buyer; Useful for the construction of complete plants.

**Disadvantages**

Higher price and fewer bids; Plant facility (or other contracted good) is constructed with little participation by the buyer and employees; less learning-by-doing; While ancillary competences transfer easily, local employees may not gain crucial tacit knowledge.

*Source: Adapted from United Nations (1983, pp. 10–11)*

initial feasibility study, the design, engineering, and construction of the plant In addition, the seller does not receive full payment until several production runs are complete. Table 2.2 lists the advantages and disadvantages of turnkey contracts. turnKey contracts.

Turnkey contracts improve the integrity of the exchange, but they do not eliminate seller opportunism entirely. Occasionally, the output of the initial production trials is acceptable, but local workers trained under the supervision of the technical staff fail to replicate the technical Staff fail to replicate the Outcome. This is not surprising: production in a sterile environment under the direction of the seller’s technical staff is in stark contrast to real-time production by local workers. Algeria’s problems with turnkey contracts have been well documented in this regard (see Oman, 1983).

Information asymmetries and other imperfections render market exchange hazardous and inefficient as the technological intensity of production increases. The government can
use its monopsony power to negotiate a more efficient mode of exchange with the turnkey contract, which places the onus on the seller. Since the primary objective in this setting is to improve the integrity of the transaction, the procurement officer’s relevant choice is between turnkey and offset arrangements.

Generally, if the objective is to obtain an end-use good like a functioning chemical plant, the turnkey contract is a suitable choice. In this case, the buyer’s primary interest is in improving the incentives of the exchange to minimize transaction hazards. If, however, the government intends to develop the capabilities of the good for other applications, the choice between offsets and turnkeys is not so obvious. Officials can design the offset to acquire capabilities while also increasing the integrity of the exchange.

**Variable offset policy**

A variable offset policy is suitable for environments characterized by moderate exchange hazard and high expected benefits from interaction with the seller. This policy gives procurement officers the choice of attaching an offset to the government purchase, or negotiating price discounts in markets. It offers more flexibility than strict mandatory offset schemes. The flexibility enlarges the opportunity set available to government negotiators and reduces the potential for diseconomies of scope. Negotiators can compare the net benefit of a price margin exchange with an offset for the particular economic setting. This increases the dimensions of the exchange and reduces the probability of the buyer accepting an offset proposal that results in production diseconomies.

With more flexibility in contract negotiations comes added responsibility for procurement officers. Governments using variable programs require bureaucrats to compare complex intertemporal costs and benefits associated with offsets to price changes from market exchange. Governments without highly skilled professionals in procurement may be better off using a mandatory scheme or markets—not both embedded in a variable offset policy.

Of the various nonstandard contracts, the variable offset policy offers the most dimensions for mutually beneficial exchange. Procurement officers can adjust the terms of the exchange to support a development strategy that is appropriate for the country. After experimenting with mandatory offsets during the 1970s and part of the 1980s, Australia switched to a variable offset policy. The consensus in Australia is that the policy has fulfilled its objectives (namely, technology transfer) while not handcuffing negotiators to non-price margin schemes (Capling, 1994; Hall and Markowski, 1996; Markowski and Hall, 2004). Nevertheless, today many governments opt for mandatory offsets in procurement.

**Mandatory offsets**

Mandatory offsets are ideal for procurement that is subject to severe exchange hazard and high expected benefits from interaction with the seller. A mandatory offset policy requires offsets for government procurement (of specified goods and services) from a foreign seller above a threshold dollar value. This policy encourages competition based on content rather than price. Mandatory offsets are easier to administer than the...
challenging variable scheme because bureaucrats are solving an optimization problem over fewer variables.\textsuperscript{11}

Another benefit of the mandatory policy is its impact on rent-seeking behavior. All types of government intervention in the marketplace attract some degree of rent-seeking behavior by economic agents, i.e., firms, interest groups, and government officials. Rent-seeking behavior is inimical to societal welfare because agents expend real resources to capture rents without producing new output. Buchanan, et al. (1980, p. 10) argue that “once markets are not allowed to work, or once they are interfered with in their allocative functioning, politics must enter. And political allocation, like market allocation, involves profit seeking as a dynamic activating force...the rents secured reflect a diversion of value from consumers generally to the favored rent seeker, with a net loss of value in the process.”

A policy of variable offsets is susceptible to higher levels of rent-seeking than a policy of mandatory offsets because procurement officials have free reign to choose between prices (markets) and content modifications (offsets). Price changes directly affect government expenditure, and offsets impact domestic industry. The variable policy, therefore, attracts rent-seekers internally (including the offset agency itself) and externally (interest groups).

The mandatory policy attracts less rent-seeking because of the strict directive for offsets whenever government makes a purchase above a threshold dollar value. The key is to design the policy such that government procurement of a selected list of goods automatically triggers a mandatory scheme. High-technology goods (see table 2.1) can support a mandatory scheme. Government procurement of aerospace, information technology, and telecommunications equipment, for example, occupies this category.

The conclusions drawn from the model allow one to argue strongly against the use of mandatory offsets outside of high-technology procurement. If exchange hazard is less severe and government still employs a mandatory offset policy, the buyer is implicitly rejecting price margin contracts that are potentially superior to the offset. Some countries are in fact following the selective mandatory policy outlined above. Israel, for instance, maintains a sophisticated program that mandates offsets for procurement of high-tech military hardware, hospital equipment, computer hardware, and civilian aircraft (Harben, 1984, p. 33).\textsuperscript{12} These goods carry potentially severe exchange hazard, and the expected benefit from the seller’s reputational capital is high.

Conversely, many European governments require 100 percent mandatory offsets for much defense procurement. At first glance, this policy appears to fulfill the necessary conditions for optimality put forth in the model. However, defense industry procurement encompasses an incredibly wide range of goods and services, many of which are low technology. Defense procurement includes generic ammunition and other ordnance, tires, clothing, and ball bearings, for example. The rigid mandatory policy is detrimental to European welfare because the opportunity cost of imposing offsets for goods that do not present an exchange hazard is price-margin savings.

After observing unsatisfactory results of a mandatory policy in the 1980s, Malaysia switched to a variable program in the 1990s.\textsuperscript{13} Australia had a similar experience. The objective of the mandatory policy of the 1980s was to increase the level of technological capabilities in strategic industries. Government officials believed that an across-the-board mandatory offset policy would generate high rates of technology transfer. The policy was
a failure. Sellers inundated procurement officials with thousands of offset proposals. Clearly, requiring atomistic firms to include offsets in the sale simply raises the output price with almost no reputational effect for the purchasing economy. Liesch (1991) finds that Australian procurement officials used workload and job creation data to determine the efficacy of an offset proposal, often failing to evaluate the quality of technology transfer. He writes (1991, p. 121) that “government mandated countertrade [offset] programs seem particularly prone to this outcome.”

Product-in-hand contracts

The sixth economic setting of the policy matrix combines severe exchange hazard with little or no expected benefit from interaction with the seller. In this setting, it is critical to build safeguards into the contractual arrangement, but offsets would be an inefficient way of doing so. Since strategic alliances and other interaction with the seller are unlikely to bear fruit, the cost of the offset burden will likely exceed any benefits. Instead, government may find it advantageous to employ a variant of the turnkey contract, known as the “product-in-hand” contract. This arrangement requires the seller to set up an operational system, akin to the turnkey contract. In contrast to the turnkey, however, the seller’s staff remains on-site after the trial runs to teach local employees how to maintain and troubleshoot the system. Only after local personnel demonstrate competency during multiple production runs does the seller receive full payment. This contract greatly reduces the probability of seller opportunism.

With risk transferring almost entirely to the seller, the output price of product-in-hand contracts rises drastically. Moreover, the strict conditions of the contract attract a much smaller pool of bids than the turnkey arrangement. For these reasons, governments seldom employ product-in-hand contracts in procurement. The purchase of an entire chemical plant that includes numerous specific assets in the production process is an example.

An optimal offset policy

The selection of an offset (variable or mandatory) depends on the level of technology embodied in the base good and the reputation of the seller—two variables that figure prominently in the policy matrix. The level and nature of technology drive the selection process from the beginning. The model developed here discourages the use of offsets for procurement of goods and services that embody medium and low technology. Low-technology procurement is suitable for arms-length exchange in competitive markets, and governments can handle medium-technology goods with an augmented-market strategy (encouragement of cooperative agreements, but no offset requirements).

When procurement embodies high-technology goods, we need to obtain more information before deciding upon offsets, turnkeys, or product-in-hand contracts. In general, if the exchange embodies high technology requiring the transfer of tacit knowledge, and/or severe rent-seeking is especially pervasive in government, I advise rules rather than discretion with the mandatory offset. If domestic firms stand to benefit
from an alliance and association with the seller, offsets become relatively more attractive
than turnkey and product-in-hand contracts.

Finally, the decision whether to employ a direct offset or an indirect offset is a
function of government’s objectives. If government uses the instrument largely to
safeguard an exchange in a hazardous setting, the direct offset is preferable. In contrast, if
government views the offset as an economic development strategy that aids capabilities
acquisition, market penetration, or the reduction of information barriers, an indirect offset
is better because of its wide applicability. Several practical findings of this study could
improve offset policy.

First, if government purchases the desired good in perfectly competitive markets, the
administrative burden of offsets is greater than any benefits. Offsets are not advisable in
this economic setting. Second, given some degree of exchange hazard, offsets are Pareto-
superior to turnkey and product-in-hand contracts when either (a) there are expected net
benefits from cooperation with the seller (e.g., reputation spillovers, subcontracting,
coproduction, training, and so forth), or (b) government suffers from acute rent-seeking
among its bureaucrats. A particular construct of offsets can reduce rent-seeking through
non-monetary (barter) exchange with the seller. And third, mandatory offsets are of
limited use because they ignore institutional differences across the various exchange
settings. In the model developed here, mandatory offsets are advisable in government
procurement only for a select category of high-technology goods or when severe rent-
seeking behavior debilitates the use of a variable offset policy.

Notes
1. In Williamson’s (1985) view, comparative institutional analysis is a critical part of policy
design.
2. Transaction cost economics explores the costs of using markets. It began with Ronald
Coase’s (1937) analysis of the firm. Oliver Williamson (1983; 1985) and others helped it to
achieve critical mass in the late 1970s and 1980s. The capabilities view of the firm considers
the firm to be a pool of core and ancillary competences that become routinized over time to
produce output.
4. This part of the analysis is particularly useful for developing countries, although the findings
and recommendations are suitable for developed economies as well.
5. This does not remove the possibility that capabilities may not transfer completely. Taylor
(2001) explains that sellers may accept cost penalties to preserve core competences in a
dynamic setting. In addition, the buyer’s economy may not be able to absorb transferred
capabilities due to an absence of industrial slack.
6. See Taylor (2001) for a discussion of how offsets alter the marginal, average, total, and
transaction costs of the seller.
7. A best-endeavors agreement calls for the seller to fulfill a target level of work in the
purchasing economy over a period that may or may not be specified. The agreement is not
binding and does not include any penalty clause for non-compliance.
8. The seller receives partial payment during the initial stages of the project, and the remainder
upon successful completion of the trial runs. There are notable variations to this sort of
compensation scheme. For highly technical projects, the seller receives payments according
to the percentage of the project that is complete. In the extreme case, a buyer may not release
full payment for one or two years after the trial production runs.
9. Some trial periods last only 24–48 hours.
10. Frequently, an indirect offset agreement may call for the seller to engage in activity that is outside the scope of its capabilities. There is a tendency for cost to escalate with indirect offsets because the seller produces in the rising portion of the average cost curve.

11. The relevant comparison for the bureaucrat is between bundled packages offered by different sellers. The bureaucrat does not need to calculate the offset’s shadow price equivalent to make an accurate comparison with price margin offers.

12. The procurement of these goods triggers an offset if the value of the transaction exceeds $1 million.

13. Interview with Mr.Ahmed Khalili, Director of the Malaysian offset program, 2 June 1998.

14. Hennart (1989) reports that product-in-hand contracts are 50 to 100 percent more expensive, on average, than turnkey contracts.

15. Given market power that allows for the extraction of rent, government has two choices: it can bargain either for price discounts or receive extra benefits (offsets) off the price margin. If government cannot rely upon bureaucrats to make effectual use of the money from price discounts, offsets look more attractive. Some offsets avoid price discounts altogether and instead inject benefits directly into the economy.

References


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3
Mandatory defense offsets—conceptual foundations

Stefan Markowski and Peter Hall

Introduction

In this chapter we seek to lay conceptual foundations to achieve a clearer understanding of the potential for mandated defense offsets to generate economic and/or defense-strategic benefits for the countries that use them. Mandated offsets may include forms of countertrade, local content arrangements, and bundling. We focus on the operation of a hypothetical Defense Procurement Agency (DPA) in a representative country and assume that it needs to fulfill a given set of requirements for the purchase of military equipment.

In an earlier paper, we defined defense offsets as “compensatory procurement arrangements designed to offset the cost of purchasing defense equipment from overseas by means of a reciprocal (countertrade) commitment by suppliers in support of a purchaser’s domestic economy” (Hall and Markowski, 1996, p. 289). We emphasized that these compensatory procurement arrangements are mandated by the government of the importing country in that they apply to either all imported government purchases or to imports by the DPA. We also argued that “offsets-type requirements are often normal contracting arrangements between businesses,” as in many commercial transactions “a given purchase or sale is contingent on tied purchase or sale of other products. In that sense, offsets are an aspect of the normal transactional reciprocity between willing buyers and sellers” (p. 308). Transactional reciprocity is thus not peculiar to defense or other government imports.

Literature

Over the past 25 years, a growing literature has focused on barter exchange, countertrade, and the bundling of transactions in domestic and export markets. Bundling transactions refer to counterpurchase, compensation trade, and buyback arrangements that involve goods-for-goods rather than goods-for-money exchanges. Perhaps awkward but common, such forms of transacting business occur in many institutional environments whether faced with shortages of a suitable medium of exchange or not (Mirus and Yeung, 2001). Package enhancements added to the purchase of another product are common (e.g., “buy a telephone subscription plan and get a ‘free’ mobile phone”). Unlike earlier forms of bundled transactions that emerged in environments lacking suitable monetary media of exchange, the in-kind transactions of the 1970s and 1980s were mediated by convertible (hard) currencies (Mirus and Yeung, 2001).
In a recent literature survey Mirus and Yeung (2001) observe that an “intriguing feature common to barter, counterpurchase, and buyback is ‘bundling’: the exchanges of goods and services are bundled together [while] in normal market transactions buying and selling of goods and services is unbundled, an arrangement made possible by the use of money and the ‘market’ as an institution” (p. 363). Mirus and Yeung use the following definitions (2001, p. xii):

- **barter:** the direct exchange of goods and services, completed in a short period of time;
- **counterpurchase:** an intertemporal exchange of goods and services, bundling transactions into current buying and future selling; and
- **buyback:** a capital-good exporter accepts part or full payment in the form of output produced with the equipment it has sold.

An interesting issue discussed in the countertrade literature is this: when and why would commercial importers adopt seemingly awkward bundling strategies and under what circumstances would commercial exporters agree to do business on that basis? In some cases, the bundling of transactions by commercial buyers and sellers can be shown to be advantageous to private firms in terms of well-defined commercial objectives. If entering into such arrangements undermines the achievement of these objectives, it can only be because traders were ill-informed or subject to misperception.

Mirus and Yeung defined offsets as a form of bundling, i.e., as “requirements placed on exporters by the importer or importing country to produce part of the product, or source parts, or to assemble the product in the importing country” (1993, pp. 412–413). But then they exclude offsets from further discussion. Offsets, they argue, are characterized by “a different analytical content and less often involve an implicit contractual relationship between trading firms” (p. 413). Although Mirus and Yeung narrowed the scope of offset requirements to buyback arrangements, they are right about a distinguishing characteristic of offsets: bundling requirements are trade restrictions imposed on the exporter by the importing country. Thus, government offset requirements exclude private bundling deals adopted by commercial importers and exporters. Instead, they arise from restrictive (protectionist) trade policies adopted by importing countries for either strategic defense reasons (defense offsets) or for economic reasons (civil offsets).

Offsets requirements, especially defense offsets, involve addressing a mixture of objectives. Lack of clarity as to what is to be achieved by their use is a key problem in evaluation exercises. Whereas commercial buyers are assumed to be driven by economic self-interest, it is unclear what net benefits will accrue to whom by a policy that mandates public agencies to require some form of defense offsets from sellers of military items. Normally, the DPA is charged with applying offset requirements. The possible arrangements reduce, we argue, to three basic categories:

- **countertrade:** the arms importing country makes a purchase of required goods conditional on a reciprocal (offsetting) sale of local products worth an agreed fraction of the value of the imported equipment. In effect, the seller undertakes to arrange a reciprocal purchase of goods and services
from the buyer, e.g., to buy from a list of exportable products that has been prepared by the buyer; a special case of countertrade is local content requirement the buyer makes its purchase conditional on the seller’s commitment to source an agreed portion of the contract value in the buyer’s territory (buyback). Use may be made of existing local suppliers through subcontracting and licensed production, or new production facilities may be set up through foreign direct investment, joint ventures, and coproduction arrangements; and the bundling of requirements: the buyer ties its purchase decision to the supply of other, related or unrelated, products. Such products may be goods or services that the vendor would not otherwise be willing to offer this particular purchaser, or products that the buyer seeks to have supplied for less than the current market price (or free of charge). Examples include technology transfers, training, through-life support, and marketing assistance.

All forms of offsets arrangements involve reciprocity but there are distinctions in the nature of the transactions. Countertrade, if applied to products that were previously only traded domestically, amounts to export creation. Local content requirements induce import substitution. And bundling of requirements influences the quantity and composition of a country’s imports of goods and services. Offset arrangements can of course involve a mixture of all three categories.

In the remainder of this chapter we discuss the three types of offsets in turn, ignoring mixtures.

**Countertrade**

To understand what drives countertrade we compare a countertrade transaction with trade under unencumbered conditions and examine the net benefits to each party. Consider figure 3.1 where country X (the arms buyer) offers to import a weapon system a from an arms supplier in country Y (the arms seller) who recognizes that X will require it to comply with an offset demand that obliges Y to import goods from X. Those goods are represented as a good b, which Y would have the freedom to resell in international markets—and normally would. To meet the policy objectives of X, the obligated exports of b must be a “new activity,” i.e., additional to exports of b from X that would otherwise have occurred. In line with the usual institutional arrangements, exports of product b are expressed as a percentage of the value of the weapon system purchased by X. Usually, these additional exports of b are viewed by X as “paying for” (offsetting) at least some of the arms imports.

In the absence of countertrade, X is assumed to require a quantity \( q_a \) of weapons at price \( p_a \) per unit (not shown in figure 3.1) which, in principle, may be higher or lower than the price paid under countertrade, \( p^*_a \). Y would then obtain revenue \( p_a q_a \) from the sale. Normally, offset guidelines do not allow Y to charge a higher price when an offset requirement is imposed by X. However, complex customer-tailored
products such as weapon systems do not have observable market prices like simple homogenous (“textbook”) commodities. It is in the nature of complex weapon deals that there is no unique market price \( p_a \) with which \( p^*_a \) can be unambiguously compared. X cannot therefore know with certainty how much of the cost to Y of engaging in mandatory countertrade is reflected in the price \( p^*_a \) it pays. This makes it difficult for X to be sure that Y has not padded the weapons price—in the sense of charging more than the minimum it required to sell the arms to X in the absence of an offset demand.

If the countertrade transaction proceeds, Y delivers \( qa \) for revenue of \( p^*_a qa \) but will have to purchase from X \( \alpha (p^*_a qa) \) of product b, where \( \alpha \) is the percentage value of counterpurchase obligated under the mandatory offset scheme. (The parameter \( \alpha \) can be equal to, or smaller or greater, than one. In figure 3.1, it is assumed that \( \alpha > 1 \), i.e., a more than 100 percent offset value.) Thus, \( \alpha (p^*_a qa) = p^*_b qb \), where \( qb \) is the quantity of b that Y must purchase at an average price \( p^*_b \) to satisfy the offset requirement. For the offset deal to be struck, it must also produce a satisfactory return for key stakeholders in Y.

In the unlikely case that the on-selling of imports of b is particularly lucrative for Y, the offsets deal yields more profit than unencumbered trade. (It would have to be shown, however, why X would have used Y as an intermediary and did not export b directly.) If Y is fully aware of this profit-making opportunity in advance, it might even reduce the price of a, \( p^*_a \), to secure the offset deal. The pricing strategy adopted by Y depends on its market power vis-à-vis X (see below). Suppose, however, that Y anticipates merely breaking even, or even making a loss on the resale of b. In such cases, Y would proceed with the arms-offset deal only if \( p^*_a \) were high enough to compensate it for losses from the resale of b.

As a general rule, we conclude that Y is unlikely to be hurt by the offset requirement. It would only consent to it if it expected the two components of the countertrade package together to produce satisfactory returns for key stakeholders, i.e., if \( p^*_a \) is high enough to compensate them for losses from the resale of b. If it could not achieve that, it could always walk away from the deal. Alternatively, Y may accept offset obligations but fail to honor them. While the DPA may protect its interests by designing incentive contracts that penalize offset default, such contracts are difficult to enforce.

We now consider the buyer side of the mandated countertrade transaction. In the absence of offsets, X would import \( qa \) at \( pa \) per unit paying \( pa qa \) in total and sell product b

Figure 3.1: Countertrade
as an export in the world market. If X had sufficient monopsony power it could seek in its dealings with Y a deep price discount on arms, or a package enhancement, or a combination of the two. It makes economic sense for X to mandate a countertrade requirement only if (a) it believes that it has a degree of market (monopsony) power relative to the arms seller, and (b) it also believes that it is more advantageous to it to use its perceived market power by tying additional exports of b to the import of a. If X’s perception were correct, it could negotiate a price discount which could be used to promote (or subsidize) exports of other goods and services. In most cases, X will not have such market power and will therefore be poorly placed to extract any meaningful concessions from Y.

If X has no market power vis-à-vis Y, it will not be able to prevent Y setting \( p^* \) at whatever level is required by Y to make the entire deal at least minimally worthwhile. If Y is a monopolist, X’s offset demand will be ignored or the cost of meeting it factored fully into \( p^* \). Since X has no market power, its threat to walk away from Y’s offer would not induce Y to lower the price or accept the countertrade demand. If, in contrast, X does have significant market power vis-à-vis Y, the puzzle is why it would restrict its freedom to use it as flexibly as possible. This is what happens when it operates a mandatory scheme requiring a fixed proportion a of arms imports to be offset through countertrade (with an associated “no-price padding” demand that suppliers may well not comply with). A mandatory scheme might achieve as good an outcome for X as an unencumbered competitive tender—but that would be a coincidence. Well-informed negotiators using market power intelligently and flexibly to negotiate price discounts and/or package enhancements should be able to outperform a mandatory scheme most of the time.

In a special case of barter exchange, offset guidelines demand a simple swap of \( q_a \) for \( q_b \). For example, intra-COMECON trade provided countless examples of such goods-for-goods exchanges. However, even Soviet bloc countries used a reference currency (US$ or “convertible roubles”) to agree on the value of such swaps. In some cases, countertrade requirements may involve part-barter-part-monetary exchange, in which X’s countertrade demands may require Y to accept currency for a portion of the value of the weapon system and a quantity of good b for the remainder. Complete (or partial) barter exchange is a special use of defense offset requirements as most offset demanders expect money to be used as a medium of exchange. In the past, these types of countertrade were largely associated with the intra-communist bloc trade and thus applied to military deliveries arranged between members of the Warsaw Pact.

**Local content**

Under mandatory local content requirements, a form of countertrade, the primary demand for arms is combined with a secondary demand for in-country production, related or unrelated to the primary requirement. Normally, this involves the foreign arms supplier (prime contractor) to source at least some of its inputs (usually related to the arms package) from local producers. Alternatively, new production capabilities may be formed in-country through foreign direct investment or joint ventures.
Although local content is a variant of countertrade, as the dominant type of offset requirement applied in practice, it is treated here as a distinct category.

In figure 3.1, the DP A seeks to combine the primary requirement for \( q_a \) with a secondary requirement for \( q_b \) of product b, which is now defined as a component of weapon system a. A local content target, set as a percentage of the total value of the arms requirement, must be achieved if a supplier is to be successful in tendering for the primary arms contract. Thus, \( p_b q_b / p^* a q_a = \beta \), where \( \beta \) is the percentage local content target. Note that \( \beta \) may exceed 100 percent if the local producer of b supplies large quantities over long periods of time so that, in present-value terms, \( p_b q_b > p^* a q_a \).

In the absence of mandatory offsets, the DPA would seek to source supplies at the lowest price for the required quantity and quality. However, it would include a local content requirement if there were defense strategic reasons to support industry activities. If suppliers knew that b could be produced competitively in X, it might be assumed that they would arrange for local sourcing of b and no price premium should be necessary to achieve the local content target. But suppliers might not be aware of the competitive potential of local producers or may be reluctant to restructure their supply chains and bear the associated cost. To win the contract, the prime contractor would have to make the appropriate sourcing arrangements but cost premiums would be incurred if local production were not world competitive or new capability had to be created.

With a high local content target, the overseas prime contractor would have to include uncompetitive local subcontractors in its supply chain. Consider figure 3.2, where \( D_{xb} \) shows a prime contractor’s demand for b that is to be integrated into \( q_a \) as required by country X. The price \( p_{yb} \) is the price of b if it were sourced from a world competitive supplier in country Y, and \( S_{yb} \) is the corresponding supply schedule for fully imported b. Product b can also be produced in X, at a higher cost than \( p_{yb} \), and \( S_{xb} \) is the domestic supply schedule.

In a normal competitive market, the prime contractor would import the entire requirement, \( q_b \). But under a mandatory local content requirement, the prime contractor is obliged to source b in country X to the value of \( \beta (p^* a q_a) \). The cost of meeting the local content requirement depends on the position and slope of the domestic supply curve, \( S_{xb} \). For example, in figure 3.2, if the achieved local content is \( q_b' \) at a (local) price \( p_{xb} \), the imported quantity is \( q_b - q_b' \) with the average cost of local and imported supplies increasing above \( p_{yt} \). The price premium associated with offset-induced import substitution will be large, approaching \( p_{xb} - p_{yb} \), if the overseas contractor exercises market power and applies the high local price, \( p_{xb} \), to the imported content of the
transaction. In small countries, the domestic supply schedule is likely to be relatively inelastic and close to the vertical axis as there are not many defense-capable subcontractors. Thus substantial premiums will need to be paid to attract high-cost (less efficient) domestic subcontractors into the supply chain. When local content requirements are substantial and mandated, prime contractors can usually be expected to factor in any associated higher costs and raise their bid price (for a), \( p^* \), accordingly. Alternatively, overseas suppliers may renege on their offset promises. This is likely to happen when price premiums for local content are not allowed under the offset guidelines and prime suppliers have significant market power. In any case, foreign prime contractors always retain the option to reject transactions involving offset obligations if the deal would become unprofitable by meeting them.

Arms importers with enough market power to reduce arms sellers’ profits may achieve that using normal procurement mechanisms (competitive tenders) rather than mandatory offsets requirements. As we argued earlier, if the DPA has market power vis-à-vis suppliers, the application of mandatory offsets—here in the form of local content requirements—deprives it of a degree of freedom in negotiations to achieve optimal outcomes.

Is there any reason, from X’s standpoint, to apply mandatory local content requirements? In small countries, governments often argue that local producers are potentially world competitive but have had no opportunity to break into the supply chains of international prime contractors. In terms of figure 3.2, policy makers believe that the true local supply schedule is positioned (or could easily shift) below \( S_{xb} \), so that local content could potentially be obtained at prices not higher than \( p_{yb} \). They also believe that foreign prime contractors are unaware of the true potential of local suppliers; that the primes falsely regard \( S_{xb} \) as the true domestic supply schedule. Local content requirements are argued to be addressing an information imperfection and expected to result in import substitution at no extra cost. However, similar outcomes could be achieved through normal competitive tendering if the DPA combined its primary requirement for imported weapons with a specific local content demand that the successful contractor would have to comply with.

Policymakers also argue that production set up under local content requirements will offer lasting benefits beyond the completion of the initial contract. But if local suppliers are uncompetitive or only just competitive, the diversion of trade to local sources is likely to be discontinued once the procurement transaction is completed. Since many nations use arms procurement to force relocation of footloose elements in global supply chains, local sourcing is likely to cease unless there is a reasonable prospect of the international prime winning further work in the host economy.

**Bundling**

Next we consider mandatory bundling of requirements. In figure 3.3, country X requires \( qa \), which could be supplied by a firm from country Y at a price \( p_a \), expressed in a common convertible currency. X’s demand and Y’s supply are shown as \( D_a \) and \( S_a \), respectively. To simplify, assume as before the requirement for a to be fixed. Under its mandatory offset scheme, X requires a to be supplied jointly, by the same
vendor, with another product c. This requirement is shown on a second horizontal axis, orthogonal to the first. Normally, $q_c$ would be available at price $p_c$, given X’s demand schedule, $D_c$, and the supply schedule, $S_c$. The combined requirement for products a and c is shown by the coordinates of $q_aq_c$ in the horizontal (product-product) plane. For country X, the combined cost of sourcing $q_a$ equals $p_aq_a + p_cq_c$. The supplier of the joint requirement need not be the producer of c. The vendor is simply the package integrator on the supply side.

X expects the benefits of bundling, equivalent in value to a certain proportion of the primary requirement, $\chi(p^*_a q_a)$, to be achieved at no extra cost to itself. (As before, the parameter $\chi$ can be equal to or smaller or greater than one.) Thus, in figure 3.3, $q_c$ is to be supplied as an offset jointly with product a but at no extra cost ($p_c=0$) so that the combined cost to X of the bundle $q_aq_c$ should be no greater than the cost of buying a only, $p_aq_a$. This assumes that either the marginal cost of supplying c is zero—an untenable assumption—or that the purchaser has enough market power to force the supplier to use profits made on product a to cross-subsidize the unprofitable delivery of package enhancement c. If the marginal cost of supplying c is positive and the buyer has no market power relative to the supplier, the vendor is almost certain to factor expected offset demands into its offer price for product a. In figure 3.3, the price of a would then be raised to $p^*_a$ so that the buyer pays the full price for product c.

As with countertrade, suppliers are unlikely to be hurt by mandatory bundling arrangements as they can walk away from such transactions if they do not believe them to be profitable. Some arms suppliers may accept offset obligations with no intention of discharging them later.

What is the reason, from X’s standpoint, for bundling the requirements together? First, some products are characterized by strong technical complementarity, i.e., components must be combined to produce a system that works. In this case a and c must be combined to form the complex product ac. Such components may be sourced from different producers, possibly from different countries. The package provider (system integrator or prime contractor) is responsible for combining them. Second, there may be scope-related efficiencies. On the demand side for example, the buyer may bundle different requirements to lower the administrative cost of contracting them out and in the belief that such scope-related efficiencies will be achieved by large, diversified contractors. In figure 3.3, the buyer may believe that a diversified supplier combining
delivery of a and c into bundle q_aq_c can lower the cost below \((p_aq_a) + (p_cq_c)\) and will pass on cost efficiencies in the form of a lower offer price. But as in the previous cases, X does not need a mandatory bundling requirement to achieve this outcome. Demands for the combined delivery of two or more products may easily be incorporated in normal tender specifications.

Mandatory offset demands are less likely to achieve efficient outcomes as they do not refer to the specific additional requirements that should be bundled with the primary ones. Invariably, they are defined in terms of nominal dollar amounts calculated as percentages of arms imports and refer to some vaguely specified package enhancements: technology transfers, training, or other broadly-defined products deemed without further valuation to be of benefit to the purchaser (direct offset) or, even more vaguely, to society at large (indirect offset). If there are no complementarities between the offsets and the primary requirements, the purchaser may have been better off sourcing the two requirements separately from different vendors. If the arms supplier has no competitive advantage in bundling additional offsets with arms deliverables, it will unavoidably be more costly for it to include offsets in its offer and, under a mandatory offset scheme, these costs will be anticipated at the time the arms supplier makes its offer to X. In some cases, the DPA may have market power to limit price-raising by suppliers. If it does, the DPA might be better off by buying the two products separately and using its bargaining power to secure price cuts in each.

The problem with mandatory bundling requirements is not the bundling of requirements per se, which may be optimal when specified and negotiated with precision. Since any package enhancement that meets the nominal target calculated as a percentage of arms imports is deemed to be of equal benefit, it is the untargeted nature of bundling-based offset demands which may prevent the achievement of optimal outcomes. This is often combined with a naive belief that such package enhancements can be extracted from suppliers at no cost.

**Conclusion**

Why do governments, despite all the doubts about the efficacy and social usefulness of such policies, persist with mandatory, broadly targeted offsets rather than leaving DPAs to negotiate specific offsets on a case-by-case basis when advantageous? At the least, governments must lack confidence in the negotiating and market scoping skills of their procurement agencies. If an agency has market power to counter the monopolistic power of large international prime contractors, it should be able to use it effectively with or without offset obligations. If it lacks such power, the application of mandatory offsets will not provide the benefits it seeks.²

Individual countries may argue that since everyone else insists on offsets, international suppliers price them in as a matter of course—so they should demand offsets themselves as they are paying for them anyway. Against this, buyers with any market power at all can negotiate price discounts as easily as package enhancements—and their preference for offsets remains to be explained.

On the face of it, government procurement agencies seeking to engage suppliers under offset schemes are doing nothing different from normal market operators attempting to
exercise market power in their best interests. But when such reciprocal arrangements take the form of mandatory offset requirements, and the buyers become “so inflexible that they insist on an ‘in kind’ package enhancement (rather than an equivalent or greater price discount), their behaviour undermines their own best interests by restricting their options” (Hall and Markowski, 1996, p. 309). When offset requirements are bureaucratically mandated and applied broadly to some vaguely specified national interest (e.g., employment, foreign currency savings, or technology transfer), it is difficult to evaluate the net benefits that may or may not exist.

Notes

The authors are most grateful to Jurgen Brauer for many insightful comments on an earlier version of the chapter.

1. As the term “local content” suggests, offsets arrangements are normally applied to foreign vendors while local prime contractors are exempt from such offsetting requirements. But the distinction between foreign and local may be difficult to apply in practice. The prime contractor may, for example, be a local subsidiary of a multinational firm. The prime may also be a local system integrator that imports a significant proportion of its inputs.

2. Offset obligations are normally met after a defense contract has been signed and—usually—after delivery of the arms or weapon system has taken place, or at least commenced. (The main exceptions are offset credits which may result from contracts completed earlier.) This means there is scope for suppliers to promise offsets before the contract is signed but then to renege on their obligations later, or offer less value than the purchaser had been led to expect. Given the difficulty involved in pursuing a large, overseas contractor and the costs of enforcing a contract, purchaser governments are often exposed to risk when incorporating offsets in a deal that they would avoid if the transaction were an unencumbered money payment for a weapon system. On this topic, see Taylor (2004).

References


4
Economic aspects of arms trade offsets

Jurgen Brauer

Introduction

The literature on arms trade offsets (and offsets generally) is cluttered with a babel of terms. These include: direct and indirect offsets; commercial and industrial countertrade; simple and multiple barter; bilateral government trade agreements and bilateral government framework agreements; compensatory arrangements; clearing arrangements; economic cooperation agreements; coproduction; licensed production; subcontractor production; overseas investment; buybacks; technology transfer; and switch trade. Authors arrange these terms into a plausible order and proceed from there. The major themes they then address are captured in the following questions:

1. Are arms trade offsets part of normal trade relations or are they in some sense “extra-normal” and, if so, why would that matter?
2. Why are arms trade offsets agreed to? What economic theory (or theories) would explain offsets? What are the economic rationales of the players involved?
3. Are arms trade offset agreements economically efficient? Is social welfare maximized? What is the benefit, net of cost, for whom? In a word, what is the empirical evidence?
4. What, if anything, should be done about arms trade offsets?

The first question is well addressed in this book by Markowski and Hall (chapter 2) and by Taylor (chapter 3). The objective of this chapter is to address the remaining questions.

Economic theories of arms trade offsets

The first part of the second question asks how economic theory explains the existence and persistence of voluntary or of mandatory countertrade and arms trade offsets. Important pieces include Murrell (1982), Banks (1985), Mirus and Yeung (1986a, 1986b, 1987), Hennart (1989), Udis and Maskus (1991), Caves and Marin (1992), Amann and Marin (1994), Hall and Markowski (1994), and Taylor (2000). A good review is available in Martin (1996, chapter 2). Briefly, one set of explanations revolves around international trade conditions. For example, since an overvalued currency inhibits exports (by making them too expensive on world markets) an arms trade-related indirect offset purchase agreement essentially amounts to a selective devaluation to stimulate exports in the chosen sector. Another example: countries facing difficulties borrowing on international financial markets to finance arms imports can circumvent this difficulty by engaging in
non-monetary offset trade. Also, since barter by its nature is statistically less visible than monetary transactions, it is possible to engage in difficult-to-detect price discrimination to dump product on the world market that otherwise might be difficult to dispose of.

Another theoretical offering suggests that buyback requirements—instances in which the arms seller agrees to invest in physical plant in the purchasing country and to buy back a certain proportion of the output produced there—serve to hold the arms seller hostage to its own exported plant technology. In this case, uncertainty about the quality of the transferred technology is mitigated by sharing the risk with the seller. The seller is unlikely to dump outdated technology on the buyer if the seller has to buy back part of the output produced. A related and intriguing explanation comes from the observation that licensed technology generates a revenue stream only so long as the technology is current and competitive. Since technology depreciates arms sellers possess an economic incentive to license technology to arms buyers in an offset deal. Yet another set of explanations revolves around search and transaction costs. Small-country arms buyers face steeper market penetration costs for non-defense items than established large-scale international conglomerates do. For example, in 2001 Boeing Corporation rang up sales revenue of US$58 billion. This would place it as number 45 on the world-GDP list and would exceed the GDP of many of its government clients. Thus, an offset by which Boeing agrees to market products on behalf of its client may be a potent tool to penetrate foreign markets.

Furthermore, Hall and Markowski (1994) argue that the realities of international trade far exceed in complexity simple textbook cash-for-goods ($3 for a hamburger) markets. Many international trades are joint product trades, so complex that there may well exist economies of scope in drafting complex contracts involving a variety of countertrades. In essence, they argue, countries are not just buying arms; they are buying complex bundles of goods and services and wish to minimize associated transaction costs. In a word, “in a world of imperfect markets, oligopoly rents, complex transactions and asymmetrical information, offsets might enhance the welfare of the purchaser” (Martin and Hartley, 1995, p. 127).

All of these theories can be read to rationalize arms trade offsets after the fact. They merely suggest that, in principle, offsets may entail net benefits when compared to the status quo and that the issue needs to be decided empirically. Comparing the welfare effects of arms trade offsets to the status quo of international trade relations is pragmatic but intellectually dicey. For instance, it is surely inappropriate to deal with an overvalued exchange rate by means of arms trade offsets. It is surely inappropriate to deal with access to the heavily protected US and EU textile and agricultural markets with an arms trade offset. And it is surely inappropriate to assume that government makes optimal resource allocation decisions in the first place when deciding on certain levels of arms imports and associated offsets. Who is this “government”? Who makes decisions for whom? This leads to the next section which examines the players involved in offset deals.
The arms trade offset players: who wants offsets, and who is opposed?

The second part of the second question asks who are the interested parties, the players, in the offset game, and what are the benefits they might derive or the costs they might bear? Here is one list.

The exporting firm (i.e., its management and shareholders)

Firm wish to maximize profits. If deals without offsets maximize profits, those deals will be agreed to. If deals with offsets maximize profits, they will be agreed to. One claim made by arms producers is that without offsets, sales will be lost to competitors who do offer offsets. It is a buyers’ market, and offsets are a condition of staying in the market. For general commercial products that may be true; but for military items—especially major weapon systems—this is a disingenuous argument. If the United States government decided to restrict international arms sales, the likes of Lockheed Martin and Boeing would not go out of business. There will simply be less business, not no business, possibly leading to higher prices for purely domestic procurement. (But I will show later that this is unlikely, at least for the case of the US.) Arms trade offsets are a condition of business only inasmuch as governments jointly permit the practice.

The exporting firm’s employees, and its union(s), if any, and the communities in which the workers live

Employees, especially unionized ones, can be counted on to oppose competition in the output market. If there were no competition, unionized employees as the seller of labor services would hold effective monopoly power and possess the ability to extract rent from their employer. Accordingly, the US record is unambiguous: labor unions and their spokespersons always oppose arms trade offsets, especially in the form of coproduction and licensed production, on the argument that jobs would be shifted abroad. Union representatives routinely call for greater government regulation, not of arms trade, but of competitive arms trade. The communities in which employers and employees live potentially lose tax revenue and are opposed to direct offsets, whereby production might be shifted to another country, also.

The exporting firm’s subcontractors, and their workers and communities

In many instances, arms manufacturers structure offsets such that component production undertaken by subcontractors is outsourced to the buying country. In this case, the prime contractor and its employees are held harmless (or even gain), but the employers, employees, and communities of the subcontractors will be opposed.
The exporting country’s non-military firms

In a famous case that continues to traverse the literature, Northrop Corporation sold 64 F-18 aircraft to Finland. Part of the deal involved selling Finnish papermaking machinery in the US: an offset. Valmet, a Finnish company, offered such a machine to International Paper Company in the US in direct competition with a US-based firm, Beloit Corporation of Wisconsin, a subsidiary of Harnishfeger Industries. Beloit did win the contract but barely broke even on it. They had to give up profits on account of the Finnish competition. The case inspired US Senator Russell Feingold (D-WI) to sponsor an amendment to the US Arms Export Control Act of 1994, prohibiting “third party incentive payments to secure offset credits.” Undoubtedly, offsets can hurt non-military firms. But what Senator Feingold, and others, failed to observe is that the profits the Wisconsin firm lost are the profits International Paper won. The net effect to the US economy was zero.

The government of the exporting firm’s country

If arms trade offsets assist manufacturers of military goods to stay in business and maintain a certain level of employment and if, simultaneously, subcontractors and non-military business lose employment on account of direct and indirect offsets, the government—the presumed impartial arbiter of all things economic—is in a bind. It would need to consider the net benefits to the country. But the evidence that it does so is thin, in part because the possible effects of offsets ricochet around the economy, as in the Feingold example. Indeed, even if Beloit had lost the sale altogether to the Finnish company, it would still be true that the loss to one US company equals the gain to another.

It is said—and here I pick up an earlier theme—that arms exports, by increasing the production run, lower the average cost of weapon systems and thereby the taxpayers’ economic burden. True, in theory: if fixed cost equals $1,000 and incremental, per-unit cost equals $100, then a 10-unit production run costs $1,000 + (10×$100) = $2,000, or $200 per unit. A 20-unit production run would cost $1,000 + (20×$100) = $3,000, or $150 per unit. Thus, for a 10-unit domestic procurement ordered by government (and a 10-unit order by another government), the domestic taxpayer pays $1,500 instead of $2,000. In practice, however, it is little appreciated that a very large chunk of United States arms exports is in fact US taxpayer subsidized. In FY 1995/96, US taxpayer subsidies of US arms exports amounted to nearly $8 billion (Hartung, 1996, p. 33). This equaled about two-thirds of the total $12 billion US arms exports that year. In my example, the US taxpayer pays $1,500 for the ten units for domestic use, but also pays for two-thirds of the other, exported, ten units. That is, roughly, 7×$150 = $1,050, for a total taxpayer bill of $2,550, or about 25 percent more than the smaller 10-unit production run at higher average cost (i.e., $2,550 vs. $2,000). The $8 billion arms export subsidy is large enough for each of 160,000 arms export workers to take a permanent, taxpayer-financed vacation at $50,000 a year. On the face of it, US arms exports per se are a bad deal for the US.
For the arms importing country, many benefits are claimed for arms trade offsets. Preservation of foreign exchange, employment creation, and technology transfers are among those most often mentioned. I already suggested that these claims may not hold up to factual scrutiny. I examine this in the next section of this chapter.

These would gain, inasmuch as their respective counterparts in the arms exporting country lose. Component production, coproduction, or licensed production obviously create benefits, narrowly construed. But the economist asks at whose cost these benefits are purchased, and what portion of the cost is borne by foreigners and what is borne by the importing country? Suppose for instance that a $3 billion arms deal results in $3 billion worth of compensating offsets directed toward indigenous arms component production. That means that $3 billion worth of taxpayer revenue to purchase the arms has been directed, via the offset, to arms component production and has not been directed into health, housing, and education. The presumption therefore is that the social rate of return on armament component production exceeds the social rate of return on health, housing, and education but this is rarely, if ever, considered or explicitly calculated (and I would surmise that the comparison would not be favorable to the military sector, at least in the case of developing nations).

If a $3 billion dollar offset requires me to undertake offset investments in country A, I obviously will not invest wherever else I might have invested, such as in country B. Third-parties will lose. Thus many authors argue that by encouraging bilateralism, mandatory offsets undermine international free-trade agreements. Indeed, for this very reason the WTO Agreement on Government Procurement expressly forbids offsets in government procurement although exceptions are granted to developing countries and, in article 23, further exceptions are granted on account of reasons pertaining to national security and public health. The agreement is “plurilateral,” meaning that not all WTO members have acceded to, and are therefore not bound by, its provisions (see http://www.wto.org/).

My third question asks about the evidence. The evidence is weak (and weak evidence should not be taken to support the case for offsets). Anecdotes abound, but case studies are few, and none are comprehensive in the sense of an economic audit that would assess
all costs and all benefits to all people. Consider the following points. First, there is evidence that the US loses some military jobs on account of arms trade offset agreements with highly industrialized countries such as the Netherlands and Switzerland (Dirksen, 1998; Markowski, 1998). The Swiss and the Dutch nonetheless exercise careful control over the specification of arms trade offset agreements to ensure the precise direction into which offset-resources are steered. Almost never are they aimed at increasing indigenous military production capacity. Contrast this to the case of Spain, which had to abandon dreams of an integrated, comprehensive, indigenous arms industry to be generated via arms trade offsets (Molas-Gallart, 1998). The evidence further suggests that offsets are tiered: developed countries (such as the aforementioned Switzerland and the Netherlands but also the UK and Germany) are able to demand and usefully link offsets to their own military industries. In contrast, so-called newly industrialized countries, NICs, tend to demand and integrate offsets more into non-military industries, and LDCs on the whole integrate into non-military industries (US GAO, 1996; also see Matthews, 2002, p. 197).

Second, after fifty years of substantial offset trade, and after the arms trade and offset hubris of the 1980s, why would—the odd exception notwithstanding—this general observation, that DCs tend to negotiate direct arms trade offsets and LDCs tend to negotiate indirect offsets, obtain? An answer is found in Brauer (1991; 2000). In empirical work he found an almost one-to-one correspondence between a country’s potential to produce arms and its actual arms production. He further found that it is not actual arms production that creates the potential, but that the potential permits actual arms production. A country’s arms production potential depends on the state of its human and physical capital. What the limited empirical evidence of the offsets literature suggests is that it ties in to Brauer’s findings. As a group, developing nations do not posses the requisite capital, neither to engage in arms production nor arms coproduction, and that technology transfer and training do not transfer this capital in a self-sustaining manner. These capabilities apparently cannot be imported; they need to be grown indigenously. Why won’t the vaunted technology transfer be self-sustainable? Because the transferring country does not simply stand still while its “beautiful princess” (Williamson, 1983) is shipped abroad and effective competition is created. Instead, the exporting country will further develop its technological prowess, once more leaving the receiving country behind.

Third, even indirect (non-military industry) offsets do not necessarily benefit the importing country. Consider the argument that arms trade offsets conserve scarce foreign currency reserves. A simple example shows why this argument is incorrect. If South Africa sells $1 worth of mangoes to the US, South Africa’s US dollar reserves increase by $1. If South Africa buys $5 worth of American apple pie, its US dollar reserves fall by $5. The net foreign exchange cost to South Africa is $4. Now suppose that there is an offset deal by which South Africa pays the Americans $4, instead of $5, for their apple pie but requires them to sell the mangoes on its behalf in the US market. The Americans get $4 directly and another $1 from the mangoes South Africa ships to the US for the Americans to sell there. Thus, the Americans ultimately get their $5 (although at extra cost since they are not in the mango business which they will need to learn). To South Africa, the net foreign exchange cost is still $4, namely the $4 it paid for the apple pie and the mangoes it shipped but did not sell. More formally, an arms trade offset “operation allows a country to import without having to spend foreign exchange but does
not allow it to obtain any from the world market either” (Miramon, 1985, p. 27). Indirect offsets are an attempt to shove non-competitive product onto the world market, thereby betraying the underlying economic inefficiency.

Fourth, suppose the receiving country argues that an offset does not displace trade but generates genuinely new, additional trade. It can be shown that this is wrong, too. Consider this example: suppose South Africa agrees to purchase military items from the EU to the value of R30 billion with a 100 percent offset requirement. The EU contractors agree to find someone willing and able to import R30 billion of South African agricultural products (fruit, juice, wine). From the EU’s point of view this is a trade displacement, say from Chilean fruit, juice, and wine suppliers to South African suppliers. In another year, however, suppose that Chile signs an offset contract of equivalent value, requiring the EU to purchase Chilean fruit, juice, and wine. Again, this must result in trade displacement, this time perhaps against the continuation of the South Africa fruit, juice, and wine exports to the EU. The lesson to be learned is that for offsets to carry a genuine economic impact, world demand for the underlying products must be increased. But world demand for commercial product is hurt, not helped, by extra military expenditure. Offsets do not offer additional trade: they merely displace it and probably destroy some of it. In addition, Miramon argues that it is “hardly to the advantage of the developing countries to hand over the responsibility for marketing their…goods to foreign trading partners …for whom this is a secondary activity” (1985, p. 27).

Fifth, what about offsetting physical investment in the receiving country? I mentioned previously that technology transfer offsets provide an opportunity to dispose of technology that is on the verge of being outdated. Offset receiving countries recognize this and can partially protect themselves if they negotiate buyback deals (which obligates the technology exporting country to buy back product made with the transferred technology). Still, an outdated technology combined with low-cost labor might make a buyback deal attractive to the offset offering firm. Alternatively, even if I buy back competitively made product, at some point in time the offset agreement ends, and unless the receiving country has the ability to sustain the momentum, it will fall behind again (which is an implicit argument in Brauer, 1991; 2000). Another line of critique would ask how those unfamiliar with the transferred technology can properly evaluate what they receive? Or perhaps the US does transfer up-to-date technology but counts on being able to consistently outpace its own transferred technology (see Sperling, Louscher, and Salomone, 1995, p. 296). To those who would sing the praises of offset-related technology transfer, it should at least give pause that the US technology lead is widening, not narrowing.

Sixth, it is at times demonstrated that the offset granting exporting firm can benefit by locating competent subcontractors in the offset receiving country. For example, offset consultants Redlich and Miscavage conducted a meeting that brought together various divisions of a major US prime contractor with potential Israeli business partners. The consultants concluded that although “the seminar was obviously connected to the client’s offset interests in Israel, it was conducted with the interest of finding business opportunities that the company would want to pursue regardless of any offset credit they might receive” (1996, p. 403). From an economic point of view, what the prime contractor should have done anyway as part of its due diligence obligation toward
shareholders cannot be credited as benefits due to offsets. Likewise, any Israeli business thus generated cannot be credited to the offset deal either since, again, it is business that should have taken place anyway if they had submitted to due diligence in the market place as well.

What, if anything, should be done about arms trade offsets?

My fourth question asks what, if anything, should be done about arms trade offsets. I make a single general point, in three parts. First, if the underlying issue is economic development and growth, the developed countries would do best simply to open up protected markets (see also Miramon, 1985). Legions of people are opposed to what is nebulously referred to as “globalization,” but in my view the greater scandal by far is that a few EU and US farmers are subsidized to the tune of hundreds of billions of dollars a year, sheltered within “non-globalized,” protected home markets, even as millions of peasants around the globe could substantially benefit from an open world agricultural market that would spark a production and export boom in the poor countries. As usual, the problem is not the presence but the absence of free, private, competitive markets. If the issue is economic development, the developing countries should press their counterparts in the West much harder on this issue (instead of on arms trade offsets).

Second, I believe that each country needs an arms trade offset audit team whose task it would be to measure the full economic cost of each proposed deal. This is based on the notion that where public funds are expended, costs and benefits should be publicly accounted for. Just as private companies need to account to their shareholders and have their accounts audited and certified to fairly represent the company’s affairs, so public accounts likewise need auditing. The offset audit team should certify that the full economic costs and benefits have been accounted for and publish the details for public inspection. The public-at-large can then decide whether the losses or profits are worth the original objective. There is no need to (or danger of) revealing military and trade secrets. After all, what type of equipment a/o services are to be imported is widely known and reported in the trade press. But especially in countries where external security threats are minuscule and where it can reasonably be argued that there are severe non-military related public needs, such as in the areas of education, housing, and health, elected governments owe it to their constituents to weigh the full economic cost and benefit with special care.12

Third, economics is about the material and immaterial well-being of all people.13 By training, economists cannot but look with great unease at analyses that are limited to one or the other interest group (labor unions, employers, one country). Economists are global public servants. An economic valuation of arms trade offsets must therefore ultimately ask what the contract contributes to the lives of the people that finance it. And it must ask this question not only with regard to the flow-back of funds (the offset part of the deal) but also, and especially, with regard to the out-flow of funds—the arms deal itself. And so I squarely question the notion that developing countries need to import major weapon systems in the first place. The proportion of violent conflict within and among developing nations in which major weapon systems played an important role is small. We know that most wars are small-arms wars and that most killings occur on account of dismissively
labeled “small” arms. We must therefore question that imports of major weapon platforms and weapon systems enhance the security status of the importer. We cannot simply take the stance, as Hall and Markowski do, that once “the objectives of defence procurement have been agreed,” the only question is if “an offset requirement [is] an efficient means of pursuing them” (1994, p. 176). Public choice theory teaches us that there can be no simple presumption that the objectives of defense procurement have been agreed nor, indeed, that the objectives of defense itself have been agreed—and yet public funds are expended. My call for offset audits would go a long way to ask and answer exactly what sort of security purchases a country really wishes to commit itself to. It may yet find that there are plenty of feasible, viable alternatives to imports of major weapon platforms and systems. 

And from the exporter’s side, the ultimate question also is not in terms of pure economics, but in terms of political economy, normative even: should arms and arms technology be transferred? As Hartung points out, the US faced its own weapons “the last five times the US has sent significant numbers of troops into combat” (1996, p. 3). This echoes Ann Markusen’s statement, as a member of the US Presidential Offset Commission, that the commission should make “the national security issue a central feature of its work and conduct hearings in which experts on arms trade proliferation and the contribution of offsets thereto are asked to testify” (Markusen, 2001).

Notes

I thank Mr. Matthias Spoerle for research assistance.

1. This particular list is taken, mostly, from Neuman, 1985, tables 1 and 2. She strives to bring some conceptual order to these terms. For similar efforts, see e.g., Korth, 1987, chapter 1, and Martin, 1996, chapter 2.


4. With reference to year-2000 revenue, Fortune magazine ranked Boeing as number 16 on its well-known Fortune-100 list (www.fortune.com; accessed 16 August 2002). The country GDP is from the World Bank (www.worldbank.org; accessed 16 August 2002) and refers to year-2000 GDP. Company sales volume and country GDP are not of course directly comparable (one is revenue, the other is value-added) but does suggest an order of magnitude. On this measure, Wal-Mart’s $220 billion sales (Fortune’s #1 ranked company) would rank #20 in the world-GDP list, ahead of Turkey’s GDP of $199 billion, and nearly twice as much as South Africa’s GDP of $125 billion.


9. This, apparently, is now recognized in South Africa as well (see Dunne, 2003).

10. Again, there are of course individual instances of effective competition being created by transferred technology. But individual instances do not appear to have accumulated to systemic change. And, again, the economic fact of the matter is that if technology transfer...
leads to more efficient component production, that should have been done in any case, even in the absence of offsets.

11. This is worth quoting: “The supplier nation can follow one of three strategies: seek to suppress the rate of technological diffusion; seek to ensure the development of technological innovation at a constant rate outrunning the rate of diffusion or imitation; or seek to control innovations.”
12. See Glewwe (2002) for a review article on the returns to education in developing countries.
13. See Frey and Stutzer (2002) for a review article on happiness.
14. As so often when it comes to military expenditure or military affairs, I find that governments are unduly impressed by those who would ask it for information. When government expends public funds, it ought to welcome—as a matter of routine —opportunities to have its actions examined and audited, especially by disinterested professionals.

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Arms trade and economic development

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5

Arms trade as illiberal trade

Ann Markusen

Introduction

The arms trade is at the fulcrum of the tension between an increasingly integrated world economy and an increasingly nervous world populace, where non-state actors—terrorists, insurgents, and crime gangs—use conventional weapons and unconventional techniques to disrupt, grab power, and create havoc. The arms trade must remain illiberal for security reasons, but its regulation must be tougher, multilateral, and more transparent.

The arms trade, precisely because of its exceptional security status, has been sheltered from the liberalized trade regime. Arms sellers have been free (or constrained by their governments) to refuse transfers to certain parties while arms buyers (chiefly governments) may extract commitments of 100 percent or more in countertrade or buy only from indigenous industry. Illiberal trade practices in this unique market have created a complex web of state-to-state, firm-to-state, and firm-to-firm relationships. Yet the world arms market and the defense industries that supply it are markedly more international today than they were a decade ago, and until the events of 11 September 2001, pressures from buyers, the defense industry, and the Pentagon dovetailed in favor of a more liberalized arms trade.

In this chapter, I chart the proliferation and changing nature of relationships—which I call “diagonalization”—in the international weapons trade. I then postulate a set of economic and security outcomes that appear linked to illiberal arms trade practices and to the phenomenon of offsets in particular. These include national hyper-specialization, competitive disadvantages for the non-arms sector, the transformation of defense contractors into trading companies, faster weapons proliferation, and an exacerbation of the one-team arms race, world over-spending on arms, and the rise of an international military industrial cartel (IMIC). I make the case for each of these and marshal what evidence I can on its significance, drawing on secondary data, published and trade association accounts, and interviews with participants in the process.

I pay particular attention to the role of offsets in the arms trade because they reveal the failings of a system that is both illiberal and one in which security concerns are subordinate to commercial aspirations. In the present environment, most nations and firms participating in or tolerating offsets are uncertain as to whether they gain or lose from them in the aggregate and are, in any case, skeptical that the growth in their use can be reversed. I argue that the damage from these forms of illiberal arms trade practices, in tandem with lax security oversight, is underestimated, severe, and increasing. Concerted multilateral and unilateral actions to curtail such practices by major market participants are in order.
The diagonalization of the international arms market

Until the end of the cold war, the major protagonists—the United States, the Soviet Union, Britain, France, Germany, and Italy—possessed cradle-to-grave defense industries which procured supplies within a single nation, engaged in research and development for a single government, and sold the great bulk of their output and services to that same government. The arms trade, while not unimportant, accounted for a relatively small share of the output of any nation’s military industrial complex and was largely conducted for strategic reasons by which to bind client states to the major protagonists. Relationships among actors were predominantly horizontal, i.e., between sellers and buyers within a single national market (see figure 5.1). For example, Rheinmetall sold primarily to the German government, Rolls Royce to the British government, and Boeing to the US government. Overlap, by which a company from one arms producing state sold to the government of another, was rare. While more complex than this—North-South and transatlantic trade has a long history, including offsets—up to the end of the cold war, the domestic market formed the major source of demand for most prime contractors (Keller, 1995, pp. 28–29; US Congress, Office of Technology Assessment, 1991, ch. 1; Neuman, 1985).

From 1989 to 1996, the arms trade shrank substantially (Gold, 1999). As world arms demand plummeted by 40 percent, the locus of production, especially of leading-edge weaponry, shifted from the former Soviet states in favor of the US in particular (see table 5.1). European and second-tier developing countries abandoned some weapon lines in favor of purchasing American systems that enjoyed the deep R&D pockets of the federal government and superior economies of scale. Even though the absolute value of American arms exports fell, the share of American firms’ output sold internationally rose significantly (table 5.2), and in some weapon lines reached 100 percent—the current sales of Lockheed Martin’s F-16 aircraft, for example. In a related implosion of large defense contractors, some firms merged across national borders, especially in Europe but also across the Atlantic (Markusen, 1999a, 1999b, 2000).

Since 1989, the horizontalized market has changed dramatically (see figure 5.2). For one thing, partnerships between firms—some mergers, some joint ventures—created vertical, cross-national bonds between large companies, such as the Lockheed-Martin/British Aerospace teaming up on the Joint Strike Fighter (JSF), the new partnership of Raytheon and France’s Thales (until recently, Thomson-CSF), and above all the ambitious EADS (European Aeronautic, Defence and Space Company), formed of the French Aerospatiale-Matra, Germany’s DASA, and Spain’s CASA. New teaming arrangements between governments, such as between Britain and the US on JSF, create vertical ties among buyers, too, though these are reportedly weaker than those between firms. In the JSF program, for instance, the US
and British governments deal respectively with Lockheed Martin and British Aerospace but spend little time talking to each other about the program.

New and more numerous diagonalized (cross-national) exchanges are taking place, as prime contractors in one country sell to government customers in other countries, and suppliers in one country sell to primes in another, often the result of offsets. A single offset deal on a large weapons system, for instance, might require an American firm to purchase components from several buyer country firms, to market agricultural output from farmers in those countries, and to transfer technology to an unrelated civilian firm whose goal is to sell into yet other international markets. The same firm, to sell the same weapons system into a Middle Eastern country, might have to invest in a new line of gasoline stations in Europe. And, for another Middle Eastern customer who is willing to pay, it might develop a state-of-the-art radar system that even its American sponsor does not yet enjoy.
In return for yielding up autarchic industries and national champions, many buyers have intensified their demands for offsets—agreements by the sellers to buy components, transfer technology, market unrelated goods and services, or invest in buyer country enterprises (US General Accounting Office, 1998). Their ability to do so was enhanced by the “buyer’s market” created by post-cold war excess capacity (Willett and Anthony, 1998, p. 2). Meanwhile, most governments are clinging to ambitious strategic and military policies while facing less-than-enthusiastic publics, parliaments, and legislatures. To try to finance their ambitions, they increasingly try to forge cooperative R&D strategies and to tie down future international sales even before a weapon emerges from the drawing board.

It is difficult to “unpack” the motivations of the multiple actors in this highly regulated, yet highly competitive market. The complexity of gains and losses, and initiatives and responses means that even large companies and government agencies are uncertain whether they are gaining or losing by engaging in offsets and partnerships. In the deliberations of the US Presidential Commission on Offsets in the Arms Trade, for instance, American government officials disagreed across agencies on the security and economic costs and benefits, while defense industry

Table 5.1: Military expenditure 1985, 1990, 1994, 1998 (Selected countries; index: 1998=100)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Britain</td>
<td>150</td>
<td>138</td>
<td>115</td>
<td>100</td>
</tr>
<tr>
<td>China</td>
<td>57</td>
<td>56</td>
<td>61</td>
<td>100</td>
</tr>
<tr>
<td>France</td>
<td>107</td>
<td>112</td>
<td>109</td>
<td>100</td>
</tr>
<tr>
<td>Germany</td>
<td>162</td>
<td>144</td>
<td>107</td>
<td>100</td>
</tr>
<tr>
<td>Russia/USSR</td>
<td>778</td>
<td>683</td>
<td>113</td>
<td>100</td>
</tr>
<tr>
<td>United States</td>
<td>142</td>
<td>141</td>
<td>116</td>
<td>100</td>
</tr>
<tr>
<td>South Korea</td>
<td>62</td>
<td>85</td>
<td>96</td>
<td>100</td>
</tr>
<tr>
<td>South Africa</td>
<td>207</td>
<td>261</td>
<td>163</td>
<td>100</td>
</tr>
<tr>
<td>Developing countries</td>
<td>106</td>
<td>110</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>Industrialized countries</td>
<td>169</td>
<td>157</td>
<td>111</td>
<td>100</td>
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<tr>
<td>World</td>
<td>154</td>
<td>145</td>
<td>106</td>
<td>100</td>
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<table>
<thead>
<tr>
<th></th>
<th>Britain</th>
<th>France</th>
<th>United States</th>
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<tbody>
<tr>
<td><strong>Arms exports</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>2,541</td>
<td>2,788</td>
<td>11,366</td>
</tr>
<tr>
<td>1996</td>
<td>1,773</td>
<td>2,101</td>
<td>10,228</td>
</tr>
<tr>
<td>1999</td>
<td>1,078</td>
<td>1,701</td>
<td>10,442</td>
</tr>
<tr>
<td>Change 1989–1999</td>
<td>–57.6</td>
<td>–39.0</td>
<td>–8.1</td>
</tr>
<tr>
<td><strong>Share of world market</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>6.8</td>
<td>7.4</td>
<td>30.2</td>
</tr>
<tr>
<td>1996</td>
<td>7.7</td>
<td>9.1</td>
<td>44.5</td>
</tr>
<tr>
<td>1999</td>
<td>5.2</td>
<td>8.3</td>
<td>50.7</td>
</tr>
<tr>
<td>Change 1989–1999</td>
<td>–23.1</td>
<td>11.6</td>
<td>67.8</td>
</tr>
<tr>
<td><strong>Exports/procurement</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>28.32</td>
<td>15.26</td>
<td>14.02</td>
</tr>
<tr>
<td>1996</td>
<td>25.49</td>
<td>15.80</td>
<td>17.44</td>
</tr>
<tr>
<td>1999</td>
<td>12.49</td>
<td>*</td>
<td>16.44</td>
</tr>
<tr>
<td>Change 1989–1999</td>
<td>–55.9</td>
<td>*</td>
<td>17.30</td>
</tr>
</tbody>
</table>

*Procurement data unavailable for 1999.

**Note:**


Officials admitted their concern with proliferation of offsets even as they defended their latitude to contract for them.

Two apparently anomalous behaviors serve as examples of the changes in this market. First, in a recent assessment of the armed services’ export reform effort in the 1990s, Major Isaiah (Ike) Wilson (2001) finds that practices have shifted away from a dominant concern with restraining proliferation toward an overarching concern with making the weapons sale “work” for customers, i.e., foreign governments. The services come to believe that they cannot afford all the weapon purchases and upgrades that they need without spreading the cost over a larger number of buyers. If offsets are part of the deal, their tendency is toward a permissive stand on these as well. In this way, they see themselves primarily as agents for the foreign buyer rather than as guardians of the American technological edge. Of course, the calculus is more complex than this—the
services strongly favor interoperability with allies, and so on—but Wilson argues that this is a major shift in attitude and practice inside the Pentagon.

Second, the major American defense companies, traditionally hostile to offsets, have come to see them as a part of their business, indeed as a service that they can offer and even profit from. In 1984, “a year-long study by sixty aerospace companies warned that offsets negatively affect US surge capacity” and pressed for an end to mandated foreign offsets (Neuman, 1985, p. 210, footnote 84; see also Hammond, 1990, p. 42). But in the past few years, major firms have set up extensive offset operations, manned by self-made deal-makers whose work is essentially that of a trading company—evaluating offset demands, marketing offset products, building plants in or working with potential foreign suppliers, searching for saleable technologies, training foreign firms’ managers and engineers, identifying sources of credit, bargaining with buyers over commitments and performance, trading offset credits and debits, and accomplishing the paperwork that documents the fulfillment of obligations. The cost of offsets—the transactions costs involved in fulfilling them—is currently running between 7 and 10 percent of the value of the arms sale, and thus we might expect that an equivalent share of personnel within the firm is now devoted to these activities. Concomitantly, the Aerospace Industries Association, a major US industry trade group, has developed a staunch position opposing unilateral action against offsets and approaches even multilateral negotiations gingerly (Johnson, 1999).

The proliferation of offset agreements and long-term offset obligations has introduced considerable diagonalization into our previously simple conception of the geo-economics of the arms trade. American and European firms, as the major sellers in the world market, are deeply engaged in relationships with governments and diverse kinds of firms in buyer countries. Because the American government refuses to broker offset deals itself, firms are forced to develop this expertise and exercise it. To make matters more complex, in some buyer countries offset deals are negotiated with Ministries of Economics, not Ministries of Defense. As soon as the Dutch Navy, for instance, decides to purchase an American weapon system, it hands off the contract to its Ministry of Economics to develop the offset component of the sale. In turn, the Ministry of Economics may require the selling firm to deal directly with a multiplicity of Dutch firms—as subcontractors, as technology recipients, and as merchandisers.

Offsets are a sizeable and long-term factor in the international arms trade. In the five years from 1993–1997, for instance, 35 reporting American prime contractors signed agreements with 30 nations totaling $19 billion in offsets on $35 billion in arms sales, with an average fulfillment period of 84 months. Over the same period, US primes fulfilled $12 billion in offset transactions, for which they received offset credit of $14 billion (US Bureau of Export Administration, 1999, p. i).

There is substantial evidence that offsets as a trade distorting practice are increasingly important in the international arms trade and that this trend will continue. A recent US Bureau of Export Administration study (1999, pp. i–iv) finds that although offset agreements have remained roughly equal in percentage terms over the prior twenty years worldwide, the number of countries resorting to them has increased, that more of them are moving toward 100 percent offset requirements, that contracts are more complex and lengthy, and that performance requirements have risen (see also US General Accounting
European offsets on American contracts rose from an average of 72 percent in the 1980s to 88 percent in the mid-1990s.

What can be said about the overall industrial, economic, and security dimensions of distortions that result from these trends? In what follows, I explore a series of distortions associated with the offset phenomenon. Offsets are only a subset of illiberal trade practices in arms—we could eliminate them without insisting that governments eliminate “buy domestic” practices. Indeed, in what follows, I assume the persistence of preference for domestic suppliers as a matter of economic and security policy, exploring only what would happen in the absence of offset arrangements. In the conclusion, in reflecting on offset policy, I return to the complex relationship between offsets and other illiberal trade practices, such as “Buy American.”

Industry distortions

Any less-than-free trade regime is hypothesized by economists to lead to distortions in the location and composition of industry and thus in the use of resources. As Zysman and Cohen (1983) conclude in their review, the arms trade is a prototype of the new mercantilism. Three axes of distortion can be traced in the case of arms sales in the presence of offset practices. These include national hyper-specialization in the arms industry, hidden losses to the non-military sector, and resource misallocation within defense-industrial firms. In this section, I take up each of these in turn, marshaling what evidence I can on the likely scale of each.

National hyper-specialization in weapons

If offsets were prohibited by international agreement, it is quite likely that the pattern of international specialization that held for the western allies up through the 1980s would have persisted to a much greater extent than it has. Countries would be less likely to opt to import weaponry from abroad, even if superior, if they could not extract economic activity and know-how in return for patronizing another nation’s industry. Seven of eight large American aerospace systems integrators, in a recent survey by the US Office of Management and Budget, expressed the conviction that they would lose between 50 and 90 percent of their export sales without offsets (US Presidential Commission, 2001, p. 32). Countries on balance would be buying more of their equipment in their domestic markets. The large, decade-long gain in the American export market share would have been truncated.

With offsets, a pattern of hyper-specialization is put into place where nations with superior technologies and products succeed in exporting these at the expense of underperforming buyer-country facilities. To a large extent, this specialization reflects differential government investments, themselves a function of size and economic success, in military R&D. At the same time, the size and vertical integration of these winner complexes erodes, as work sharing arrangements and subcontracts are awarded to firms in the buyer country. Of the offset obligations on the 180 US weapon systems settled by American firms in the mid-1990s, 37 percent of the transactions consisted of direct offsets (meaning that portions of the actual work related to the system sold were allocated
to the buyer country), 67 percent of which were in the form of subcontracts, and another 30 percent in technology transfer, training, coproduction, and licensed production (US Bureau of Export Administration, 1999, p. 29).

These offsets come at the expense of companies’ own operations and those of their domestic suppliers. For American military aircraft, parts imports grew by 74 percent over the period 1993 to 1998. The US Department of Commerce estimates that as much as one-third of current military aircraft parts imports could be the direct result of offsets. This figure does not take into account the cumulative effect of past offsets (US Bureau of Export Administration, 1999, pp. iii–iv). In fact, giving foreign suppliers a cut of the components business often leads to a permanent supply relationship. For example, in an F-16 coproduction arrangement with General Dynamics, a Dutch firm, DAF, became a subcontractor for landing gear equipment and subsequently supplied the gear not only to General Dynamics, but also to other manufacturers, competing with American subcontractors (Hammond, 1990, p. 31).

While the large systems integrators essentially export portions of their own capability through direct offsets, the larger burden falls on their suppliers (Mowery, 1999, p. 87). Although it is difficult to separate out offset impacts from other adversities in the 1990s, they have contributed to the disappearance of 50 percent of the arms supplier base in the US. One survey of suppliers suggests that offsets have to date played a minor role in this restructuring, but that in the future, as offsets become even more important, the adverse effects on suppliers will grow in significance (Bozdogan, 1997, p. 28).

American workers lose jobs under offset arrangements as well. In a sample survey of 64 transactions by the eight largest US aerospace companies over the period 1993 to 1998, a staff study for the US Presidential Commission on Offsets in International Trade found that direct offsets completed during this period supplanted $2.3 billion of US work, or 25,300 work-years—the equivalent of 4,200 full-time jobs per year, more than two-thirds of which was borne by their suppliers (US Presidential Commission, 2001, p. 28; see also Scott, 1999). In the same survey,

![Figure 5.3: US offset transactions by type, 1993–1997](image_url)
firms estimated that they would have lost $7.8 billion annually in sales, a drop of 50 percent, if they had not granted offsets, or a total of 85,800 work-years. However, this latter estimate is highly speculative (ibid., p. iii).

Offset practices, then, intensify weapon-platform specialization among nations and extend the division of labor across national borders. By encouraging the purchase of “best weapons” where “buy domestic” practices already distort trade, they are in fact eliminating distortion.

It is, in my view, impossible to determine with any certainty whether prime contractors secure or lose sales as a result of offsets. To the extent that offsets redistribute component production and outsourcing to “second best” producers in other countries or build their own future competition, they enhance trade-distorting international patterns of production. Disproportionate growth in parts imports suggests that this is a significant phenomenon.

Overall, then, for the nations specializing in systems integration (US, Europe), offset arrangements produce overall aerospace production gains, absolute increases in the aerospace trade balance, but relative gains in aerospace imports over exports as a result of the emerging international division of labor. In the US, for instance, aerospace exports (both civilian and military) rose by $18 billion (in constant dollars) between 1989 and 1999, 59 percent, while imports rose by $10 billion (also in constant dollars), or 104 percent (US Presidential Commission, 2001, p. 25).

The hidden injuries of privileged trade

Potentially greater than the distortion of capacity distribution within military production is the displacement of economic activity from non-defense sectors associated with offset practices. Subcontractors displaced by their prime contractor’s switch to a foreign product generally know that they have lost these sales. It is in

<table>
<thead>
<tr>
<th>Industry</th>
<th>%</th>
<th>Amt ($000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation equipment</td>
<td>60.4</td>
<td>2,633,147</td>
</tr>
<tr>
<td>Electronic/electrical equipment</td>
<td>14.1</td>
<td>613,601</td>
</tr>
<tr>
<td>Measuring &amp; analyzing instruments</td>
<td>11.9</td>
<td>518,246</td>
</tr>
<tr>
<td>Educational services</td>
<td>3.1</td>
<td>132,962</td>
</tr>
<tr>
<td>Technical services &amp; consultants</td>
<td>2.2</td>
<td>95,980</td>
</tr>
<tr>
<td>All other</td>
<td>8.4</td>
<td>365,451</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>4,359,387</td>
</tr>
</tbody>
</table>

Table 5.3: Direct and indirect offsets in the US, 1993–1997
<table>
<thead>
<tr>
<th>Industry</th>
<th>%</th>
<th>Amt (s000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation equipment</td>
<td>35.0</td>
<td>2,418,555</td>
</tr>
<tr>
<td>Electronic/electrical equipment</td>
<td>15.0</td>
<td>1,034,311</td>
</tr>
<tr>
<td>Industrial machinery, excl. electrical</td>
<td>12.6</td>
<td>869,661</td>
</tr>
<tr>
<td>Credit services</td>
<td>7.7</td>
<td>533,551</td>
</tr>
<tr>
<td>Business services</td>
<td>6.6</td>
<td>455,662</td>
</tr>
<tr>
<td>Technical services &amp; consultants</td>
<td>4.7</td>
<td>326,064</td>
</tr>
<tr>
<td>Investment services</td>
<td>4.0</td>
<td>277,136</td>
</tr>
<tr>
<td>Fabricated metal products</td>
<td>3.3</td>
<td>229,264</td>
</tr>
<tr>
<td>Educational services</td>
<td>1.4</td>
<td>97,956</td>
</tr>
<tr>
<td>Undetermined</td>
<td>1.6</td>
<td>110,939</td>
</tr>
<tr>
<td>All other</td>
<td>8.0</td>
<td>554,081</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>6,907,180</td>
</tr>
</tbody>
</table>


Non-related sectors that hidden injuries of privileged trade are inflicted, i.e., without the affected firms’ knowledge.

The mechanics of such displacement were dramatically showcased in an incident that led to the creation of the current Offsets Commission in the US. In 1992, a small northern Wisconsin paper company, Beloit Corporation, faced losing a large contract for papermaking machinery to sudden competition from a Finnish corporation, Valmet. In return for a profitable sale of F/A-18 fighters to Finland, Northrop was offering American firms incentive payments to buy the Finnish machinery (Lumpe, 1994). Beloit appealed to Wisconsin Senator Russell Feingold. Senator Feingold, a Democrat, teamed up with Senator Trent Lott, a Republican, to establish the Commission. Shipyards in Lott’s Louisiana jurisdiction were reporting that aerospace companies were offering offsets that cut into naval work by American contractors.

How common are such instances of artificial competition and how severe is the displacement? Figure 5.3 shows the distribution of offsets required of US arms sellers for 1993–1997 by type, value (on the horizontal axis), and the number of transactions (the number next to the horizontal bars).

Indirect offsets comprised about 61 percent of the $11.3 billion in transactions the 35 reporting American primes completed over the period 1993–1997 (US Bureau of Export Administration, 1999, p. 29). Half of these indirect offsets fell in the transportation equipment and electronics/electrical equipment categories, with another 16 percent in metals and machinery, and the rest in business, technical, and educational services (table 5.3). In contrast to direct offsets, which were far more heavily concentrated in aerospace-related industries, indirect offsets were more widely diffused, including motor vehicle parts, mining machinery, papermaking machinery, industrial chemicals, machine tools, wine and food products, and computer software (ibid., pp. 32–33).
Civilian aerospace and its suppliers are particularly affected by these indirect offsets, since prime contractors in aerospace are better positioned to know the civilian market than they do other industries. Civil sector imports into the US more than doubled between 1995 and 1998, increasing faster than the growth in civil aircraft as a whole. Of course, offsets are associated with civilian aircraft sales as well, and these are not reported to the government and are thus not included in the summary figures reported here. Scholars studying Japan have concluded that a large and internationally competitive auto parts industry in Japan was created by military coproduction and offset programs (Samuels, 1994; Flamm, 1999, p. 32).

The impact of offsets in less-closely allied sectors is almost impossible to gauge. As an approximation, we could speculate that because indirect offsets are actually larger than direct offsets, they contribute as much or more to resource misallocation as do direct offsets, at least in the US case.

The negative consequences of indirect offsets are likely to grow in significance over the coming decade. US data and anecdotal industry intelligence suggest that buyer countries are increasingly asking for indirect rather than direct offsets. Often, this choice is linked to strategic economic development policy, where countries foresee relative stagnation in the international military market and choose to use their offset credits to construct comparative advantages in sectors with greater income elasticity and growth potential. This dynamic could further exacerbate American crowding into the relatively mature aerospace industry and undercut diversification and expansion in other American sectors.

Evidence for this trend can be inferred from responses to the US Presidential Commission survey of large US aerospace companies. When offsets take the form of technology transfers, they improve the recipient firms’ competitiveness and rarely result in technology transfer back to the US. Of all offset transactions studied, 32 percent resulted in the transfer of US technology to foreign firms. Of these, 65 percent were moderately or very important in reducing the foreign firm’s costs or increasing its quality, while 29 percent were moderately or very important in enabling the foreign firm to compete in world markets, and 24 percent were similarly important in enabling competition in the US market. Only 4 percent of offset transactions resulted in the transfer of technology from foreign firms back to the US (US Presidential Commission, 2001, p. 35). Samuels (1994; 1997) documents the asymmetry in technology transfer in the US/Japanese F-15 relationship. Some 130 American firms are participating in teaching Japanese firms how to develop new capabilities and utilize new technologies.

Defense contractors as trading companies

An additional industrial distortion arising from offsets concerns the internal division of labor in the major contracting firms. As noted above, the growth and increasing sophistication of offset arrangements has prompted the creation of new occupations and areas of expertise within companies (Hammond, 1990, p. 17.) Hammond describes these new functions as follows:

“…defense contractor offset organizations are typically fairly small but high-powered. They are not internationally based but have the majority of
their workers in the USA. The jobs are demanding, require special skills, are stressful and have more in keeping with venture capital firms than management in a manufacturing context. Increasingly, the offsets, more than the products themselves, are the critical aspect of obtaining a contract” (Hammond, 1990, pp. 42–43).

One indicator of the significance of this activity is the emergence and fast growth in recent years of the Defense Offsets Industry Association (DOIA). DOIA brings together American industry offset employees, government officials, and sometimes representatives of buyer nations to share information on the problems and challenges of negotiating offsets. Because the offsets world is changing so rapidly, they meet every six months.

The growth of offset efforts has forced companies to develop capabilities that are not part of their traditional “core competency.” Individuals engaged in this work report that at DOIA conferences, a robust topic of conversation is the convoluted career paths by which industry people end up doing offsets. Sometimes consultants must be brought in to deal with certain types of demands, and sometimes firms decide to outsource the job of, say, selling foreign goods in unrelated fields into the American market. Sometimes, in desperation, a firm will attempt to buy offset credits in the market from brokers who have emerged to fill this role.

The resource misallocation associated with this effort can be roughly gauged by the industry’s current estimate on the total cost of offset management—around 8 percent of the value of an export sale. Hammond concludes that “the costs of financing countertrade deals are higher than if access to regular credit markets was available” (Hammond, 1990, p. 51). He points to telephone and travel costs inflated by long lead times and legal and monitoring expenses. Contractors attempt to externalize this cost by asking the buyer country to absorb it, but this does not always work. In fact, the seller and buyer are by this point engaged in something close to bilateral monopoly—the buyer will attempt to extract as much as possible of the consumer surplus from the selling firm, a surplus enhanced by the fact that the development costs have already been covered by the US seller. Because the buyer can threaten not to buy the product, or may be willing to buy elsewhere if its conditions are not met, defense contractors sometimes cover this cost out of profits, which are reputed to be substantially higher on export sales than on sales to the home government.

This resource misallocation is mirrored by a similar commitment of personnel within the buyer nation to negotiating its side of the contract. Hard bargaining is not restricted to the largest and European buyers—the Netherlands, Greece, and South Korea are currently viewed as the most sophisticated at extracting offsets. Just as the American defense contractors have created their own trade association, the buyer nations, led by the Dutch, have created a twenty-one country consortium of nations sharing information and techniques for crafting offsets. It is quite likely that this network will quicken the pace of learning about smart buyer offset practices across countries.
American national security policy rests squarely on the nation’s superiority in military technologies and weapons systems. That superiority is contingent upon the ability to control the proliferation of conventional weapons. To the extent that offsets multiply the possibilities for leakage of leading edge weapons and the technology for producing them, they undermine national and world security. Even where the current system cost and interoperability concerns favor technology sharing, the export of current generation military aircraft and other systems can and does end up becoming an argument that the industry and armed services use to push for the next generation sooner than they otherwise would. This is costly for taxpayers and contributes to an unnecessary arms race among allies (see also Markusen, 2001).

The United States has one of the strongest licensing regimes in the world, but enforcement is inadequate. Diversion of technologies to unauthorized uses and to prohibited third parties happens frequently. Although there is no systematic study of these lapses available, several cases can be cited, many of them involving current or past offsets:

The Japan Aviation Electronics Industry was discovered to have illegally sold US licensed weapons components—gyroscopes and accelerometers for Japan’s F-4 fighters—to Iran and was fined $10 million in 1992 (Lumpe, 1994, p. 35). South Korea violated the terms of its license for M-16A1 submachine guns by selling them to hostile countries (Lumpe, 1994, p. 35).

Israel has repeatedly transferred US-licensed missile and radar technology to China in the 1980s and 1990s, and it has been charged with illegally incorporating US designs and technology into weapons exported to South Africa, Chile, and Ethiopia, countries to whom the US would not sell for human rights or foreign policy reasons (Lumpe, 1994, p. 35). Brazil transferred American technology, gained with an offset deal, to Iraq, where it was used to improve the targeting capability of Iraqi Scud missiles (Evans, 1997).

In small arms, there are numerous examples of violations of licensing agreements, many of them the product of offset arrangements. Small arms proliferation is a significant security concern for the US because regional conflicts in areas such as the Balkans, the Middle East, and Africa require peacekeeping and humanitarian operations which are rendered much more dangerous as small arms spread.

Since the arms trade includes a large black market, students of the arms trade believe that beyond these discovered cases lie many more transfers that have gone undetected.

The American military services harbor intense debates internally over the security implications of offsets and pressures to slacken arms export controls. Many officers see interoperability as very important for their European and peacekeeping operations. Since
this generally implies American-style weapons, they see no way of convincing allies to purchase these without some form of compensation. At the same time, the trends detected by Wilson (2001) suggest that offsets are also tolerated as a means of getting around budget constraints in the short term.

Remarkably, the evolution of a post-cold war arms trade policy is taking place without integration of security evaluations and economic imperatives. In the US, despite a new interagency working group, the Departments of State, Commerce, and Defense still spar over arms trade policy. Reflecting the ascendancy of economic over foreign policy or security concerns, the Department of Defense appears to be emerging as the lead agency in this process, undermining the State Department’s traditional arms control function. Multilateral arms trade forums such as the Waasenaar Agreement are in limbo, while economic bargaining over the arms trade heats up. Inside the Pentagon, as a result of a “reinventing government” exercise under the Clinton administration, the Air Force and Navy have each consolidated their arms trade functions, with security assistance officers subordinate to those who are intent upon speeding up and simplifying the arms transfer process for economic reasons (Wilson, 2001). In other major arms supplying countries, too, governments “have become more reluctant to subordinate the economic aspects of the arms trade to foreign and security policy considerations” (Willett and Anthony, 1998, p. 2).

Compounding the problem is the asymmetry between US industry—which supplies about half of all world arms sales and enjoys almost exclusive access to US R&D contracts that comprise 72 percent of all allied R&D expenditures—and the Europeans, who bargain hard for an opportunity to buy the components and technology that result from this investment. Flamm (1999, pp. 30–31) concludes, “it becomes more important for the United States to maintain its technological lead by building even more-advanced weapons systems domestically. Thus, the United States has a system whereby it cooperates technologically to create its own competitors.”

The negative security consequences of offset arrangements—arms proliferation and a quickening of pressures for new arms research and development—have economic consequences in the longer run. The upward pressures on the defense budget in technology-rich countries like the US include anxieties over the need to develop next-generation weapons, and when other countries are asked to help fund these systems or eventually buy them, this process contributes to inflation in military budgets, a subject to which I next turn.

**Geo-economic distortions**

Arms trade offsets and protections in a world where other sectors must submit to free trade lead to macroeconomic distortions beyond the microeconomic phenomenon of resource misallocation. These include a tendency toward higher overall military spending worldwide and the rise of an international arms industry cartel whose actions compound the macroeconomic impact.
Bloated worldwide military spending

One sobering outcome of the illiberal nature of the arms trade is the tendency for countries to spend more on military equipment than they would in the absence of the ability to buy domestic and to extract offsets on imported systems. This is because spending on defense meets a dual purpose for governments—it not only enables military strategy but it serves as an economic development policy (Hammond, 1990, p. 37), ensuring a strong Keynesian impact on the domestic economy and enabling the cultivation of comparative advantage in military-related and dual-use sectors. Politically, this cycle is closed by associated pressures from defense-dependent firms, workers, and communities to continue weapon programs and aggregate military expenditure levels. Defense ministries collaborate in defending offset arrangements as a means to convince electorates and politicians that buying foreign can produce longer term gains for the domestic economy, and not just in military sectors (Udis, 1994, p. 34). The deepening diagonal relationships between firms in one country and government in another mean that this political engagement of firms happens even across national borders (Evans, 1997, p. 15).

Developing countries, in particular, whose leaders desire to pursue industrial policies despite free-trade regimes, find military spending on dual-use industries and negotiation of offsets attractive. South Korea, for instance, has deliberately cultivated a dual-use military-industrial sector, using the military mantle to evade free-trade strictures on certain governmental practices in support of industry. In the 1990s, Korean military expenditure has increased, in large part in response to US insistence on post-cold war burden sharing. The Korean military has chosen to import greater shares of its weaponry from abroad, sacrificing uncompetitive domestic military industrial capability with poor export prospects. It is, however, adroitly using offset arrangements on these purchases to enhance the capability of its non-defense sectors (Lee and Markusen, 2003).

As in the Korean case, buyer governments may believe that offsets provide a back-door way of constructing comparative advantage, thus encouraging higher levels of military spending than in the absence of such arrangements. Illiberal trade allows nations room to parlay spending on national needs into economic activity and investments in longer term comparative advantage. Without this circuitous economic development impact, military spending would be less attractive in the competition for scarce national government funds, especially in this era of fiscal austerity. It is this amplifying effect on total sales that defense companies are acutely aware of when they estimate that some countries would simply choose not to buy at all in the absence of offsets.

However, using arms purchases and tied offsets as an economic development policy may not pay off for recipient countries. In a recent study of South Africa’s decision to spend R30 billion in imported weapons, Batchelor and Dunne (2000) show that the government invested considerable effort into negotiating offset offers from the foreign equipment suppliers to benefit its local defense industry and national economy. They show that this is costly: “at no point has government considered trying to limit the purchase costs of the SANDF’s acquisition programme, by simply buying the cheapest off-the-shelf weapons (or even second-hand weapons)” (p. 23). They anticipate that the impact on the local economy will be smaller than expected and point out that it is very
difficult for South Africa to judge whether the prices they are paying for weaponry are reasonable.

“Off the shelf purchases would have been cheaper and would have allowed the government to allocate the savings to encourage conversion in defense related industries. This would have allowed it to develop those areas of the economy with the highest potential for economic growth and job creation, thereby dealing more effectively with the current high levels of unemployment” (Batchelor and Dunne, 2000, p. 24).

The South Korean and South African cases suggest that if offsets were prohibited, countries would still choose to buy weapons and might buy more of them domestically. But they would be unlikely to spend as much as they do currently, viewing investments in military-industrial sectors as unpromising in the longer run. Furthermore, if they chose to buy internationally, they would be apt to drive hard bargains on price and quality alone.

It is difficult to separate out this “supply side” upward pressure on military budgets because of the overall plunge in military spending following the end of the cold war (table 5.1). However, since reaching a low in the mid-1990s, military spending has increased in some countries, notably the United States.

The rise of an international military industrial cartel

One fascinating implication of the scholarly work on offsets is the apparent emergence of an international cartel in leading-edge weapon systems. If the logic and significance of the illiberal regime which I have laid out is correct, then we can anticipate that the major prime contractors, to the extent they can police their ranks, have a great stake in maintaining offset practices and the exclusion of the defense industry from free-trade regimes. Overspending on weapons by governments and substitution effects that favor aerospace over other sectors in the economy through the operation of offsets mean bigger markets, cost advantages, and a margin of pricing power for aerospace producers at the expense of other public and private sector goods and services. Of course, members of the cartel would continue to compete on individual weapons sales, just as oil companies and oil countries in OPEC do.

The number of competitors in the world arms market has imploded even though each has somewhat greater access to each others’ domestic markets. The competition remains oligopolistic but is more international in scope. The lead firms remain highly dependent on defense business: Lockheed Martin, Raytheon, British Aerospace, Northrop-Grumman, Thomson, and General Dynamics were 60–84 percent defense-dependent in 1998 (table 5.4). Furthermore, greater shares of these firms’ sales are international rather than domestic.

At least one researcher has hypothesized a “trade creation” effect of offsets (Hammond, 1990, p. 62). The data on recent US aerospace trade offers some evidence for this view. From 1995 to 1999, increased US government procurement accounted for $2 billion in new sales for American aerospace firms, or only 7 percent of the industry’s overall $30 billion rise in sales, while military exports increased by more than $4 billion,
or 15 percent of the total (US Presidential Commission, 2001, p. 24; Aerospace Industries Association, 1999, p. 116). Despite the export

Table 5.4: Top-10 arms producing countries, 1998

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company</th>
<th>Country</th>
<th>Arms sales (US$mn)</th>
<th>Arms as % of total sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lockheed Martin</td>
<td>USA</td>
<td>17,880</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>Boeing</td>
<td>USA</td>
<td>15,900</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Raytheon</td>
<td>USA</td>
<td>12,480</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>British Aerospace</td>
<td>UK</td>
<td>10,520</td>
<td>74</td>
</tr>
<tr>
<td>5</td>
<td>GEC</td>
<td>UK</td>
<td>7,010</td>
<td>55</td>
</tr>
<tr>
<td>6</td>
<td>Northrop-Grumman</td>
<td>USA</td>
<td>6,720</td>
<td>75</td>
</tr>
<tr>
<td>7</td>
<td>Thomson-CSF</td>
<td>France</td>
<td>4,310</td>
<td>63</td>
</tr>
<tr>
<td>8</td>
<td>General Dynamics</td>
<td>USA</td>
<td>4,160</td>
<td>84</td>
</tr>
<tr>
<td>9</td>
<td>TRW</td>
<td>USA</td>
<td>4,100</td>
<td>34</td>
</tr>
<tr>
<td>10</td>
<td>United Technologies</td>
<td>USA</td>
<td>3,260</td>
<td>13</td>
</tr>
</tbody>
</table>


component outpacing sales to the Pentagon, the modesty of these figures compared with civil aerospace sales suggests just how intensely competitive the military aerospace market is. They bear out a precocious 1994 Pentagon study suggesting that the ability to use exports as a substitute for deep cuts in Pentagon spending would be limited (US Department of Defense, 1994).

The formation of such a cartel is greatly facilitated by the implosion in the numbers of defense firms operating in the systems-integration military market during the 1990s. Desirable elimination of cold war excess military-industrial capacity, as I have demonstrated elsewhere, would not necessarily have required fewer military conglomerate firms. The latter resulted from the interaction of Wall Street investment banking machinations and Pentagon policy (Markusen, 1999a). The outcome -fewer, larger, and more defense dependent firms, not just in the US but internationally—makes it easier for companies to compare notes and forge a geo-political strategy that solidifies into something very like an international industrial policy for aerospace.

US firms dominate in this process. Robert Trice, Vice President for International Business Development at Lockheed Martin, characterizes the world market as follows:

“In order to compete internationally in this new environment, the US industry has consolidated into three large, globally competitive companies (Boeing-McDonnell, Lockheed-Martin and Raytheon-Hughes, and a number of “smaller” companies in their own right). The only real competitors in the global market are the European companies which are smaller, generally less productive state-owned firms, with the exception of
British Aerospace and DASA… At present, the US companies can rely on a highly protected core domestic market of approximately $80 billion-defense procurement and R&D combined. No other country can match that, nor do other countries spend more than 50 percent of their defense budget on procurement. On top of that, they must use those funds to feed their own weak, noncompetitive, state-controlled domestic companies… Arms control critics argue that the US industry dominates the world market. This is true” (Trice, 1997, pp. 4–5).

This development is also facilitated by unrealistic military and security strategies on the part of lead governments in the post-cold war period. Pressed to keep cold war systems in production while investing in the “revolution in military affairs” and national missile defense and in military manpower, buyers like the US armed forces—arguably the most favorably located of all the players in this game—behave as if they have the fewest options and must capitulate to pressures to streamline and underwrite arms sales and to engage in joint development projects with acceptable foreign partners. The short-termism driving firms to accept offsets that could cut into their future expertise is spreading to the American services as well, driving them to relax vigilance on potentially proliferating arms sales in order to be able to fund today’s weapon programs. To the extent that American and European governments permit international mergers and are jointly developing new generation weapons, such as the Joint Strike Fighter, they further the cartel-building project by enabling closer working relationships among companies, relationships that are reportedly not mirrored by equally close cooperation between the governments themselves.

An emergent international military-industrial cartel centered on aerospace is suggested by the configuration of the recently created US Presidential Commission on Offsets in International Trade. Despite its charge to cover all military-industrial sectors, to investigate indirect as well as direct offsets, and to weigh the security as well as economic consequences of offsets, the Commission, as manifest in its interim report (2001), has confined itself to looking at the economics of offsets from the point of view of the largest aerospace prime contractors. Companies and unions from the shipbuilding, ordinance, and military vehicle sectors are not represented on the Commission. No subcontractors or representatives of firms adversely affected by indirect offsets are represented nor were any surveyed in the OMB survey preparatory to the Commission’s work. None were asked to testify at the initial meeting. Security matters also receive short shrift in the interim report.

This suggests that in the US, at any rate, the arms policymaking apparatus has been captured by the interests of the lead military-industrial aerospace firms. It is not difficult to predict that the Commission’s final report to the US Congress will steer clear of any meaningful recommendations for restraint in arms offset policy. The report might counsel multilateral negotiations. But like arms control and arms trade negotiations since the end of the cold war, such efforts would be unlikely to result in anything very dramatic in the near future.
The offsets issue: what can be done?

Scholars espouse widely diverse views on the effectiveness and desirability of offsets (see the chapters in Martin, 1996; and the chapters in this book). My own research and participation in the US Presidential Commission suggests to me that offsets are growing in significance and do indeed produce distortions in the structure of firms, industries, and the composition of national spending for both buyer and seller countries. In this chapter I have laid out some arguments and evidence. Others have arrived at different conclusions about the magnitude of the problem (e.g., Martin and Hartley, 1995). These are empirical questions, and I hope that better data will permit us to test competing theories adequately in the future.

If we do determine that offsets present a longer term and significant problem on both economic and security grounds, what can be done to reverse the growth trend? At present, policies of international organizations and national governments are contradictory and ineffective, permitting the spread of offset arrangements geographically and toward indirect and novel forms of barter. Organizations such as the GATT, IMF, and OECD hold hostile views toward countertrade as both prejudicial to exporter countries and as harmful at the global level (Martin, 1996, p. 18). However, even though the World Trade Organization’s Agreement on Government Procurement prohibits the use of offsets in government procurement generally, it explicitly exempts a nation’s “action…necessary for the protection of its essential security interests relating to the procurement of arms, ammunition or war materials, or to procurement indispensable for national security or national defence purposes” (article 23, accessible at http://www.wto.org/).

For much of the cold war period, the US government officially considered offsets “market distorting” and left responsibility for their negotiation and implementation to US exporters, a policy put in place in 1978. This policy supplanted a more hands-on policy that created significant problems for the Pentagon. In effect, this left the industry to pursue offsets with no effective regulation. In the 1980s, concern on the part of Treasury and Commerce economists and some members of Congress led to official reporting requirements on offsets annually (to begin as from 1996) and were strengthened in 1994, when responsibility was shifted from an interagency group to the Department of Commerce and contractors were required to notify the government of offsets on military sales in excess of a certain sum (Udis and Maskus, 1996, pp. 358–361.) A review of American offset policy in the 1990s suggests concern and modest tightening of regulations, but no real will to either unilaterally or multilaterally stem the rising tide of offsets (ibid., pp. 360–371).

The American government must play a lead role in the illiberal trade logjam if things are to change. As long as American policy is ineffectual on offsets, no other country—all of them beneficiaries of offsets—will take the lead. Countries like the UK and France, who would like to free themselves of the necessity to grant offsets to developing countries, benefit too much from the offsets they can extract on purchases of American weapon systems.
A major impediment to American leadership on offsets is its own “Buy American” practice which for all practical purposes renders the home market the exclusive domain of American prime contractors. In those instances where the Pentagon does buy foreign, it regularly demands offsets by requiring foreign suppliers to hire American subcontractors and use US supplies for spare parts. In practice, the US policy is to establish domestic production capabilities for any weapon system purchased abroad wherever possible (Hammond, 1990, pp. 71, 87; Mowery, 1999, pp. 90–91). To our allies and buyer nations, demanding the cessation of offsets without opening up our domestic market is a non-starter.

Thus, offsets as a policy issue and subject of international negotiations cannot meaningfully be approached without a reconsideration of the de facto domestic content practice. Offsets plus “Buy American” practices produce a world market in which each nation may, if it makes the effort and bargains well, ensure itself economic activity equivalent to the amount it is willing to spend on weapons. This is the antithesis of the kind of national specialization envisioned by Adam Smith and David Ricardo, where nations specialize on the basis of comparative advantage.

This brings us full circle to the international aerospace cartel, led by American firms and exercising considerable clout not only in the market for weapons but in political arenas where military spending levels, arms trade policy, and even military and foreign policy are shaped. In his review, Hammond concludes that “perhaps the most important insight into offsets is that they occur for political rather than economic reasons” (Hammond, 1990, p. 86). I would restate this as “for reasons of political economy.” The attractiveness of offsets to both buyer countries and seller firms is increasingly economic, not political, especially because private sector defense contractors facing short-term profit pressures in a relatively stagnant market are gaining political power and influence, while governments face conditions of fiscal austerity and a skeptical public vis-à-vis the salience of defense programs. But these economic pressures are filtered through the political decision making machinery in each nation, particularly the Parliaments and Ministries of Economics/Industry in buyer countries and the Pentagon in the US.

Conclusion

This rather glum portrayal of the illiberal but increasingly commercial arms trade suggests that governments must thoroughly overhaul their arms trade licensing and promotion practices. The recent proliferation of conventional weapons and the rising potential for sophisticated weapons to fall into the hands of hostile forces may offer an historic opportunity for such an internationally coordinated initiative. It is also imperative that the military and its civilian overseers clarify their calculus (and evaluate past payoffs) on the longer term security risks of arms proliferation versus the purported short-term gains from spreading development costs of a weapon system more broadly through exports.

Arms trade restraint advocates could take a lesson from the trade liberalization camp. Illiberal trade practices in other markets have been eroded by a very long and concerted campaign, including an ideological struggle. That contest is not over, and questions of pace, dislocation, environment, and protection of labor and human rights continue to be
intruded into the project of international institution building. But the ability to convince large groups in the electorate that liberalized trade is in their interests has played a very important role in the success of pro-free trade advocates. A similar campaign could address publicly the reasons why the arms trade should remain illiberal, why it needs reinvigorated oversight, and why commercial interests must be subordinated to security concerns, including a return of lead responsibility for arms trade regulation from Defense and Commerce to the State Department. A concerted effort will be required to rein in a process that will otherwise deepen the economic distortions addressed in this chapter and the destabilizing security consequences of faster and broader arms proliferation.

Note

A version of this chapter is forthcoming in a special issue of Defence and Peace Economics. My thanks to Catherine Schinasi, Sol Polacheck, David Gold, Ron Smith, Susan Willett, Binyam Solomon, Judith Reppy, Ike Wilson, Dennis Smallwood, Paul Dunne, and others for comments, and to Greg Schrock and Michael Leary for research assistance.

References


Defense offsets: policy versus pragmatism

Ron Matthews

Introduction

The purpose of this chapter is to evaluate the pragmatic aspects of defense offsets rather than policy ambitions. Are the actual development benefits of offsets real, or are they simply the hyperbole of politicians seeking to persuade skeptical public opinion of the wider economic benefits of purchasing expensive military equipment?

Offsetting market failure

The classical free markets approach of Adam Smith and David Ricardo provide the principal conditioning factors of the international economic system in the 21st century. It is a system dominated by the important, yet controversial, 148 member World Trade Organization, the WTO. Nepal and Cambodia are the two most recent recruits to the club with all member countries seeking growth through trade. Still more countries, including Russia and Saudi Arabia, line up to share the growth and development benefits of free trade.

Reality, however, does not always square with theory. While there is no doubting the positive impact of economic liberalization, it is an economic veil that hides myriad market imperfections. At the heart of the free market and open trading models, lie the critical assumptions of unfettered market access, homogenous goods, free information flows, immobility of capital between states, and fragmentation of the supply base. Such assumptions define the theoretical models of perfect competition and comparative advantage theory—respectively, the rationale of economic liberalization and the WTO. Yet the assumptions are far removed from the contemporary mechanics of global markets. Economic reality reflects market barriers, product differentiation, patents and the protection of intellectual property rights, high levels of capital mobility through foreign direct investment, technology transfer, and progressive industrial consolidation, leading to oligopolistic market structures at the national, and, increasingly, the international level.

Nowhere, moreover, is the disparity between theory and practice more evident than in the defense sector. Imperfections abound. The European Union’s Article 223 of the Treaty of Rome, now superceded by Article 196 of the Treaty of Amsterdam, acts to constrain competition and protect member country defense markets. The US has its protectionist “Buy America” legislation, seeking to safeguard America’s defense industrial capabilities by requiring that US purchases of offshore weapon systems be
produced under license in America. This also happens, more subtly, in Japan, where over 90 percent of arms are procured locally through licensed production of mostly US defense equipment. Additionally, Japan has put self-imposed policies in place, denying it the right to export defense equipment. China, conversely, suffers externally imposed embargos on its ability to import weapon systems. The list of politically motivated impediments to open trade is endless. Also, from an economic perspective, static classical economic models will likely impose dynamic cost competition. The reality is that open markets facilitate the search for profit, amplify first-mover advantage, and hence “incentivize” product development and the creation of technology gaps through raised levels of research and development expenditure. These costs constrain new entrants because the perverse effects of defense globalization are turning classical models upside down. The large scale and technological maturity of advanced country defense firms are such that new entrants are deterred.

The international defense market is complex, often lacking in transparency, and always hyped as operating on the “dark side,” characterized by corruption, bribery, shady deals, and nepotism. Defense offsets, perhaps unfairly, have been categorized in this light, earning offsets the opprobrium of policymakers, particularly in the US. A consequence of such perceptions is the effort by numerous countries to re-badge offset policy as industrial participation, cooperation, or partnership. A deliberate advantage of such titles is that they connote long-termism, mutual benefit and, importantly, trust.

Notwithstanding the dubious non-market aspects of defense offsets, their re-emergence as a dominant theme in trading patterns has been influenced by market forces. This has driven the transformation of the international arms market from a seller’s market in the early 1980s, characterized by an abundance of purchasing nations and limited defense contractors, to that of a buyer’s market today. Now, by contrast, there are many sellers of weapon systems, but few purchasers. This reversal of fortunes affords buying nations substantial leverage in extracting concessions from offshore vendors. Not all countries, though, have sought to exploit their market position when purchasing “big-ticket” weapon packages from abroad. For instance, the constant threat of war with India has meant that for Pakistan urgency of supply has historically held a higher priority over offset-induced defense industrialization (Matthews, 1994). Even more extreme is Brunei’s procurement posture. In this tiny, oil-rich state, policy is primarily directed toward off-the-shelf acquisition of British defense goods, with the government viewing offset requirements as unprincipled trading behavior. Brunei’s defense treaty with Britain may provide the *quid pro quo* for buying British, helping to explain Brunei’s unequivocal aversion to offset opportunities. Adoption of an agnostic approach toward exploiting the potential benefits of defense offsets is more the exception than the rule, however. In the main, governments do view offsets as a win-win situation. Hence, the purpose of this chapter is to evaluate the pragmatism of offsets rather than the policy ambitions. Are actual development benefits achieved? Or are claims to the effect simply the hyperbole of politicians seeking to persuade skeptical public opinion of the wider economic benefits of purchasing expensive military equipment?
Offset strategy

Development of less developed economies requires diversification away from reliance on cash crops toward the promotion of industrialization. In defiance of classical comparative advantage theory, developing countries are obliged to erect tariff barriers to protect the fledgling manufacturing sector. The WTO condones such import substitution protectionism, but solely with respect to the poorer members of the club. In pursuit of competitiveness, however, the barriers must eventually come down. History has shown that the import substitution model can work, and Japan’s “techno-nationalism” model is testament to this fact (Chinworth and Matthews, 1996). Development experiences of the latter 20th century suggest that import substitution can propagate the seeds of industrial and technological development, but cannot guarantee sustainable indigenous capability. Nowhere is this more evident than in the defense sector.

Since Britain’s industrial revolution, defense production has been at the core of the manufacturing endeavor. It has driven innovation across the military-civil divide via technological cross-fertilization of blueprints, ideas, skills, processes, and products. Defense-development synergies favor the countries that possess substantive defense industrial bases. This has meant that, post-world war II, the technology gap between rich and poor countries has widened. Indeed, today this euphemistic “gap” is in reality a yawning chasm. The US defense budget, for instance is now around $400 billion, and rising, supporting a huge defense R&D expenditure in excess of $50 billion; this is over three times larger than that of the whole of Europe, and reportedly as much as 70–80 percent of the entire world’s defense-related R&D (Kennedy, 2002). This huge US R&D sum reflects the high cost of developing sophisticated defense technologies required to realize the “transformational” warfare doctrine. While many of these technologies will bespeak the military “high-spec” battlefield context, many others will be sourced from the commercial sector. These latter technologies are associated with shorter product cycles, faster availability, and lower cost. Such interdependence between civil and military industrial bases is one of the principal distinguishing characteristics between advanced defense industrial bases and the rest. The struggle for viability, sustainability, and dynamism in defense industrial capability is not just the reserve of less developed countries, but an imperative taxing policymakers of all countries.

For the past two decades, defense offsets have been viewed as a partial solution to the paucity of indigenous industrial undertaking in developing countries. For these poorer countries, offsets have been conceptualized as the catalyst for “deeper” industrialization. By the same token, industrialized nations view offsets as a technology vehicle for avoiding both the high costs of “reinventing-the-wheel” and as a partnering mechanism for engaging in collaborative development of frontier technological systems. The question relevant to all states, however, is whether aspirations equate to achievements. All important in effecting technology transfer is
the crafting of an appropriate and successful offset strategy. Figure 6.1 illustrates the spectrum of policy flexibility in this regard.

Many nations have seized the opportunity to formalize offset policy through the publication of prescriptive guidelines, but inflexibility in the negotiating position may not always be appropriate. Japan and Singapore, for example, are two countries which do not impose a standardized solution to fit all circumstances. Rather they adopt a case-by-case policy approach, seeking to maximize mutual benefit through negotiation and compromise. Importantly, this need not imply a reduction in the quantity and quality of technology transfer, as evidenced by Japan’s and Singapore’s successful track record in adapting, modifying, and improving second and third generation technologies derived from initial licensed production. Japan’s defense industry offers a good example of this offset model, whereby near self-sufficiency in several sectors has been realized through the application of learning to promote indigenous defense industrialization.

On the path from unregulated flexibility to prescription, is the intermediate case of best endeavors. This is an approach favored by Britain’s Ministry of Defense. The key ingredients here are partnership, trust, and vendor commitment. No penalties are imposed if the vendor fails to achieve the required 100 percent offset target across the stipulated delivery period. The sole penalty is that consideration of future bids by an offshore vendor will be influenced by its performance on earlier offset programs.

The final offset approach shown in figure 6.1 is founded on obligation, meaning precise adherence to regulations, including penalties for non-achievement of offset targets across the specified delivery period. This approach normally imposes offset multipliers on the vendor, thus providing incentives for investment, technology transfer, and work placement into the buyer’s pre-determined strategic sectors of the local economy. Prescription imposes standardization and clarity, but as more countries have come to view defense purchases as a means of enjoying offset-induced development, so the demands for benefit have become more ambitious. Inevitably, this has led to policy stress and the non-fulfillment of vendor offset commitments.

Offset strategy goes deeper than legal compulsion to accomplish specified offset targets across a prescribed time period. It also encompasses industry and technology policy. The offset strategy matrix shown in figure 6.2 illustrates the mix of processes and objectives linked to the principal forms of offset strategy. The matrix matches the character of the primary contract to the sectoral destination of the associated offset programs, representing a study framework of civil-military strategic relations. The arrows within the matrix track the crude chronological development of offset strategy.
Figure 6.2: Offset strategy matrix

Quadrant I shows the traditional offset model, whereby a major weapon systems purchase from an offshore vendor is tied to a defense related offset program. For instance, South Korea’s purchase of 120 F-16 fighters was tied to a 30 percent license agreement for in-country production of components and subassemblies of this aircraft. Equally, India’s purchase of Russian SU-30 aircraft is tied to offsetting license agreements facilitating Indian defense industrialization. As already mentioned, the UK industrial participation policy pursues similar objectives. Here, however, the stipulated offset requirement is for the purposes of compensating UK defense contractors for the loss of work caused by MoD switching from sovereign “cradle-to-grave” development production to “off-the-shelf” purchase from an offshore vendor. Importantly, offsetting investment, technology transfer, and placement of work from the overseas prime contractor must be undertaken competitively. Thus, in the British model, offset credits accumulate due to competitive success through the granting of market access rather than by a defense equivalent to affirmative action. Moreover, while the normal causal flow is from the primary defense contract to offset license arrangements linked to the same contract, it is not an uncommon practice these days for offset programs to cross over into other local defense programs.

Figure 6.2 also shows the US policy position firmly embedded in quadrant I. Without doubt, the US “Buy America” legislation is an offset policy under a different guise, unequivocally aimed at strengthening US defense industrial base capability. Even with the onset of defense globalization, the clamor in Washington is for greater rather than less protection of US defense supply capability. This is symptomatic of the tensions over offset-driven defense globalization versus defense industrial sovereignty that are likely to intensify in the years ahead.

Quadrant II reflects that as the global defense industrial imbalance between the US and the rest of the world has heightened, the pursuit of defense industrialization has increasingly come to be questioned by numerous industrializing countries. There has been a growing recognition that the high costs of defense R&D and constrained production scales limit the economic benefits of defense-related offsets. As a result,
The policy direction has begun to shift from defense to civil offset requirements. The thrust of Saudi offset policy (the Kingdom of Saudi Arabia, KS A), for instance, has focused away from defense objectives, as exemplified in the US Peace Shield program to commercial training and industrial objectives. Evidence of this re-focus is the ongoing Al Yamamah offset arrangement that has been instrumental in the establishment of a Tate and Lyle sugar processing complex, Glaxo pharmaceutical plant, and commercial computer training facilities (Matthews, 2002a). Other examples of a quadrant II offset strategy include Malaysia, which has sought to develop university competence through civil offsets linked to overseas defense contracts, Oman, seeking regional commercial training opportunities through the sponsorship of a local air traffic control college, and Kuwait, via the fostering of small and medium enterprise (SME) networks in the civil business environment.

Quadrant III illustrates that civil-civil primary contract and linked offset arrangements have become increasingly important in the global economy over recent years. These arrangements arise because big-ticket commercial contracts in sectors, such as aerospace, power generation, and telecommunications are so expensive that in a tight international market, the purchasing countries are in a position to play one bidder off against another and extract concessions. For instance, in a move likely to be followed by other Persian Gulf states, Kuwait’s finance ministry has begun requiring 35 percent countertrade commitments from all foreign companies having civil sector contracts of more than KD10 million ($35 million) with the Kuwaiti government (Financial Times, 2002). Principal among these concessions is offsetting investment. Similarly, Indonesia’s Garuda Airline, for instance, used its market leverage when purchasing airliners from Airbus and Boeing to obtain offset work in the fabrication of subassemblies for the aircraft purchased. This work played an important role in the preservation and “up-skilling” of local workers at Indonesia’s PTIPTN Bandung aerospace manufacturing complex (Matthews, 1996). Indonesia’s offset contracts with Boeing included the production of engine access doors, pylons, and other relatively low-technology work. These outputs were then shipped to Mitsubishi factories in Japan as part of a global network of offset operations. Indonesian manufacturing packages would be integrated into Japan’s higher value-added sub-assembly production in Tokyo before onward shipment for final assembly at Boeing’s Seattle factory. In China, similar civil-civil offset arrangements occur, with local production of vertical and horizontal tail fins in China’s AVIC aircraft fabrication plants. Again, these offsets were linked to the purchases of Airbus and Boeing aircraft by the myriad operating airline companies in China (Matthews, 2002b). Saudi Arabia has also engaged in this civil-civil offset strategy, incorporating an additional novel dimension into its policy approach. The Kingdom has exploited local manufacturing capacity created through the Peace Shield joint venture defense offset program. This includes civil offset work gained from, for instance, the $4 billion telephone switching equipment contract from ITT, a US company. Civil-civil offset arrangements are permitted by WTO regulations, but only for developing countries.

Quadrant IV captures a fourth offset strategy, the contemporary policy significance attached to dual-use industrialization. Civil-to-defense offset strategy emphasizes the role of technology spin-on. Here, local defense industrialization is underpinned by foreign technology transfer via licensed (or multinational) production of technologies in the
recipient country’s civil economy; the labor skills and manufacturing outputs are, in turn, transferred domestically from the civil to the defense sector to foster development of sovereign defense industrial capacity. Japan provides an excellent example of this dual-use strategy, particularly since the preponderance of R&D occurs in civil industry. The innovative, high-tech dual-use avionic, microelectronic, telecommunication, and process machinery products of civil-military industrial conglomerates such as Mitsubishi, Kawasaki, Toshiba, Nissan, and Sony are then employed, as appropriate, to propel the technological development of Japan’s defense industry. This strategy enjoys the benefits of cost reduction, technological synergy, and reduced time-to-market. Singapore’s defense industrial strategy has also been characterized by its emphasis on dual-use technology cross-over opportunities (Matthews, 1999a, 1999b, 2002c). Emulating the Japanese and Singaporean strategies, China’s defense industrialization strategy, since March 1986 and the implementation of the “863 plan,” has been predicated on the promotion of local strategic industrialization. The “863 plan” prioritizes the infusion of foreign technology via the development of civil (dual-use) industries, the high technology outputs from which are then subsequently absorbed into the Chinese defense industrial base for sovereign development of critical technologies. This process will accelerate China’s progress toward achieving transformational war-fighting capability (Frankenstein and Bates, 1996).

Development through offsets?

Given the particular offset strategy pursued, the question is: do offsets work? This is not an easy question to answer, not least because the subject’s sensitivity means that empirical data are difficult to come by. By and large, the economic impact of offset policy remains shrouded in mystery. What is known is that there are two opposing standpoints: the recipient nations, seeking to extract maximum industrial benefit from offset-based inward technology transfer, and the vendors/contractors seeking, by contrast, to minimize obligations for outward technology flows. The negotiating trick is to satisfy both parties, accommodating the development of a long-term mutually beneficial trading relationship. Inevitably, for partnership to occur, the recipient country will require measurable progress on technological development; the sustainability of the development process is a particularly important metric in this respect. Rather than linked to the life of a specific offset project, the technology strategy needs to embrace productive opportunities across the broader economy. Offset policy thus needs to be framed accordingly.

Figure 6.3 provides a conceptual model of the key attributes for offset success. It highlights the key components of the offset cycle, from initial technology transfer to the long-term goal of sustainable indigenous technological development. Offset packages will be shaped by the institutional arrangements in place. What is best for one country with a particular industrial level and context, may not be best for another country. Although policies will differ, the important point is that in the 21st century there is limited excuse for countries not to have established a policy position. While a win-win end game to an offset arrangement can never be guaranteed, both the transferor and transferee need to identify and plan to ensure the realization of the benefits anticipated to accrue.
Once the work placement and/or technology transfer has been agreed, then for promotion of local capability to occur, it is fundamental that the technology is effectively absorbed into the local industrial base. At this second, absorption stage of the model, three critical success factors can be identified:

- Possession of an educated and highly trained workforce;
- Existence of a diversified and innovative subcontractor base, structured across clusters of horizontally and vertically integrated high technology companies;
- The ability to dynamically evolve local technologies where intellectual property rights can be conferred.

The third stage of the conceptual model recognizes that in the absence of international competitiveness, long-term economic success will be illusory in spite of technology transfer and absorption through infusion of new skills and capacity. Hence, a national culture supportive of R&D is essential to ensure continuous re-investment into the national technology base. Moreover, the universal search for competitiveness will be aided by the reduction in cost structures achieved through export penetration, but this is not as straightforward as it appears. Given that most developing countries leverage new locally-designed technology systems by incorporating critical subassemblies and components from advanced country contractors, export opportunities are often constrained by the latter embargoing third-country sales. This is a danger that South Korea presently faces in its plans to export the T50/A50 Golden Eagle (Matthews, 2003).

The ultimate goal of indigenous sustainable technological development will be more realizable if the local economy has a robust and well-crafted Science and Technology Policy (STP) in place. A coherent and logical offset strategy should be coordinated with other facets of the STP framework. These will include policies such as education and training, the development of University Science Parks and government support for R&D, regional development, and appropriate technology strategies.

The fact is that few countries have effectively developed their technology base through offsets. Rather, it is the existing technology base that defines the parameters for successful absorption of technology offsets (Brauer, 1991; 2000). Taking stock of the importance of extant industrial and technological capabilities leads to a more informed judgement on the performance of offset programs and to the tempered prediction that offset performance will often struggle to meet the rhetoric of political and corporate commentators.
Reality versus rhetoric

Perhaps surprisingly, offsets are unknown to the broad sweep of the defense community, and in those cases where there is an awareness, there is likely to be misunderstanding. Such widespread ignorance suggests that offsets are relatively unimportant, but this does not square with reality. The subject has been fundamental to the practice of defense procurement for at least two decades, and over the last two or three years, the study of offsets has been pursued with fervor by defense economists across the globe. The catalyst for the heightened academic interest in compensatory trade was South Africa’s 1999 controversial offset program. Even with intense academic, political, and media attention, it is remarkable that empirical evidence on offset deliverables remains sketchy. The reason of course is the subject’s sensitivity. From the corporate standpoint, offsets represent possibly the principal marketing tool for gaining competitive edge over rivals; indeed, its significance appears to be growing, given the predilection of countries to elevate the offset package above price and product considerations.

Notwithstanding this lack of data, it is possible to offer general observations to inform policymakers and analysts involved in framing offset strategy. It is sensible to compartmentalize discussion into the short and long-run implications of offset performance. Quite clearly, tangible benefits do accrue to the purchasing country, though with the passage of time the case becomes more difficult to prove once the initial offset multiplier benefits dissipate. This can best be illustrated by reference to GKN Sankey’s export to the Philippine Army of 150 Piranha (Simba) wheeled armored personnel carriers and ancillary equipment, worth around $100 million. The first eight of these vehicles were built in the UK and the remaining 142 were assembled in the Philippines. However, as soon as they were completed, the assembly line and the factory were closed (Villanon, 1998). GKN Sankey fulfilled its contractual obligation of 15 percent offsets and 100 percent countertrade, but save for a small amount of local job creation and skill-generation, there were only minimal offset benefits to the Philippines. In retrospect, it is evident that the British defense contractor and the Philippine planning authorities had focused on the short-term benefits of the contract at the cost of long-term sustainability.

In the short-run, vendor intent has to be driven by the imperative of making the sale. Offsets act as a powerful technological discriminator in this regard. Most defense contractors would admit that aside from the sale, there is little attraction for them to enter into offset agreements. Except for the possibility of fostering a growing network of efficient offset subcontractors and integrating them into an international supply chain, the stereotype of offsets is that it is a cost. More telling, the majority of arms vendors view offset cost as a pricing issue. The challenge of who pays for the offset lies at the heart of why nations escalate offset targets. The attempt is to minimize vendors’ loading of offset costs into the primary defense contract price. It is for this reason, as well as the growing leverage of buyer nations, that offset targets during the 1990s have risen. The UK, Belgium, Denmark, Netherlands, Norway, Portugal, and Spain all have 100 percent offset requirements, most of them mandatory. Further afield, offset targets have inflated even more dramatically. For instance, South Africa’s recent $4 billion purchase of frigates, submarines, helicopters, and fighter/trainer aircraft from the UK/Sweden, Germany, and Italy was linked to offset targets reportedly reaching up to 300–400 percent (Financial Times, 2002). Indeed, the Republic’s $2.5 billion purchase of Gripen fighters and Hawk
trainer aircraft requires a total offset commitment, direct and indirect, of $8.7 billion, that is, an offset requirement of 348 percent (Financial Times, 2002). Moreover, an offset deal in excess of 400 percent was also reportedly negotiated between South Africa and Germany for the purchase of submarines (Interview, 2000). Offset targets will obviously cause difficulty if the strategic aspirations of the arms purchasers are not realistic, but reaching a common agreement on the valuation of offsets is a cause of tension in discussions. For instance, Eurofighter’s efforts to establish an industrial offset strategy with Norway’s defense ministry complicated the former’s 1999 bid to sell 20 Eurofighter Typhoons to the Royal Norwegian Air Force. Difficulties were caused by the parties’ differing valuations of Eurofighter’s industrial cooperation (offset) plan. Eurofighter valued its offset package at Nkr 26.7 billion. Set against a 10-year time frame, and based on 23 percent direct, 26 percent indirect defense, and 51 percent dual-use and civilian high-technology contracts, Norwegian industry valued the plan at somewhat less, around Nkr 16 billion. Using its own calculating methods, Norway’s defense ministry reached yet another valuation of just Nkr 4.5 billion (Berg, 1999).

Further immediate difficulties are caused by additionality clauses. The result of such clauses is to question whether an offset is actually an offset. The best example here was Britain’s 1986 purchase of US AWACS aircraft. A 130 percent offset package to compensate Britain’s defense industry for cancellation of the indigenous GEC Nimrod program was agreed with the US contractor, Boeing. Boeing estimated that its offset package would create the equivalent of 40,000 man-years of work for UK industry, over eight years. Bizarrely, up to mid-1989, Britain’s Ministry of Defense had made no effort to assess the employment effects of the offset work. Worse still, some 60 percent of the value of follow-on work for contracts placed by Boeing with UK suppliers before the end of 1986 was counted as offset credits (Martin and Hartley, 1995).

If vendors are serious about entering into mutually beneficial partnerships with their global clients, then a serious commitment to the successful completion of offset agreements is essential. Longer-term strategies thus come to the fore. Most purchasing countries in any case increasingly stress long-term development plans. This is reinforced by the trend whereby countries allow vendor companies to bank offset credits, to be used to fulfill future offset obligations associated with anticipated defense sales in those same countries. It is estimated that such credit transfers already account for 7.5 percent of all offset transactions (Udis, 2000). Moreover, the banking of offsets against future seller commitments has increased the tendency to allow offset commitments to extend into the long-term, stretching over several projects rather than being tied to specific projects for bilateral clearing (Udis, 2000).

In the long-run, offsets have the potential to impact on a number of critical areas, such as technology transfer, competitiveness, economic efficiency, defense-industrial sovereignty, employment, and in the current pursuit of transformational warfare, coalition forces benefit from rationalization, standardization, and interoperability (RSI) of military equipment. However, as mentioned earlier, in order to exploit long-term gains from offsets, the recipient country must be able to effectively absorb overseas technology. For most countries, the technology transferred must be high technology, of an equivalent technical level as the defense equipment being sold. Yet, US evidence suggests that American offset-related technology in 85 percent of the cases was over 10 years old (Cahill, 2000). Unsurprisingly, this refers to first-tier tacit manufacturing knowledge, not
design know-how or proprietary in-house sophisticated manufacturing technologies (Watkins, 2000). Even if current technology is transferred, it will most likely be protected through legal retention of the intellectual property rights and physical barriers via “black boxes” (Martin and Hartley, 1995). Technology transfer is the critical issue in many respects, yet there is a prevailing sense that offsets fail to deliver on this count. Certainly, this is the case for most of the developing countries, and it might also possibly be generalized to apply to advanced countries. Martin and Hartley (1995) for instance argue that little offset-related transfer of significant technologies into the UK defense sector has occurred.

To counter this negative view, fragmentary evidence exists to suggest that licensed production offers opportunities for countries with a mature defense industrial capability to produce improved versions of the original weapon system. The RAF Apache, for example, is a Westland Longbow version of the US Army AH-64D. The RAF fleet of 67 aircraft benefits from the more powerful Rolls Royce RTM 322 engine. Although detuned, it provides a superior profile and greater growth potential as compared to the US T600 engine. British Apaches will also benefit from the High Intensity Defensive Aides Suite (HIDAS) that the US aircraft do not have. The WAH-64D helicopters additionally have a more modern radar and Mission Planning System enabling real-time updating of mission plans to accommodate rapidly evolving threats. Finally, the British Longbow variant helicopters enjoy more extensive corrosion protection than their US counterparts.

Similar examples of host countries upgrading licensed equipment include that of the US, which through the stringent “Buy American” regulations requires that all major overseas equipment procurement be licensed-produced in the US. Thus, the AV-8B Harrier II is an improved version of the British original; the former incorporating the APG-65 radar common to the F/A-18 (the only UK Harrier equipped with radar is the Sea Harrier) and possessing greater capability through its ability to deliver GBU-12 and GBU-16 bombs with pinpoint accuracy. Also, the US Goshawk, more formally known as the T-45C trainer, is a substantially improved licensed production version, built around a new digital “glass cockpit” design, of the British Hawk trainer. The Goshawk is a “navalized” variant of the BAe Systems Hawk. Numerous modifications have been introduced, including the need to provide lower landing speeds for carrier-based operations. This has necessitated SMURFS (strakers) being fitted to the rear fuselage to prevent excessive turbulence around the tail plane, and more powerful engines have been developed to counter the resultant increased drag of the aircraft.

Employment generation is another long-term objective of offset strategy. For the less industrialized countries the creation of sustainable jobs is always likely to be challenging. Saudi Arabia’s multiple offset programs have managed to create only a few hundred local jobs, and most of these unskilled (Matthews, 1996). Spain’s 1980s licensed production of the US F/A-18 aircraft did generate substantial numbers of jobs in a broad array of local industrial sectors, but only at considerable cost to Spanish public funds which were used to effectively subsidize Spanish firms’ output costs to ensure they were competitive with McDonnell Douglas’ existing US supplier costs (Molas-Gallart, 1996). Industrialized countries are also impacted by offset-related employment considerations. Britain’s Westland company claims that the Apache program has created up to 3,000 British jobs (Spear, 1997), but in the longer-term, the net impact of offsets in the UK as a whole may lead to a loss of jobs. Thus, while inward industrial participation work is anticipated to
reach £5.3 billion up to 2010, the value of outward bound offset packages is estimated to reach between £12–15 billion from global obligations, equating to the entire annual turnover of Britain’s defense industry (Financial Times, 2002). Similarly, the US fears that its overseas defense industrial offset obligations will lead to the loss of 469,000 jobs over the next 20 years (Spears, 1997).

Conclusion

The purpose of this chapter has been to explore the theory and practice of defense offsets. It is a subject that nearly always attracts controversy, and conjecture. Increasingly, offsets have come to be viewed as a “third-way” to local industrial and technological development, but the evidence for this is slim. Offsets can work to support industrialization, but as the Japanese case indicates, governmental, organizational, and possibly cultural issues are instrumental in arriving at successful outcomes. Offsets will contribute to sustainable technological development only if recipient countries evolve appropriate offset policies, provide the conditions for effective technology absorption to occur, and foster a business environment conducive to promoting competitiveness. This is an ambitious agenda, and hanging on the presumption that offsets are here to stay. History has shown this not to be the case.

Note

1. But see Chinworth (2004) for an important updated assessment of the effect of offsets on Japan.

References


Part II
Cases
Comparing British and German offset strategies

Jocelyn Mawdsley and Michael Brzoska

Introduction

A comparison of Britain and Germany offers insights into the origins of national offset policies. Both countries are among the larger arms producers and exporters in Europe. They both run a number of large arms procurement programs, including collaborative ones. Some defense companies, like BAE Systems, produce arms in both countries. Additionally, both countries share membership in international organizations, notably the European Union and NATO, that have some bearing on defense industrial policies and are signatories (in 2000) of the six country Framework Agreement on defense industrial restructuring in Europe. Furthermore, on a number of important features of defense production, exports, and procurement, Britain and Germany are similar. For instance, the arms industry is privately owned, and government ownership is minimal and confined to a few research and development facilities. But there are also striking differences, particularly on defense industrial policy, including export policies. Similarly, British and German offset strategies are markedly different in perception if less so in results.

The comparison of the British and German cases allows for fresh perspectives on the nature of defense offsets. Offsets are often analyzed, at least by economists, within frameworks of efficiency, competition, and net welfare gains. The objective of analysis is prescription: how to develop better offset policies. While valid, analysis which is blind to the particularities of the defense industry, as well as to the defense industrial policy of a state, cannot be comprehensive. This chapter emphasizes the analysis of the status quo and how it came about. It does not prescribe a particular approach to offsets. Still, interesting lessons can be drawn. This chapter describes the differences in the countries’ approaches to procurement, including import offsets, particularly in collaborative projects, and to export policy, with a focus on export offsets. Finally, some of the underlying causes for the differences are analyzed.

Overview of procurement policies and the role of import-offset requirements

United Kingdom

British defense procurement policy aims to provide the necessary equipment for its armed forces in a cost-effective manner. Currently, Britain operates a mainly open, competitive
procurement policy under the Smart Acquisition framework. Compared to other European countries Britain has a large procurement budget and is still able to run national projects. In Britain, an agency of the Ministry of Defense, the Defense Procurement Agency, is responsible for procurement and offset policy, while another agency, the Defense Export Services Organization, supports defense exports and implements offset policy. The Department of Trade and Industry also maintains an interest in defense industrial matters. British defense industry is in private hands. It is dominated by BAE Systems but the defense industrial base is considered globally competitive. Compared to other European firms, British firms are much more active in the United States. Britain is the second largest arms exporter in the world. Government relations with British defense firms range from the very supportive (on exports) to relatively strained (on procurement).

**HISTORICAL BACKGROUND**

For much of the cold war period, the relation between the state and defense industry could best be described as monopsonist: the state controlled the extent and type of defense industry and operated a protectionist procurement policy to preserve defense industrial assets (Dunne and Macdonald, 2001). This was seen as crucial to maintain an industry that had been leading in many sectors after the end of the second world war, but was losing its edge against US and, from the 1960s onward, European producers. By the late 1970s, Britain’s remained one of the few European defense industries to be able to compete on some world markets, but it was heavily dependent on government intervention to do so.

During the 1980s, the neo-liberal “value for money” approach favored by the Thatcher governments affected the defense industry and the defense procurement budget. All major government-owned companies were privatized. However, the Levene Reforms on procurement are regarded as the key moment of change. These reforms ensured that competition became the norm wherever possible; there was a move to firm or at least fixed price contracts2 and to competition at all stages of the procurement process. New and non-British suppliers were encouraged to bid by an insistence that even subcontracts were placed competitively and by MoDs insistence of breaking preferred supplier links (Schofield, 1995).

These changes carried implications for government-industry relations and for the role of exports in the British defense market. Relations between state and industry became increasingly adversarial on procurement issues as major systems were purchased abroad (mainly from the US) and industry was forced to become leaner and more competitive, securing its place in the world market.

A major complication for competitive procurement was the emergence of one major British defense producer, BAE Systems. Procurement officials had little choice but to buy either from BAE Systems or from overseas. Obviously, the strong concentration of military technology, skills, and employees under one company roof provided BAE Systems with considerable economic and political weight.

Although the 1997 Ministry of Defense Strategic Defense Review (commissioned by the new Labor administration) encouraged industrial partnership in procurement, and embedded it in a new system of defense procurement, the Smart Acquisition initiative, the commitment to competition in the defense market remains strong. The review
recognized the changing nature of the defense industrial base, and pointed to the reduced number of suppliers as a reason to form longer-term partnerships. However, government insistence on competitive tendering led to the Defense Procurement Agency’s controversial policy of encouraging foreign-owned firms like Thales to establish a considerable presence in Britain. The resulting distrust of the Agency by British firms (especially BAE Systems) led to great pressure being put on government to clarify defense industrial policy, which was duly done in 2002 (MoD, 2002). The result is more industry friendly but the emphasis on competition remains strong.

THE ROLE OF OFFSETS

The British government refers to offsets associated with British arms imports as industrial participation (IP). The Defense Procurement Agency (DPA) is responsible for setting British industrial participation policy and the Defense Export Services Organization (DESO) for its implementation.

Both the defense industry and government have long seen arms import-related offsets as an unavoidable nuisance. Their fundamental objection to such offsets is based both on the strong position of industry (there was no great need for technology transfer) but importantly also on MoDs preference for open, competitive procurement. However, both industry and government have accepted import offsets as a necessity so long as protectionist policy exists elsewhere, most notably in the United States. The 2002 Industrial Policy Paper states: “The goal is a fair and accessible competitive defence market, both at prime contractor and sub-systems level, where this can genuinely be achieved, allowing the UK defence industry to compete on merit for leadership of and involvement in foreign programmes” (MoD, 2002, p. 16, note 1).

Government has therefore developed a systematic policy to deal with import offsets. British policy sets a threshold whereby, if there is an offshore capital element of more than £10 million (or £50 million for French and German companies under a reciprocal waiver agreement), industrial participation bids may be requested through either the offshore (geographically defined) prime contractor or a UK-based subcontractor. Ownership is unimportant: at question is the location of the work. The 2002 Industrial Policy Paper gave two major objectives for industrial participation: technology transfer and investment in particular industrial capabilities (MoD, 2002, p. 12). These industrial capabilities are divided into two specific groups: a very small number of capabilities, which for national security reasons have high priority, and a much larger group of capabilities which the government deems desirable to retain in the UK industrial base (MoD, 2002, pp. 11–12).

It is official policy that bids should only be requested automatically from the United States, otherwise on a case by case basis. But in practice such requests are the rule. The work must be defense-related, new, of equivalent technical quality, achieved within the duration of the contract, and at no additional cost to the MoD. There is no compulsion to offer an IP package. In mid-2002 the total value of IP agreements stood at £5.2 billion (predominantly from the US) of which £2.7 billion were outstanding (£0.2 billion direct offsets; £2.5 billion indirect offsets). Much of the benefit goes to small and medium-sized enterprises (SMEs) instead of to large-scale contractors.
The MoD emphasizes that the IP proposal is less important than getting the right equipment at the right price, and that while IP will not win you a contract, it may lose it. Typically Britain asks for and receives 100 percent offsets, even though high rates of offsets are not well regarded as it only increases what British firms will be asked for overseas. More indirect offset is proposed than direct which is less financially secure, but more efficient procurement is thought to result when an established supply chain is used. Equally, even lower direct offsets can be advantageous if the product is likely to be exported widely. For example, Britain was the launch customer of the C-130J Hercules transport aircraft, but through IP (even though the direct offsets element is relatively low) some UK SMEs are now embedded in the supply chain for other exports.

As far as indirect offsets are concerned DESO recognizes that the civil-military divide is difficult to draw with very high technology work and it operates on a pragmatic approach (although industry would prefer an even more pragmatic one). The UK does not offer multipliers for technological transfers, and award of offset credit rests on the firm actually using the technology in the market place. There is increasing use made of technological and asset transfers to fulfill offsets in Britain. For example, Boeing invested in the Aerospace Manufacture Research Center at Sheffield University. Parliamentary interest in IP is relatively high and its use is monitored following the AWACS affair in the 1980s when it was commonly felt that Britain had gained little from a major procurement contract compared to other European countries (House of Commons, 1989; Martin and Hartley, 1996). Industrial interest is also naturally great and the Defense Manufacturers Association runs an IP forum to facilitate contacts between foreign arms sellers and potential UK partners and to encourage information exchange on IP opportunities. Interestingly, both industry and government believe that as defense firms both become multinational and increasingly pursue strategic alliances to help gain overseas contracts (as BAE did in the Czech Republic to help sell Gripen), formal direct offsets are likely to gradually disappear.

The British government’s free trade policy toward the defense market coupled with its belief that its defense firms can prosper in a freer market is most pronounced at the European level. It is of the opinion that offsets and similar work share or juste retour arrangements in collaborative projects should be phased out together with other barriers to trade to maximize the efficiency of the European defense market. To this end, and recognizing that there was no consensus at the EU or Western European Armaments Group (WEAG) level, it has enthusiastically supported two intergovernmental initiatives that aim to make collaborative projects and the European defense market more efficient. OCCAR was set up to jointly manage procurement projects (for France, Germany, Italy, and the UK) and was thought to offer European nations improved management of collaborative projects. The relinquishment of juste retour in favor of global balance was considered a major step forward. The British government is also enthusiastic about the Framework Agreement, where it sees an opportunity to solve many of the problems of fragmentation in the European market. In July 1998, the defense ministers of the six major arms producing countries in Europe (France, Germany, Italy, Spain, Sweden, and the United Kingdom) signed a Letter of Intent aimed at facilitating cross-border restructing of their defense industries. A Framework Agreement was agreed in July 2000 with the intent that when those countries cooperate with one another they can do so more efficiently and effectively, and that many obstacles to trade will be progressively
removed. Britain proposed an offset waiver within this group in 2002 and was hopeful of gaining agreement on it.

**Germany**

German procurement policies are marked by a close, though not tension-free relationship between domestic companies and the procurement authorities, namely the *Bundesamt für Wehrtechnik und Beschaffung* (BWB), in charge of management, and the supervisory *Hauptabteilung Rüstung* in the Ministry of Defense, which is in charge of policy. In November 2000 an arms procurement council (*Rüstungsraff*) was set up comprising the heads of the armed services, the Chief Comptroller, Director General of Armaments, and the heads of the budget, defense administration, and IT departments. Its task is to plan German defense procurement through prioritization.

The relation between industry and procurement authorities is close, although German defense industry is totally privately owned, and the major producers also have substantial civilian components. Competition among the major German defense producers is limited. Certain companies, or more often consortia of companies, are preferred suppliers for certain types of products. Foreign suppliers are more or less forced to participate in such consortia in order to be successful. An observer has written: “German defence industrialists run an ‘open’ national supplier cartel, whose only common purpose is defence against outsiders who are not capable of retaliating” (Kerber, 2002, p. 29).

Direct offsets, through the participation of German companies in more or less all procurement orders to the tune of German financing, have played a major role in building and supporting the German defense industry. Nevertheless, Germany does not have an official industrial participation policy.

**HISTORICAL BACKGROUND**

Germany’s history has played an influential role in its attitudes toward, and actions on, questions of armaments. Immediately following the second world war Germany was disarmed, and it was not until 1954 with the signing of the Paris Treaties, and West Germany’s 1955 accession to NATO, that a new army was formed. Tight restrictions were maintained on the development and production of weapons.

At the time when German rearmament took place, there was naturally no defense industry in existence in Germany following, as it did, almost a decade of demilitarization. The German government of the time was determined to rebuild a domestic industry, partly for strategic reasons, but predominantly in order to participate in technological progress made in the military sector and to steer regional economic development. Established industries in Germany opposed rearmament, fearing that a diversion of resources to defense would disrupt the economic miracle. It was agreed therefore that defense procurement should benefit the overall industrial development of German industry especially by subsidizing scientific and technical developments in areas where Germany was comparatively backward (Brandt, 1966).

West Germany adopted a middle-of-the-road strategy, whereby much equipment would be purchased overseas but existing capacities in the civilian sector would be used or adapted for production in Germany. International collaboration offered the best chance
of overcoming its deficits on the defense industrial scene, The rejection of the idea of building up a defense industrial sector has meant that to this day, German companies involved in defense production also have considerable civilian operations.

The German defense industry thus developed largely along economic lines, based on technological advantages and government priorities on location. Government ownership, while extensive until the 1980s in the newly emerging aerospace industry, was not viewed as an activist instrument to construct a comprehensive national defense industry (at least after the days of Franz-Josef Strauss), but as a defensive strategy to support infant, and failing, industries. To this day Germany does not have an explicit defense industrial policy: both government support of the industry and acquisition policies have been opportunistic, driven by commercial opportunities, employment and technology policy, and regional politics.5

Germany does, though, abide by certain principles, which while never formally codified as an official policy, are important in the procurement decisions taken by German governments:

- maintenance of technological and industrial capacity through collaboration within NATO;
- facilitation of Germany’s integration into the European Union and transatlantic alliance;
- pursuit of industrial policy particularly in the area of aerospace to help build up dual-use capacities;
- acquisition of technology (military or dual-use) through licensed production (in the belief that military technology would spin off to benefit general economic growth).

This produced a procurement sector with high levels of collaborative projects and a defense industrial sector firmly embedded in the civilian economy (Cowen, 1986). But the lack of any official policy has made the aims and objectives of German defense procurement rather opaque.

German defense industry developed strengths in niche areas, such as tank production and naval shipbuilding, closely related to similar strengths in civilian industry, namely the automobile industry and merchant shipbuilding, but remained weaker in aerospace and electronics. The industry has gone through a period of rapid consolidation in the 1990s which left the country with a handful of mid-sized defense manufacturers that employ some 90,000 workers as compared with 280,000 ten years ago (Küchle, 2001).

THE ROLE OF OFFSETS

Industrial offsets played a major role in the development of the German defense industry after World War II. Procurement authorities insisted on work to be conducted in Germany to the tune of German funding, wherever this was technically and financially feasible.6 Additional costs of production under licence in Germany were accepted when this led to technology transfers to Germany. In cases where domestic production did not make sense, German authorities negotiated for industrial offsets for its defense industry (Cowen, 1986).
Offset requirements were primarily managed through procurement policies but no official policy was formulated. Only German companies were effectively allowed to participate. Foreign suppliers had to pair up with German companies and share the work. Consortia where German partners could additionally gain in terms of technology and long-term production capacity were preferred. It should be noted that Germany was unusually successful in using offsets to “grow” an indigenous defense industry; this was almost certainly because the importance of successful German rearmament to its NATO allies meant that they were willing to accept these terms.

The German approach to offsets proved difficult in the early phases when there was hardly a German defense industry to cooperate with. In the 1950s and 1960s, foreign suppliers were therefore allowed to set up subsidiaries in Germany to compete for procurement contracts. Later on, many of these affiliates either went out of business or were swallowed by the growing German companies.

At present, the German procurement preference for companies operating in Germany does not seem likely to change, even though it now will include more foreign-owned companies. Procurement continues to support the “cartel” (Kerber, 2002) of German companies by only giving contracts to such consortia where German partners have a work share corresponding to German procurement expenditure.

Germany’s objectives of Europeanization and collaboration in procurement to maximize resources mean that the government is, like Britain, supportive of OCCAR and the Framework Agreement, although it emphasizes that it sees these as steps toward a European Armaments Agency. About 70 percent of Germany’s major procurement projects are developed and produced in international projects. As the importance of German defense industry grew and procurement resources decreased, Germany has become more insistent on its rightful work share in these projects although it accepts a managed approach to collaboration such as OCCAR’s global balance system. German industry, however, would prefer action to come from the European Union as it feels that the Letter of Intent process is codifying their disadvantaged status vis-à-vis government support at a European level.

**Comparative analysis of import offset policies**

The British and German cases present two types of defense industrial preferences with respect to offsets: industry perspectives on import offsets are largely dependent on their position vis-à-vis competition in the arms market. A strong competitive defense industry will in principle be against offsets. It will still seek offsets as a second-best in markets where others do the same, but it clearly perceives this as a loss in opportunity and business. A weak industry, however, will regard direct offsets as a crucial instrument to improve their competitiveness through technology transfers, which enable receiving industries to improve their longer-term production capabilities.

Governments, at least in the British and German cases, have provided support to industry’s position on offsets. The British government, which is devoted to open competition in procurement, is actively seeking offsets despite in principle being opposed to them. Industry may clamor for an even more pro-“buy British” stand, but the fact remains that the British government will regularly request offsets beneficial to British defense industry. Offset policy, as defined by the government, is setting the ground rules
for both the government and industry when it comes to offsets. They signal to potential foreign suppliers what to expect in procurement competition but also define the roles of government and industry in this area.

Germany, interestingly, has no such explicit offset policy, largely because offsets have been, and still are, built into the procurement system. Government-industry relations are so close that foreign suppliers have no chance to gain contracts other than through cooperation with German companies. Government has shaped the industrial scene, too, by preferring large conglomerates in which defense was not the major activity to companies highly dependent on defense. It has also used defense procurement for non-defense purposes, such as regional and technology policy. All this has happened in an ad hoc fashion, without an explicit defense industrial policy.

Export offsets

United Kingdom

The British government provides a considerable level of support for companies wishing to export defense equipment. This is regarded as legitimate support as it helps to maintain the viability of the UKs defense industrial base. Ministers actively lobby on behalf of British defense firms and further support is provided by an agency of the MoD. There is also the Defense Export Services Organization (DESO), an unusual organization, which has few international counterparts. Its role is to provide assistance to British defense companies and to overseas customers interested in acquiring British defense products. As, collectively, the world’s second biggest arms exporter British firms are frequently faced with the challenge of outgoing, or export offset deals. It is recognized that in some countries the offset package is of more importance than the main tender. The number of countries adopting offset requirements is growing, the offset percentage demanded is increasing, and the complexity of the pertinent regulations is high. DESO therefore explains the rules and regulations of the customer country to firms, establishes contact with offset contacts there, and facilitates the development of offset projects. It concentrates its efforts on smaller exporters who do not have dedicated offset staff. In many cases, as the indigenous defense industry is too small or the offset demands too high, indirect civilian offset is used. This makes it harder for defense prime contractors, which in Britain tend to have less of a civilian component than in Germany, to fulfill their offset obligations. DESO also tries to spot projects that could be used for offset credit, even using non-UK companies and regional policy agencies to start projects that the defense firms can invest in.

Export offsets are both a source of opportunity and a problem for industry. Industry recognizes that offsets will remain for the foreseeable future, even as it fears that ever increasing levels of offset will eventually lead the system to collapse. There is some industrial concern especially from lower-tier suppliers that foreign countries’ desire to protect and expand their indigenous defense industry is simply bringing more firms into a market which already suffers from overcapacity. They also realize that British defense firms need to play the offset game with increasing skill. The Defense Manufacturers Association established the British Defense Manufacturers Offset Group in 1990 to
increase levels of information and advice available. Trade Partners UK also awarded a contract in 2001 to the British Consultants Bureau to provide advice to UK SMEs on offset and countertrade issues. This package of services is generally considered to be of major assistance to UK defense firms, especially given that exports represent approximately 40 percent of UK defense industrial production. Nevertheless offsets are seen more as a problem to be dealt with than as an opportunity.

Germany

As a result of Germany’s experience in world war II, involvement in the international arms trade is a sensitive topic. Originally restricted to exports of weapons received from allies in the 1950s, arms exports grew with the build-up of the German defense industry as from the late 1960s. Export policy has remained more restrictive than that of other main producers in Europe, such as Britain and France. Still, Germany is one of the five or six largest exporters of military equipment in the world. One reason for this position in a highly competitive market has been its extensive willingness to offer offsets.

When German companies began to penetrate the international arms markets in the 1960s, their willingness to offer production of German products under licence gave it a distinct marketing edge. Many customers were keen to master the domestic production of small arms, but also of warships and armored vehicles. The dominant suppliers, including the United States, the Soviet Union, and the UK, hesitated to provide such offsets, for strategic and economic reasons. Strategically, they were interested in the dependency growing out of arms sales. Economically, they feared the development of competitors that might be able to produce with lower costs.

German producers, as latecomers in the international arms markets, saw their chance in offering production technology. The success of German arms exporters since the 1970s was largely grounded in this willingness to transfer technology. It was supported by the general expertise of German industry in industrial project management. German firms did not help to erect defense companies, but a wide range of factories. Usually a consortium of a defense company owning the relevant technology, and a project manager, with expertise in building factories, was in charge of providing customers with packages containing weapons and production capacities.

In addition to these direct offsets, German industry also developed specific expertise in indirect offsets. This was largely done through the trading departments within the large conglomerates that also produced arms. An example is Thyssen, which builds warships and armored vehicles but largely is a steel producer and trader. One company in particular developed skills relevant to marketing German arms through indirect offsets: Rheinstahl. This company is a trading house in metal ores and metal products but also of production facilities related to metals. It has paired, for several decades, with the major German shipyards. Rheinstahl negotiated the commercial side of naval deals and provided the offsets, for instance by buying metal ore from Brazil or copper ingots in Chile, while the shipyards negotiated on technology and provided the ships. In addition, business itself has supported offset trade through an informal group that developed into the Deutsches Kompensations Forum in 2000.

The German government sees export offsets as entirely a matter for the firms concerned. The officials deciding whether export permission is granted do not consider
the offset side of any deal at all (although the effects of technology transfer are considered). They provide little support for German firms needing to develop offset packages.

The German defense industry feels disadvantaged by the existing regulations, which it says damage its competitiveness in relation to other European firms. It is certainly true that German export rules are often an issue in agreeing collaborative projects. The German government also does not engage in export promotion in the way of the British or French governments, although in the 1990s some low-key activity has begun (for example, the German navy had an arms promotion tour to South Africa). Equally, where export credit guarantees are concerned the German government “Hermes” credit guarantee agency is generally barred from assisting with defense sales (except to EU/NATO or other like-minded countries).

The lack of government support might be thought to be negative for German firms. Nevertheless, German firms are putting together major offset packages such as the 16 billion rand offset deal to sell four frigates to South Africa (value 6 billion rand) or the three submarines to South Africa again (offset 30.3 billion rand; value 5.2 billion rand). This is largely because compared to other European firms, and certainly to the US, the defense firms are more experienced in the offset game.

Comparative analysis of export offsets

British companies principally regard export offsets as a nuisance which complicate matters. They look to the government to help in keeping the costs of export offsets down. The British government lends its support because it is keen for the British defense industry, one of the few competitive British industries left, to be strong in exports.

The German government, in contrast, operates a hands-off policy with respect to the official promotion of arms exports. It also is keen that the German defense industry should export but fears, for historical reasons, being perceived as an unethical supplier and so follows relatively strict export rules compared to other European countries. It is, however, willing to bend the rules, for instance for naval shipbuilding, which can export to many more countries than say the tank-building industry.

More importantly, by insisting on defense production capabilities within larger conglomerates instead of dedicated defense firms, the government has built-up a defense industry structure that has some advantages in world export markets where offsets are important. The German government can have both: a strong export industry and show moral restraint. Another contributing factor was that the German government was not interested in the strategic aspects of arms transfers, and thus had no hesitation in allowing foreign countries to produce German weapons under licence.

Conclusions

Offsets are the coin of the weak in arms production. Stronger industries are opposed, both on the import and export side, and only accept offsets as a second-best in highly imperfect markets. Direct offsets can, as the German example demonstrates, help to build-up a domestic arms production base. However, even in the German case, it should
not be overlooked that the strong areas of industry are less those that benefitted from technology transfers, such as aerospace, than those that had close links to civilian activities, particularly shipbuilding and armored vehicles.

The analysis of the longer term effects of offsets is even more sobering when the main customers benefiting from earlier German technology transfers are considered. Few of these continued producing in quantity after the end of the immediate offset arrangements. In some cases, technology transfers resulted in commercial disasters, such as in Argentina, where German ships, tanks, and aircraft were produced under license (see Scheetz, 2004). In others, production was discontinued because of the lack of customers. It remains a basic fact that defense production is only sustainable where there is a general industrial environment that can support this activity (see Brauer, 2004).

On the other hand, it makes little sense to view offsets in isolation. The British government, which is not keen on offsets, is promoting its industry by other means. Thus it runs an extensive, and costly, export promotion program.

In the end, there is no hiding from the fact that the arms market is characterized by what Ann Markusen (2004) has called “illiberal trade,” where non-economic motives and behavior are rampant. Offsets are less illiberal than some instruments and policies, but they remain an obligation many participants in the trade would shed if they were not faced with strong partners insisting on them. However, as this study has shown, some cope better than others with this situation. The German industry and government have, largely through the late-comer status of the German defense industry, made much out of offsets, both on the import and export side while the British industry and government, starting from a much stronger position, would prefer to get rid of them altogether.

Notes
1. This chapter is primarily based on information gained from a series of interviews carried out in Britain and Germany with Ministry of Defense officials and industrial representatives in the summer of 2002.
2. Firm price contracts mean that the contracted price does not change at all; fixed price contracts only allow for inflation-linked price changes.
3. Britain does not aggregate contracts; the threshold applies to each contract separately.
4. For the UK, direct offsets refer to work on that particular contract, indirect offsets refer to other defense-related work.
5. The aerospace industry in the 1950s and 1960s can be seen as an exception. Lavish subsidies, aggressive and expensive import substitution, licenced production, and finally coproduction, were used to gain the technology the industry needed to flourish but had missed out on during the period before rearmament.
6. Part of German procurement was offset of a different kind, namely for the stationing of allied, particularly US troops in Germany. For these deliveries, German authorities could obviously not ask for compensation.
References


8
Offsets and the Joint Strike Fighter in the UK and the Netherlands
Keith Hartley

Introduction: the policy issues

Defense equipment procurement policy is determined by economics and politics. The economic determinants are reflected in rising equipment costs in real terms and budget constraints. Political factors are reflected in a nation’s desire for independence and its willingness to pay for such independence. As a result, nations have a set of choices about the industrial policy implications of their defense equipment procurement policy, ranging from complete independence to importing foreign equipment directly “off-the-shelf.” Between these extremes, there are various international collaborative industrial policies, each involving different degrees of work sharing.

The UK has experienced all types of industrial policy in its defense equipment procurement. It has bought equipment from its own defense industrial base (e.g., ammunition, tanks, trainer aircraft, warships, submarines), it has been involved in major European collaborative programs (e.g., Jaguar, Tornado, Typhoon), and it has experienced licensed production (e.g., of US helicopters) and imports of foreign equipment, usually from the USA, with or without some form of work sharing or offset agreement (e.g., UK work share on imports of US Phantom combat aircraft and offsets on US AWACS).

For the purposes of this chapter, international collaboration is defined broadly to embrace two or more nations involved in work sharing on defense equipment procurement. This includes the traditional European collaboration where two or more nations share development costs and combine their national production orders. It also includes licensed production where a nation produces foreign equipment under licence and coproduction where nations are involved in production sharing (e.g., European purchase of US F-16 aircraft). Finally, it includes offsets associated with the import of foreign equipment (e.g., UK purchase of AWACS). In contrast, the independence associated with a nation buying from its own defense industrial base can offer the attraction of capturing all the work from the procurement.

This chapter reviews the political economy of traditional European collaborative procurement, including its inefficiencies. It then evaluates the UK involvement in the United States Joint Strike Fighter program (JSF) and reviews this as a possible model for future international collaboration. Consideration is also given to the Netherlands’ procurement choice of an F-16 replacement. This decision involved the Netherlands in evaluating alternative aircraft and associated industrial participation arrangements. Both the UK and the Netherlands case studies are based on original material acquired by the
author as part of an economic and industrial evaluation of procurement options. These evaluations did not involve a comparative assessment of the cost, military, and operational performance aspects of the rival aircraft. However, the case studies provide information on the industrial participation deals available for various European and US combat aircraft and are typical of such offset arrangements. They also add to our knowledge in an area that lacks published information.

**UK defense procurement policy**

Like all other countries, the UK is faced with the need to make defense choices in a world of uncertainty: the future and its threats are unknown and unknowable. Typically, defense input costs of both equipment and personnel (capital and labor, with the UK relying on an all-volunteer force) have risen at faster rates than any increase in the defense budget could provide for. This defense economics problem means that policymakers cannot avoid the need for difficult choices: something has to go and the question is what goes? Broadly, there are four options. First, there is the “equal misery” solution, involving less training, delays in delivery, reduced purchases of spare and replacement equipment, stretching new equipment programs and some cancellations. Second, the increased efficiency solution involves competitive procurement, purchasing from lower-cost sources overseas, smart acquisition (aiming to deliver cheaper, faster, and better equipment), and military outsourcing (including private finance initiatives and public-private partnerships). Third, the defense review solution involves a major reappraisal of a nation’s defense commitments, including withdrawal from overseas bases, the ending of major commitments, and the cancellation of some large equipment programs. The UK undertook such defense reviews following the end of the cold war (1990/91) and with its Strategic Defense Review of 1998, involving reductions in the size of the armed forces, reorganization of forces, closure of military bases, and reduced defense capability (e.g., the capability for one Gulf-type war or two Bosnia-type operations). A fourth option is to increase defense spending, but this involves sacrifices of social welfare programs. Between 1990/91 and 2000/01, UK defense expenditure declined from £30.4 billion to £24.1 billion, a reduction of some 20 percent (in constant 2001/02 prices). In contrast, over the period 2003 to 2006, UK inflation-adjusted defense spending is planned to rise by some 1.5 percent per annum.

Equipment is one of the major cost items in the UK defense budget, accounting for some 42 percent of expenditure in 2000/01 with personnel accounting for a further 37 percent. Given the need for difficult defense choices, the equipment procurement program is an obvious focal point for economy measures. Cheaper alternatives to “buying British” are obvious options. These include European collaborative programs and imports either with or without an offset. Alternatively, a complete program could be canceled with its associated cost savings and a reduction in UK defense capability. Options for cancellation include the UKs planned order for two new aircraft carriers, or its order for new nuclear-powered submarines, or a reduced purchase of Typhoon aircraft.
European collaboration

Typically, when the UK has purchased costly new equipment, it has chosen the European collaboration option. Examples include the Jaguar (UK-France), Tornado (UK-Germany-Italy), and Eurofighter Typhoon (UK-Germany-Italy-Spain) combat aircraft, the UK-Italian Merlin helicopter, the A400M airlifter (eight nations), and the Meteor air-to-air missile (six nations). The simple and ideal model of international collaboration offers major savings in development costs from sharing between partner nations as well as economies in production as nations combine their orders and obtain the economies of scale and learning from longer production runs. For example, two equal partners on a collaborative aircraft program would share development costs and by combining their order for, say, 200 aircraft each, they would expect savings on unit production costs of about 10 percent from a doubling of output.

Reality departs from the ideal model of collaboration. Traditionally, European collaboration has been characterized by major inefficiencies and delays reflecting work sharing and government and industrial management arrangements. Typically, each partner nation seeks a share in each sector of high technology work on a project (e.g., airframe, engine, avionics) so that work is not allocated on the basis of competition and comparative advantage. There is also duplication of flight testing centers and final assembly lines. Further inefficiency and delays arise from the complex inter-governmental committee structure and arrangements for policing and monitoring collaborative projects, all of which contribute to raising transaction costs. For example, over 75 percent of cooperative projects involving the UK required unanimous agreement from the high-level multinational Steering Committee given responsibility for the program, with each partner seeking to protect its national interests. During the early years of development of the Eurofighter Typhoon, decisions were reached through a four-level hierarchy of some 50 committees with consensus sought at each level.

“This meant that nations did not always make decisions in an efficient and timely manner, inefficiencies which were compounded because the NATO Agency charged with managing the programme did not have clearly delegated authority and responsibility and was not a clear focus for the management of the programme. These problems were mirrored by industrial management structures which meant that responsibilities andaccountabilities on both sides became blurred” (NAO, 2001, p. 34).

Inefficiency in European collaborations has been reflected in both development and production costs and in program delays. Cooperative development programs are usually more expensive than similar national projects: estimates suggest that they might be from one-third to almost twice as high as a national alternative. For example, the two-nation Merlin helicopter total development costs were estimated to be 43 percent higher than an alternative national development cost, and the corresponding figure for the four-nation Eurofighter Typhoon was an extra 96 percent. However, even with higher total development costs, collaboration offers savings in development costs from cost sharing...
with partner nations. On average, the UK’s cost share is about one-third of total development costs (NAO, 2001, p. 16).

Further inefficiencies arise in collaborative production. Ideally, collaboration should lead to a 10 percent reduction in unit production costs for every doubling of output. Once again, however, collaborative production inefficiencies arise from the artificial splitting of work packages and their allocation on criteria other than minimum cost and from the establishment of multiple production lines with corresponding losses of scale and learning economies. As a result, it has been estimated that the production economies on collaborative programs are likely to be in the region of 50 percent of those on national programs (NAO, 2001, p. 17). Collaboration also leads to delays in delivery, estimated at some 11 months. Such delays have resulted from industrial factors, from the time taken for partners to commit to the project, from delays in securing funding, and from partners reducing their order quantities and withdrawing from the program (NAO, 2001, pp. 19–20; Hartley and Martin, 1993).

Initiatives have been introduced to improve the efficiency of European collaborative programs, especially their management. A four-nation procurement agency, OCCAR (France, Germany, Italy, UK), aims to improve the efficiency of European collaboration through contracts placed on the basis of competition and the rejection of traditional work sharing within individual programs (juste retour) in favor of global balance (national work sharing over a number of programs). Nonetheless, there will continue to be pressures from both national governments and their industries to protect their national interests (e.g., through a “Fortress Europe” policy). There will also be the continued search for cheaper defense equipment with imports being an attractive option.

**UK and defense equipment imports**

Since 1980, UK defense equipment imports have shown a rising trend in both levels and shares of total UK equipment spending. Aerospace imports from NATO countries, especially the USA, have dominated the import figures (see table 8.1). Such imports have been at the expense of the UK defense industrial base and have also been reflected in UK requirements for offsets for its domestic industry.

Offsets appear attractive but appearances can be deceptive. Questions arise as to how much of any offset is genuinely new business which would not otherwise have been obtained, how much is high technology work, how much is defense-related business, how much involves highly paid jobs, whether the offset work is temporary or permanent, and whether extra costs are involved. UK experience with the purchase of Boeing AWACS aircraft for the RAF illustrates some of the problems with offsets. For this purchase, the UK agreed a 130 percent offset. However, Boeing was allowed to count its purchase of Rolls Royce civil aero-engines for its commercial aircraft as part of the offset obligation. This meant that civil aerospace work was counted against a defense offset commitment. The arrangement was generous to
Table 8.1: UK defense equipment imports

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<tr>
<td>Total imports (£ mill, current prices)</td>
<td>147</td>
<td>246</td>
<td>627</td>
<td>1,433</td>
<td>1,660</td>
<td>1,804</td>
</tr>
<tr>
<td>Imports (£ mill, constant 2001 prices)</td>
<td>367</td>
<td>476</td>
<td>857</td>
<td>1,722</td>
<td>1,729</td>
<td>1,804</td>
</tr>
<tr>
<td>Imports as share of UK equipment spending (%)</td>
<td>3</td>
<td>3</td>
<td>7.1</td>
<td>16.8</td>
<td>17.1</td>
<td>18</td>
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By type (£ m, current prices)

a) Military aircraft | 2  | 18  | 316  | 1,137 | 1,363 | 1,609 |
b) Missiles | 65  | 119  | 190  | 134  | 142  | 138  |
By origin (£m, current prices) NATO | 141  | 220  | 471  | 1,162 | 1,383 | 1,718 |

Notes: (i) Military aircraft includes parts; missiles comprises guided weapons, missiles and parts. NATO includes other Europe. (ii) Constant prices based on UK GDP deflator at market prices.

Source: DASA (2002).

Boeing, representing over 50 percent of Boeing’s offset commitment, and, typically, Rolls Royce aero-engines would have been purchased without the offset agreement: hence, they were not new work resulting from the offset obligation. It has been estimated that for developed nations such as the UK, genuinely new business might be some 25 to 50 percent of the total offset (Martin and Hartley, 1995). Similarly, for imports purchased directly “off-the-shelf,” there are few opportunities for acquiring new technology since the development work on the project will have been completed. And offsets raise questions about the definition of high technology. For the UK purchase of Boeing AWACS, work on the aircraft galleys and toilets counted as high technology.

Both contractors and governments have every incentive to exaggerate the benefits of offsets and ignore the costs. But all policy changes involve gainers and losers, and offsets are no exception (there are no free lunches). They are seen as a means of redistributing jobs from exporting to importing nations, but there are efficiency losses to the importer if it is a higher-cost nation and if there are more efficient alternative uses for its resources. Offsets are attractive to vote-sensitive politicians who can use them to justify the import of defense equipment by claiming that they are protecting the national defense industry, its jobs, and technology. The reality is that a nation’s defense industry based on offset business will lose the capability for design and systems integration associated with independent national programs and European collaborative projects. This then raises the question of how a nation might combine its search for low-cost defense equipment while maintaining a high-technology defense industrial base: is JSF the solution?
The UK and JSF: the project history

The Joint Strike Fighter (JSF) program is a requirement for an affordable new tactical aircraft combining the needs of the US Air Force, the US Navy, and the US Marine Corps. The Air Force requirement is for a low-cost replacement for its F-16 and A-10 aircraft with a flyaway unit-cost target of $28 million (1994 prices); the US Navy requires a carrier-capable aircraft with stealth features and long range to replace its F-18s and the A-6 with a flyaway unit-cost target of $31–38 million (1994 prices); and the US Marine Corps requires a short take-off and vertical landing variant (STO VL) to replace its AV-8B aircraft with a flyaway unit-cost target of $30–35 million (1994 prices). In addition, the UK Royal Navy and the RAF require a replacement for their Harrier STOVL aircraft. Cost savings on the JSF come from commonality among the three variants, with some 70 to 80 percent of the value of the aircraft being common, and from the long production run for the US forces. Estimates suggest that jointness will lead to cost savings of some 18 to 25 percent for development, production, and operation (life-cycle costs) as compared to the costs of three independently developed aircraft types (CBO, 1997, p. 42). The original requirement for the US forces was 2,852 aircraft plus a further 150 aircraft for the UK, resulting in a total planned order for 3,002 aircraft. UK involvement in the program was at both industry and government level.

Competition was used to determine which two firms would be selected for the JSF Concept Demonstration Phase. Three bids were submitted comprising five firms. In November 1996, the US Department of Defense selected the proposals from Boeing and Lockheed Martin with the losing bid from a team composed of McDonnell Douglas, Northrop Grumman, and British Aerospace (BAE). Boeing (X-32) and Lockheed Martin (X-35) were each awarded contracts to build two JSF concept demonstrator aircraft with flight tests planned for 2000 and on the basis of which the preferred bidder was to be selected. This competing prototype stage was a “fly-before-you-buy” competition, with each rival designing and flying demonstration aircraft, evolving their preferred weapon systems concepts for the production designs, and submitting proposals for the next phase, called Engineering and Manufacturing Development (EMD). In December 1996, Boeing announced a merger with McDonnell Douglas, and in May-June 1997 Lockheed Martin announced that Northrop Grumman and BAE had joined its JSF team.

Following a Memorandum of Understanding (MoU) signed with the US government in December 1995, the UK government entered the Concept Demonstration Phase (CDP) of the JSF program in November 1996. JSF is an international program in which the UK entered as a full partner, with a 10 percent share of the CDP of the project. As a result, the UK contributed $200 million as a full collaborative partner during the $2 billion CDP. Other nations involved in the JSF program by 2000 were Canada, Denmark, Italy, Norway, and the Netherlands, each being associate or informed partner nations, with each contributing under 2 percent of the CDP costs (these five nations contributed a total of $50 million to CDP costs).

UK participation in the JSF program was initially subject to an investment appraisal undertaken in 1995. At this stage, the UK requirement was for 60 aircraft only (later raised to 150 aircraft). On this initial basis, it was estimated that an UK-only program
would be between 60 and 105 percent more expensive than UK participation in JSF, and JSF also compared favorably on cost criteria with variants of existing aircraft such as Eurofighter and F-18. However, it was also estimated that it would be some 4 percent cheaper to buy JSF directly from the USA rather than participate as a partner in the joint program (NAO, 2001, p. 59). In return for the extra cost of being a full partner, the UK obtains possible military, economic, industrial, and technology benefits, although there is no formal arrangement for distributing work between UK and US industry. At this stage of the procurement process, prior to EMD, questions arose about the possible economic benefits to the UK of its participation in the JSF program.

Economic benefits to the UK

The results in this section are based on a study of the economic and industrial benefits to the UK of its requirement for a Future Carrier Borne Aircraft (FCBA; Hartley, 2000). The focus is on the impacts on the UK aerospace industry and the economy in terms of employment, technology, and exports. The study was undertaken in early 2000 during the CDP and before the award of the EMD to the preferred contractor. At that time, the US JSF was a strong contender for the FCBA; other contenders included a naval version of Eurofighter Typhoon, a development of the Harrier (Harrier III), the US F-18 E/F, and the French Dassault Rafale.

On JSF, two industrial teams were competing for the EMD contract. The Boeing team included UK suppliers in its international supplier team. These included Flight Refuelling, Messier Dowty, and Martin Baker. The Lockheed Martin team was a partnership with Northrop Grumman and BAE Systems (its JSF project team, formerly BAE Military Aircraft). BAE Systems had an exclusive partnership agreement with Lockheed Martin on the JSF. This provides BAE Systems (JSF team) with at least 10 percent of the work on all phases of the JSF and for all customers, including export customers (BAE has responsibility for the rear fuselage and tail section). For example, with initial planned orders for some 3,000 units and forecast export sales of 2,000 aircraft, BAEs work share could be the equivalent of 500 aircraft (airframes only). The exclusive partnership meant that BAE was in a risky “win-lose” position during the CDP. In contrast, some UK firms were involved in both rival industrial teams, and hence, were in a safe “win-win” position during the CDP. Rolls Royce, for example, was involved in the Pratt and Whitney engines for both teams’ STOVL variants and was also involved in the rival General Electric engine. Similarly, the former GEC Marconi company was involved in both teams; but with the creation of BAE Systems following the merger between BAE and GEC Marconi, BAE Systems Avionics became suppliers to both teams. A postal survey of suppliers involved in the Lockheed Martin JSF showed that a majority were also involved in the Boeing JSF program (Hartley, 2000). That some of the major UK aerospace equipment suppliers were involved in both teams should be no surprise. Both Boeing and Lockheed Martin will have selected those UK firms which have a competitive advantage and could enhance their bids, and these are likely to be the same group of UK companies.
### Table 8.2: Overall evaluation: a UK perspective, 2000

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Number of jobs (per annum)</th>
<th>Quality of jobs</th>
<th>Technology</th>
<th>Exports per UK</th>
<th>Overall rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>LM</td>
<td>EMD: 3,000+</td>
<td>high</td>
<td>potentially good on technology transfer</td>
<td>2,000</td>
<td>1</td>
</tr>
<tr>
<td>JSF production:</td>
<td>12,500</td>
<td>medium/</td>
<td>some for firms in Boeing supplier team</td>
<td>2,000</td>
<td>2</td>
</tr>
<tr>
<td>Boeing production:</td>
<td>5,500–9,500</td>
<td>high</td>
<td>Boeing supplier team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JSF R&amp;D:</td>
<td>4,100+</td>
<td>high</td>
<td>good (?)</td>
<td>some(?)</td>
<td>2</td>
</tr>
<tr>
<td>III production:</td>
<td>9,000+</td>
<td>high</td>
<td>limited</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Naval production:</td>
<td>10, 345–13, 150</td>
<td>high</td>
<td>some</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eurofighter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boeing offset:</td>
<td>6,000</td>
<td>low</td>
<td>little</td>
<td>none</td>
<td>5</td>
</tr>
<tr>
<td>F-18E/F offset:</td>
<td>4,000</td>
<td>low</td>
<td>little</td>
<td>none</td>
<td>6</td>
</tr>
</tbody>
</table>

*Note:* LM=Lockheed Martin; EMD=Engineering and Manufacturing Development. The results are based on a study completed in June 2000 (Hartley, 2000).

Assessment of the likely economic and industrial benefits to the UK of the rival JSF teams during the Concept Demonstration Phase was influenced by the exclusive partnership agreement between Lockheed Martin and BAE Systems. Selection of the Lockheed Martin JSF offered direct economic benefits to BAE Systems and to its suppliers in the form of jobs, technology, and exports. BAE Systems and the UK might benefit from technology transfer, including stealth technology on the airframe, and battlefield management and data access. However, transfer of sensitive technologies to the UK will depend on the US-UK MoU, on associated technology access agreements, and on the approval of the US Congress. There could also be technology transfer from the UK to the USA in the form of STOVL and lean manufacturing technologies. Further benefits to BAE Systems and the UK would include the retention of the company as part of the UK defense industrial base and possible involvement in life-cycle support for UK and European JSF aircraft (e.g., servicing, repairs, and maintenance).

The results of the study of the economic and industrial impacts for the UK from the rival JSF teams and the alternative aircraft are shown in table 8.2. The rankings are based on quantitative and qualitative assessments made in 2000 before contractor selection and before the start of full development. Clearly, military performance, cost, and delivery will...
dominate the final choice, but if the competing aircraft are identical or similar on military performance and cost, then wider economic and industrial criteria enter the procurement choice. Table 8.2 presents the type of evidence which the UK government needed to identify the trade-offs for each aircraft option and to make an informed procurement choice.

Estimates of employment shown in table 8.2 were based on interviews with Lockheed Martin, BAE Systems (for JSF, Eurofighter, and Harrier III), and Rolls Royce, as well as on a postal survey of UK equipment suppliers mostly involved on the Lockheed Martin JSF. Estimates for the Boeing JSF were based on data in the public domain and on plausible assumptions (e.g., about work awarded by Boeing to BAE Systems): hence, the range of estimates for Boeing shown in table 8.2. Overall, for firms in the UK aerospace industry, UK participation in the EMD and production phases of the JSF program is expected to require highly-skilled and high-wage jobs; and with wages reflecting productivity, these are high-productivity jobs compared with manufacturing and all UK industries. Typically, jobs on JSF will pay annual salaries which in 2000 were over 30 percent higher than the average for other industries and for some skills salaries were 2.4 times higher (i.e., compared with manufacturing and all industries in Great Britain; ONS, 2000).

Evaluations were also made of the economic and industrial impacts of alternative UK aircraft, namely, a naval Eurofighter and Harrier III. Compared with JSF, the broad choices for the UK were between a small share of a large-scale JSF program and a large share of a small-scale naval Eurofighter or involvement in Harrier III (on which there was little information in the public domain). The overseas aircraft were assumed to involve a 100 percent offset, but assuming that such offsets created only 25 to 50 percent new jobs in the UK (not all of which would be in the UK aerospace industry). For all the alternative aircraft, assumptions were made about their likely unit-costs which provided the basis for estimating employment.

Overall, on economic and industrial criteria, the Lockheed Martin JSF was ranked top and offered the UK the best value for money (table 8.2) A key and distinctive element in the Lockheed Martin JSF is its exclusive partnership with BAE Systems which offered the UK company an involvement in EMD, a share in the total sales of JSF to all customers, and possible access to high technology. The Lockheed Martin JSF also contributes to maintaining BAE Systems as an important component of the UK aerospace industry and of the national defense industrial base.

Joint second-ranked options were the Boeing JSF and Harrier III, each with different benefits for the UK. This ranking was based on a qualitative assessment as there were insufficient data to discriminate more clearly between the two options. In particular, the assumptions for Harrier III should be regarded as tentative and “heroic,” reflecting the uncertainties surrounding this project. Naval Eurofighter was ranked next, offering some technology, plus substantial production work, but limited export prospects compared with JSF. Nonetheless, naval Eurofighter provided the UK government with some bargaining power and a credible-threat strategy when negotiating an EMD agreement with the USA. The offset options are ranked lowest, reflecting the number of jobs, their low quality, little technology, and the absence of export prospects (Hartley, 2000).
The UK and JSF: the position in 2003

In January 2001, the US and UK governments agreed an MoU for the UK to participate fully in the System Development and Demonstration Phase of the JSF program (SDD: previously known as EMD) which was estimated to cost $25 billion. The UK is the only Level 1 partner in the program and will contribute some £1.3 billion to the SDD phase (about 8 percent of SDD costs), plus about £600 million to fund work on UK-specific requirements. An immediate benefit was that the UK obtained key project roles in the JSF Joint Program Office and “…played a major part in the contractor selection process” (NAO, 2002, p. 99). For example, the UKs close involvement led to inclusion of some UK weapons in the operational requirement. It is not known whether the UKs input into contractor selection included an assessment of the wider economic benefits offered by the rival JSF projects and their industrial teams.

In October 2001, the US awarded a “winner takes all” contract to Lockheed Martin for the estimated 126 month SDD phase of the JSF program (F-35). Subsequently, the UK announced its selection of the STOVL variant for its Future Carrier Borne Aircraft requirement, with an estimated in-service date of 2012. Lockheed Martin’s marketing literature on its F-35 claims that it will create or sustain 5,000 UK jobs in about 70 companies during the SDD phase and 8,400 UK direct jobs per year for the 30 year production and support phase. Overall, the UK will receive an estimated share of 15 to 20 percent of the JSF program. The UK is also one of eight international partners on the program: the others are Australia, Canada, Denmark, Italy, the Netherlands, Norway, and Turkey. The eight partners have collectively committed $4.5 billion to JSF development costs (e.g., Australia will contribute almost $150 million and Norway $125 million to the SDD phase).

The JSF program is not without its problems and critics. Already, the US has reduced its requirement for the Navy and Marine Corps, there are concerns about the reliability of the cost estimates, especially for the low-cost variant, there remain significant project risks during the development stage, and there are uncertainties about the commitment of each of the US forces to acquiring a common aircraft. Further concerns have been expressed by some of the international partners about their failure to obtain work share on the JSF (e.g., Australia, Norway). As a result, the JSF Program Office has modified its global best value approach to placing subcontracts with partner nations to include a “strategic best value” exemption. This permits certain work to be set aside for contractors that meet cost and schedule requirements (e.g., components such as arrester hooks and some ground equipment).

The Netherlands and JSF

In early 2001, the Netherlands undertook studies into the military, cost, and industrial implications of its F-16 replacement program (RUSI, 2001). The rival European and US aircraft for this replacement were the Eurofighter Typhoon, the Gripen, Rafale, an advanced F-16, the JSF, and the F-18 E/F. A study was undertaken into the wider economic and industrial impacts (industrial participation) for the Netherlands of these
alternatives. Information was provided by some of the major rivals, namely, Eurofighter Typhoon, the Saab/BAE Systems Gripen, the advanced F-16, and the rival JSF teams. These studies need to be treated with caution: they reflect the marketing efforts of the rival bidders and as such are subject to contractor bias. The focus is on the economic impact in terms of employment, regional effects, and technology transfer. Moreover, the study was undertaken at an early stage in the Netherlands’ F-16 replacement program when there were major uncertainties and estimates were no more than tentative, broad orders of magnitude. Despite such limitations, the study provided valuable information on the wider economic and industrial impacts of the procurement choices, with a focus on the Netherlands’ aerospace and defense industries. This was a rare opportunity to obtain information on the range and variety of industrial participation offers from rival bidders (Hartley, 2001, chapter 6). There follows an outline and evaluation of the industrial impacts of each rival aircraft.

**Eurofighter Typhoon**

Typhoon offered the Netherlands the opportunity to become a partner in the development, manufacture, and support of future versions and enhancements of Typhoon. On this basis, it would qualify for pre-contract participation in the development work for Typhoon Tranche 3 aircraft, as well as for participation in other European defense technology programs (e.g., radar, missiles). Post-contract participation included opportunities for Dutch industry to be involved in the production of Typhoon airframes and engine parts and components, in avionics and accessories equipment, and in logistics support. There were further post-contract opportunities for Netherlands industry to be involved in non-Typhoon defense projects involving Eurofighter partner nations (e.g., Airbus, warships). Eurofighter had already identified a number of Dutch companies and institutes which offered potential for cooperation (e.g., Stork-Fokker, Fokker Space, Sun Electric Systems, Signaal).

Eurofighter partner nations claimed that a Netherlands decision to buy Typhoon would result in two sets of economic benefits. First, it was claimed that the pre-contract investment would produce an estimated economic return between three and five times the value of the original Netherlands pre-contract funding (e.g., a pre-contract investment by the Netherlands of, say, €0.2 billion would lead to €0.6 to 1.0 billion of post-contract work). Second, there would be additional offsets according to standard Dutch requirements. Possible work areas included continued development of Typhoon and production of items for Tranche 3 aircraft as well as involvement in logistic support for all these aircraft, together with participation in other current and future programs (EF, 2000).

Typhoon offered opportunities for Dutch industry to be involved in development work, as well as the more conventional offset participation in production work. However, from the published literature (EF, 2000), it was not possible to reach any informed judgment on the valuation of the possible technology benefits to Dutch industry. There was also uncertainty about the availability of future funding for Typhoon Tranche 3 aircraft. But compared with the US aircraft, Typhoon offered the Netherlands a different set of economic benefits associated with the “European dimension.” These included participation in Europe’s largest defense program, including cooperation with Europe’s
largest defense and aerospace companies and access to some 350 major suppliers to the Typhoon program. On this basis, Dutch policymakers were required to reach some judgment on the potential military, economic, and industrial benefits of participating in Europe’s largest defense program.

**Saab/BAE Systems Gripen**

The Gripen was claimed to offer “a unique industrial co-operation opportunity involving companies and organisations related to Saab-BAE Systems” (Saab/BAE, 2000). This unique industrial cooperation package aimed to establish an equal partnership in an industrial development program for Gripen together with further work opportunities in aerospace and defense as well as in non-aerospace and non-defense activities. Saab/BAE Systems were willing to consider a minimum commitment of a 100 percent offset for the Gripen program with a significant share in the aerospace and defense sectors, the aim being a “long-term partnership on a sound commercial basis” (Saab/BAE, 2000). Unlike traditional offsets, the Gripen industrial cooperation package stressed the creation of a “long-term partnership resulting in the establishment of profitable businesses which will continue developing long after the fulfilment of the offset commitment” (Saab/BAE, 2000). Saab/BAE Systems were offering the Dutch government and its air force a partnership in future developments of the Gripen, with the Netherlands qualifying as a full partner in the future Gripen-2010 programs (and with the Swedish government committed to funding the future development of Gripen).

Some of the features of the Gripen industrial cooperation package offered to the Netherlands included (Saab/BAE, 2000):

- the creation of a Gripen Design and Development Center in Holland with direct employment of 40–50 personnel and a 2–3 year lead time to create such a Center. Technology transfer was to be facilitated by the co-location of Dutch personnel to Sweden at an early stage in the program;
- Dutch industrial participation in what was then the world’s largest defense company (Saab/BAE Systems), together with links to the partners on Gripen (Volvo and Ericsson) and to their major suppliers (e.g., General Electric, Lockheed Martin, Lucas Aerospace);
- access to non-aerospace and non-defense industrial cooperation through Saab’s membership of Investor AB, one of the world’s largest industrial holding companies;
- participation in other Saab/BAE technology development programs (e.g., UAVs, Meteor missile, Airbus, A400M airlifter);
- involvement in a range of Gripen enhancement work, with opportunities for Dutch industry to participate in both development and production work. A number of Dutch companies had already been identified as potential partners (e.g., Fokker Aerospace, Fokker Elmo, Fokker Space, Signaal, NLR, Edim, Senior Aerospace).

The Gripen industrial package had four distinctive features. First, it offered the Netherlands an equal partnership with Sweden in the development of the next version of
Gripen. In contrast, the Netherlands was to be a junior partner in the Typhoon, Rafale,
and JSF aircraft. Second, it focused on developing long-term partnerships which were to be “profitable and sustainable” long after the achievement of the offset commitment. Third, it offered a range of cooperation from aerospace and defense to non-aerospace and non-defense activities. Fourth, the risks associated with the Gripen aircraft were relatively low compared with some of its rivals. Gripen was in service and the Swedish government was committed to funding Gripen-2010. In contrast, at that stage, JSF had not started full development and funding for Typhoon Tranche 3 did not exist.

Rafale

The French Rafale was reported to offer Dutch industry participation in both development and production work on a European aircraft. An indication of the possible Rafale industrial participation for the Netherlands can be obtained from its bid for the then new fighter aircraft contract from Greece. The Rafale industrial cooperation program based on a partnership among Dassault, SNECMA, and Thomson-CSF offered Greece a global partnership with an invitation to join the Rafale agency with “extensive industrial and technological benefits” (Richard, 2000). Greece was offered access to state-of-the-art technologies developed for Rafale together with participation in future developments for the Rafale mission system as part of a joint development team. It was also offered a final assembly line for the Greek Rafales and manufacturing, assembly, and testing as a sole source of major items for all production Rafales (e.g., aircraft assemblies, mission systems equipments). Engine issues were to be addressed in a similar fashion and there would be Greek involvement in logistic support. It was estimated that a purchase of 60 Rafales by Greece would lead to 1,000 jobs in Greece, 20 years of employment, €1,800 million for the Greek defense industry, and an overall total of €4,800 million from the global partnership (Miltech, 2000, pp. 99–100). Of course, with this and other industrial participation deals, the opportunity cost question cannot be ignored. A direct buy “off-the-shelf” from the manufacturer is likely to be a lower-cost solution, so that any savings could then be injected as spending into the Dutch economy with such alternative spending offering jobs, technology, and export benefits.

Advanced F-16

Under the original 1975 agreement, the Netherlands and three other European nations (Belgium, Denmark, Norway) purchased 348 F-16 aircraft with the Europeans receiving a work share of 58 percent of the value of their initial order. Final assembly lines were established at Fokker in the Netherlands and SABCA in Belgium. This was a coproduction program without design involvement, with any extra costs associated with the program being absorbed by the four European participating governments. The Dutch companies involved in the F-16 coproduction program included DAF (landing gear components), Fokker (final assembly), Oldelft (head-up display), Philips (engine components), Signaal (radar antenna), and Simmonds (fuel measuring control unit).

Lockheed Martin claimed that the advanced F-16 would involve a continuation and expansion of the “highly successful industrial programs that Lockheed Martin has enjoyed with Dutch industry…over the last three decades. Lockheed Martin would rely
on these previous successes to develop a new industrial participation program in support of the advanced F-16” (LM, 2000a). The company also offered offset work on its other programs (e.g., F-16, Hercules).

Previous experience with the original 1975 European purchase of F-16s provides some indication of the likely economic impact of offsets associated with an advanced F-16 purchase. In principle, offsets offer both military and economic advantages. Nations buy an established and proven aircraft so avoiding risks, they save on the R&D costs which would be involved in an independent solution, they help to retain the national defense industrial base, and they provide employment, technology transfers, and balance of payments benefits. However, these claimed benefits are rarely supported with empirical evidence, nor is careful consideration given to the likely costs of offsets (there are no free lunches). For example, reference to the technology benefits of offsets rely on ad hoc examples, such as the transfer of US production and management technology to European co-producers. Rarely is consideration given to assessing the market value of such technology and who pays for these benefits (governments or firms).

While the overall offset targets for the F-16 coproduction program were achieved, the distribution of offset between the four European nations was unequal due to their different aerospace capabilities and their competitiveness. The Netherlands received offsets of 52.8 and 76.1 percent against their respective targets of 58 percent (minimum) and 80 percent (target level: Struys, 1996). Lockheed Martin claimed that for the Netherlands, the F-16 coproduction agreement had “… resulted in value added participation approaching £3 billion” (LM, 2000a). But “value added participation” and “approaching” were not defined, nor was reference made to whether the figures were in current or constant prices. If the figure means sales, then over a 25 year period, it represents an average of under $120 million per annum (most likely in current prices). Nor was the program costless. Estimates suggest that compared with buying directly from General Dynamics, the Europeans paid an extra 34 percent for their F-16s (Rich et al., 1981). Such estimates do not include the costs of the extra time and delays involved in the F-16 coproduction program compared with a direct buy from the USA (e.g., the costs of running-on old equipment).

JSF options

At the time of the study, JSF was a competition between the Boeing and Lockheed Martin teams (see project history above). This section assesses the information available on the Netherlands industrial participation in the rival JSF teams. In 2000, the Boeing JSF One Team comprised a group of companies “fundamentally involved in the overall design, execution and management of the entire program” with each company chosen on the basis of its commitment to quality and affordability (Flight, 2000, p. 23). In addition to Boeing, the One Team comprised 34 leading aerospace companies from the USA, UK, Denmark, and the Netherlands. The Dutch companies listed as One Team members were Fokker (airframe structural details, wire bundles), Perot Systems (supportability systems), and Philips (airframe structural details). Other Dutch companies were likely to be involved if Boeing were selected for the development phase and if the Netherlands selected the JSF as its F-16 replacement. Also, the Boeing JSF offered opportunities for applying its commercial airplane expertise (e.g., on the development of the Boeing 777
and new generation 737 airliners) and its international competitiveness in the jet airliner market to achieving the cost and performance targets on JSF. On this basis, any Boeing offset for the Netherlands might involve the transfer of production technology from its civil aircraft business.

Lockheed Martin provided some company information on the likely involvement of Dutch companies in its JSF project. Much depended on whether the Netherlands joined the full development program as a Level 2 partner for JSF (an order for 100 aircraft was assumed). The original F-16 coproduction agreement involved no design or support responsibility and was a “build-to-print” arrangement. With JSF, Lockheed Martin industrial partners are “fully integrated into the design, production and support team” and typically retain design and support responsibility over the life of a program. Industrial partners are chosen on the basis of “best value” in terms of affordability and technical competence. By early 2001, Lockheed Martin had selected a number of Dutch companies for the next phase of the program and these were chosen regardless of the Netherlands’ participation in the development phase. These companies were Fokker Aerostructures (Stork: structural components, moveable doors), Fokker Elmo (Stork: wiring harness), Signaal USFA (cryogenic coolers), and DPCC (a consortium: PHM systems). Lockheed Martin regarded the Netherlands as “the largest potential international industrial participant with the exception of the UK,” and it estimated the value to Dutch industry of its involvement in the JSF project at $3 to 4 billion, with some estimates based on involvement in full development totaling $6 to 7 billion over the life of the program (1994 prices: LM, 2000b). Technological involvement for Dutch companies ranged from software to electronics to structural components, together with technology spin-off benefits. It was also estimated that Dutch involvement in the full development phase would lead the US government to waive its R&D levy of some $5 to 7 million per aircraft.

Predictably, many Dutch companies were involved in both rival JSF teams (i.e., a win-win situation): one estimate was that 80 percent of Dutch firms were involved in both teams and firms which have international reputations for competitiveness and technical excellence will be attractive to both Boeing and Lockheed Martin (Hartley, 2001, p. 121). Both JSF teams offered Dutch companies opportunities for design and development work on their components. Comparing the offset arrangements for the two JSF projects, using the available but limited information, it was expected that Lockheed Martin would have a competitive advantage in industrial partnerships and offsets for the Netherlands. Based on its long experience with the European F-16 coproduction agreement, it has a detailed knowledge of the Dutch aerospace and defense industries and the national government (i.e., its entry costs were borne by that program).

**F-18E/F**

Little information was available on the industrial participation for this option. Nonetheless, some broad generalizations were possible. If the Netherlands were to select the F-18 E/F, it would likely be offered a conventional offset package based on production work for the aircraft. Since the F-18 E/F aircraft has been developed, there seems little opportunity for Dutch industry to be involved in development work on the
aircraft, although Boeing could have offered participation in other military and civil projects.

**Overall evaluation**

Each of the industrial participation and offset proposals have different features, requiring policymakers to specify their objectives clearly, identify their priorities, and place valuations on their various aims. The rival industrial participation packages differed in the following respects:

- the risks and uncertainties associated with the rival aircraft and their associated offset packages; in 2001, some aircraft already existed and had entered operational service while others had not started full development;
- the extent of any partnership in the development program; the options ranged from no partnership to various forms of junior partnership to equal partnership in development work;
- a program with Europe or the USA and their associated aerospace companies; the type of industrial partnership and its duration. For example, are there opportunities for industrial participation outside the project in non-defense and non-aerospace work; and is the offset or partnership for the duration of the procurement only or is a more permanent and longer-term commitment being offered?
- the involvement of Dutch companies. The rival bids are likely to involve a common core of Dutch companies. The different bids will then need to be evaluated in terms of the amount and type of work offered to the common core of Dutch companies, the importance of these companies to the Dutch defense and aerospace industries, and the involvement of other Dutch companies outside the common core;
- the need for quantification. The rival bids need to be expressed in terms of the estimated number of jobs, their skills, location, and their duration. Since offsets are prone to exaggeration, the reliability of a firm’s offset estimates might be determined by its willingness to include the industrial participation content into a legally enforceable contract.

Any overall evaluation of the rival bids from a Netherlands perspective has to be tentative. There was a lack of data for an informed ranking, so the evaluation was

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Development work</th>
<th>Production work</th>
<th>Technology</th>
<th>Other offsets</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saab/BAE Gripen</td>
<td>equal partner</td>
<td>yes: 100% long-term partnership</td>
<td>yes</td>
<td>industrial package</td>
<td>1</td>
</tr>
<tr>
<td>Typhoon</td>
<td>junior partner</td>
<td>yes: Europe’s largest defense project</td>
<td>some</td>
<td>involvement in other current/ future projects</td>
<td>2</td>
</tr>
<tr>
<td>Company</td>
<td>Type of Participation</td>
<td>Final Assembly</td>
<td>Experience from F-16</td>
<td>Offsets on Other Programs</td>
<td>Work on Other Boeing Projects</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------</td>
<td>----------------</td>
<td>----------------------</td>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Rafale</td>
<td>junior partner</td>
<td>yes</td>
<td>some</td>
<td>possible (?)</td>
<td></td>
</tr>
<tr>
<td>LM JSF</td>
<td>some</td>
<td>yes</td>
<td>some</td>
<td>value=$3–4/ $6–7 billion</td>
<td></td>
</tr>
<tr>
<td>LM Adv. F-16</td>
<td>limited (?)</td>
<td>yes</td>
<td>experience from F-16</td>
<td>offsets on other LM programs</td>
<td></td>
</tr>
<tr>
<td>Boeing JSF</td>
<td>some</td>
<td>yes</td>
<td>some</td>
<td>–</td>
<td>possible work on other Boeing projects</td>
</tr>
<tr>
<td>F-18E/F</td>
<td>none</td>
<td>yes</td>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on a qualitative assessment of the economic and industrial benefits of the rival bids. Military performance and cost criteria were not part of this evaluation. The results are presented in table 8.3 where there is confidence about the extremes of the ranking (numbers one, two, and seven), but less about the middle order. Nor is any attempt made to quantify the differences in the rankings (e.g., there might be only marginal differences between rankings 4 and 5). In the event, the Netherlands decided to be an international partner in the JSF development program.

**Conclusion: JSF as a model for future international collaboration?**

European collaborations in defense equipment have been characterized by major inefficiencies resulting from inter-governmental bureaucracy, industrial management problems, and work share requirements. In contrast, European collaboration in large jet airliners has been successful, with Airbus as the only rival to Boeing (a duopoly).

Economic theory offers some policy guidelines for international collaboration in defense projects. First, international collaboration has to offer cost savings compared with an equivalent national project and ideally compared with the least-cost alternative (importing). In other words, analyzing such collaborations as clubs requires that club membership be worthwhile (i.e., benefits at least equal to the costs of membership). Second, an efficient international club would allocate work on the basis of comparative advantage determined by competition. For example, a country with a comparative advantage in high technology would undertake the development work on the project and there would be no requirement to award work to the losing bidders. Nor would countries have an automatic right to a share of the development work based on the size of their order (juste retour). Third, the project needs to be managed by a single prime contractor subject to an incentive-contract offering rewards for good performance and penalties for poor performance.

JSF seems closer to the policy guidelines of economic theory than the traditional European collaborations. There were competitions at the design and prototype stages on JSF. For the prototype competition, there were two prime contractors each selecting partner companies and major suppliers on the basis of their technical excellence and international competitiveness (i.e., selection on commercial rather than political criteria). The ultimate winner of the development contract was awarded the contract on a “winner takes all” basis (i.e., no requirement to offer some work to Boeing as the loser).
Interestingly, a number of suppliers were associated with both JSF industrial teams (a win-win situation), whereas BAE Systems adopted a high-risk strategy and agreed an exclusive partnership with Lockheed Martin (a win-lose position).

The international partners on the JSF program are unique in providing a North American, European, and Australian partnership, with each contributing to the project’s development costs. In return, each will expect some benefits from their contributions. Benefits might take the form of exemption from paying an R&D levy on any purchases, an opportunity to bid for work on the program, priority in deliveries, and access to technical and performance data on the aircraft. These benefits have to be greater than the alternative of a direct buy “off-the-shelf.” The UK is different in that it is the only Level 1 partner, paying a premium of 4 percent compared with a direct import. Clearly, the international partners will expect and will lobby for some work share, but any work awarded will be determined by the prime contractor and not by governments and the work allocations will not be allowed to increase the final price of the aircraft. Nor is there an elaborate inter-governmental bureaucracy with responsibility for project management. Similarly, there are no complex industrial management problems and the associated need to create a new international company (cf. Eurofighter): Lockheed Martin and its industrial partners (Northrop Grumman and BAE Systems) have prime contractor responsibility and their suppliers are subject to normal commercial supply contracts.

JSF provides a model for future international collaboration. It is a collaboration based on economic rather than political criteria. Of course, critics might claim that it is not a genuine international collaboration of the type pursued in Europe but instead is an American-led and dominated program with the US retaining a monopoly of design and development and retention of stealth technology. The UK as a Level 1 player is different; but for the other international partners it will be argued that JSF is a new package of the old US idea whereby international collaboration is seen as sharing some production work.

References


9
Nordic offset policies: changes and challenges

Björn Hagelin

Introduction

This chapter compares the origin and content of offset policies in the four Nordic countries Denmark, Finland, Norway, and Sweden. By policies are meant formal government and/or agency guidelines that explain the reasons and conditions for demanding offsets in connection with military acquisitions. All of the Nordic countries have experiences as arms importers—in the case of Finland from both the Soviet Union and western countries—as arms exporters (although that experience varies greatly), and as partners in international arms cooperation. This chapter describes their policies, if any, in these three roles.

Evolution of Nordic offset policies

The idea behind offsets is to compensate (or offset) the cost of importing weapon systems. As the Nordic countries began to use such arrangements at different dates they also defined somewhat different policies. The earliest Nordic examples were in the form of countertrade or work share/cost share arrangements during the 1960s and involved Finland and Denmark.1 During the 1980s, offsets were demanded also by Norway and Sweden. Access to foreign markets and/or to receive foreign technology became central objectives. The first important case in Norway was the order of six type-210 submarines from Germany in 1982. Sweden’s largest indigenous military project, the Gripen combat aircraft, was to save money as compared to the prior-generation combat aircraft, the Viggen. One option was to purchase subsystems and components from abroad rather than to develop them in Sweden. The costs for those imports were to be compensated for by the foreign suppliers.2

These examples illustrate that offset arrangements could mean different things, and that they were generally used in connection with larger acquisitions. Still, the early offset policies of all the Nordic countries are considered flexible when compared with the policies of larger arms producing countries (Ahlström, 1992a; Ahlström, 1992b).

The actual codification of Nordic national offset policies do not, with the exception of Sweden, date back to those early years. Sweden’s first offset guidelines were presented in a Ministry for Defense document in 1983 and updated in 1999 (see table 9.1).
Table 9.1: Year of published offset policies, guidelines, and revisions

<table>
<thead>
<tr>
<th>Country</th>
<th>Year(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>1996</td>
</tr>
<tr>
<td>Norway</td>
<td>1999</td>
</tr>
</tbody>
</table>

Denmark’s offset policy was formalized into an official document in 1996. In connection with Finland’s acquisition of British Hawk aircraft in 1977 the Finnish Parliament decided that offsets were a precondition for a purchase. An intra-governmental Finnish Offset Committee was established, but formal policy guidelines were not published until 1991. The rules were then slightly revised in 1998, 2001, and 2002. Until 1999 the policy in Norway was a short Ministry for Defense statement passed by Parliament. In 1999 formal offset guidelines were published by the defense ministry, and a Strategic Advisory Group for Industrial Co-operation and Offset (SAGICO) was established.3

The presentation and comparison in this chapter make use of available policy documents and guidelines, published summaries, and personal communication.4 Not every aspect of national policy can be formally defined in official documents, and many aspects of implementation have been left open for negotiation on a case-by-case basis, but by 1999 all Nordic countries had published offset policies. Having evolved especially during the 1990s, the policies more clearly specified what governments want (or do not want) as buyers and how they set out to achieve their objectives.5

A comparison of Nordic countries as arms importers

All the Nordic countries have defined minimum values for when 100 percent offsets are to be requested (table 9.2). Finland and Sweden have roughly the same minimum values, while Denmark has defined the lowest limit. These limits broadly reflect the size and capacity of their respective domestic defense industrial base. By international comparisons, all are relatively small. The smaller the national defense industrial base, the more difficult to implement large military offset agreements. In Norway, if there is at least 80 percent foreign participation in a military project, it is credited as a 100 percent offset. Among the Nordic countries, small size has become a problem for Denmark in particular. This problem was reflected in its 1996 policy which defined not only minimum values but also stated that above Dkr100 million ($12.7 million, at average 2002 market exchange rates at current prices) only 30+ percent offsets would be demanded. Otherwise, it was feared, offset implementation by Danish industry would be too complicated.

In June 2002 Danish offset obligations with 33 foreign suppliers amounted to eight billion Dkr ($1 billion) to be completed before 2010. More than 50 percent of these obligations were with EH Industries Ltd. and Lockheed Martin Aeronautical Systems. Military offset obligations were expected to increase further as a result of additional
major acquisitions, including new combat aircraft, submarines, transport helicopters, aircraft surveillance equipment, battle tank communication systems, and naval radar systems. With an offset policy specifying that offset obligations should be implemented within eight years there was a risk that over time obligations would become impossible to fulfill. Consequently, in August 2002, the National Agency for Enterprise suggested to create a venture fund with foreign supplier capital. This would be used as a catalyst to expand Denmark’s military production. Foreign suppliers would be given the opportunity to pay into the fund—about five percent of the offset amount was mentioned—and receive a multiplier benefit, although multipliers have as a rule not been accepted in Denmark. The foreign suppliers who would pay into the fund would also receive a return on their investment. In May 2003, based on the recommendation by a special Task Force study, government decided against pursuing the idea at this time.

Offset priorities are similar in all four countries. The overriding aims are to support indigenous military companies by sustaining domestic military-industrial capabilities, technological skills, employment more generally, and to generate new business activities. Still, actual administration differs. Although the Ministry for Defense is involved in one way or another in all four countries—it is the formal buyer of military equipment—ministries involved with trade and industry seem equally important. For example, in Denmark the Agency for Trade and Industry—which is part of the Ministry of Business and Industry—prepares the Industrial Cooperation Agreements (ICA). In Finland, the Ministry for Trade and Industry defines industrial participation guidelines and is responsible for reviewing offset fulfillment. In Denmark and Sweden it is the defense acquisition agency that is involved in the actual offset specifications. In Finland, the

Table 9.2: Limits for demanding 100 percent offsets

<table>
<thead>
<tr>
<th>Country</th>
<th>Offsets Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>25–100 m. DKr (US$m. 3.2–12.7) Entire time period</td>
</tr>
<tr>
<td>Finland</td>
<td>50m. FIM (US$7.9m.) 1991–2001 10 m. € (US$9.4m.) since 2002</td>
</tr>
<tr>
<td>Norway</td>
<td>50m. NOK (US$6.3m.) until 2001 75 m. NOK (US$9.4m.) since 2001</td>
</tr>
<tr>
<td>Sweden</td>
<td>75 m. SEK (US$7.7m.) 1983–1999 100m. SEK (US$10.3m.) since 1999</td>
</tr>
</tbody>
</table>
Finnish Offset Committee has that role, and in Norway the aforementioned SAGICO seems to have a similar role.

One of the main reasons for policy revision was to increase the military-technological content of offsets through direct and indirect technology transfers. In Finland, technology transfers in indirect offsets were introduced in the 1991 policy. Preferred offsets today involve more participation of domestic industry in the development and/or manufacture of the purchased equipment in order to sustain or develop skills and to learn how to maintain and support the equipment during its lifetime. Support of small and medium-sized enterprises (SMEs) is also an important offset objective in both Denmark and Finland.

Although Norway’s policy document includes a list of prioritized technology areas to be counted as indirect offsets, Sweden seems to have the strongest technology focus, partly because of the armed forces’ Research and Technology (R&T) policy (Swedish Armed Forces Strategy, 1997; 2002). In Sweden, decisions about whether the procurement of a particular technology, or parts thereof, should be defined as a direct or indirect offset in a tender document must be taken in consultation with the armed forces.7

Another important reason for offset revision was to make policy more specific and detailed. This was the result of, first, more competition in the international arms market (which in the 1990s had made it a buyers’ market), and, second, increasing national, especially industrial, awareness of market demands. Offsets are not just a political add-on to make any specific contract more appealing; instead, together with credits and favorable loan guarantees they have become a competitive tool. Sweden’s 1999 policy and the 2002 acquisition guidelines (Guidelines, 2002) illustrate this by linking industrial participation directly with defined defense technological areas; not, as a rule, accepting multipliers or offset banking;8 and only accepting swaps between Swedish and foreign offset obligations of up to 15 percent of total obligations.

In general, the use of multipliers, especially with high coefficients, has been reduced. The 1991 Finnish guidelines could give technology transfers a multiplier coefficient as high as 20, while for investments leading to new industrial production it could be as low as 0.5. According to the revised Finnish 2001 rules, technology transfers and investments are evaluated on a case-by-case basis by the Finnish Offsets Committee. In Denmark, unless there are substantial technological benefits involved, multipliers are not accepted. Industry is required to bid competitively on any offset contract. Still, there are exceptions. Finland’s 2002 rules state that in specific cases concerning technology transfers or marketing projects, a fixed part of the cost may be borne by the Finnish parties. In Denmark, technology transfers may be credited in proportion to the investment if a Danish company can exploit it and if it is free of charge. Sweden’s defense acquisition agency (Försvarsmaterielverk, FMV) may accept multipliers in indirectly related R&D activities, but only with a maximum coefficient of three. The highest possible multiplier coefficient accepted by the Norwegian government is five, and must involve R&D projects placed in Norway, R&D technology transfers to a Norwegian company, or investments resulting in new commercial activities. The lowest offset multiplier coefficients in Norway are offered for the acquisition of partly finished products (0.2 to
1.0) and marketing assistance (0.1 to 2.0). Marketing assistance is, moreover, only accepted as offset if it leads to sales within two years.

All Nordic countries accept offset banking, i.e., the use of offset credits that a foreign supplier has earned before a new defense acquisition contract is signed (in Norway, this is called “conditional offsets”). Sweden accepts such credits but again the use is restricted. If a foreign supplier to Sweden has exceeded its obligation when a contract is fulfilled, these excess credits cannot as a rule be transferred to a new contact. When exceptions are made, such credits must be used within three years. If a foreign company that has entered into conditional offsets in Norway does not win a new delivery contract, the credits may be used by other suppliers in that country within two years. The Danish policy is most explicit, stating that banked credits will be extended for two years, may not be transferred to a third party, and will only be allowed to satisfy up to 50 percent of obligations under new cooperation agreements.

No buyer wants compensations to drag out for a long time. Preferably, fulfillment should not take longer than the time agreed to fulfill the military order. Norway’s policy stipulates that offset obligations must be fulfilled “by the delivery of the procurement contract.” Still, in their policies, Denmark and Finland have formulated time limits for the implementation of offset agreements: in Denmark between 3 and 8 years and in Finland between 3 and 10 years, at least according to its 1991 guidelines. In the revised Finnish IP guidelines no such time limit is mentioned, as is also the case in Sweden. With an emphasis on long-term technology offsets and IP, it is actually very difficult—or may even be counterproductive—to specify time limits. This is also acknowledged in Norway for offsets involving long-term contractual cooperation.

Offset requirements are generally to be defined before a delivery contract is concluded. Moreover, they should be implemented according to the agreement. If not, all the Nordic countries retain the right to punish a foreign supplier. The Finnish and Swedish policies accept direct economic sanctions. The Norwegian policy states that the authorities in such cases “…will withhold payment corresponding to 10 percent of the contract figure… If the offset obligations are not met within two years after the expiry of the agreement, the withheld sum will be forfeited.” Denmark takes a somewhat different position. The threat of economic sanction is not used since it is acknowledged that it increases the price of the imported product. Instead, Denmark blacklists a supplier from receiving new contracts until the obligations have been fulfilled.

How important are offsets for the procurement outcome? Can an acquisition decision be based on offset benefits rather than on other considerations? Basically no. Norway’s policy states that conditional offsets will not influence the acquisition decision. The Swedish guidelines are explicit in that the “…purchaser’s choice of supplier must not be influenced by any offsets on offer unless and until it has been established that the prospective suppliers’ products or systems meet the purchaser’s requirements.” Even without such explicit references it is understandable that neither offset offers nor the existence of offset agreements should be allowed to affect the procurement decision so that the decision-process is focused on military requirements.

As from the 1980s offset arrangements have come to include not only compensations to take place in the buyer’s country but also from the buyer’s country. Increasing the volume of exports as well as finding new export markets have become important aspects of offsets. Both military and civilian exports have a high priority in Finland’s military IP
policy, especially for SMEs. As in Finland, Sweden’s defense acquisition agency guidelines are explicit about export expectations, especially from indirect IP commitments. Links between offsets that lead to domestic coproduction and follow-on exports are also important. For example, as a result of the selection of NH-90 transport helicopters by Finland, Norway, and Sweden, industry in these countries are involved in NH-90 production also for non-Nordic customers. Transnational military-industrial relations are increasingly relevant for all Nordic countries as well as for their future position in European military production.

A comparison of Nordic countries as arms exporters and as international arms cooperation partners

No Nordic country has formulated an explicit military export offset policy. In 2002, the Association of Swedish Defense Industries (ASDI) attempted to do just that by making the point that Swedish military companies should accept their own import offset policy also as exporters. But this did not remain in the association’s final IP policy document (Policy for Offset, 2003). Still, large military exports from Nordic countries, such as the Saab-BAE Systems Gripen sales, involve recipient offsets. The supplier may also, as an offset benefit, help the recipient to export its own military products to other customers. For instance, as part of their offer to sell 24 Gripen aircraft to the Czech Republic, BAE agreed in December 2001 to attempt to find buyers for 36 L-159 light combat/trainer aircraft being produced for but no longer wanted by the Czech Republic.

As exports and international cooperation have become increasingly important aspects of Nordic defense industrial policies, arranging offsets with foreign buyers will be important to secure Nordic export contracts. With countries with which closer military relations have developed, special offset arrangements may be negotiated. The historical and political relations among the Nordic countries, the changing security situation in Europe during the early 1990s, and the shared need to reduce acquisition costs resulted in the signing of a Nordic Armaments Cooperation (NORDAC) framework agreement in 1994, in essence an attempt to establish a common Nordic arms market. Objectives include more effective use of Nordic defense industrial resources and increased use of common acquisitions. In November 2000 the countries signed another agreement to further the economic, technological, and industrial advantages from military cooperation, and in June 2001 they signed an agreement concerning support for industrial cooperation in the defense materiel area. Of special interest is that the parties agreed to refrain from requiring industrial compensation for the procurement of products from each other, if not prevented to do so by other rules and regulations, and that intra-Nordic arms trade information is to be compiled in annual compensation accounts. Every five years an evaluation report on the compensation balance is to be drawn up (Agreement, 2001, section 4).
Changes and challenges

While there has been supplier criticism of offsets as a distortion of otherwise competitive arms markets, offsets have simultaneously been regarded as necessary to compete for contracts. The 2001 status report by the US Presidential Commission on Offsets in International Trade downgraded the overall negative effect of offsets in US military trade when valued against the benefits (US Presidential Commission, 2001). This conclusion is likely to reduce the effect of offset critics in both the USA and other countries and to direct the debate toward policies that reduce the most negative consequences of offsets. Such developments are already visible from the revisions of Nordic offset policies. But the policies and their changes also point to challenges both for the use of offsets as such and for the participation by the Nordic countries in wider European military-industrial undertakings.

Policy versus reality

It is clear that the Nordic countries have learned from and been influenced by other, including each others’, policies. As buyers they try to get as much out of offsets as possible. Over time, this resulted in a shift in the basic Nordic offset policy: from indirect civilian offsets to direct and indirect military offsets. There has been a move away from mixed industrial, regional, and other civilian aims toward military gains, mainly through direct IP and technology transfers. Factors used for calculating offset values have been adapted and principles developed to punish suppliers that do not implement agreed offsets. But it is important to remember that while policy formulates objectives and guidelines, the companies involved can still accept arrangements that stretch the implementation of the policy if deemed rewarding.

Nordic policies are somewhat ambivalent about offsets. On the one hand, offsets will continue to be demanded for large military acquisitions. On the other hand, it has been acknowledged that in certain cases offsets may be detrimental because of added costs. While Danish industry reportedly had not experienced any added costs from offsets by the middle of the 1980s, Denmark’s offset policy now acknowledges added costs. Finland estimates a 10–15 percent cost increase per offset agreement (JAS Industrisamverkan, 1986, pp. 64,68). Its National Audit Agency, together with its 1999 finding that Finland’s acquisition of the US F-18 combat aircraft did not result in the expected offset gains (except with regard to technology transfers), suggested that the country’s offset policy be revised to reflect the possibility of offset-related higher costs. Subsequently, in 2002, the Ministry for Trade and Industry suggested that offset demands can be made for less than 100 percent compensation or even, in certain cases, zero. Such an option already exists in the Norwegian policy.

The question remains: are offsets beneficial? Unfortunately, national conclusions as to net gains are not always comparable and often controversial. A Norwegian report in 2000 pointed to this general problem, especially on account of the low quality of available data (Halvorssen and Vamraak 2000, p. 41). A US General Accounting Office report concluded that the work of the US Presidential Offset Commission may result in better
agency coordination with regard to offset data collection which had not been efficient until then (US GAO, 2000). The many ways to arrange and calculate offset requirements—such as complicated IP arrangements, multipliers, saved offsets, accepting offsets together with export credits and government loan guarantees as parts of an export order, etc.—complicate evaluations as well as comparisons. The percentage figure given for the value of an offset agreement does therefore not necessarily correspond to the actual work offered by the supplier or the work that the supplier becomes involved in. Recognition of these problems, increasing the demand for higher-quality data—including national policies mandating regular reviews of offset implementations—will likely result in improved evaluations of offset benefits and drawbacks. The first Nordic evaluation report is expected in 2008.

Civilian versus military offsets

All Nordic countries have increased the use of offsets as a tool for military-industrial participation and relevant technology transfers. Their policies have become more explicit and specific. Some of the countries combine non-military and military-industrial offset goals but Sweden’s policy has completely moved away from mixed goals to a 100 percent military-industrial offset policy only. This does not imply that all countries should have a military-only offset policy—the opposite is, of course, possible within limits agreed to by the EU and international trade organizations. In particular, it is possible for Nordic countries, as arms exporters, to emphasize civilian offsets when negotiating offsets with a foreign recipient, especially if that recipient is a developing country where basic human needs have not yet been fulfilled.

Cost versus participation

All Nordic countries are relatively small military producers. Problems with implementing offsets in small states are illustrated by Denmark in particular. Further reductions in the Nordic military-industrial base are not unlikely, and Denmark’s current problems may be experienced by other Nordic countries in the future.

One particular factor limiting offsets is the use of commercial “best-practice” in military acquisitions. Subcontracts for the US Joint Strike Fighter (JSF) project are signed on a commercial basis, and no buyer should expect offset benefits. This raises the issue of cost versus participation. All foreign participants, with the exception of the British, have had to accept less than full participation—and thus also less than total influence—in the balance between costs and expected gains. Norway and Denmark each paid $10 million to be associate JSF partners during the initial development phase until 2001. In the current and more expensive engineering and manufacturing development phase they each pay between $125–150 million for getting subcontracts and (perhaps) being competent buyers more than 10 years into an uncertain future.

Acquiring advanced military equipment is not easy or cheap for small states that wish to support their own limited defense industrial base. Ambitions have to be redefined and expectations perhaps lowered. Direct imports will become more important as complements to indigenous development and manufacture.
Importers, exporters, or partners?

While all Nordic countries have offset policies as importers of major military equipment, they have not formulated such policies as exporters. One explanation is that with the exception of Sweden, Nordic countries have limited military exports. But the use of industrial participation to support domestic military-industrial development will spill over to the countries’ military exports. No Nordic country is therefore simply either an arms importer or an arms exporter. This plays into the NORDAC idea that instead of demanding offsets from each other the countries should abandon them altogether. It has been noted that policies in both Norway and Finland permit not demanding offset work under certain circumstances, and both Denmark and Sweden have acknowledged that more international cooperation could make offsets unnecessary. The Swedish arms manufacturer’s 2003 policy recognizes that there may be instances when the application of the IP principle could be reduced or not be used at all.

Stating goals is easier than overcoming, by practical measures, existing difficulties. National protectionism exists in Europe. Countries and agencies remain wary of harmonization or to give up technological leads, just as individual companies are unwilling to lose their competitive edge for the “common good.” In effect, an offset policy may be used as a protective measure. Paradoxically, the differences in military-industrial size and competence that remain between Sweden and the other Nordic countries could complicate cooperation. Among Nordic countries, Sweden has the largest military-industrial base and is its major arms exporter. Sweden’s 1999 government offset policy, its 2002 arms acquisition agency guidelines, and the 2003 policy document of its arms manufacturers’ association all aim to support Sweden’s military industry. This may send a message to other countries that these are policies to be used to gain national and company-specific benefits. To avoid being co-opted by Swedish policy, other Nordic governments and agencies may seek closer relations with non-Nordic partners.

In addition to national and regional Nordic policies and aims, several military companies in the Nordic countries are partly or wholly owned by foreign companies. Foreign ownership became possible with privatization and the development of companies’ commercial strategies. Foreign interests can support or complicate Nordic as well as broader cooperation and influence national military company strategies and developments.

Changes versus challenges

The application of national offset policies among individual European states, including the Nordic ones, may be affected by pan-European developments in the European effort at arms-export policy harmonization, continued changes in national military-industrial bases, and more commercially-based acquisition decisions both in Europe and in the USA. In the European military-industrial future, there may be no room left for a distinct “Nordic dimension.” The likelihood is that most or all military production and acquisitions in Europe will become coordinated and international. The development and success of future European arms acquisitions will be decided by the answers to four questions linking military doctrine, the European Security and Defense Policy, and defense-industrial policy: what should be produced, for what purpose(s), by whom, to be used by whom? Not all European countries are likely to participate in all aspects of
military production, nor to be involved in every military operation. The degree of harmonization in military production in Europe will be a reflection of Europe’s perception of its role(s) and responsibilities as well as its ability to agree on a common road map.

National offset goals and regional European developments may be incompatible. To guide European developments, its governments need to take the reins together. Offsets are not a separate issue but part of Europe’s military-political development. The EU needs to formulate implementation guidelines for a common, long-term European policy to sustain and develop common and shared strategic industrial and technological skills. The aim would be to establish cost-effective military acquisitions within a European security and defense policy. Some nations and military companies will be winners, others will be individual losers but to the benefit of all. For the latter, the outcome is not necessarily bad in the long-term if competitive civilian activities are established, activities that are likely to have a stronger positive impact on economic development and company success than military activities.

We may have come full circle as a result of increasing recipient demands for military IP and investment. Offset has become a buzzword whose meaning today has become confused. Perhaps it is time to return to traditional forms of military transfers: direct transfers of complete weapon systems, license manufacture (individually or in the form of consortia), and weapons R&D cooperation. Separate recipient demands—be they military or not—can be supported in ways other than by being linked to a particular military acquisition.

Notes

1. Finland and the Soviet Union arranged countertrade deals as a result of Finland’s purchase of 24 MIG-21 combat aircraft in 1962. When Denmark in 1968 ordered 46 Draken combat aircraft from Sweden, and when Finland ordered 12 Swedish J-35 Draken in 1970 and 50 UK Hawk-50 light combat and trainer aircraft in 1977, both Denmark and Finland demanded local assembly to offset employment losses and to sustain and gain skills.
2. The major offset arrangement was with General Electric in 1983 for the further development by Vol vo Flygmotor of the GE-404 engine and its licensed manufacture for Sweden’s air force and, in part, also for foreign customers.
3. In Norway the offset history has not been properly documented. Moreover, two offset studies prepared during the 1990s by the Norwegian Center for Economic Analysis (ECON) have limited distribution and were not available for this comparison.
4. A full list of references, especially to the policies, guidelines, and revisions in the Nordic languages is available directly from the author.
5. The titles of the Swedish and Norwegian 1999 policy documents are similar, although Norway has kept the term “offset arrangements” rather than the more common term “industrial participation” (IP). For Norway, export of defense products still seems to have the highest priority together with indirect defense offsets. Sweden, in contrast, has a “cooperative” policy emphasizing defense IP. Similarly, Finland and Denmark define their policies as IP or cooperation policies. It should be noted, however, that Norway uses so-called Industrial Cooperation Agreements (ICAs) as its most important offset tool.
6. Personal communication with the National Agency for Enterprise.
7. The term R&T is becoming more common, paralleling the use of R&D (research and development). The difference between the two is not always clear but one purpose of using the R&T phrase is to emphasize the importance of relevant technology development,
including technology demonstrators, rather than the development of prototypes of complete military platforms.

8. Neither multipliers nor banking are mentioned in the Swedish policy guidelines but are referred to in studies of earlier Swedish policy (see Ahlström, 1992a, 1992b).


11. Sweden’s 1999 policy states that offsets should not normally be demanded in international cooperation unless partners make such demands. Similarly, a Danish memorandum from 28 August 2001 states that as long as there is no free defense market in Europe, offset agreements will be used. The Danish memorandum mirrors the formulations used in a European Defense Industries Group (EDIG) June 2001 policy paper (see EDIG, 2001).

12. See Sköns (2004) for a description and discussion of Finland’s (and Sweden’s) offset audit efforts.

References


Evaluating defense offsets: the experience in Finland and Sweden

Elisabeth Sköns

Introduction

The use of offsets has become a common practice in the international arms trade. Today almost all countries demand offsets for their major arms import programs. This is the consequence of changing supplier-buyer relationships on the international arms market. Export pressures due to the continuously accelerating cost of advanced weapon systems during the past three to four decades have since the end of the cold war been reinforced by the decline in domestic demand for military equipment in the main arms producing countries. Arms producing companies are outbidding each other in offering attractive offset packages as a method of competition on the international arms market, and the buyer governments are using their leverage to obtain optimally beneficial offset packages.

Offsets are agreements in foreign trade to “compensate” importing countries for the loss of domestic economic activity and foreign currency occasioned by the import. Although the very purpose for demanding offsets is to obtain economic compensation, there is still rather little knowledge about the economic impact of offsets as well as about the effect of offsets in general. Much remains to be investigated as regards their theoretical, potential, and actual economic benefits and costs. In particular, there are few empirical studies of the actual implementation and economic impact of offsets in the recipient country. Only a few countries have tried to conduct evaluations of their offset programs, among them Finland and Sweden. Therefore, the experiences of these countries can be of interest for other countries.

The purpose of this chapter is to describe and analyze the experiences in Finland and Sweden as regards their efforts to evaluate some of their offset programs in official audits. The chapter begins with a general background to the problems involved in evaluating offsets in the international arms trade, and a description of the approach taken in this chapter, including the definition and terminology used. Then follows the discussion of the experience in Finland and Sweden. The chapter ends with a number of tentative conclusions.
Evaluation of offsets

Methodological difficulties in offset evaluations

Empirical studies on the implementation of offsets, their contribution to the achievement of offset policy goals and their economic impact are associated with a number of difficulties. There are many reasons for this. One is the problem of data access. Stephen Martin (1996, pp. 3–4) argues that the main problems associated with the evaluation of offsets are, first, that there is little, if any, routinely published data on offsets, and that the analyst is therefore reliant on the goodwill of industry and government to discuss such matters; second, that offsets are big business and commercially sensitive; and third, that those involved with offsets in industry and government have vested interests which sometimes makes it difficult to disentangle fact from fiction. Willett and Anthony (1998) emphasize similar reasons for the lack of standardized data in this area: difficulties to find instruments with which to measure a complex trading activity; that the growing number of offset agreements adds a problem of scale; and that defense contractors are notoriously reluctant to reveal what they regard as highly sensitive commercial information.

But there are also more fundamental, conceptual problems involved. The four most important problems are (i) the difficulty to assess whether a particular offset activity actually occurred as a result of the offset arrangement, or whether the offsetting trade would have occurred even in the absence of the offset agreement; (ii) that arms deals with offset agreements usually increase the cost of the underlying arms deal, but that the amount of the additional cost is never specified and thus difficult to take into account; (iii) the broad range of activities covered under the umbrella of the offset concept, and the different types of impact that these different activities have; and (iv) the variety of offset policies of recipient countries, some of which are related to defense policy goals while others are related to economic policy goals.

The first of these problems is that in order to be able to evaluate the actual economic impact of offsets, it is necessary to know what transactions would have taken place in the absence of the offset transactions. Since this by definition is unknown, an assumption has to be made—most often that they would not otherwise have taken place—and this introduces a fundamental source of uncertainty into the evaluation. The second refers to the additional cost of offset-related arms deals as compared to “pure” arms purchases. Mandatory offset agreements often include penalty clauses in the event that offset obligations are not fully implemented. Suppliers insure themselves against this risk by raising the contract value of the arms deal. Non-mandatory offset deals normally also lead to higher contract values, due to the significant administration costs involved in offset arrangements. In principle, an evaluation of the economic impact of offsets should thus subtract the negative effect of the increased contract value from any positive economic effect of fulfilled offset transactions, but in practice this is often impossible since the additional cost is unknown. The third problem is that the term “offsets” does not refer to a well-defined homogenous activity but is a collective term for a broad range of transactions and activities, each of which with different economic effects. It is therefore difficult to generalize about the impact of offsets. Each type of offset has to be evaluated
on its own terms, with different methods and techniques. The fourth fundamental problem stems from the variety of goals—defense policy and economic policy goals, or a mix of these. Within each of these there can be a broad range of sub-goals, for example with respect to export and trade, business development, local industrial content, and technology transfer.

The meaning of offsets: definitions and terminology

The problems discussed above make it important to be careful with the use of concepts and terms in order to be able to be specific and differentiate among types of offsets. For the purpose of this chapter, the following terminology is used. Offset arrangements that are linked to an arms trade program, are called defense offsets, or simply offsets. The term direct offsets means offset projects that are directly related to the specific products of the arms import deal, while indirect offsets are unrelated. Offsets involve either military or civil activities. The term military offsets is used for offset work in the military sector, for example, sub-contracts or technology transfers to the arms industry in the recipient country; the term civil offsets is used for offset work in the non-military sector, for example, investment in the production of non-military goods. With this use of terms, direct defense offsets are always military offsets, since they are directly related to the arms trade deal, while indirect defense offsets can take the form of either military offsets (work in the military sector that are not related to the purchased military products but to other military products) or civil offsets. The negotiated agreement between the two parties that stipulates that the exporter will complete a certain amount of offset work within a specific time period is called an offset agreement, while the actual delivery of the offset work by the exporter (e.g., the placement of a specific contract) is called an offset transaction. For offset completion, the exporter receives offset credits. The term offset projects is used as a general term for each specific offset activity, regardless of whether it is only agreed or actually implemented.

The official terminology in Finland and Sweden sometimes differs from this use. When official documents of these countries are cited, their terms are also used in this chapter. In Finland defense offsets are often called counterpurchases or industrial participation (IP), and in Sweden offsets are referred to as industrial cooperation (IC) or industrial participation (IP). The use of terms such as IP and IC is intended to emphasize the cooperative aspect of offsets and long-term business relations and activities as opposed to short-term transactions (Ahlström, 2000, p. 16).

The approach of this chapter

The evaluation in this chapter is based on the results of official audits of offset agreements made in Finland and Sweden and on interviews with officials who have been engaged in the administration and implementation of offset agreements. Evaluating the audit efforts requires criteria. In this chapter, the following criteria are used. First, to what extent have suppliers fulfilled their offset obligations (fulfillment rates, e.g., in terms of contracts placed, etc.)? Second, to what extent have fulfilled offset obligations contributed to the defense policy goals of the recipient country? Third, to what extent have fulfilled offset obligations contributed to the economic policy goals of the recipient
country? And fourth, to what extent have the offset agreement had an overall positive effect on the recipient country?

The analysis also includes inferences derived from changes in the official offset policies of Finland and Sweden. Policies, and changes therein, reflect perceptions of experts and decision makers of the costs and benefits of offsets. Although misperceptions may occur, policy changes nonetheless are based on experience gained from past offset agreements and transactions. Such experiences are not always spelled out in official documents but can be inferred from policy changes and the reasons given for these in interviews with some of the actors. In both Finland and Sweden (as well as in the other Nordic countries), policy has changed toward defense-only goals and, simultaneously, toward direct and indirect military offset requirements. The question is whether these changes are motivated fully or partly by negative experiences with the use of indirect, civilian offsets and the pursuit of economic policy goals, and if so, whether these experiences would be relevant for other countries as well, or whether changes were motivated primarily by other, more specific, types of factors, such as changes in the external environment.

**Finnish offset experiences**

Although official guidelines were not established until 1991, Finland has used arms import offsets since 1977 to achieve both defense policy and economic policy goals. The defense policy goals were of two major types, to acquire military technology (technology transfers) and to support and sustain the defense industry (primarily through contract work). The primary economic policy goals during the 1980s and 1990s were to support small and medium-sized firms, promote local production, and increase employment, particularly in the economically weak regions of the country. The administration of offsets is the responsibility of the Ministry for Trade and Industry (i.e., policy, guidelines, and monitoring of offset) and of the Finnish Offset Committee, an intra-governmental organization designed for the purpose of formulating offset requirements in the specific deals.

Since 1977, the Finnish Government has negotiated 20 offset agreements. Only one of these has been subject to an official audit, namely the deal related to the procurement of United States F/A-18 Hornet combat aircraft, the largest offset agreement ever negotiated in Finland. This section summarizes the results of this audit and evaluates its conclusions as regards the economic impact of the offset agreement. It then compares these to a parallel assessment made by the US Department of Commerce.

**The Finnish audit of the F/A-Hornet offset agreement**

In 1992 the Finnish Government ordered 64 F/A-18 Hornet combat aircraft from the US aerospace company McDonnell Douglas (MDC), to be delivered before the end of 2000. To this was linked an additional order for the armaments and maintenance system for the aircraft to be delivered by 2001. The total procurement cost was 13.92 billion Finnish markkaa (FIM), or about $3.3 billion (FIM9.5 billion for the aircraft and FIM4.42 billion for the equipment). The offset arrangement linked to these arms deals was concluded
between the Finnish Government and MDC\(^3\) and amounted to 100 percent of the combined contract value for the two deals (i.e., $3.3 billion). The duration of the offset agreement was slightly longer than the delivery period for the aircraft and their systems: the offsets were to be fulfilled over a 10-year period from the date of signing the offset agreement, half of which during the first five years. The agreement was associated with penalties to be incurred for unfulfilled offset obligations (Statsrevisorerna, 1994; 1995).

In 1999, three years before the completion of the offset period, the national audit organization in Finland (Statens Revisionsverk, SRV) conducted an audit of the offset agreement. The official purpose was three-fold: first, to examine the fulfillment of offsets and to assess their impact; second, to investigate whether the offset goals for the deal, as set by parliament, had been achieved; and third, to investigate whether the benefits of the offset projects had outweighed the costs incurred (SRV, 1999, p. 13). As regards fulfillment rates—concluded contracts for offset projects—the audit found that by the end of 1998, that is, after 6 years of the 10-year offset period, 88 percent of total offset commitments had been fulfilled, involving around 600 offset projects. However, it was emphasized that the basic question as regards fulfillment was whether these transactions would have occurred anyway, i.e., without the offset obligations. SRV made efforts to investigate this, but it was not always possible to demonstrate the role of the offset supplier in the creation of the deals. In fact, in none of the 600 offset projects was it possible to establish with certainty what positive effect the supplier had had on the initiation of the deal. Furthermore, it was evident that some of the projects accepted as offsets would have occurred without the offset arrangement. The evaluation also identified a number of problems concerning the reliability of the fulfillment statistics. These included the over-pricing of multiplier coefficients,\(^4\) the use of consultants,\(^5\) and the practice of advance crediting of some projects before the results of these projects were ascertained.

The offset goals, the audit concluded, had not been satisfactorily achieved. The specific goals of the Hornet agreement, as determined by the Finnish parliament, were first, to promote the production and employment of the defense equipment industry in Finland; second, to involve small and medium-sized companies in the offset projects; and third, to also involve the high-technology industry and research community. The offset agreement was designed to include 16 percent in direct offsets (directly linked to the aircraft or its equipment and maintenance) and 84 percent in indirect offsets. Within the latter category, the distribution of offsets was 59 percent in exports from Finland to the USA, 15 percent in technology transfers from the USA to Finland, 9 percent in US support for Finnish marketing and export promotion, 9 percent in US contributions to a Finnish capital investment fund, with the remaining 8 percent in other types of offsets. The greatest problems identified by SRV in terms of goal achievement were in the areas of employment promotion and in providing exports for small and medium-sized firms. The number of new job opportunities created as a result of offsets was found to be extremely limited and the export share of small and medium-sized firms was small despite coefficients assigned to promote them. In the area of technology transfer, goal achievement was slightly better in that the amount of achieved transfers corresponded to expected volumes. However, the proportion of high-tech exports was small and concentrated primarily on traditional export products from large export companies. The majority of offset-generated export business was conducted with existing trade partners.
so that the export share going to new markets and customers was relatively small. The audit also concluded that it was uncertain whether any lasting business contacts had been created as a result of the offset projects.

The third criterion to be addressed by the audit was whether the offset benefits outweighed their costs. As part of the entire arms deal/offset package, the Finnish Government had agreed to pay the management costs for fulfillment monitoring. The size of this additional cost had been estimated at about 3–6 percent of the arms deal contract value ($100–200 million). The audit was unable to conduct a regular cost-benefit analysis. It only noted that offset management costs had been significant. It also noted that the large scale of offset obligations in the Hornet deal were fulfilled partly through seemingly artificial projects. To avoid the labor-intensive management of a diversified offset package, the audit agency therefore recommended better advance offset planning and to limit it to specific measures. It also recommended that in future cost-benefit evaluations be conducted for each major import procurement program.

In sum, regarding the economic effects, the main audit conclusions were that first, the registered fulfillment rates were high, but the reliability of these statistics were uncertain and it was entirely unclear whether the registered transactions would have occurred regardless of the offset obligations or not; second, that the economic offset goals were not fully achieved, particularly not with respect to employment and small and medium-sized firms; and third, that it is questionable whether the benefits of offsets were greater than their costs and whether it is always expedient to demand 100 percent offsets. As regards future offset arrangements, SRV emphasized the importance of improved advance planning and of considering more limited levels of offset compensations and focus instead on a smaller number of targeted offset activities. The audit agency also remarked that linking defense offsets to economic policy goals was questionable because it involves a significant amount of financing general export promotion activities via the defense budget (SRV 1999, p. 16).

The US survey of the F/A-Hornet offset agreement

The Finnish conclusions are in apparently stark contract to the conclusions of a study conducted by the supplier government. In its 2001 version of its annual “Offsets in Defense Trade” publication, the Bureau of Export Administration (BEA) of the US Department of Commerce reviewed the performance of several of the largest Finnish companies that received offsets related to the Hornet deal. It concluded that “it is likely that offsets probably aided these companies’ growth” (US BEA, 2001, p. 37). This conclusion was based on a statistical survey of income and employment data for the largest offset-receiving companies, together accounting for 30 percent of total offset work under this deal. While noting that offset work was not the only reason for income and employment increases, the study still maintained that offsets were “undoubtedly a factor” (p. 38). These conclusions seem to contradict the assessment of the Finnish audit, but it is possible to reconcile the conclusion that offset-receiving companies experience net income and employment growth with the assessment that the Finnish economy received no significant net benefit, nor that Finnish offset policy goals were achieved. A possible explanation is that the US survey identified short-term effects, while the Finnish evaluation was looking at medium and long-term effects. Most of the offset work placed
with Finnish companies included in the US review were counterpurchases, which contribute directly to the companies demand. Furthermore, the major impact on company net income occurred in the first year of the contract period, when offset work accounted for almost 20 percent of the combined net income of these companies. This reinforces the impression that the impact identified in the US review might well be of short duration. As regards the technology transfer obligations in the Hornet offset deal, the US study concluded that “transferring and introducing know-how and new technology to Finnish companies may not only have impacted a specific industry sector or company, but it is likely that it also may have strengthened the trend of growing investment in commercial research and development, an indicator signaling high level of innovation” (US BEA, 2001, p. 39). However, no attempts were made to measure this or to conduct an empirical examination; the US BEA conclusion is not empirically supported. These two studies illustrate how parties to an offset contract can arrive at different conclusions, or at least emphasize different types of results and thus give an impression of contrasting findings.

**Swedish offset experiences**

Sweden has had an offset policy since 1983. The policy was developed in the context of the procurement of sub-systems for the domestic JAS 39 Gripen combat aircraft program. The smaller size of the Gripen program, as compared to its predecessor program, the Viggen, would have involved significant employment cuts at Saab, the producer company of Swedish fighter aircraft. To avoid personnel cuts, Saab needed to expand its commercial production. Offsets were seen as a method for achieving this. Offset requirements were therefore linked to import contracts for the engine and other sub-systems for Gripen. This was the context in which the first guidelines for Swedish offset requirements were drawn up and subsequently employed for the import components of the Gripen program. An official evaluation of Gripen offsets has not been conducted. There was an official investigation in 1986 (Swedish MoI, 1986), but this was in the early stage of the program and looked only at planned, not implemented, offsets. The administration of offsets is the responsibility of the Ministry of Defense (policy and guidelines) and of the arms procurement agency, Försvarets Materiel Verk (FMV) (specification and management of offsets).

Since 1983 the Swedish Government has entered 15 offset agreements. Three of these underwent an official audit, conducted in 1995, and provided the basis for a subsequent revision of Swedish offset policy in 1999. The first part of this section summarizes the results of this audit. The second part analyzes the motivations and rationale behind the change in Swedish offset policy in 1999 with the aim to make inferences as regards the economic impact of previous offset agreements.

**The Swedish audit of three offset agreements**

The 1995 official audit of Swedish defense offsets was conducted by the Swedish National Audit Office (Riksrevisionsverket, RRV). It covered three defense offset agreements associated with the import of US Hellfire missiles (agreed in 1983), the French Super Puma helicopters (agreed in 1987), and German DWS39 bomb capsules
The selection of these three offset agreements was based on data availability. During the period 1983 to 1994, the Swedish arms procurement agency, FMV, signed a total of eleven offset agreements, four of which were completed by 1995. The audit included three of these, with a combined value of SEK1 billion ($120 million). The fourth was excluded since “it was very similar to one of the other three examined.” The RRV audit had three purposes: to assess the goal achievement of these offset programs, to evaluate the administration of offsets by the FMV, and to evaluate its own method for auditing offset programs (RRV, 1999).

The main goals of Swedish offset policy during the period of these programs were three-fold, namely to generate long-term cooperation between Swedish and foreign industry, to provide employment in Sweden, and to transfer valuable knowledge to Sweden. These goals were supplemented with a set of six sub-goals, including one purely defense-related goal: to secure local capacity to maintain imported defense materiel. The other five were general industrial and economic policy goals: (i) to generate local employment in interesting and sustainable industrial activities; (ii) to stimulate technological development in industry through transfer of technology and know-how to Sweden; (iii) to promote regional balance in the distribution of employment opportunities and industrial activity; (iv) to improve the international competitiveness of Swedish industry; and (v) to protect the Swedish domestic market (Swedish MoD, 1983, para 3.2).

The RRV audit focused on two of these sub-goals, namely to examine the three audited offset agreements with regard to their effects on technology transfers to Swedish industry and the creation of export opportunities for Swedish firms. The audit found that while formal offset fulfillment had been satisfactory in all three offset programs, policy goal achievement was more complicated to evaluate. While it was possible to identify the effects of direct offsets (those directly related to the respective arms deals), it was difficult to establish the effects of indirect offsets, such as the effects of reciprocal purchases of products that were not related to the arms deals (RRV, 1999).

The detailed findings, and recommendations for changes in offset policy and practice, were more far-reaching than these conclusions suggest. They implied a number of weaknesses in Swedish offset policy and practice at the time. RRVs main recommendation was that government offset policy should be made more specific. For policy goal achievement, it was seen as important to make a distinction between sub-goals that should be regarded as general requirements applicable to all offsets and those that should be used as specific requirements in individual offset agreements. RRV also recommended that policy should include guidelines for implementation by the FMV, the procurement agency. Among other items, these should direct FMV how to formulate offset requirements and administer agreements and to set criteria for approval of offset credits for actual transactions. RRV had found that FMV had dealt with the approval and administration of offset contracts on a case-by-case basis without established criteria with which to decide which contracts could be counted as offsets. In some cases, FMV retroactively approved existing orders as offsets in order to allow offset commitments to be fulfilled (RRV, 1999, p. 92). Another finding was that contractual offset requirements, as signed by FMV, had often been vaguely formulated. This resulted both in inadequate guidance for the final assessment of whether to approve a given order as an offset credit and in an unsatisfactory degree of achievement of the long-term goals of the offset policy. RRV further noted that offset orders given to Swedish companies upon the
signing of offset agreements gave them an advantage over potential foreign suppliers. This might lead to less competition and thus higher prices. In view of these findings, RRV recommended that FMV should draw up its own policy and guidelines for individual offset agreements and that these guidelines should direct FMV to (i) raise offset content demands and specify the requirements more clearly; (ii) establish in advance the criteria by which transactions can be approved as offset transactions; (iii) conduct offset orders through competitive bidding, open also to foreign companies; and (iv) from initiation to conclusion, continuously monitor, control, and document offset projects. These recommendations indicate that there had been significant difficulties in FMV’s administration of offset transactions.

The third purpose of the RRV audit was to evaluate its own evaluation method. The audit model developed by RRV was essentially a strategy for the compilation of information. The model consisted of three steps: the specification of the offset goals to be evaluated, a mapping out of the effects that are relevant for the audit of the specified offset goal, and the identification of some form of specific measurement for the evaluation of these effects. The basic idea was to focus on the achievement of the most tangible goals which, in turn, could constitute the basis to assess effects on the more general goals. RRV concluded that their audit model had proven appropriate for evaluating the effects of offsets. Based on its experiences with the evaluation of these offset arrangements, RRV recommended that an audit of major offset transactions be decided at an early stage of an offset agreement (RRV 1995, pp. 34–35).

The rationale for changes in Swedish offset policies

Sweden’s first offset policy, from 1983, drew on the European experience with offset agreements related to licensed production of US F-16 fighter aircraft. These included only direct offsets, work linked exclusively to the procured aircraft. This meant that when the procurement program ended, so did the offset program. Inherent in this construction was a temptation to buy more aircraft in order to maintain production and employment at the plants that did the offset work. Sweden wanted to avoid this effect and therefore decided to put a strong emphasis on indirect offsets in its first offset policy.

Since its revision in 1999, Swedish offset policy is fundamentally different. The overall goal has changed from a mix of economic and defense policy goals (with an emphasis on the economic part) to a pure defense policy goal: “The main purpose of offset requirements should be to secure Swedish competence in defense technology” (Swedish MoD, 1999). Consequently, the types of offsets demanded have changed. In particular, the policy change involved abandoning civil offset requirements, focusing instead exclusively on military offsets, both direct (related to the imported military equipment) and indirect (related to other military equipment or technology). The main objective of direct military offsets is to support domestic maintenance and modification of the imported military system or sub-system, while the objective of indirect military offsets is to secure defense technological competence in Sweden more generally. Following parliamentary decisions, the policy directs that military offsets should be focused primarily on the technology fields that have been prioritized as essential to maintain within the country. The policy for indirect military offsets directs that more importance should be attached to their qualitative and long-term impact than to their
quantitative and short-term impact, and it states that the forms of offsets that are most important for this purpose are activities that contribute to extending the production runs of Swedish systems through export promotion and international cooperation.

Some reasons for these policy changes can be found in the recommendations made by RRV in 1995 and in the rationale for these recommendations. Other reasons have been provided in interviews conducted by the author. First, behind the change of the overall goal of Swedish offset policy (toward defense policy goals) was the experience that it has proven difficult to implement policy with several types of goal. Thus, a choice had to be made between defense policy and economic policy goals (Wilén, 1994). But the reasons for the preference for defense policy goals are not clearly stated anywhere. One reason seems to be the principle that offset benefits should accrue to the sector that had financed them, that is, the defense sector. This rationale was reinforced by the experience that offset agreements come at a cost: arms deals with offsets generally carry a higher contract value than those without, in particular if the offset deal is accompanied by a penalty clause (sellers tend to shift the cost of this risk to the buyer).

Second, the choice of specific defense policy sub-goals for direct and indirect military offsets in the revised offset policy was motivated by two basic reasons, namely to prioritize the defense technology sectors and to adjust to the increasing internationalization of arms production. Thus, since 1999 the overall rationale is to use offsets to support Swedish defense industry in the prioritized sectors, primarily by targeting offsets to support Swedish exports and international cooperation and thereby to lengthen production runs in these sectors. Third, although the decision to abandon civil offsets was not motivated by an outright failure to achieve economic policy goals, there were a number of negative experiences with civil offsets during the 1980s and late 1990s. These had been associated with a number of problems, primarily because of the lack of interest among small and medium-sized companies to engage in offset work. This lack of interest had several components: (i) the short-term outlook of many of these companies may have reflected a perception among them of offsets as countertrade and thus an inability to understand the potential for long-term industrial cooperation; (ii) most companies already had full order books because of strong growth in the Swedish economy during this period; (iii) their protected environment as sub-contractors to the Swedish automobile industry which was flourishing at the time; and (iv) their risk-avoiding behavior, partly due to the asymmetry in size among potential Swedish offset contractors—primarily small and medium-sized firms—and the foreign offset-providing companies which were large corporations.

In the area of indirect military offsets experiences were mostly negative, again primarily because of low interest among potential Swedish offset partners. Swedish defense companies generally disliked offset work and argued that they would have sold their products regardless of offset obligations. The technology transfer component involved in offset work was difficult to estimate and assess. In one case, a Swedish defense company even argued that an offset contract for technology cooperation had actually involved more technology transfers from it than to it. Some Swedish defense companies argued in favor of a standard clause in all Swedish arms import contracts that these purchases should be counted as offset work for future Swedish exports deals, a form of offset swaps. Still, the interviewed officials were not entirely negative toward offset agreements. The general assessment can be summarized as a negative perception of...
offsets in principle but a pragmatic attitude in practice: offsets exist; therefore, they need to be used optimally. The main obstacle to achieving an optimal economic impact of offsets was seen to be insufficient focus and lack of specificity of offset policies and guidelines that would be necessary to target offset work to economic policy goals and/or company strategy. In sum, the change in 1999 in Sweden’s offset policy from one with a mix of defense and economic policy goals to one toward exclusive defense policy goals was due mainly to the difficulties involved in having a mixed policy. The choice between the two was guided primarily by the principle that the sector paying for the offsets should also receive its benefits. The difficulties encountered in the implementation of indirect civil offsets in Sweden during the 1980s were to a large extent due to the specific economic environment for small and medium-sized firms in Sweden during this period and thus do not have general application.

Summary and conclusions

The evaluation of the Finnish and Swedish experience with defense offsets, although limited in scope and depth, can be useful to other countries. However, the evaluation shows that the impact of offsets is often highly dependent on the specific context and economic environment of the time. It serves to caution against deriving overly strong generalizations. In the following subsections the experience of defense offset evaluations in Finland and Sweden is summarized, and an attempt is made to draw some general conclusions.

Summary of offset experiences in Finland and Sweden

The registered rate of offset obligation fulfillment was high in the agreements that have been evaluated in Finland and Sweden. However, the audits confirmed that there are major difficulties associated with the interpretation of such statistics. The major problems are: (i) reliability problems due to difficulties to establish to what extent registered activities were actually related to an offset; (ii) reliability problems due to the difficulty to ascertain whether the same, or corresponding, activities would have taken place even in the absence of the offset arrangement; and (iii) validity problems in terms of goal achievement: quantitative measures are poor indicators for assessing the achievement of policy goals such as long-term industrial cooperation and development.

Both countries faced major difficulties in the implementation of indirect offsets. In Sweden, the audit concluded that indirect civil offsets were difficult and costly to target, administer, implement, and monitor, and did not appear attractive to Swedish small and medium-sized companies, primarily because of their lack of interest in offset work. Neither did indirect military offsets attract much interest among Swedish defense companies, primarily because they thought that they would have achieved the same contracts even without the offsets. In contrast, direct military offsets were relatively easy to implement and monitor in the Swedish cases. The main problem with these are that they are difficult to sustain beyond the duration of the arms import program.

Achievement of pure defense policy goals has not been evaluated in any detail. However, meeting these goals seems to be associated with more positive experiences
than with meeting economic policy goals. The reasons are not quite clear. In Sweden the preference in favor of defense over economic policy goals, when a choice had to be made between them in the 1999 policy revision, was motivated partly by the principle that the benefits should accrue to the funding ministry, and partly by the opportunities identified in using offsets to support prioritized defense industry sectors and military technologies, deemed necessary in an era of growing internationalization of arms production. The experience from attaining economic policy goals (from the implementation of civil offsets) has been more bleak. It is not always clear whether the reasons for this were general or specific for the three deals evaluated, and to what extent they derive from the specific economic environment at the time. In the Finnish case the economic goals were not fully realized, and this was true in particular for the effect of offsets on employment and on small and medium-sized firms.

The overall utility of offsets was regarded as limited in Finland and problematic in Sweden. The Finnish audit of the Hornet offset deal questioned whether high offsets are always better than more limited offset demands and even whether the benefits of offsets were greater than their costs. In Sweden, the audit concluded that it was difficult to establish the effects of indirect offsets and did not make any overall assessment of the utility of the offsets in the three studied cases.

Conclusions

It is relatively easy to monitor formal fulfillment of offset work in terms of contracts signed, but it is difficult to establish whether these transactions are the results of the offset arrangement. Thus, statistics on offset fulfillment should be regarded with a great deal of caution. The contribution of offsets to the achievement of long-term policy goals within broad policy areas such as defense policy and economic development policy is extremely difficult to evaluate empirically because of the multitude of other determinants that can affect these goals: reality is too far removed from a ceteris paribus situation.

Regarding the choice of goals for offset policy, it is easier to implement an offset policy with only one type of overall goal: either defense policy goals or economic policy goals. Regardless of which of the two major policy options is chosen, it is important to define the long-term offset policy goal in line with the overall defense and economic policies within which it is adopted.

For an assessment of the long-term impact of an offset arrangement, one must take into account also the duration of the offset program. Since duration of direct offsets normally coincides with that of the arms import program, this type of activity thus tends to have a relatively short-term economic effect. It can even be argued that this carries a cost in the future: when the arms deal is completed, the offset work is finished as well and there is a need to find alternative employment for labor and capital used in the offset work. Like any other company decision, the choice of offset projects needs to be based on a realistic assessment of long-term prospects for the production line, technology, and company to survive in international competition. This is particularly problematic with direct military offsets. In an environment where the level of demand is much lower than it was ten years ago, and the main players on the defense market are larger and stronger competitors, the future of many small arms producing companies is highly uncertain.
Thus, for the purpose of maintenance, support, repair, and modification, there is room for innovative ideas for how to satisfy these needs in other ways than by offset requirements.

In using offsets for economic policy goals the most important condition for long-term success is that offset projects are designed to suit a specific economic or regional policy initiative or company strategy. The more tailored an offset activity can be to an existing policy or strategy, the better the prospects for the satisfaction of long-term policy goals. In any cost-benefit analysis of offsets it is important to take into account not only the benefit side of the equation but also the cost side. Since it is generally acknowledged that offset agreements increase the cost of an arms import program, this additional cost to the contract price of an offset-related arms import deal should be taken into account in any evaluation of the economic implications of defense offsets.

Notes
1. Nordic offset policies, and changes therein, are described in Hagelin (2004).
2. The dollar value was $2.92 billion at the time of the agreement, but eventually increased to $3.3 billion.
3. The MDC team included General Electric (engine subcontractor), Northrop (aircraft tail), and Hughes (radars) but MDC alone was responsible for the implementation of the offset agreement.
4. Multipliers as high as 20 were seen as overly high, resulting in unreasonably high offset credits.
5. The use of consultants made it impossible to assess the contribution of the offset provider separately from the contribution of the consultants.
6. The audit was published in Swedish in 1995 (RRV, 1995) and subsequently summarized in English as RRV, 1999.
7. There has been no systematic study of the reasons for this lack of interest. The listing in the text is based on interviews with FMV staff.

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Interviews

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Officials at the Swedish Ministry of Defense
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11
Offsets in Belgium: between Scylla and Charybdis?

Wally Struys

Introduction

The purpose of defense is not to pursue economic goals, but to fulfill defense needs. But undeniably, an economic role exists within the framework of resource allocation to satisfy collective goals in addition to defense. Organizing and equipping armed forces depends not only on their needs, but also on the available resources and on the economic and technological fall-out of a state’s defense policy. Defense policy can thus be linked to the pursuit of economic policy goals such as an improvement in employment levels, economic growth of domestic defense and other industries, improvements in the balance of trade, or of the distribution of income. By integrating defense offset requirements and priorities into its defense industrial policy, Belgium pursued such general economic policy goals as part of its defense acquisitions. In particular, Belgium used offsets as a means to maintain its defense industrial base and to improve its technical prowess. This chapter briefly summarizes and evaluates Belgium’s experiences with defense-related offset arrangements.

Offsets in Belgium

Belgium distinguishes among three forms of offsets. First, direct compensations refer to Belgium’s share in co-producing the acquired equipment as well as associated supplies and services. These are produced to meet the needs only of the Belgian armed forces. Direct offsets are directly related to the product delivered. Second, semi-direct compensations resulting from an arms acquisition contract, refer to equipment, supplies, and services produced in Belgium either for the arms-originating country or for third countries. Semi-direct offsets are thus also directly related to the acquired arms. And, third, indirect compensations are products, supplies, and services intended for countries that awarded a contract in any other field of activity. Hence, indirect offsets embody the purchase of products or services unrelated to arms.

The benefits of offsets

Offsets are thought to have brought many advantages to the Belgian economy. In principle, they allow the country to recuperate an important part of the acquisition
expense through direct utilization of domestic defense-related inputs, reduction in unemployment compensation, growth of social security contributions and fiscal income, and the indirect and induced economic effects in upstream and downstream industries. Defense production also contributes indirectly to the utilization of highly specialized manpower and to the creation of employment in all industrial sectors, especially in high-technology sectors such as aerospace, optics, electronics, telecommunications, and composite materials. Since requisite physical investments are partially financed from abroad, offset risks are low and costs limited. Consequently, offsets have also been responsible for structural macroeconomic advantages. For example, without offsets, it is unlikely that Belgium would have been able to sustain aircraft or engine manufacturers, and the acquisition of know-how in advanced modern technology would have remained a dream.

Offsets allowed the Belgian economy to benefit from positive direct, indirect, and induced effects in all its sectors. The political, economic, and even psychological importance of offsets in Belgium is confirmed by the fact that whenever an important defense contract was signed, the media called it the “deal of the century.” There are other advantages such as accelerated profit growth for domestic firms, acquisition of a higher level of technological know-how, and new investments in the client country that permit seller and buyer to expand their markets. Recourse to offsets implies that investments by the beneficiary are reduced since the recipient firm only produces part of the purchased arms. This might free capital to seek profit in other sectors. Offset compensations also improve the balance of payments and contribute to a better division of labor. On the whole, the following Belgian actors are happy with current offset policy: the military, because its allows them to buy new equipment; the politicians, because they can create employment in their political hinterland; and the industrialists, because they obtain contracts in a hermetic, captive market.

Disadvantages of offsets

General drawbacks

Offsets do not offer benefits free of costs. They present significant handicaps as well. They are antithetical to free trade, they alter the nature of sales by including terms unrelated to prices and performance, they introduce market rigidities, cause growing state intervention, and create distortions in world economy and trade. The working of natural market mechanisms is suspended: the negotiated price paid by the purchaser is generally higher than the free-market price. Offsets thus reduce general welfare. Where offsets are used to direct work to suppliers who are not under the pressure of competition, it is unlikely that they are cost effective. Offsets used in this way act as a subsidy; gains in employment generally are (more than) compensated by losses in efficiency.

Moreover, offsets cause perverse production effects. For example, they finance a costly infrastructure for short production runs. Technology transfers, for their part, do not offer guarantees for success; they may be new, yet already ageing instead of being emerging or “future” technologies. Offset-related investments have also lead to excess production capacities, resulting in idle capital. Furthermore, the defense industry
becomes even more dependent on the international arms market than it already is, and it suffers from political machinations and constraints. Technological progress presupposes permanent flows of replacement and upgrade investments; however, since the timing of offset contracts is uncertain and subject to long time intervals, offsets make long-run government investment policy difficult. Moreover, sectoral protection results in a lack of economic and commercial aggressiveness, low activity and employment levels, additional costs and higher prices, poorly developed marketing, disappointing R&T activities, and the necessity to start the learning curve all over again with each new contract.

Offsets are economically inefficient. Belgium used them as a means to maintain its defense industrial activities and to improve the sector’s technical quality. But since they operated on a contract-by-contract basis, with subcontracting benefits drying up once the foreign supplier had completed its offset obligations, these were short-term solutions of little use in the long-run. Offsets have led to limited cooperation on an ad hoc basis, thereby weakening Belgium’s defense industry. They gave rise to heavy lobbying activity and, consequently, to overprotection of national enterprises and to overcapacity in the production lines of weapon systems. They masked shortcomings and prevented management from taking appropriate measures. More often than not, the decision to purchase arms from abroad was made at a point when it was no longer possible to share in its R&D.

Disadvantages of indirect compensations

At first sight, indirect compensations seem to be the most interesting since they lead to increased economic activity in the non-military sector. In reality, however, many problems reduce their effectiveness. The purchasing country often gets low quality work and finds it difficult to measure if the work results in genuine additional, or merely re-labeled or redirected, activities that it would have been able to perform even in the absence of offsets. Other problems relate to product commercialization and uncertainty about the duration of offset-related work. Without renewal, indirect compensations tend to die out gradually. In any case, it is difficult to capture the technological value of indirect compensations in the non-military sector, and the effects on the balance of payments are likely marginal. Moreover, Belgium witnessed the spontaneous appearance of “pre-compensations” (offset banking credits) which are purchases by an arms-selling country from the buying country prior to signing an arms deal. This allows the arms seller to use the value of otherwise normal international trade activity to count against the value of offset obligations the buying country imposes.

Overcosts

Small and medium-sized countries like Belgium do not buy weapons off-the-shelf from the lowest-cost foreign supplier. They pursue other economic policy goals and demand economic compensations. Offsets do, however, increase costs. Such “overcosts” can find their origin in the seller’s as well as in the buyer’s country. Offsets arrangements frequently impose added costs on suppliers, particularly if technology transfer is involved. Where such costs are incurred they lead to increases in the price of defense
goods and services. This directly affects the defense budget. With offsets, the seller overhead burden increases because it has to manage a process of seeking and training international sources. Jobs in the arms-selling country are supplanted by offsets and appear to reduce the manufacturing base of the seller’s industry. As a result, they increase the selling price of the purchased equipment. Buying governments are, however, anxious to pay these overcosts, since they typically view offsets as a form of investment which they expect to yield results well worth the extra cost associated with such arrangements. In addition, production costs in small and medium-sized industrialized countries, such as Belgium, tend to be higher than in big arms producing countries, especially due to higher labor costs. On the whole, it is estimated that Belgium pays a 20 to 30 percent penalty for imported weapon systems. These overcosts are financed solely from the Ministry of Defense budget, impinging upon other defense budget categories.

The regional factor

In the 1980s, constitutional changes in Belgium toward a three-way federalization of the country resulted in an important shift in economic and industrial policy decision making, away from national and toward regional authorities. Diverging interests and the absence of political and financial coordination led to completely different industrial strategies in the Brussels, Walloon, and Flemish regions. Each region attempted (and still attempts) to obtain maximum benefit from measures to protect existing, or create new, production capacity. Nowadays, it is a political imperative to distribute defense acquisition contracts according to a regional quota formula. Understandably, the specifics of this formula are constantly contested by regional, rent-seeking pressure groups. In the end, each contract for defense includes an explicit regional partition of offsets, imposing even on the seller an obligation not only to provide Belgium with a minimum of activities, but to distribute these to its regions.

The future of defense compensations in Belgium

An academic approach

Logically, four solutions to the various problems outlined in this chapter are possible:

- maintain the old offset policy;
- maintain the offsets under an improved form;
- replace compensations with participation in structural industrial cooperation that is not linked to any particular arms import contract;
- reduce not only offsets but also any defense industrial activity in the country.

For obvious reasons, the first proposal must be rejected. Politically, economically, and industrially, maintaining the old offset policy is not justified. The same applies to the fourth solution. Even if offsets are more costly than beneficial, the goal cannot be simply to eradicate all of Belgium’s defense production activity, nor to forego whatever genuine
offset advantages there may be. It remains reasonable to maintain some defense production capacity even in a small country, especially when taking the evolving development of the European Security and Defense Policy into account. Instead of regarding offsets as a means to involve national industries, common economic sense suggests to use international cooperation to strengthen the European defense technological and industrial base, taking particular account of the position of smaller nations’ industries.

Although ideal, an international cooperative solution will take time. A transitional period with gradually improved offset policies may be the short and medium-term solution but offsets, en régime, will have to disappear in favor of other forms of economic returns and the pursuit of long-term objectives, such as increased structural industrial cooperation (i.e., Arianespace and Airbus). In future, firms must become high-value added centers of excellence and develop niche activities. They will have to emphasize comparative advantage with regard to their expertise, the quality of their products, and other attributes, and no longer rely on arms-import offset obligations of foreign sellers. If not, Belgian arms producers take the risk of being swept away by competition in a genuine Europe-wide defense market. But such a policy cannot of course be implemented overnight, certainly not in a global industry in which Belgium plays a very minor role. A transition period would allow improvements in the old offset instrument and its progressive replacement by economically more acceptable tools.

For their part, Belgium’s national and its regional governments must achieve coherence between disparate defense industrial policies in a sector that is supposed to fulfill national needs. Not only the national ministers of defense, of economic affairs, of social affairs, of employment, and of science and technology, but also their regional counterparts must be involved. With the coming implementation of a European Security and Defense Policy and the already happening Europe-wide defense industry regrouping, the set of feasible defense-industrial policy choices becomes progressively smaller for Belgian decision makers. Time to avoid default-decisions is running out. Indeed, not only is the supply side consolidating (BAE Systems, Astrium, Thales, EADS, and MBDA), but so is the demand side (e.g., the Organisation Conjointe de Cooperation en matière d’Armement, or OCCAR, which is the four-nation procurement agency of France, Germany, Italy, and the UK, and the incipient European Armaments Agency, EAA). Evidently, the future of small and medium-sized defense firms in small and medium-sized countries such as Belgium can only be envisaged in the framework of the ongoing Europeanization and globalization of the arms market.

In a word, the second solution is not viable in the long-run either.

The third solution

For small and medium-sized countries, the third solution is the best possible choice. Since offsets ultimately perpetuate inefficiency and maintain the independence of firms that are too numerous and too small, one must depart from the offset concept. Offsets must be progressively abandoned in favor of other economic returns that pursue long-term goals. As I argued, offsets will disappear anyway when a genuine European market will come into being, even as EU member states today still take advantage of article 296, paragraph l(b) of the Rome Treaty which provides that
any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material; and that such measures shall not adversely affect the conditions of competition in the common market regarding products which are not intended for specifically military purposes.

Although not precluding international cooperation, in practice this article prevented the defense sector from following the general movement toward European commercial integration. It was used to justify protectionist measures in the sector. Offsets worsen the situation by inhibiting or else distorting European defense industrial restructuring. At a time when there is a major overcapacity in many European nations, the use of defense offsets subsidizes uncompetitive enterprises. It is nevertheless clear that these restrictions will disappear in the framework of a genuine European Security and Defense Policy (ESDP). Security cooperation among EU members within ESDP imply common maintenance of a European defense technology and industrial base (DTIB). Any final agreement on the use of economic and industrial instruments in this sector can only be cross-national, or even global. On the supply side of the market, many have underlined the importance of the creation of a Europe-wide defense equipment market, with equal opportunities for all industrial actors. In an open market with fair competition, offsets will no longer be required. In this ideal situation, offsets can be waived for trade among European nations.

Belgian offsets will have to give way to other measures. Time is short for Belgium to establish a genuine and coherent defense industrial strategy, compounded by the vexing difficulty of taking regional needs (and political realities) into account. If its defense industry is to survive, it requires the country to ensure a smooth transition from the old offset policy to a future where its defense sector will find a well-deserved place in a pan-European arms market thanks to the existence of centers of excellence where quality of performance and competitiveness reign.

Under ESDP, European armed forces will increasingly participate in common arms acquisition programs, and international cooperation will take place not only in the military operational field, but also in the technical and industrial fields. The Belgian government will have to put in place measures now that would ensure full participation in international cooperation agreements. The alternative—the default solution—is the death of Belgium’s defense industry.

The political issue

On the occasion of two minor contracts, the Belgian government decided in December 2000 to put a “final” end to its offset policy and to take into account only operational, technical, and military criteria when acquiring new defense equipment. As could be expected, reactions were ferocious. Industrialists pleaded, not without reason, that were this policy adopted they would be placed in an unfavorable competitive situation if they could benefit no longer from economic compensations. Some politicians were, for purely dogmatic reasons, against offset policy but others, craving the status quo ex ante, supported the industrialists. An ad hoc working group of high-level advisors created by
the Prime Minister was entrusted with developing new forms of economic “returns” for defense acquisitions. Within the framework of its mission, the advisors agreed to propose to government to no longer seek recourse to offsets, except when the tenders are equivalent. This results in potential new options for defense contracts (Marsia, 2002), allowing government to choose from among three procedures: invitation for tenders, request for a quotation, or negotiated procedures, i.e., contracts either with or without classic offsets provisions but with participation in international cooperative production activities. A final policy has not yet been adopted since lobbying is still underway. But, interestingly, during 2000 and 2001, the Belgian government placed arms orders for over €1.4 billion, without offset requirements.

Conclusion

For several decades, Belgium used offsets as a means to maintain its defense industry and to improve its technical quality. Offsets strengthened Belgian defense firms in the short-run, but inhibited international cooperation and made them vulnerable to international structural changes in the industry. As a result, offsets are at least partly responsible for the current weakness of Belgium’s defense industry. Belgium never developed a coherent network of defense firms and subcontractors, its defense industry was not restructured soon enough to cope with international changes, and the defense-technological revolution elsewhere in the world did not result in the expected qualitative improvements in Belgium.

As it turns out, more than 80 percent of the “Belgian” defense industry already belongs to foreign investors. Mergers, regroupings, and take-overs by foreign firms nevertheless did not, in most cases, lead to rationalization and more efficient division of labor. Notwithstanding potentially attractive advantages, on balance offsets have been negative for the country. Over the years—probably due to the absence of a genuine industrial policy in the defense sector—defense acquisitions gave rise to short-term strategy and transformed offset policy to dogmatic behavior.

It should be emphasized that the arguments presented here apply to the Belgian case and, probably, to most of the small and medium-sized developed countries. In contrast, central and east European countries as a group exhibit different characteristics: they possessed, for example, a highly developed defense potential that is now undergoing an important transformation. Offsets might assist them to achieve wider economic development but should be limited in time so as not to give way to the disadvantages discussed in this chapter. In fact, as the central and east European countries are adapting and preparing themselves to participate in European industrial cooperation, it will not be necessary for them to insist on offsets at all.

An analogous argument can be made with regard to developing countries and countries that have little or no defense exports at the moment. Since they attempt to leverage arms imports to provide benefits for their domestic economies, the main difficulty may be to convince these nations to drop offset requirements, or at least to limit them to a reasonable period of time.
Notes
1. In Greek mythology, Scylla and Charybdis are personifications of rock and whirlwind that made navigation of Italy’s Straits of Messina hazardous. In contemporary American English, we would say that Belgium’s military industry finds itself between “a rock and a hard place.”
2. Each year, Belgium spends between €375 and €495 millions for the acquisition of equipment, land, and construction for its armed forces. Even if this sum is marginal in international comparison, for Belgian defense firms it is an important sum.
3. This section is a summary of Struys (2001).
4. Thus, when price, quality, and technical properties are close among competing offers, offsets will continue to determine the ultimate choice. The government decided to limit the weight of economic compensations in this case to a maximum of 15 percent of the contract value.
6. For example, see chapter 12 in this book by Markowski and Hall (2004) on Poland.

References
The defense industry in Poland: an offsets-based revival?

Stefan Markowski and Peter Hall

Introduction

In September 1999, Poland introduced mandatory offsets legislation in preparation for future acquisitions of western defense equipment. At the end of 2002, Poland embarked on two large equipment purchases: the US$3.5 billion procurement of 48 F-16C/D from the USA and the €1.18 billion acquisition of 690 armored vehicles from Finland. Each transaction involves a major offset deal. The Finnish transaction is expected to result in vehicle production in Poland and the US purchase involves an offset package valued at over US$6 billion. Offsets, broadly-defined to include countertrade, bundling, and local content arrangements (see Markowski and Hall, 2004a), are seen as a means of securing work for the ailing defense industry, popularly referred to by Poles as zbrojeniowka, arguably one of the very few remnants of Soviet-type enterprise.

Offsets are not new to Poland as communist Poland used countertrade in many of its international trade transactions with other Soviet bloc countries and many Third World nations. Toward the end of the communist era, these countertrade transactions often took the form of complex, multilateral clearing deals using international offset brokers. Many former apparatchiks cut their teeth on these deals and are arguably more comfortable than their western procurement counterparts when operating in the smoke-and-mirrors world of defense offset deals.

This chapter is structured as follows: the first section deals with communist-era arms production and trade, including countertrade. The second section looks at the turbulent post-communist history of zbrojeniowka and its current parlous state. Third, Polish offset legislation and administration is reviewed. The penultimate section deals with Polish offsets in the past two years, and the last section draws conclusions.

Defense industry and trade under communism

Soviet-style arms production

Producing national security was a key priority for every Soviet-type economy, including Poland. For larger member countries of the Soviet bloc such as Poland this implied large-scale domestic production of military equipment and consumables for the national armed forces and significant exports to other Warsaw Pact and “friendly” Third World countries in the Middle East, Africa, and Asia. After the USSR, Poland was the second largest...
member of the Warsaw Treaty Organization (WTO), and so were the Polish Armed
Forces. Since the late-1950s, Poland had had a relatively liberal communist regime but all
key industrial sectors, and in particular the national defense industrial base (NDIB), were
state-owned, centrally-planned and managed by Soviet-style industrial technocrats.

Unlike Soviet-style consumer products, which were generally poor quality, arms
produced by the Soviet bloc, including Poland, had to “perform” since they were
frequently battle-tested against western weapons in conflicts such as the Vietnam, Arab-
Israeli, and Iran-Iraq wars. Thus, despite its economic backwardness and technological
inferiority, the Soviet bloc was able to punch well above its economic weight by
producing vast quantities of conventional arms for intra-bloc deployment and for export.
The weapons individual Warsaw Pact countries produced were largely determined by the
USSR, which maintained its military dominance within the bloc by ensuring that key
weapon technologies and systems were first available to the Soviet military. Transfers of
new military technologies to other bloc producers were normally permitted only when
Soviet domestic production lines reached their planned capacity. As a rule, when
transferred to other bloc countries, Soviet arms designs were not to be modified
(Piatkowski, 2003). Generally, Soviet satellites were not allowed to develop weapon
systems that might have been used by them to wrest independence from the Soviets.
Nuclear weapons and strategic delivery systems were a Soviet monopoly.

Division of labor within the bloc was largely determined by Soviet-controlled
agreements between member countries. Under these arrangements, different members of
the Soviet bloc were allocated responsibility for particular product lines, either for a
complete weapon system or parts. For example, Poland specialized, inter alia, in the
production of main battle tanks, helicopters, and telecommunication equipment
(Piatkowski, 2003). Interoperability was the order of the day and achieving scale and
scope economies in weapon production was paramount. Countries such as Poland
developed and maintained NDIB production capability well in excess of domestic
requirements and export commitments. Production was duplicated within the bloc to
minimize the risk of supply hold-ups, i.e., to prevent a potentially recalcitrant member of
the bloc undermining “collective” (i.e., Soviet) security through non-delivery of a key
weapon system.

Despite their dedication to internationally coordinated production, members of the
Soviet bloc thought it prudent to maintain high levels of national autarchy in defense
supply, in case supply lines were interrupted. The logic of “self-reliance” in domestic
weapon production prevailed in larger communist countries, such as Poland, until the
Soviet system collapsed in Europe in 1989–91. This doctrine of industrial “self-reliance”
has remained highly influential throughout the period of post-communist transition.

The Polish NDIB under communism

During its final days under communism (1989) Poland was reported to be spending
While the latter figure is an accounting distortion emanating from the lack of
convertibility of the Polish zloty and, thus, the use of “artificial” prices and exchange
rates, it is indicative of the high burden of defense in the national economy. (Three years
later, when the Polish economy became more market-oriented and the convertibility of
the zloty was largely restored, the same US source, the Arms Control and Disarmament Agency, estimated defense expenditure at US$3.8 billion in 1995 prices, a decline of some 80 percent.)

In 1986, defense materiel accounted for about two percent of all industrial production and, in 1989, for about 1.2 percent (Nelson, 2003, table 4.6, p. 86). The NDIB represented a significant export-oriented sector. Peacetime production was supported by exports to other Soviet bloc countries and “friendly” Third World nations such as India, Algeria, Libya, Syria, and Iraq. In 1986, Poland exported over US$2 billion worth of military products (in constant 1996 dollars) or over 12 percent of all exports. It imported US$1.6 billion worth of defense products (in constant 1996 dollars) or over 10 percent of all imports (Nelson, 2003, table 4.3, p. 81). However, the arms trade started to decline in the late 1980s, and in 1989, Polish military exports fell to less than US$0.5 billion, 3 percent of all exports, and imports to US$0.8 billion, nearly 6 percent of all imports (Nelson, 2003; constant 1996 dollars are again used.)

In 1988, the Polish NDIB included 84 state-owned, specialized industrial enterprises employing 180,000 people. These mostly defense-specific enterprises were divided into a “military” group, controlled by the Ministry of Defense and managed by uniformed personnel (providing through-life logistic support, producing spare parts and consumables, and undertaking military research), and a “civil” group, controlled by civil ministries and managed by civilians (Piatkowski, 2003, p. 153). Government production entities comprising the NDIB were administered separately from other state-owned enterprises. They were centrally managed as one large defense-related sector but structured into a small number of large “product integrator” enterprises (e.g., main battle tank producers or helicopter manufacturers), each supported by a network of dedicated smaller component and materials suppliers. Many of these enterprises also produced civil goods such as motorcycles and electric sawing machines. In the late 1980s, civil goods and services accounted for 46 percent of the total output of the Polish NDIB (Nelson, 2003, table 4.5, p. 86).

Under communism, defense-related enterprises were accorded preferential treatment. They were given preferential access to raw materials and basic components, investment, R&D resources, and export markets. Pay scales were also higher than in other industries (Nelson, 2003). Many larger firms were located in small towns and provided their workers with job-related housing, health care, and child support. While this was a normal feature of Soviet-style industrial enterprises, job-related welfare benefits were particularly valuable in priority sectors of the economy (e.g., in zbrojeniowka and coal mining).

By the end of the 1980s, Poland produced jet trainers and helicopters, heavy armor and artillery, armored personnel carriers and other vehicles, ground-to-air missiles, small arms and other infantry weapons, a wide range of munitions, radars, communication equipment, and command and control systems, specialized logistic support equipment, small and medium-size surface vessels, and a range of engines and components. Technologically, most these products were dated as the USSR did not share up-to-date military know-how with Poland and only a handful of locally designed products were anywhere near the leading edge of military technology (Piatkowski, 2003).
Soviet-type international trade and offsets

Traditionally, Soviet bloc countries tried to insulate themselves from volatility in international trade by monopolizing and “centrally planning” their exports and imports and keeping their currencies inconvertible. As a result, it was relatively difficult for a Soviet-type economy to export and import. This difficulty was exacerbated by a well-known inability to produce good quality manufactures. A special effort was made to produce export-quality military products. But this required intense administrative focus and highly prioritized resource allocation and could only be done on a limited scale. On the other hand, the Soviet bloc could produce primary products in large quantities and traded them for convertible currencies in international markets. Examples included oil, gas, coal, and gold. Thus, there were two types of exports: easily exportable “hard” goods, including many military products, and not-so-easily-exportable “soft” goods (e.g., inferior quality machinery and consumer durables). Scarce hard goods were used to obtain the most critical imports while soft goods were used to pay for less important imports.

Offsets, mainly in the form of countertrade and bundling, were another systemic feature of the command economy. Intra-bloc trade to some extent involved trade in hard goods: the Soviets supplied their satellites with oil, gas, and other primary products while more industrialized nations such as Czechoslovakia and Poland paid with exports of more elaborately transformed products (e.g., trucks, machine tools, or military goods) or with other commodities (e.g., coal, uranium). However, much intra-bloc trade comprised soft or “softish” goods, and Soviet-style mercantilism involved trying to export “soft” and import “hard” goods. Further, since currencies were not convertible, either goods had to be swapped for goods (the crudest form of barter) or a reference currency such as the US dollar or the notionally transferable rouble had to be adopted to set prices and delivery terms. Western countries usually imported hard goods and paid for them in convertible currencies. But often the only way to export to the Soviet bloc was to engage in countertrade. Bundling was also used by the bloc countries to obtain limited technology transfers. Many Third World countries, such as India, experienced shortages of (convertible) foreign exchange and found Soviet-style “softish” goods (e.g., industrial machinery, weapon systems) desirable. They were also keen to engage in countertrade. Thus, offsets, and especially countertrade, were prevalent under Soviet-type international trade. This applied also to much of intra-block trade in weapon systems.

With such a history, it is not surprising that Poland, and perhaps other former communist countries, finds defense offsets a familiar and comfortable way of doing business. The recently agreed export of Polish tanks to Malaysia is an example of a Soviet-type offset arrangement (see below).
Post-communist transition

Decline in spending and trade

The collapse of the Soviet economic order in 1989–91 was catastrophic for the Polish NDIB (Piatkowski, 2003). Domestic sources of demand shrank by almost half, and the decline in exports was calamitous. Domestic military expenditure for 1989–97 declined in real terms (constant 1997 prices) by nearly 44 percent (from zloty 17.4 billion to 9.8 billion). In 1991, the share of military expenditure in GDP was 2.3 percent. It had decreased to a nominal 2 percent in 2000—in reality 1.5 percent since the Ministry of Defense budget had to absorb the cost of military-related health care and pensions previously borne by other sectors. New equipment acquisitions, investment in facilities, and military (in-house) R&D declined over the first post-communist decade to a low of about 12 percent of the defense budget in 2000 (from about a third in the late 1980s). The only large domestic acquisitions made during that time (PT-91 tanks and W-3 multi-role combat helicopters) had been on order since the 1980s. By the mid-1990s, exports of defense materiel accounted for only 0.2 percent of all exports or USS40–50 million (in constant 1996 dollars). With the collapse in military capital investment, defense imports declined to zero in 1992 to “recover” to about US$60 million (in constant 1996 dollars) in 1996—or 0.2 percent of all imports (Nelson, 2003, table 4.3, p. 81).

Decline in NDIB activity

By 1997, defense production as a percentage of all industrial production had decreased to 0.4 percent (Nelson, 2003, table 4.6, p. 86). NDIB employment declined to 135,000 in 1991, 71,000 in 1997, and 35,000 in 2001 (Piatkowski, 2003, p. 161). A 1999 ministerial directive identified 63 NDIB entities of which 38 were state-owned production enterprises, three were trading enterprises, 12 were military maintenance/repair facilities, and 10 were research and development centers (DU, 1999c). There are disagreements, however, as to which firms actually comprised the NDIB as the directive excluded a number of small, but often efficient, private manufacturing firms supplying the Polish Armed Forces (PAF) as well as some military R&D entities trading on their own account.

The huge decline in NDIB activity 1989–2000 was a product of many factors. First, the economy was exposed to import competition, the Polish zloty became convertible, and fiscal and monetary policies reduced domestic demand (Nelson, 2003). Traditional heavy industries, including zbrojeniowka, could not withstand the shock. Many enterprises sold their marketable assets and then borrowed heavily. The decline of zbrojeniowka has been most catastrophic at the local (community) level in one-factory towns. The former Soviet Union and other bloc countries themselves experienced a massive collapse in production activity and could no longer offer export opportunities to Polish industry. Second, exports to “friendly” developing countries also declined as the cold war ceased. There was a reluctance to export arms to potential enemies of NATO and the European Union, i.e., countries such as Libya and Iraq. But foreign buyers of equipment were also reluctant to purchase weapons that might not be supported in future
by manufacturers whose survival prospects were uncertain. Third, the technological gap between Polish-produced and western weapon systems widened rapidly in the 1990s. Imported equipment was technologically superior and the prospect of joining NATO meant that the PAF would have to become interoperable with other alliance members, especially the USA. It made little sense for the Polish military to buy modified Soviet legacy systems, and zbrojeniowka was not in a position to produce a new generation of equipment. Fourth, the civil production output of zbrojeniowka also declined but not as much as military products. Thus, the share of civil production in total output of zbrojeniowka increased to 75 percent in 1995 (Nelson, 2003, table.5, p. 86). There is clearly a question mark about the continuing military designation of several firms in this sector.

Fifth, the former cadre of defense industry managers left in control after the collapse of communism were often too old and ill-equipped to adapt to new market realities, especially in export markets. They continued to look to government to sustain their firms through domestic orders and were strongly supported by trade unions that opposed any form of radical restructuring (Piatkowski, 2003; Nelson, 2003). Sixth, industrial self-reliance continued to be regarded as a strategic imperative well into the late 1990s. Thus, several locally-designed weapon systems remained under active consideration by military planners resulting in a waste of scarce development resources on unrealistic R&D programs and the neglect of more viable production opportunities (Piatkowski, 2003). Seventh, in the post-communist transition, governments changed frequently and in the early 1990s, short-lived governments were reluctant to initiate a radical restructuring of zbrojeniowka. Right-of-center governments hoped for a market-led solution, including commercialization and privatization of the NDIB. Left-of-center governments were sympathetic to populist calls for sustaining the endogenous, government-owned arms industry. But there was no clear vision for the future of the PAF and the defense industry as its fourth arm. Several transformation plans were proposed and either rejected or not implemented as governments changed (e.g., DU, 1999b). It was only Polish accession to NATO in 1999 that forced a change of attitude (see below). In 2001, a six-year plan was approved by the Polish parliament and, subject to some further modifications, is now being implemented (DU, 200 la; 2001b). And eighth, there was considerable reluctance and a great deal of inconsistency in successive governments’ responses to foreign direct investment (FDI) in zbrojeniowka. Under the 1999 structural reform and privatization initiative, foreign investors were to be offered shares in 29 restructured defense firms with the Polish state retaining 100 percent ownership of another 6 production and 3 trading enterprises. By the end of 2001, when another government coalition came to power and changed the program, only two entities had been privatized and sold to foreign investors, both in the aerospace sub-sector (Piatkowski, 2003).3

The re-structuring program adopted by the Council of Ministers in May 2002 sanctions the formation of two “industrial (capital) groupings” (grupy kapitalowe), one led by a private trading entity PHZ BUMAR and the other by the Agency for Industrial Development (Agencja Rozwoju Przemyslu). The Polish State Treasury (Skarb Panstwa) is to retain controlling interest in both groups (Luczak, 2003a; 2003b). Another 13 enterprises, which are not included in the two groupings, are to be privatized and the rest of the sector is to fend for itself.
**NATO and European Union**

The 1999 Polish membership of NATO has already forced Polish governments to provide resources for the military and adopt NATO standards in force structure development and weapon procurement. Under the six-year plan, changes in the PAF—which is to become smaller, more professional, and capital intensive—will lead the transformation of the domestic supply chain. The use of offsets to assist and/or develop domestic industry is seen in Poland as an established NATO practice which should be followed (Piatkowski, 2003; DU, 2001a).

In 2004, Poland is also expected to join the European Union (EU). While the EU is generally opposed to mandatory civil offset requirements, arms trade and defense offsets are normally exempt from the World Trade Organization Agreement on Government Procurement that most EU countries have signed.

**Offset legislation and administration**

**Defense procurement and other related legislation**

Acquisitions of military equipment, consumables, and logistic support services are regulated by the Public Procurement Act of June 1994, which applies to all public sector agencies (DU, 2002a). Under the Act, five basic principles are to apply to all public sector procurement: universality (general applicability to all public agencies), transparency, accountability, open and fair competition, and compliance with international law. Open and fair competition provides the main mechanism for ensuring that all suppliers are treated equitably and supplies are sourced on a value-for-money basis. But the 1994 Local Preference Directive applies local preference margins to give Polish suppliers a 20 percent price advantage over imports in all public sector tenders (DU, 1994). Also, the 2002 Special Public Procurement Directive (DU, 2002b) exempts defense materiel and other security-related products from certain provisions of the 1994 Act, i.e., the need to maintain transparency in defense acquisitions, the obligation to reveal deliverables, delivery schedules, and the particulars of successful tenderers, a tenderer’s right of appeal, and the need to justify the use of acquisition procedures other than competitive tendering. Selective tenders dominate military acquisitions. While procurement of defense materiel must in principle comply with the provisions and intent of the 1994 Public Procurement Act, the 2002 Directive provides a waiver that could easily be used by those keen on engaging in the smoke-and-mirrors world of arms deals and offsetting arrangements. However, with Poland’s 2004 accession to the European Union, progressive convergence of Polish and EU (public) procurement regulations is also envisaged under the (amended) 1994 Act.

International trade in defense materiel and other sensitive products comes under the provisions of the International Trade in Strategic and Security-Related Goods, Services, and Technologies Act 2000 (DU, 2000; DU 200 lc). The Act provides a legal framework for the application of export and import controls, licensing of exporters and importers, international leasing arrangements, loans, and gifts. The Ministry of the Economy (MoE) has carriage for the administration and control of international trade in defense materiel (DU, 2002c) while military procurement is the responsibility of the Ministry of National
Defense (MoND), in particular its Armed Forces Procurement Branch (AFPB). Normally, defense materiel may only be purchased from domestic firms. Thus, foreign firms wishing to supply the PAF must seek local partners and/or licensed importers (see AMV offset below). The legislation also places restrictions on Polish producers that may deter them from seeking export opportunities (Piatkowski, 2003).

Offset legislation

The Offsets Act 1999 (DU, 1999a) requires all foreign acquisitions of military materiel above €5 million (from the same foreign supplier over three years) to provide at least 100 percent offsets in the form of compensatory transactions involving local production (content), countertrade, and/or bundling. Half the requirement must take the form of direct offsets aimed at benefitting zbrojeniowka. Depending on the value of an offset to the national economy, the value of the offset may be further increased (or decreased) using multipliers of 0.5 to 2 and, exceptionally, of up to 5. (For details of offset valuation and the application of multipliers see DU, 2002d.) An offset agreement cannot exceed 10 years and, once entered, neither side can terminate it. In case of contractual default, the offset provider may be liable for liquidated damages equivalent to 100 percent of the outstanding offsets obligation.

Under the 1999 Act, defense offsets are demanded to restructure and develop the Polish economy in general and defense-related industry in particular, diffuse new technologies, provide new export opportunities, create jobs, especially in areas of high unemployment, and support in-country R&D activities (DU, 1999a, article 5). Offsets arising out of a number of major foreign equipment acquisitions planned for the next few years (e.g., F-16s, AMVs) are expected by the government to provide the domestic defense industry with orders sufficient to allow it to survive in the short run, restructure, integrate into the US and west European division of labor, and develop technological competencies to make it internationally competitive in the long run. This strategy may be described as an offset-led industrial recovery.

Offset administration

Figure 12.1 shows the typical arrangement for negotiating and implementing an offset agreement. This is a particularly complex scheme involving a government-to-government agreement, as in the case of US F-16 acquisition (see below). Smaller
procurement deals are likely to be less complex but may involve a Polish partner or subsidiary of the foreign prime contractor. In the figure, the Polish and US governments and the US prime contractor negotiate the purchase of a weapon system (primary transaction). Negotiations concerning the offset package are conducted in parallel. Primary contract negotiations are shown in the figure as step (a) and offset negotiations as step (b).

The negotiated offset obligation may be general, i.e., x$ worth of offsets to be provided by the foreign prime, or specific, where a number of well-defined offset projects are agreed at the time the primary contract is signed under the Master Offset Agreement. In the general case, at step (c), the prime must arrange an offset transaction with a third party foreign offset provider and a Polish offset recipient. The prime must ensure that the value of agreed offset deliverables is sufficient to meet its offset obligation, otherwise penalties in the form of liquidated damages may apply. The MoE is responsible for overseeing offset implementation, step (d). This involves the authorization of each specific offset proposal or project and validation and/or acceptance of the associated offset credit. The latter is not related to the actual cost of offset provision and is supposed to reflect the value of the offset to the Polish economy. At step (e), the offset transaction is implemented and, when completed and audited by the Polish Offset Authority, the prime contractor’s offset obligation is discharged.

Recent offset agreements

In this section we provide three examples of recent offset arrangements. Two of these, the F-16 and AMV, involve purchases of imported equipment by Poland and,

**Table 12.1: F-16 master offset agreement**

<table>
<thead>
<tr>
<th>Offset type</th>
<th>Direct offsets</th>
<th>Indirect offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Purchase of goods and services</td>
<td>16</td>
<td>1.701 (22)</td>
</tr>
<tr>
<td>Technology transfer and training</td>
<td>5</td>
<td>0.740 (10)</td>
</tr>
<tr>
<td>Direct financial or in-kind contribution</td>
<td>5</td>
<td>0.199 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>2.665 (34)</td>
</tr>
</tbody>
</table>

**Notes:** (1) and (3) number of offset obligations; (2) and (4) US$ billion net (percent of total offset value).

**Source:** Holdanowicz and Hypki, 2003, p. 14.
thus, come under the 1999 Offset Act. The third is an example of offset requirements that Polish industry must comply with in its export markets.

The F-16 offset

In 2003, the Polish government agreed to buy 48 of Lockheed Martin’s F-16C/D advanced air fighters for US$3.5 billion, the largest defense contract by a former Soviet bloc member since communism’s collapse. The planes are to be delivered between 2006 and 2008. To facilitate the deal, the US Congress authorized a US$3.8 billion loan with interest-only payments during 2002–10 and repayments of principal deferred until 2011–15 (for discussion see Evans, 2003). On the Polish side, a special Aircraft Acquisition Act caps the annual cost of F-16 related debt service in 2002–10 at 0.05 percent of GDP (DU, 2001d).

At the same time an offset agreement was struck, valued by Poland at over US$6 billion (in current dollars) over the next 10 years. Liquidated damages (penalties for failure to meet offset obligations) were a particularly sticky point in arranging the deal. A senior Polish official commented that “we understand that penalties are a key problem for Lockheed. One can imagine [the problems for] a company with US$6 billion of potential penalties that is publicly listed” (DJ, 2003). Another sticking point was the use of multipliers. According to Polish sources, the US$6 billion offset deal represents “a nominal value of US$5.456 billion and indicates the government used an average multiplier at the lower end of the 1–5 range” (DJ, 2003). The marginal cost of offsets to Lockheed Martin is likely to be a small percentage of their stated net value as many obligations will be discharged by other companies.

To “nail down hard commitments,” Poland proposed a package of 74 offset projects, aimed specifically at channeling resources into the biotechnology, information technology, and telecommunications sectors. Lockheed Martin preferred an “open agreement” rather than nominating specific projects (DJ, 2003). The Master Offset Agreement comprises 44 “initial” projects representing 74 offset obligations valued by the Americans at “net” US$7.751 billion or “gross” US$12.547 billion when multipliers are applied (Holdanowicz and Hypki, 2003). (All figures are in current dollars.) Direct offsets comprise 16 projects valued at net US$2.665 billion (34 percent of all initial offsets), and indirect offsets 28 projects are valued at net US$5.086 billion (66 percent of all initial offsets). This amounts to less than the 50 percent of direct offsets required under the 1999 Offset Act. Table 12.1 shows the structure of the Master Offset Agreement.

In the true smoke-and-mirrors tradition of offset arrangements, a senior Polish official valued the direct offsets at about 50 percent of US$6 billion (Rochowicz, 2003). Estimates appear to differ as details of the deal are not available and the use of multipliers is not transparent (see Holdanowicz and Hypki, 2003; Luczak, 2003b). According to Polish officials, 51 percent of the offset package by value (US$3 billion) represents the buyback of goods and services from Polish companies (mostly those owned by US firms). We define this as the local content offset. A further 20 percent is described as “new investment,” which may also be local content but some could be described as a bundling offset. Technology transfers account for 10 percent (bundling) and the rest are exports—the countertrade offset (DJ, 2003).
US$3 billion worth of obligations will be discharged by 2006, another US$2 billion by 2009, and the balance by 2013 (Holdanowicz and Hypki, 2003). Liquidated damages are set initially at 4 percent for four years—not 100 percent as required under the Act—and subsequently at 3 percent. As observed by a senior Polish official, Lockheed Martin could easily elect to pay the penalty rather than discharge its offset obligations (Holdanowicz and Hypki, 2003, p. 15). This is not likely, as many countertrade and local content transactions should be quite profitable per se and the enlargement of the Polish footprint should be a profitable long-term investment for US firms.

The AMV offset

Another major transaction is the delivery of 690 armored vehicles (AMV) in 2004–13 by the Finish Patria Vehicles, fronted in Poland by WZM Siemianowice Slaskie, which will in future assemble and part-manufacture the vehicles (Holdanowicz and Luczak, 2003). As part of the deal, the Italian Otomelara will supply 313 turrets Hitfist 30 (for €0.3 billion). The first 40 specially modified turrets will be made in Italy and the rest in Poland. The total deal is worth €1.18 billion and is to be funded by the MoND.

The associated offset package is worth over €1.611 billion gross and comprises 71 offset projects (Holdanowicz, 2003a). Patria Vehicles will be responsible for 33 offset projects worth €1.0857 billion gross. These will involve technology transfer, the training of Polish production workers, the eventual transfer of the entire production line to Poland, and some buyback arrangements. Over 20 percent of the offset value represents the transfer of technology, 67 percent purchase of Polish goods and services, and the balance represents various forms of direct and financial investment in Poland (Holdanowicz, 2003a). The vehicle is to be progressively “polonized” with the local content to grow from about 1 percent in the first year to nearly 53 percent in 2010 (Holdanowicz and Luczak, 2003).

Otomelara and its main subcontractors will be responsible for 38 offset programs valued at €0.525 billion, of which 26 percent represent technology transfer and training, and 74 percent the purchase of Polish goods and services (local content) (Holdanowicz, 2003a).

The sale of PT-91M tanks to Malaysia

In this case Poland is an offset provider. This contract involves the sale of 48 PT-91M battle tanks and support vehicles to Malaysia in 2006–07 for US$370.5 million (Holdanowicz, 2003b). The associated Malaysian offset requirement involves two contracts of US$ 111 million each. The first contract comprises about 40 projects most of which have not been revealed at the request of the Malaysian buyer. They include, however, the delivery of horse breeding technology as well as some maritime surveillance technologies (Holdanowicz, 2003b). The second contract is a classic countertrade transaction and will require Poland to purchase US$ 111 million worth of palm oil.
Conclusions

What lessons can be drawn from the recent Polish offset experience? Perhaps rather surprisingly, the experience of Soviet-style foreign trade has largely been forgotten, although, as the example of export to Malaysia shows, skills in arranging countertrade transactions have not been lost. Offsets related to the F-16 and AMV acquisitions have been seen as an opportunity to reverse the flagging fortunes of zbrojeniowka. The use of direct offsets in this case is similar to the use of a tariff in support of an infant industry except that it applies to firms suffering from an age-related decline (a senescent industry). In this respect, Polish offset policy is similar to that used by many west European countries to compensate their industry for the loss of business.

Unlike many other countries, Poland has taken offsets seriously and attempted to strike a good bargain by insisting on specific offset obligations tied to the primary acquisition. Polish negotiators have gone into the process with their eyes wide open, and the debate on offsets in the national media shows that the difference between promises and delivery is well understood. The underutilized F-16 assembly plant in Turkey has been compared unflatteringly with the successful Dutch and Belgian plants (Rochowicz, 2003). It is the Dutch model that has clearly inspired Polish policymakers. In the smoke-and-mirrors world of compensatory arrangements, the Poles appear to be finding their way with greater ease than most.

It remains to be seen whether direct offsets deliver on their promise and provide the basis for a sustained recovery of zbrojeniowka. Indirect offsets are more promising, and Finland’s Nokia has been mentioned as a successful firm that did benefit from offset-related technology transfer (Choroszy, 2003). The experience of countries such as Australia, however, shows that investments in defense-related industry capabilities are difficult to sustain over time as export opportunities are limited while domestic demands are small and often very capricious (see Markowski and Hall, 2004b).

Notes

The authors are most grateful to Mr. Roland Trope of Trope and Schramm, New York, USA, Mr. Krystian Piatkowski, editor of Nova Technika Wojskowa (New Military Technology) and Mr. Wojciech Luczak, editor of Raport—Wojsko Technika Obronnose (Report—Armed Forces, Technology, and Defense) for providing offset-related publications and advice. We also benefitted from discussions with General Pawel Nowak, Chief of Defense Procurement, the Polish Ministry of Defense, and Messrs. Maciej Falkowski, Piotr Ogrodzinski, and Andrzej Brajter, who dealt with defense offset legislation in the Ministry of Foreign Affairs in Warsaw. The authors are solely responsible for the factual content and opinions expressed in this chapter.

1. During the final two decades of the Soviet bloc, most bloc countries abandoned transaction-by-transaction swapping of goods for goods and instead used bilateral clearing arrangements. These involved adopting historic prices from east-west trade—periodically adjusted—expressed in convertible currencies to calculate the value of exports and imports over a year. At the end of the year, severe imbalances often emerged as bilateral trading partners failed to
deliver or reneged on earlier commitments and other countries became involuntary lenders (see Markowski, 1973).

2. For a discussion in Polish see Piatkowski, 2003, and for a comment in English see Nelson, 2003.

3. PZL Warsaw-Okecie S.A., acquired by EADS, and WSK PZL Rzeszow, acquired by Pratt & Whitney (United Technologies).

4. Poland chose the F-16 in preference to JAS-39 Gripen, offered by the BAE Systems-Saab consortium, and the French Mirage 2000–5. The acquisition cemented Poland’s relations with the USA but drew criticism from EU countries who felt that Poland, an EU member-in-waiting, was more focused on its ties with the USA than those with its EU neighbors.

5. Direct offsets will include projects such as Pratt and Whitney’s (United Technologies) assembly of engines for F-16s at its PZL Rzeszow plant; Northrop Grumman’s commitment to build radar systems for the plane; the purchase of aircraft parts from PZL Swidnik by companies such as Textron (Bell); the teaming agreement with Alberta Aerospace to develop the Phoenix jet trainer; Motorola’s commitment to build an emergency communications network TETRA; and promises of assistance in obtaining FAA certification for and marketing of the Polish M-28 Skytruck aircraft and the W-3 Sokol and SW-4 helicopters. Indirect offsets are to include General Motor’s upgrade of its Polish (Opel) car plant to treble its vehicle exports, the modernization of a fuel refinery in Gdansk, a pharmaceuticals project to produce synthesized human insulin, and work on laser research.

References


13
Offsets and the development of the Brazilian arms industry
Sam Perlo-Freeman

Introduction

As from the 1960s, Brazil’s governments pursued a concerted strategy to establish a domestic arms industry. It had two purposes. First, an indigenous arms industry was seen as essential for national security and to secure Brazil’s ambitions for great power status. Second, the industry was to reduce dependence on United States arms. For a third-world producer and exporter, the industry achieved spectacular success in the 1980s, then experienced an equally dramatic collapse following the end of the Iran-Iraq war in 1988, but is now showing signs of revival.

A crucial element of the development strategy for the arms industry was, and continues to be, the acquisition of military technology from industrialized countries through licensed and coproduction, joint ventures, and other forms of what is now described as direct offsets, though formalized offset policies for procurement are of more recent origin. This strategy fits well with Brzoska’s (1995) “5 easy steps” to developing an arms industry: assembly, component production, licensed production, domestic design and production, and independent production with few imported components.

While some countries have spoken for offsets in terms of job creation or favorable balance of trade effects, in Brazil the promise of technology transfer was central and frequently formed a key requirement for procurement. This is similar to the approach taken by countries such as South Korea and Taiwan (see, e.g., Cheng and Chinworth, 1996). This strategy enabled Brazil to produce a wide range of weaponry approaching the technological frontier. But it has required the investment of substantial economic resources and has produced mixed commercial results.

This chapter reviews the history of the development of the Brazilian arms industry and the role of various forms of technology transfer in this process, from the beginnings of the industry in the 1930s to the present day. The chapter also assesses the success and failure of the strategy in technological and in economic terms. Following an overview of the evolution of Brazil’s arms industry, I discuss the role of offsets, especially as it relates to technology transfer, and their economic and technological successes and failures.
The evolution of the Brazilian armaments industry

Background and early efforts

Commanding one third of the region’s population and GDP, Brazil is Latin America’s largest state. It had and has the subcontinent’s largest armed forces and highest level of military expenditure (Perry and Weiss, 1986; BVC, 2002). As a result, Brazil is a dominant power in the region and has entertained ambitions to become a world power. Nonetheless, Brazil maintains peaceful relations with its neighbors and has not been involved in a war within the region since 1870. Brazil has accordingly maintained a low level of military expenditure as a share of GDP, usually around 1 percent. Her desire for military power relates more to long-term ambitions as a regional and global power than to any immediate threat to its borders.

Independence of arms supply was seen as essential to fulfilling Brazil’s potential. Former Air Force Minister Joelmir Campos Macedo declared that “it is a condition of security that each nation manufacture its own armaments” (Kapstein, 1991, p. 584). Military industrialization was also seen as central to general industrialization. This led to a concerted, long-term (and costly) government effort to establish a domestic armaments industry, based on a strong civilian industrial support base and a gradual ascent of the technology ladder through technology transfer.

The effort to lay a strong civilian industrial, technological, and manpower base for arms production began in the 1930s, when Brazilian military officers began to train in areas such as steel technology, telecommunications, and oil drilling (Barros, 1984). The government also sought to develop critical industries such as steel (Brigagao, 1986). To train engineers, government established an Aviation Technology Center (CTA) in 1945 and, in 1947, an Aeronautics Technological Institute (ITA). Based in Sao Jose dos Campos, these became the center of an aeronautics technology park, supported by a complex of peripheral civilian industries (Franko-Jones, 1988).


Brazil’s modern arms industry came into being in 1969 with the foundation of the aircraft manufacturer Embraer. Receiving an astonishing level of government support, Embraer was able to recruit the entire research staff of the CTA’s Institute of Research and Development (Cassiolato et al., 2002) and was bequeathed CTA’s design for the Bandeirante light transport/commuter plane. The government also gave tax breaks for companies buying Embraer shares (Franko-Jones, 1988). Around this time, civil engineering firms Engesa and Avibras commenced production of armored cars and missiles, respectively (Franko-Jones, 1988).

Under license from Aermacchi of Italy, Embraer began producing the Xavante armed trainer in 1971, to be followed by production of the Bandeirante. Engesa started production of the Urutu armored personnel carrier in 1972 (SIPRI Yearbook, 1978). Embraer also produced the indigenously designed Xingu transport and Seneca light planes produced under license from Piper of the US, and later the EMB-312
Figure 13.1: Brazilian exports of major conventional weapons, 1974–2001 ($1990 million)

Source: SIPRI.

Tucano trainer and the civilian Brasilia, successor to the Bandeirante. Helicopters were assembled in Brazil under license as from 1978. Engesa produced a wide range of armored vehicles, all popular export items. Avibras enjoyed great success in the 1980s with the Astros II series of multiple rocket launchers, based entirely on indigenous technology. In 1981, Embraer signed a co-design and production agreement with Aeritalia and Aermacchi of Italy for a new subsonic fighter, the AMX. Design, component production, and assembly were conducted in both Italy and Brazil. Brazil’s naval production, centered at the Arsenal Marinha do Rio de Janeiro (AMRJ), advanced in the 1970s and 1980s in cooperation with British and German companies.3

Government support was essential. From the mid-1970s, government encouraged the setting up of joint ventures between overseas arms companies, mostly European, and local companies, bringing about technology transfer.4 Financial support was extensive: funds were appropriated for military R&D, including through secret decrees and the granting of “extraordinary credits.” Arms exports were subsidized (Brigagao, 1986).

Due to Brazil’s relatively low own level of military expenditure, arms exports were crucial to the success of the industry. Brazil’s largest arms market was the Middle East, and Iraq in particular during the 1981–88 Iran-Iraq war, where Engesa’s armored vehicles performed well. Brazilian aircraft were popular in South America, but the Embraer Tucano trainer was also sold to Britain5 and France. During the early to mid-1980s, Brazil was frequently ranked as among the top-10 arms exporters and, among developing states, second only to Israel (SIPRI). Up to 90 percent of Engesa and Avibras’s production, and 65 percent of Embraer’s, was exported (Perry and Weiss, 1986; Franko-Jones, 1988). Figure 13.1, charting Brazil’s exports of major weapons systems, illustrates the industry’s rapid growth from the mid-1970s.

In the mid-to-late 1980s, then, the Brazilian arms industry was widely viewed as a success. Lock (1986) quotes a figure of 100,000 employees in 350 companies in the industry in 1984, while Brigagao (1986) claims 200,000. Domestic industry supplied 70 percent of the Brazilian air force’s fleet (Perry and Weiss, 1986). Engesa likewise supplied most of the Brazilian army’s armor requirements. Perry and Weiss (1986, p. 107) write that “with the assistance of foreign licenses for certain critical components, [Brazil] is now capable of producing the entire range of conventional armaments.”
In the late 1980s and early 1990s, Brazil’s arms industry was adversely affected by a number of external factors. First, the end of the Iran-Iraq war in 1988 deprived Brazil of a lucrative weapons market, particularly affecting Engesa and Avibras. Second, the end of the cold war heralded a general decline in the global arms trade. And third, the 1991 Gulf war demonstrated the superiority of US technology, rendering Brazil’s less sophisticated weapons much less attractive (Kapstein, 1991).

Engesa suffered a major disaster with the Osorno main battle tank, developed for the Saudi and Brazilian armed forces in the early 1980s. $100 million was spent on development, and it was hoped that sales to Saudi Arabia would reach $4 billion but the deal stalled due to financing difficulties (Kapstein, 1991). The 1991 Gulf war, which tied Saudi Arabia more closely to Washington, effectively killed the deal. In 1990, Engesa filed for bankruptcy, as did Avibras, which was also hit by the loss of the market in the Middle East. While Avibras survived, turning mostly to civilian production, Engesa was dismembered.

Embraer was struck by a global aviation recession as well as by the national decline in support for technology. Embraer also pursued big new projects without proper financial backing (Cassiolato, et al., 2002). The AMX fighter failed to win any export orders. Between 1990 and 1995, Embraer cut its workforce from 12,700 to 3,600 (Goldstein, 2002), and the company was privatized in 1994 (Cassiolato, et al., 2002). Embraer’s fortunes improved in 1994 with the sale of 200 of its new EMB-145 regional jets at the Farnborough Air Show. The company subsequently thrived in this civil regional jet market, controlling around 40 percent of the market by 1999. The company was responsible for around 6.5 percent of Brazil’s manufacturing exports. Military sales, however, had fallen to 7 percent of Embraer’s total (Cassiolato, et al., 2002).

Brazil’s arms exports collapsed (see figure 13.1). From 1981 to 1988, they had never been below $100 million per year, but slumped to $35 million in 1989, and have never since reached $100 million. From 1989 onward, no Brazilian company has been listed in SIPRI’s list of the top-100 arms companies.

**Recent developments**

There are signs of recovery in Brazil’s arms industry, especially in the aviation sector with recent export orders from Venezuela and the Dominican Republic. In addition, the Brazilian air force ordered 76 ALX Super Tucano trainers, adapted for patrolling the Amazon, as part of the $1.4 billion SIVAM (Sistema de Vigilância da Amazônia) monitoring and surveillance program for the region which is led by Raytheon of the United States. Embraer also supplied five Airborne Early Warning and Control (AEW&C) and three Airborne Remote Sensing aircraft for the program which came online in summer 2002. A planned purchase of 12 new advanced jet fighters may lead to substantial local production, though the purchase has been postponed.

There are signs as well of a new export drive in the arms industry, with Avibras sealing a $500 million contract with Malaysia for the supply of Astros II Multiple Rocket Launchers (MRLs). Avibras is also developing a new Astros III MRL (Foss, 2002) and,
more ambitiously, a cruise missile.\textsuperscript{14} However, there seems little prospect of Brazil returning to armored vehicle production (Rezende, 2002a). According to \textit{Jane’s Defence Weekly} (21 April 2000), the Rio Arsenal has started work on an indigenously designed submarine.

\section*{The role of offsets and technology transfer}

\textbf{Overview}

Brazil’s strategy for developing its arms industry was pragmatic and long-term, using what SIPRI described as an “appropriate level of technology” (SIPRI, 1986). One aspect of this was the strong foundation on research, technology, and educated personnel established through institutions such as the CTA. Another was the encouragement of a civilian industrial base. A third was the willingness to ascend the technological ladder gradually by pursuing links with foreign firms to obtain technology transfer, and specifically using overseas procurement to further the domestic industry through licensed and coproduction. At its best, this enabled Brazilian arms companies to obtain not just technology, but foreign capital, training, and practical know-how through interaction with foreign personnel.

The policy of seeking technology transfer as a requirement of procurement has been pursued fairly systematically. The \textit{Financial Times} of 14 November 1980 wrote that “the armed forces are also important in the area of technology transfer. Whenever a part is imported, its technology is always transferred to the national industry.” This strategy was pursued early on. The production of the Xavante trainer/attack aircraft under license from Aermacchi of Italy was crucial to Embraer’s early development, as were a number of other license deals. But Brazil’s systematic courting of foreign (mostly European) firms started in the mid-1970s. The \textit{Financial Times} article continues: “Between November 1974 and July 1975, 60 representatives of foreign arms manufacturers were in Brazil studying investment possibilities, either in technology transfer (via license) or formation of joint ventures with Brazilian companies.” The advantages for European partners were numerous: cheap labor, abundant steel supply, political stability, proven industrial capacity, access to Latin American markets, and avoidance of domestic export controls (Rohter, 1978).

The use of licensed and coproduction continued in naval and aerospace procurement through the 1980s, but a formal offsets policy was not introduced until 1991 when the Aeronautics Ministry adopted a policy document for aerospace procurement. This was followed with an implementation document in 1992 (Brazil, 1991; 1992). In many ways, this formalized existing practice in promoting technology transfer through procurement. Significantly, the first objective of offsets listed in the documents is “promoting the increase of technological and quality levels of the national aerospace sector, with the modernisation of production methods and processes and the acquisition of new technologies.” The implementation document specifies that compensation (offsets) shall apply to all purchases in the aerospace sector of over $1 million, but does not specify a minimum level of offset as a proportion of the contract. Instead, the document states that “the norms for the negotiation of Compensation Agreements must observe a degree of
flexibility…with a view toward technological capacity and the increase in labor charges in the… aerospace sector.” The current competition to supply Brazil’s air force with an advanced fighter is the first “big ticket” purchase by Brazil since the 1991 policy was introduced, and the first where offsets have been publicly discussed. Accordingly, the five bidders have competed intensively in terms of offsets offered. The technology transfer focus of the policy is reflected in this competition. The industry magazine Countertrade & Offset reported in December 2002 that the Ministry of Defense was preparing a new offset policy whereby all three armed services would seek 100 percent offsets for purchases over $5 million.

Offset arrangements, 1970–2002

I now discuss in detail some of the most significant offset and technology transfer deals that Brazil pursued as part of the development of its arms industry (see Perlo-Freeman, 2002). Some sectors of the industry have involved more by way of offsets and collaborative projects than others, especially fixed-wing aircraft and related systems, helicopters, and naval vessels. Armored vehicles and missile production was based overwhelmingly on indigenous design so that there are fewer major instances of offset arrangements in these sectors.17

AIRCRAFT

Embraer (Empresa Brasileira de Aeronautica) is at the center of Brazil’s aeronautics efforts and is probably the clearest success story of Brazil’s military industrialization effort. This sector has perhaps also been among the most effective at absorbing and developing foreign technology. It had the distinct advantages of the extremely strong technological and human resource base described earlier and, at a commercial level, a strong civil side to fall back upon when Brazil’s export arms markets collapsed. In addition, Cassiolato, et al., (2002) emphasize Embraer’s well-thought out “learning strategy” within which relations with overseas companies played a vital part.

Early projects: Although Embraer’s first plane, the Bandeirante, was an indigenous design, their first specifically military plane, the EMB-326 Xavante trainer/tactical support aircraft was made under license from Aermacchi of Italy, a condition imposed by the Ministry of Aeronautics. This arrangement included Italian specialists coming to Brazil to help set up production, and Embraer engineers receiving training in Italy, accelerating and augmenting the process of technology transfer (Cassiolato, et al., 2002). Between 1972 and 1981,200 of these planes were made and two dozen exported (Perry and Weiss, 1986). The 1978 SIPRI Yearbook notes that the Brazilian content of the planes was increasing.

The early 1970s also saw an open technology transfer agreement with Piper of the US to manufacture light planes, the Piper Seneca. This followed the imposition of a 50 percent tariff by the government on new planes entering Brazil (Franko-Jones, 1988).18 In 1975, when Brazil bought 49 Northrop F-5E Tiger fighters, an offset arrangement involved Embraer manufacturing several components for the fuselage (Perry and Weiss, 1986). In addition, Embraer employees received technological training in engineering (Cassiolato, et al., 2002).19
According to Cassiolato, et al. (2002, p. 16) these programs had the desired effect: “Learning through user/supplier interactions was intense and global. Embraer became known on the world market for being a user of extremely qualified equipment and software. It was not satisfied in simply knowing how to operate the services or the technology that it bought, but…to modify the technology to its requirements” (p. 16). However, Brazil cannot be said to have achieved fully independent production in this area. It remained heavily dependent on imported components. Lock (1986, pp. 86–87) paints a fairly negative picture: “It is commonly quoted that Embraer imports up to 60 percent of the components it uses to manufacture its aircraft. So far Brazil has not produced a single engine for its aircraft …There are no indications that the degree of nationalisation increased significantly during the period observed.” Both Cassiolato, et al. (2002) and Goldstein (2002) describe this as a deliberate strategy: Embraer concentrated on “key technologies” such as fuselage and systems integration, gaining autonomy in its business, importing and integrating components as necessary. Pursuing rapid nationalization of components would have been more costly and may ultimately have led to a technological dead end.

The AMX: The indigenously designed Tucano trainer was Embraer’s next step. Following that, it signed a coproduction agreement in 1981 with Aermacchi (now Alenia Aerospazia) and Aeritalia of Italy to produce the subsonic AMX fighter. Embraer’s share in the project was 29.7 percent, with 23.8 percent for Aermacchi and 46.5 percent for Aeritalia. Brazil’s air force ordered 56 aircraft, and the Italian air force 187. Each company was involved in the design, development, testing, and manufacture of sections of the aircraft, and the plane was assembled in both countries. In addition, Brazilian companies made other subsystems under license or in coproduction deals (Perlo-Freeman, 2002), it being the government’s policy to support suppliers in the aeronautics industry as well as Embraer, using subcontracting and technology transfer agreements (Franko-Jones, 1988). The aircraft entered service in 1989–90. The AMX project can be seen to have been a technological success for Embraer which became the lead partner for the new AMXT model of which 8 were sold to Venezuela in 2000. However, that this was the first export order for any AMX illustrates the plane’s commercial failure. Kapstein (1991) notes that the unit cost of the AMX doubled from its original $10 million.

SIVAM: Brazil’s biggest-ever defense procurement deal, developed in the 1990s, is the $1.4 billion Sistema de Vigilância da Amazônia or SIVAM program, which came online in 2002. It is a collaborative project involving Raytheon of the United States, Embraer, and other Brazilian companies. SIVAM is a vast monitoring, surveillance, communications, and air-traffic-control system for Brazil’s 5.2 million square kilometers Amazon region, “composed of a large quantity of ground-based and airborne platforms to include surveillance and remote sensing aircraft, radars, environmental and weather sensors, and remote user stations connected to three regional co-ordination centres by a vast encompassing telecommunications network.” SIVAM’s goals include surveillance of illegal activities, environmental protection, border patrols, air-traffic control, air-surveillance, and various other scientific, environmental, and economic purposes.

Amid allegations of bribery and industrial espionage, the SIVAM prime contract was awarded to Raytheon in 1994 (e.g., Evers, 1996). Raytheon was to supply the ground and airborne radars and other sensors and communication systems. But the project was a
collaborative one with Embraer and ATECH, a Brazilian company set up for the purpose. Embraer supplied five AEW&C aircraft and three Remote Sensing Aircraft, both based on the ERJ-145 regional jet, to act as the airborne platforms for Raytheon and Swedish systems, as well as a $380 million contract for 76 ALX Super Tucanos for SIVAM border patrols and training (Fricker, 2002). ATECH, was created for SIVAM in 1997, to ensure Brazilian autonomy in the operation, maintenance, and technological evolution of system intelligence, responsible for software development, technology absorption, and operational training of various governmental organizations. This is indicative of the high level of technology transfer and training involved in the SIVAM program. Rodrigues (2001) argues that there is great potential for incorporating local commercial technologies into SIVAM and for development of Brazil’s civil and military technological base through the program.

Formal offset requirements were attached to some aspects of the SIVAM program. Priority was given to direct offsets, with multipliers (allowing certain types of offset to be counted at a multiple of their value) rewarding technology transfer, training, coproduction and licensing, joint venture, and R&D in software.

The F-X competition: The Brazilian air force has long sought to replace its ageing Mirage III fighters with an advanced supersonic multi-role fighter. A request for proposals for the F-X fighter was issued in August 2001, with final bids submitted in May 2002. The contract is for around $700 million, with a 100 percent offset requirement. Air Force command stated that “companies should present trade compensation proposals, guaranteeing that the amount to be paid by Brazil in the aircraft purchases will be reinvested by those companies, in transferring technology that allows FAB [the Brazilian air force] to maintain the aircraft software on its own.” However according to Brigadier Cima of the Aeronautics Ministry, only 20 percent of the offsets were to be direct, the rest indirect, though with an emphasis on high technology items from Brazil’s aerospace industry. Initially the order was for 24 planes, but this had to be cut back to 12 to stay within budget, rendering full local assembly of the aircraft dubious.

There are five planes in the competition: Dassault of France’s Mirage 2000, Lockheed Martin’s F-16, Saab/BAEs Gripen, and two Russian planes: Rosoboronexport’s Su-35, and RAC-MiGs Mig-29 Fulcrum. Of these, Dassault, Rosoboronexport, and Gripen have already set up collaboration agreements with Brazilian companies: Dassault with Embraer, Rosoboronexport with Avibras, and

<table>
<thead>
<tr>
<th>Model/year</th>
<th>80</th>
<th>81</th>
<th>82</th>
<th>83</th>
<th>84</th>
<th>85</th>
<th>86</th>
<th>87</th>
<th>88</th>
<th>89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bandeirante</td>
<td>73</td>
<td>67</td>
<td>32</td>
<td>10</td>
<td>23</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>10</td>
<td>2</td>
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<tr>
<td>Xingu</td>
<td>25</td>
<td>12</td>
<td>18</td>
<td>26</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brasilia</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>6</td>
<td>20</td>
<td>38</td>
<td>46</td>
<td>54</td>
</tr>
<tr>
<td>ERJ-145</td>
<td>–</td>
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Table 13.1: Embraer aircraft production, 1980–1999
<table>
<thead>
<tr>
<th>Model/year</th>
<th>Civil</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xavante</td>
<td>5 15 0 0 0 0 0 0 0 0</td>
<td>5 10 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Brasilia</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Tucano</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>AMX</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
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</table>

**Light aircraft**

(Piper/Ipanema)

<table>
<thead>
<tr>
<th>Model/year</th>
<th>Civil</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERJ-135</td>
<td>67 51 33 49 43 28 24 24 26 17</td>
<td>67 51 33 49 43 28 24 24 26 17</td>
</tr>
</tbody>
</table>

**Military**

<table>
<thead>
<tr>
<th>Model/year</th>
<th>Civil</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xavante</td>
<td>5 15 0 0 0 0 0 0 0 0</td>
<td>5 10 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Brasilia</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>Tucano</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>AMX</td>
<td>0 0 0 0 26 57 49 35 45 54 40</td>
<td>0 0 0 0 0 0 0 0 0 0</td>
</tr>
</tbody>
</table>

Source: Cassiolato, et al. (2002).

Gripen International with the Brazilian airline VEM-Varig. The Dassault/Embraer and Rosobornexport/Avibras bids both envisage local production, while the Gripen bid promises local logistical support and software development. In all cases, the full transfer of software source code is key, a condition that puts the F-16 at a disadvantage as the United States is reluctant to transfer advanced technology to the region.34

The F-X purchase was postponed in early 2003 by incoming President Lula da Silva in favor of an anti-hunger program but has not been abandoned. The project may determine the extent of recovery in Brazil’s arms industry: participation in production of such high-technology aircraft could potentially lead the industry to a new technological level. But the order is very small, so if a locally built plane does not win export orders local assembly could rapidly become unviable.

Overall, the examples show steady progression of technological capability in the aeronautics sector, with collaborative ventures playing crucial roles at many stages. But
this has not always led to commercial viability, with projects such as the AMX falling flat. Embraer was only able to survive and maintain Brazil’s capability in the sector by diversifying into commercial aviation.

Illustrating the fluctuating fortunes of their military aircraft business, table 13.1 shows the number of each type of aircraft produced by Embraer from 1980 to 1999. Since then, military deliveries include continuing AMX production and the SIVAM planes.

Helicopters: Helicopter production in Brazil has been much less successful technologically than the fixed-wing sector. Production was established in 1978 through Helibras, a joint venture between Aerospatiale of France (now Eurocopter), which took a 45 percent stake, the Minas Gerais state government which also took a 45 percent stake, and the Brazilian company Aeroporto Cruzeiro do Sul which took the remaining 10 percent. The company assembles Aerospatiale/Eurocopter helicopters under license, with production of the Ecureuil and Lama models commencing in 1979. Helibras now manufactures a wide range of civil and military helicopters, has around 300 employees, and has sold about 420 helicopters, with 15 percent exported to Latin America. While the government hoped that Helibras would eventually design its own aircraft and produce or purchase components locally, the company never got much beyond the stage of assembling imported kits from France, producing no more than 5 percent of its components locally by 1986 (Bransford, 1986). The 1984 SIPRI Yearbook describes helicopter production in Brazil as only reaching the level of assembly and basic component production. Franko-Jones (1988) describes helicopter production in Brazil as an “acknowledged failure.” Nonetheless, in contrast to other projects that have succeeded technologically but failed commercially, Helibras has remained commercially viable and continues to attract orders domestically and internationally (Perlo-Freeman, 2002). As to the reasons for Helibras’s technological underachievement, one possible factor is that Helibras lacked the intense research and human resource development that lay behind, for example, Embraer’s success.

NAVAL VESSELS AND EQUIPMENT

Brazil has produced warships since 1789 at the AMRJ arsenal (Mills, 1997). Production of modern major naval vessels began in the 1970s. For such vessels, Brazil was particularly dependent on foreign technology and collaboration, due to the advanced technologies and huge capital outlays involved (Perry and Weiss, 1986). The first major collaborative project was a contract with Vosper Thornycroft of the UK, announced in 1970, for the construction of six frigates, the last two to be made at AMRJ. The deal was to include as many Brazilian-made components as possible. As with successful aerospace projects, exchange of personnel was important, with Brazilian engineers participating in the construction work and British specialists helping in Brazil. Despite this, the two Brazilian-built vessels took much longer to complete (Lock, 1986), and the total cost of the program was £200 million, twice the initial contract. After the Niteroi, plans were initiated in 1977 to build locally-designed corvettes, the Inhauma, with assistance from a German company, Marin-Technik (Lock, 1986). The completed ships were commissioned from 1991–92 (Jane’s Fighting Ships). A fifth has now been started on (Mills, 1997). Originally 12 of these corvettes were planned, but lack of export orders made the ships an economic disaster (Kapstein, 1991).
Meanwhile in 1982, Brazil concluded an agreement with HDW of then-West Germany for the construction of four diesel-electric Tupi-class submarines. The first was built in Germany, the other three assembled by AMRJ. As with the Niteroi, technical assistance and training were part of the package. The aim was to increasingly incorporate Brazilian components and technology, with the goal of developing an indigenous submarine capability and eventually nuclear submarines (Meason, 1978). The submarines were commissioned from 1989–1996, and two more improved Tupi-class vessels are planned by AMRJ, with one under construction. As with aircraft, a strong research base and a focus on active technology absorption through exchange of personnel has borne fruit in terms of developing capability. But the sheer size and complexity of major warship projects has given rise to serious cost inflation and delays, unmitigated by export orders, which raise the question of just how much resources the government is prepared to pour into this sector. Technological capability would seem to have been bought at a high price in this case.

**Evaluation of Brazil’s offset strategy**

There are a number of levels at which the success or failure of the strategies and policies described in this chapter can be evaluated: the technological level, how well Brazil has been able to develop autonomous technological capability in armaments through the use of offsets; the commercial level, whether offsets have helped to create commercially viable arms production; and at the level of the effect on the economy as a whole.

General economic benefits have been tenuous at best, a pattern common to offset agreements in other countries. The first point to note is the added cost of such deals compared with off-the-shelf procurement. Numerous authors (e.g., Kapstein, 1991; Franko-Jones, 1988; Perry and Weiss, 1986) affirm that this was accepted by the government as a necessary price for obtaining technology. But clearly there is an economic burden. The vast subsidies poured into Embraer and into the industry generally through export support must also be considered.

Opinions differ as to the balance of trade effect. Brigagao (1986) quotes high figures for levels of exports and Franko-Jones (1992) claims that in 1982, Embraer earned two dollars of foreign exchange for every one they spent. But Väyrynen (1992) takes the opposite position with regard to Embraer, arguing that its imports of components exceeded their exports in the 1970s and early 1980s. Brauer argues that foreign exchange earnings from arms sales are often overstated and costs understated (for example the extra cost of procurement to obtain technology transfer), and that “no-one has provided conclusive evidence that the net effect is positive for the arms exporting country” (2002, p. 114). At any rate, arms exports are only a small proportion of total exports, so that any net positive effect is not likely to be large—a conclusion also reached by Barros (1984). As for jobs, even a high estimate of employment such as Brigagao’s figure of 200,000 in 1984, at the height of the industry’s success, is trivial for a country as huge as Brazil (Brigagao, 1986).

A stronger case can be made in terms of the development of the civilian industrial base, and Väyrynen (1992) argues that Brazil has gained economically from its arms industry in this respect. Certainly a project like SIVAM seems to offer the potential to diffuse a broad spectrum of technology through Brazilian government and society. And,
arguably, Embraer’s success as a commercial aircraft manufacturer would never have come about had government support not been motivated by the desire to promote military production. Of course, this begs the question as to whether

**Table 13.2: Assessment of Brazil’s arms industry**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Use of offsets</th>
<th>Technological success</th>
<th>Commercial success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed-wing aircraft (Embraer)</td>
<td>High</td>
<td>High</td>
<td>Mixed; military production hit trouble, saved by strong civil side</td>
</tr>
<tr>
<td>Helicopters (Helibras)</td>
<td>High</td>
<td>Low</td>
<td>Fair</td>
</tr>
<tr>
<td>Missiles (Avibras)</td>
<td>Low</td>
<td>High</td>
<td>Ran into serious trouble, but diversified and survived</td>
</tr>
<tr>
<td>Land vehicles (Engesa)</td>
<td>Low</td>
<td>High</td>
<td>Went bankrupt</td>
</tr>
<tr>
<td>Major naval vessels</td>
<td>High</td>
<td>Fair</td>
<td>Very costly, private companies withdrew</td>
</tr>
<tr>
<td>(AMRJ; others)</td>
<td></td>
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</table>

the same benefits for civil industry could have been achieved through direct civil investment.

Yet it was not primarily jobs or balance of trade that motivated offset deals, but technology transfer aimed at developing autonomous military capability. If we are to judge Brazil’s strategy in its own terms, it must be at this level. From this point of view, it is important to consider both technological and commercial success together. If production cannot be made viable, as was the case for Engesa, the capability will practically be lost. The Brazilian case presents quite a mixed picture. Table 13.2 gives a broad overview, looking at the various sectors of Brazil’s arms industry in terms of whether they used offsets, and the level of technological and commercial success. From this table it is not clear that there is any particular pattern. To the contrary: each sector appears to show a different pattern of development, depending on its particular circumstances. What is clear is that making a commercial success of design and manufacture of high-tech major weapons systems is difficult, whether or not offsets play a part in the strategy. Even with massive initial state support, it has only been possible to maintain viable operations by diversification into civil production as in the case of Embraer and Avibras, or by not being required to operate as a commercial entity, as is the case of the Navy-run AMRJ.

Embraer, and the associated aeronautics industry, perhaps represents the clearest success of the technology transfer strategy. They have gradually ascended the technological ladder, now apparently ready to participate actively in production of an advanced fighter aircraft. Their military and civil technologies have worked together effectively, producing a world-leader in the regional jet market. But this has all been achieved through massive government investment and subsidy, and at the end of the day Brazil is not anywhere near fully autonomous arms production in any sector. Even at the semi-autonomous, collaborative level that Brazil can reasonably aspire to, arms production is still operating at very low levels compared to the 1980s. It is hard not to ask what all the funds poured into the industry have actually bought.
Conclusions

Offset policy and practice in Brazil, involving licensed production, coproduction, and technology transfer has been pursued not so much for direct economic benefit but to develop Brazil’s arms industry to fulfill a certain view of its place in the world. Indirectly, the arms industry has also been used to try to develop civilian industrial infrastructure. A strong research and development base in the post-war period, heavily supported by government, led to rapid development of the industry as from the 1970s, with technology transfer through procurement playing a crucial role, especially in the aeronautics sector. Collaborative arrangements of various kinds with foreign companies helped the industry to develop to higher technological levels. Domestically produced or licensed aeroplanes, armored vehicles, and missiles all enjoyed spectacular export success through the 1980s, rapidly turning to financial collapse following the end of the Iran-Iraq war. The armored vehicle sector vanished, while Embraer and Avibras only survived through success in civil manufacturing. Nonetheless, they maintained and developed their military production capabilities, enabling a tentative revival in the arms industry in recent years.

Overall, the arms industry in Brazil has proved costly, has been difficult to maintain as a commercially viable concern, and cannot realistically hope to attain full independence of arms supply in any case. Nonetheless, strategic use of offsets has brought technological benefits on both the military and civil sides, especially in the aeronautics sector.

Notes

1. In 1999, Brazil ranked 14th in the world in terms of military expenditure and 20th in terms of the size of its armed forces. The next-ranked Latin American countries were Argentina at rank 29 (military expenditure) and Colombia at rank 34 (armed forces).
2. Brazil sent troops to support allied forces in Italy in world war II.
4. Links with the US were very limited as a result of the Carter administration’s human rights restrictions on arms sales to Brazil.
5. Made under license by Shorts of Northern Ireland.


17. Albeit that Engesa’s early models were modifications of foreign designs (see Turner, 1980).

18. As Embraer’s technology developed, it farmed production of the Seneca out to a subsidiary, Neiva. Franko-Jones (1988) notes that Embraer was trying to sell Neiva, but today Neiva is still part of Embraer, making the EMB-120 Brasilia and other commercial planes.

19. Cassiolato, et al. (2002) also note that Embraer manufactured complex components under subcontracts from Boeing and Douglas, although it is not clear if this was linked to a procurement.

20. According to airforce-technology.com, 192 were eventually delivered in total.

21. Embraer was responsible for the wings, air intakes, ordnance pylons, jettisonable fuel tanks, main landing gear, part of the electrical system, and reconnaissance pallets.


25. Including drug smuggling, illegal logging and gold-digging, and rebel activity in neighboring civil war-affected states.

26. Raytheon web site, as in note 24. In many ways, though, SIVAM represents an assertion of sovereignty by Brazil over the poorly-controlled region. It was first announced at the Earth Summit in Rio in 1992 and was a way of demonstrating that Brazil could take care of the environmentally crucial region herself without outside interference. International environmental concerns had revived long-held fears in some military circles that outside powers coveted the Amazon’s vast natural resources (see Guedes da Costa, 2001).


31. See note 30.

32. See note 30. In fact, there seems to have been considerable confusion about the exact composition of the offsets requirement (Shanson, 2002).


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*Kane’s Fighting Ships*. Various editions.


The Argentine defense industry: an evaluation

Thomas Scheetz

Introduction

Since the early 1990s, Argentina has gone from being one of the major defense industrial producers among less developed countries (LDCs) to one where defense production barely subsists, the only remaining significant instances being those of licensed production and repair of aircraft and surface ships. Argentina’s eighty-year experience with defense production allows a wealth of conclusions regarding the limitations on the viability of defense industries in LDCs.

In Argentina, as in other developing countries, historically five reasons have been given for the launching of military-run industries. All of these propounded the industries’ supposedly positive economic development effects or the need for independence in arms sourcing in case of war. The single most important argument has always been import substitution industrialization (ISI). But the military also frequently justified arms production for its supposed export promoting possibilities. In this chapter, I examine this possibility with respect to the local defense aircraft industry. A third argument was Vernon’s “product-cycle theory” (1968), where arms technology, far beyond its initial R&D stages and with the production process long since completely defined, could be produced in Argentina, thereby inserting the country into the technology learning process. A fourth argument used to defend the founding of military-run arms industries was Hirschman’s (1958) “poles of development” argument. Here defense production was meant to trigger “backward and forward linkages” to other industrial sectors. Finally, arguments of a political and military nature have been made. Such industries were supposed to provide operational and logistic independence for the country in time of war. My previous analyses (Scheetz, 1993; 2003) demonstrate that none of these five arguments has ever been able to provide support for the reality of the Argentine defense sector; indeed, their irrelevance finally gave way to the sector’s collapse and privatization. The military-run industries themselves prospered only when the country itself prospered (during the decade of the 1920s and 1940–1955, when heavy state subsidies were fiscally feasible). Otherwise, they followed the Argentine economy into decline. These “infant industries” never grew up.

Military “Malthusianism”

One might well attribute defense industry decline in Argentina to the failure of each of the five theories cited above along with the general decline of the local economy. And while these arguments do have explanatory power, there is an additional reason why Argentine arms production was destined to fail. It has to do with the relation between...
scarce fiscal income and the rapid growth of weapons costs. This relation could be termed “military Malthusianism,” so named because (similar to Malthus’ theory) it contrasts the exponential growth of the unit cost of major weapon systems with the (at best) linearly growing fiscal income. A “Malthusian” gap between the two opens and increases over time, causing a decline in the acquisition of the number of arms systems. Since 1950 unit costs of arms have risen an average of between 9 and 11 percent annually (Pugh, 1993; Kirkpatrick 1995; 1997). Simultaneously, in the case of Argentina, real GDP grew at an average yearly rate of only 1.73 percent between 1970 and 2001 (Economic Commission for Latin America and the Caribbean). Given that central government fiscal revenue as a share of GDP held fairly constant over the same period, at a yearly average of 13.1 percent of GDP (IMF data), we can assume that Argentine fiscal revenues climbed at approximately the same rate as the GDP. Thus we are confronted by a Malthusian effect whereby over time an ever wider gap is opened between the unit cost of military equipment and the country’s ability to acquire systems of armaments for a given size of air, land, or sea forces. Pugh and Kirkpatrick claim that this factor, which I call military Malthusianism, has been the primary determinant (via changing ratios of budget to unit costs) of the numbers and types of equipment procured and, thence, of industrial and military roles and structures. Pugh elaborates on why all “attempts to halt cost escalation are foredoomed to failure” (1993, p. 179). While this phenomenon does not deny the value of attempts to continually improve the efficiency of production methods, or even the importance of collaboration in order to obtain economies of scale-related cost savings, the fundamental divergence between the two trends is shown to be inevitable. This is grounded in the logic that a country’s use of second-best arms against an adversary would be fatal (and therefore their purchase economically irrational). Thus the security dilemma produces the need for a competitive edge in armaments, an edge ever harder to maintain.

The authors demonstrate that this factor affects the forces of developed countries—for instance, in 1954 Great Britain’s Royal Air Force had 5,213 aircraft, whereas in 1994 it had shrunk to only 1,100 (Kirkpatrick, 1997, p.62). And since economies of scale affect the average unit costs of most weapon systems, smaller producers and purchasers, like Argentina, are inevitably and gradually squeezed out of the market. Their alternative is to simply acquire and produce obsolescent weapon systems. If even countries like the US and UK are confronted by these realities, there appears to be no way that developing countries like Argentina can avoid this Malthusian dilemma.

Kirkpatrick and Pugh point to a dynamic whereby countries first attempt to make their industries more efficient, then search for company fusions both within the country and among allies, followed by plant closures, and gradually moving toward multi-role arms systems (e.g., combat planes like the costly Argentine IA-63 Pampa) with ever more limited demand for the product (witness the Royal Air Force’s shrinking from 5,213 to 1,100 aircraft). If this is occurring in developed countries, the situation is exacerbated for LDCs attempting to compete with a weapon system that would not be competitive in most conceivable combat roles.

Obviously this Malthusian trend takes into account that rival countries face the same unit cost dynamic, and that the acquired systems tend to have greater firepower and accuracy than the systems they replace. Nonetheless, this growing spread between fiscal income and weapons cost severely affects roles and missions (by limiting deployment),
and this becomes a very serious problem for LDCs that may acquire very few units. They have to concentrate their deployment and thereby become more vulnerable to an effective surprise attack. The current purchase of ten F-16s by Chile is an example. At a total cost of US$650 million, the purchase has stretched the government’s ability to purchase other (naval) arms systems. At the same time the limited number of planes deployed can form less than a normal-sized squadron, thus almost guaranteeing their concentrated deployment. LDCs like Chile and Argentina cannot afford large modern air forces. And the deployment of less than modern forces (like that proposed by the local licensed production of the IA-63 Pampa) would put that country at a severe disadvantage in case of war. The failure to take this Malthusian trend into account has lead to the Argentine armed forces being overwhelmingly labor intensive (80 percent of the military budget is spent on personnel).

Moreover, the survival of a local defense industry, be it in a developed or less developed country, depends on the capacity to maintain the quality of its research and development (Kirkpatrick, 1997). This is because of the high ratio of weapons development costs to the final product cost (Pugh, 1987). Countries like Argentina have lost this battle. The attempt in the aircraft industry, described below, is an attempt to regain some of this R&D capacity, albeit destined to failure when analyzed in depth. In what follows I briefly present the privatization of the Argentine military-run industries and what remains of the sector today. The chapter then concentrates on the aircraft industry that was licensed to Lockheed Martin Argentina SA (LMAASA), one of two privatized military enterprises attempting to survive in both civil and military production. LMAASA is presented as an example of offset production.

The privatization of Argentine military-run industries

Beginning in October 1990 and running through August 1997, the Argentine national government got rid of (sold off, liquidated, or transferred to province or private hands) almost its entire military basic industrial and arms producing sectors. The reasons are to be found in the recently adopted liberal market ideology along with the fiscal needs of the state to cover budget deficits and solve the external debt crisis. The neo-liberal privatization craze swept the entire continent during the 1990s. The date of property rights transfer is listed (see table 14.1, appended to the chapter) in the case of the privatized enterprises. The airplane factory was given in concession to Lockheed to refit the recently acquired A-4 Skyhawks and to provide maintenance for the Air Force and civil aircraft (as described below in detail). Table 14.1 also lists those few enterprises still in the public sector (they can be easily identified under the arms industry rubric as those which have not been transferred, liquidated, or privatized). They are Fábrica Militar Rio Tercero, FM de Pólvoras y Explosivos “Azul,” FM Fray Luis Beltrán, FM de Pólvoras y Explosivos Villa María, Sociedad Anónima para el Desarrollo de la Tecnología Acuática (SATECNA), SISTEVAL, Construcción de Viviendas para la Armada (COVIARA), Interbaires, Intercargo, and Edcadassa.
The Lockheed Martin aircraft licensed production unit

The only significant arms production unit still operating in Argentina is Lockheed Martin Argentina SA (LMAASA), and in the context of the discussion of defense production offsets it is worth taking a close look at this industry. The original plant was started by the Argentine army in 1927 with German-licensed aircraft, the country’s first military industry. Over the years it has produced a series of aircraft (among others, the IA-27 Pulqui, the IA-58A Pucará, and the current advanced jet trainer, the IA-63 Pampa), from first to last employing German licensed technology. As indicated in table 14.1 the factory was licensed by the Air Force to Lockheed Martin in December 1994, the original contract stipulating its task as the reconditioning of a large share of the 36 used A-4 Skyhawks ordered from the US in 1993. The plant’s workforce of 2,950 workers was immediately reduced to 1,950 (and then to 950). The current contract, running from 1 July 2000 through 30 June 2005, commits Lockheed to increase the workforce to 1,150, although as of the end of 2003 with capacity utilization below 60 percent, the workforce was further reduced to 900 (Clarín, 23 October 2003).

The original contract stipulated that, from December 1994 through mid-2000, the Argentine government (Air Force) would pay Lockheed a total of US$212.5 million (receiving back US$12.5 million in repairs and spare parts as a canon representing rental costs for use of the government’s plant and equipment). LMAASA was committed to US$14 million investment during those six years. And Lockheed was only contracted to upgrade the A-4 Skyhawks. There was to be no further aircraft construction, nor was there any commitment to contracts with non-military aviation.

The new concessionary contract (running from 1 July 2000 through 30 June 2005) is supposed to provide P$230 million (Argentine pesos), the government receiving back P$10 million as a canon for ownership of plant and equipment. This second contract holds some additional benefits for the Argentine government for two reasons; first, because there are more production benefits for Argentina (see below), and second, because Argentina has, during the course of the contract, undergone a severe devaluation that will probably force a renegotiation of the current contract. Before January 2002, the Argentine peso and the US dollar were pegged at a 1:1 exchange rate. Following a run on the banks (November 2001) and a chaotic devaluation with default (January 2002) the peso is floating, and in mid-2003 was at P$2.90 per US dollar. But the contract is written in Argentine pesos (see Ministerio, 2000, p. 13, article 5). Whereas in early 2002 LMAASA was to receive the equivalent of US$230 million, the mid-2003 payment for their contracted products was—because of devaluation—only to be about US$79.3 million. This unpredictability in Argentine political and economic institutions should make wary those doing business in Argentina. The contract with LMAASA will have to be rewritten, but in 2003 there was no possibility that the treasury accept would make further commitments in the defense sector. Indeed, the possibility exists that in 2004 the plant will be passed again into the public sector if a revised contract is not satisfactory (Cicalesi and Del Gaizo, 2003, p.31). The Kirchner government, which took office in May 2003, has pushed for a new law strongly supporting defense production, but it is difficult to see where the fiscal support or technological capability will come from.
There follows a description of some significant aspects of the contract and actual situation:

1. Expanded output: On the positive side of the ledger, the 2001 contract greatly expands the work responsibilities of the Lockheed plant. Most especially, it will now provide maintenance for almost all Argentine military aircraft. Lockheed also promised to offer maintenance services for civilian commercial aircraft. The company commits itself to the production of spare parts for (only) 180 days after the beginning of the particular maintenance contract (see Ministerio, 2000, p. 26; article 13.6). This short time period for the guarantee of spare parts would naturally affect all long term contracts with any possible international client for Argentine equipment.

2. Renewed assembly line: After years of suspension the improved IA-63 Pampa (basic technology from Dornier, first deliveries in 1988, employed as an advanced jet trainer and light ground attack roles) will again be produced, having been contracted for by the Argentine government (see Ministerio, 2000, p. 11; article 4.6). The initial production is about 1.5 planes per month, at a local fly-away cost of US$7 million.

3. Export possibilities and economies of scale: In order to attain scale advantages by bringing the average cost down and to break even on total production costs, it is estimated that 100 aircraft must be produced and sold (Ay, 2000, p. 2). By offering coproduction as a possibility, LMAASA and Argentina have hopes of selling up to 300 units (with advanced APG-67 radar) with a fly-away unit cost estimated between US$8 million to US$9 million (see Overhaul & Maintenance, 20 June 2002, p. 165). Argentines list possible purchasers as Colombia (10 to 24 units), Israel (60 units), with South Africa, Egypt, Turkey, Greece, Mexico, Bolivia, Chile, and the United Arab Emirates given as marketing targets (Ay, 2000, p.2). Undoubtedly, most of this is wishful thinking for the following reasons: the plane incorporates much dated technology from the late 1970s; present scale factors imply high unit costs; given Argentina’s economic situation, repair parts production and supply would probably not be assured; and lastly, most of the prospective buyers will either produce their own plane (coproduction is a possibility offered by LMAASA and Argentina) or buy a cheaper, more recent vintage plane from long-established and reliable arms producing countries.

4. Workforce and human capital: Although LMAASA is committed to the expansion of its workforce from 950 to 1,150 (and total jobs generated from the plant and its local suppliers should expand to between 2,050 to 2,350), according to an interview with an aeronautical engineer, the original layoffs associated with the private concession of the plant in 1994 (when the direct plant workforce was reduced from 2,950 workers to 950) was quite traumatic. By mid-2003 the workforce had shrunk further to 900. Much of the specialized human capital either went into retirement or migrated to Embraer in Brazil. At current salary levels (Argentina management receives US$1, 500-US$2,000 per month, whereas they can earn US$4,000+ in jobs abroad), the plant cannot hope to keep the more qualified personnel in its workforce (see Brzoska, 1999, p. 152 for analysis of this aspect, involving the education of engineers and technicians, and “keeping qualified personnel in the country”). This will affect the future of the plant and any hopes it may have for competing in international markets. Overall, the average cost per man-hour in the new contract falls from US$73.6/hour to $49.3/hour, a very significant drop that will no doubt improve profit margins, but will also have an
effect on salaries, the more so following the devaluation. All foreigners formerly working for LMAASA have recently left the country, leaving only Argentine nationals to operate the plant.

5. LMAASA “commitment” to Argentina: LMAASA’s total investment in Argentina over the five years of the contract is P$8.5 million or, currently, US$2.3 million (Ministerio, 2000, p. 30; article 21). As stated above, it must pay P$7.8 million for the five year use of the former Air Force facility18 (present value equal to US$2.1 million). It will be paid P$230 million under contract by the Argentine government, P$168 million of which is to be spent on labor costs (Ministerio, 2000, p. 13; article 5.1). The Argentine Ministry of Defense will receive a 2 percent royalty (not overly generous) for any export sales of the Pampa.19 Although we have insufficient information to come to any solid conclusion, it does appear that the parent company, Lockheed Martin, is assuming much risk with its concessionary contract in Argentina.

6. Disadvantages for Argentina: The IA-63 Pampa is a one-of-a-kind airplane. There exist only 15 in the world. Thus, unit cost is high, future supplies of spare parts are not assured, and export is most improbable. Before advancing alone with its licensed production, Argentina should have studied its own regional market (mostly Brazil), and common defense planning should have been attempted, if for no other reason than that of attaining economies of scale in production, maintenance, and repair. Lacking these factors, it is hard to see how licensed production of aircraft in Argentina could ever be cost efficient.

Lessons learned from the experience with defense industries in Argentina

Cost limitations on production of major weapons are now widely understood and accepted as an unavoidable policy imperative in South America. This implies that military-run businesses must not depend on the national treasury to continue. There are perhaps ten criteria applicable to those countries, like Argentina, who today still wish to proceed with military-run industries. First, long range strategic and force planning is required (and this should preferably be regional, collective security planning). This is often complicated in LDCs by volatile fiscal and economic situations which make budget projection problematic. Second, long range investment funding for the industry must be assured. Third, nations must establish clear rules of policy behavior acceptable to all the country’s major political parties. So that long range plans might survive a change in government, these rules should include a clearly defined position with respect to the payment of bribes and the sale of arms to countries considered pariahs in the international arena. This is important because these international outcasts tend to look to LDC producers as alternative sources when developed country producers close their markets to them. Fourth, before founding any business the country should be sure that key inputs and skilled labor are assured, or can be feasibly developed. This implies a successful education system which supplies technicians and sufficient remuneration levels to keep R&D teams in the country.

Fifth, an attractive opening in international markets should exist, such that economies of scale (or dual use products or production capabilities) can be assumed.20 Small arms
production, munitions, and short range missiles are possible areas where Argentine scale production can be attained. Sixth, the producer should have the capacity for both manufacturing and marketing (including access to lines of credit for prospective purchasers). Seventh, the enterprise should offer competitive wage rates so as not to lose skilled labor. Moreover, excessive intromission by the military should be avoided. Rank should not be sufficient reason to give a voice in any enterprise, and if a soldier is to work in the enterprise, care should be taken not to limit his commitment to a short tour of duty. Eighth, the country must accept a certain level of technological dependence. Attaining independence in this area is an illusion (although one should of course try to acquire technology through tough negotiation). Ninth, there should exist at least partial (stock) ownership in the private sector, above all in order to obtain financing. And tenth, in the case of offsets, the country requires a very knowledgeable negotiating team. This last requirement was only partially met in the recent LMAASA contract.

None of these conditions are currently met, even though Argentina has recently passed a military restructuring law that recognizes several of these requirements (Law 24,948, article 21). Moreover, a new law regulating the defense production sector itself has been passed by Congress in mid-2003. Brazil and Chile, too, have been moving in the direction suggested in the prior two paragraphs. The outcome of the local debate will probably imply that Argentina keeps its small arms production capability, possibly enhanced by its R&D capability in this field. But it is doubtful that airplane production can continue over the long run, although Brazil, with larger scale and extensive marketing capabilities, is making a go of its regional (non-military) aircraft Embraer production. The fundamental drawback in Argentina (and in other countries of the region) is the lack of long run economic and military policy.

By way of conclusion, how then should Argentina acquire arms for its defense? The answer is to buy competitively; alternatively, joint ventures are a possible solution only if scale and the other ten requirements are present.

Notes
1. For the Argentine case, see my chapter “Military Business in Argentina” (Scheetz, 2003). Some of the points were previously developed in Scheetz, 1993.
2. These five reasons are not necessarily competing explanations. In principle, they can overlap.
3. Military-run industries in Argentina included arms producing industries, backward-linking producers of inputs into these industries (such as Altos Hornos Zapla, producing high quality steel for tank armor), and other industries considered “strategic” for the country (such as steel, petrochemicals, and oil).
4. Malthus hypothesized a growing gap between population and food supply. He predicted population catastrophe, resulting from famine.
5. In Argentina, central government refers to budget outlays of the Administración Nacional, that is to say, excluding provincial and municipal budgets.
6. As examples, in Ecuador a squadron is formed by 10–12 planes. Chile has a squadron with 16 F-5s. Israel has 30 F-16s in a squadron (see Spector and Marom, 1996).
8. It also privatized almost all other business assets held by government.
9. The irony was that the privatization effort came from a Peronist government. Peron’s name is perhaps that most associated with fostering the policy of ISI.
10. One of the world’s first jet aircraft, first flown on 9 August 1947.
12. This plane took part in the JPATS competition for an updated trainer for the American armed forces during the 1990s. It lost because it was said to be too advanced a jet trainer for young pilots; it was too expensive; the Argentine plant lacked scale production capabilities; and it would have displaced part of the American defense industry for a large number of aircraft. The Argentine Air Force then tried to place it with a US defense company but lost the bid anyway. Argentina and Brazil had also planned to jointly produce the CBA123 regional transport, with the Argentine Air Force producing 33 percent. This joint venture failed in the late 1980s because of lack of financing on Argentina’s part. Brazil has since very successfully gone ahead alone on the project.
13. It is similar to the Alpha Jet, an advanced trainer whose design originated in 1970.
14. This renegotiation was concluded in 2002, but when a new president took power in May 2003 the advances in the negotiation process were simply canceled.
15. Local specialists are not convinced that this promise will be kept.
16. Its original price in the early 1990s was listed as US$3 million per unit, thus demonstrating military Malthusianism in the Pampa.
17. The plant’s high fixed costs, with low production runs, imply high unit costs (see Hartley, 1995).
18. I have no estimate of the value of the plant and equipment at the time of licensing, nor is any profit information available for LMAASA.
19. This according to a published interview with the Air Force head of logistics. See www.aeroespacio.com.ar/539/site/_entrevistacm.htm
20. Of course not all production processes require scale production, e.g., submarines.
21. Chile, however, does not jointly plan force structure among the three forces, and neither has Brazil achieved joint planning in arms acquisitions.

References


Appendix

Table 14.1: Argentina, military-run industry at moment of privatization

<table>
<thead>
<tr>
<th>Sector/ Enterprise</th>
<th>Date of transfer</th>
<th>Pre-transfer personnel</th>
<th>Privatization values</th>
<th>(US$mn) Total</th>
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<tr>
<td>Polisur</td>
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<td>14.1</td>
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<td>19</td>
<td>4.5</td>
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<td>Induclor</td>
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<td>to YPF</td>
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<td>Subtotal</td>
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### Steel

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<td>143.3</td>
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### Arms industry

**Army**

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<th>Quantity</th>
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<td>DGFM (FM)</td>
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<td>1.6</td>
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<td>FM General San Martin</td>
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<td>8.5</td>
<td>8.5</td>
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<td>FM Pilar</td>
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<td>FM San Francisco</td>
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<td>FM Rio Tercero</td>
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<td>FM S.J. De la Quintana</td>
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<td>FM de Armas Portátiles</td>
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<td>Domingo Matheu</td>
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<td>FM de Pólvoras y</td>
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<td>FM Fray Luis Beltrán</td>
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<td>FM de Pólvoras y</td>
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<td>Forja</td>
<td>7/93</td>
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<td>(Navy)</td>
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<tr>
<td>Tandanor</td>
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<td>SATECNA S.A.</td>
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<td>Subtotal Navy</td>
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<td>Overall total</td>
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</table>

Notes: Pre-transfer assets (US$ mn): 5,679; pre-transfer sales (US$ mn): 1,446 (both for 1990/91; see (Luzuriaga, 1992); n/a.=not available; transf.=transferred; liq=liquidated
Sources: Personnel in general taken from Ministerio de Defensa (internal memo, 1991); personnel for Sidinsa, Petropol, Induclor, Mon. Vinilicos, and Coviara are for 1984 (internal government memo); other sources: Pérez Esquivel (1999, p. 94); Luzuriaga (1992); La Nación, 3 October 1990.
Introduction

Since independence in 1947, India has been making strong efforts to build an indigenous capability to achieve the long-term goal of self-reliance in defense production. Between 1958 and 1962 India spent less than 2 percent of GDP on defense. After the Indo-China war in 1962, India’s defense expenditure doubled to over 4 percent of GDP. This trend continued in the 1970s and 1980s and then increased significantly from Rs 153 billion in 1990 to Rs453 billion in 1999 in current Indian prices, or from US$8.1 to US$10.5 billion in constant 2000 US dollars. Since the 1960s Indian defense procurement has been influenced by three principal objectives: creating a self-reliant defense industry, reducing the dependence on arms imports, and reducing the foreign exchange burden of arms imports. This chapter examines to what extent India has succeeded in achieving these goals over the last five decades, particularly with reference to offset arrangements. Although India does not appear to have developed a formal offset policy framework, its industrial, science, and technology policies have influenced procurement of weapon systems from foreign sources employing various offset options. Particularly in the defense sector, offsets such as licensed production, technology transfer, counter or barter trade, and long-term credit arrangements have been employed consistently. These offset arrangements are not set out as formal policy declarations, but in practice they have been developed and pursued often and systematically. This makes it possible to evaluate whether defense offsets helped India to achieve its economic and military objectives such as developing a domestic defense industry, reducing the foreign exchange outflow, and reducing its dependence on defense imports. It must be said, however, that very little by way of detailed economic data are available about Indian defense deals. The assessment must therefore be qualitative in nature.

Arms imports and offsets

Over the years, India has established one of the larger defense industries in the developing world. It includes 39 ordnance factories, of which 16 were established before independence, 8 relatively autonomous defense public sector units (DPSUs), and over 50 defense R&D laboratories. Yet, India has also been a major importer of weapon systems (Nugent, 1991). Table 15.3, appended to this chapter, shows the extent of these imports. Between 1947 and 1962, India mostly bought weapon systems off-the-shelf from the UK.
and France. In the 1960s India decided to build its domestic arms industry through foreign imports and technology assistance. Between the mid-1960s and mid-1980s, India’s defense deals involved both direct offsets, such as licensed production of weapon systems or subsystems or technology transfers, and indirect offsets, that is trade arrangements involving non-defense goods and services such as raw materials, and consumer and industrial goods (Hammond, 1990, p. 7). Most defense deals with the Soviet Union or Russia involved three kinds of offsets, used separately or jointly: (i) licensed production/technology assistance; (ii) countertrade or barter; and (iii) cheap long-term credit facilities with low interest to finance these deals. Most of the procurement agreements with western countries involved two offset options, namely licensed production/technology assistance and some form of credit arrangements.

Between the 1960s and 1980s, India entered into a number of licensed production agreements. Table 15.3 illustrates this. Except for a small number of procured items from western Europe, most of the major weapon systems were procured from the former Soviet Union and other eastern bloc countries. By 1980, Soviet weapon systems constituted about 70 percent of total imports (Singh, 1990, p. 1081). As the table indicates, this appears to be the situation even in the 1990s. The Indian army is primarily equipped with Soviet/Russian weapons systems. This is also the case for the air force (with few exceptions, such as Jaguar, UK, and Mirage 2000, France, that are currently in service, and a few 1960s generation aircraft such as Gnat fighter and HS 748M AVRO transport, UK). In the case of the navy, although Soviet vessels are predominant, we do find a significant number of ships and weapon systems imported from the UK, including two aircraft carriers (Vikrant and Virat), Leander class frigates, and naval fighter aircraft and helicopters (Sea Harriers and Sea Kings). However, compared to the army and the air force, technology transfers and licensed production arrangements in naval equipment are small.

Licensed production involves different phases, such as assembling of equipment, manufacturing of parts using foreign material, and manufacturing of these parts using local materials. Between the mid-1960s and mid-1970s, India faced serious difficulties to absorb licensed technologies, particularly those involving tanks, aircraft, and naval vessels. The programs faced delays and cost overruns, and resulted in spectacular failures. For example, the Vijayanta tank (a modified 37-ton Chieftain tank of Vickers and Armstrong, UK), which “relied heavily on imported components,” was judged “extremely slow” and failed to see action in the 1965 war with Pakistan (Graham, 1984, p. 168). Only in the 1970s did production reach planned levels and unit costs fell. Meanwhile, India found itself compelled to buy Soviet T-55 (1960s) and T-72 (1970s) tanks. Although relatively inexpensive (Graham, 1984, p. 168), this ran counter to the foreign exchange preservation objective of indigenous arms production.

India’s effort to locally assemble HS-748 transport aircraft (UK) was a failure as well, and its project to produce Gnat light jet fighter aircraft was only a limited success. Licensed production of MIG-21 aircraft faced serious delays. Through 1972, the foreign exchange expenditure on imported components exceeded the foreign exchange cost had the aircraft been imported in its entirety (Graham, 1984, p. 172). However, the MIG-21 project had a “positive impact on HAL’s design and production” and helped “HAL’s development of its technical base” (Graham, 1984, pp. 172–173). Subsequently, this
appears to have helped HAL to absorb new generations of Soviet aircraft technologies, such as MIG-23, MIG-27, and MIG-29.

By the mid-1980s, India’s policy of building its domestic defense industry through foreign technology imports and licensed production produced significant results. India became nearly self-sufficient in a range of small arms, ammunition, and medium artillery. Under license, it started producing helicopters, combat aircraft, main battle tanks, armored personnel carriers, tactical missiles, and it built frigates. Nonetheless, the industry failed to acquire capabilities sufficient to close the technology gap with developed countries and keep pace with technological change in weapon systems. As a result, India was forced to import latest-generation aircraft and naval vessels from other countries. Its “cherished objective of self-reliance in military technology still remains an elusive dream” (Gosh, 1996, p. 301).

Apart from licensed production, India’s favored offset option is its method of payment for imports. Particularly with the Soviet Union and subsequently with other eastern bloc countries, India entered into rupee based trade arrangements to reduce the foreign exchange burden of imports. This enabled India to import arms for rupee-denominated credit which eastern bloc countries spent to import goods from India. The initial arrangement was for 10 years. Subsequently, it became 15 years and longer. For example, a 1980s defense deal with the Soviet Union involved a 15 year loan of Rs13 billion at 2.5 percent annual interest and repayment starting after a two-year grace period (Mehrotra, 1990, p. 23). West European suppliers, although they were willing to offer some form of credit, were generally not interested in rupees. Despite this, India entered into a number of defense contracts involving licensed production, especially with UK companies. For example, India reached an agreement with Vickers Armstrong and Yallow to produce Leander class frigates, with the UK government agreeing to fund the foreign exchange component (Graham, 1984, p. 173). But the benefits to India of the UK credit deals were not particularly significant, and perhaps even negative. For example, a deal to buy the HMS Hermes aircraft carrier was worth £50 million but the final bill, after refitting, was expected to cost India £120 million (Statesman, 13 April 1986). Similarly, India purchased the Westland helicopter with an aid package of £65 million from the UK government. Subsequently, it turned out to be a big failure technically and financially (Statesman, 18 February 1987). Although UK aid appeared to benefit India, in reality it was a subsidy for the British company that was selling the helicopter, as it was facing closure (Ray, 1986).

The offsets associated with the purchase of Mirage 2000 aircraft in the 1980s from France were meant as technological assistance to India to develop its Light Combat Aircraft (LCA) and an indigenous aircraft carrier (Tribune, 27 March 1990). But there were criticisms that India had overpaid for the Mirage 2000 deal (Prasannan, 2000). India’s contract with Bofors AB (Sweden) in 1988 was the first arms deal with a western country that involved both direct and indirect offsets, that is, countertrade and licensed production. Bofors agreed to license subsystems production in India and buy them back along with other goods. The trade element was expected to be 50 percent of the total contract value of $1.2 billion (Hammond, 1990, p. 124). However, the deal on technology transfer was abandoned after a corruption scandal.
Impact of offsets

Since, with the exception of relatively minor details about particular offset arrangements involving technology transfer or licensed production, comprehensive data are not available for Indian arms imports it is not possible to analyze the impact of offsets in depth. Whether defense offsets have helped India to achieve its economic and defense policy objectives—developing a domestic defense industry, reducing its dependence on foreign arms imports, and reducing the foreign exchange drain—cannot be definitively answered. But a qualitative assessment may be offered.

First, let us consider licensed production and technology transfer. The Soviet Union was the first supplier willing to transfer technology or permit licensed production. This started with MIG-21 aircraft in the 1960s and expanded to include all major army and air force weapons systems. The Soviet Union also provided technology assistance and long-term credit to set up an Indian defense industry. However, it imposed restrictions on licensed production that prohibited India from exporting certain products to other countries. It was also reluctant to provide complete technical information and often failed to inform India, post-sale, on important developments and innovations incorporated into a sold weapon system (Singh, 1990, p. 1086; Mehrotra, 1990, p. 135). Further, Soviet equipment was “quite often saddled with accessories for which [India had] no use” (Singh, 1990, p. 1085). In some cases, the seller charged “fancy prices” on the basis that certain technology transfers were not covered in the original agreement (Gosh, 1996, p. 347). Technology transfers at the level of whole systems worked less efficiently than at component level as sellers tended to withhold core technologies. Also, evidence showed that buyback arrangements as part of technology transfer did not produce the desired results. The defense public sector units faced problems such as high cost of production that affected their competitiveness, and long lead-times that were not acceptable to sellers (Gosh, 1996, pp. 346–47). As Indian civil industry faced a chronic problem in supplying materials necessary for producing advanced weapon systems, the foreign exchange spent on acquiring such materials increased to over 40 percent of total foreign exchange spent for defense imports (Graham, 1984, p. 169).

Although licensed production failed to create the necessary technological capabilities to meet India’s desire for advanced weapon systems, it did lead to a significant level of competence in building the Indian defense industry. Defense firms such as Hindustan Aeronautics Ltd (HAL), Bharat Electronics Ltd (BEL), and Mazagon Docks Ltd (MDL) accumulated a high level of technological capabilities and started producing sophisticated weapon systems such as combat aircraft and naval vessels. When negotiating new defense deals, this growing indigenous capacity helped to shift the balance in India’s favor, particularly with regard to technology transfers (Arya, 1985; Graham, 1984). For example, an agreement signed between India and Russia in March 1999 includes “weapons that are just being adopted in the Russian Army” itself (Basu, 1999, p. 504).

On the downside, the availability of sophisticated Soviet weapon systems at relatively low cost appears to have retarded the growth of indigenous R&D (The Asian Age, 9 June 1994).

Other offsets that played a major role in India’s procurement of weapons were countertrade and long-term credit. In the case of western countries such as Britain, France, and Sweden, India tried to strike some form of credit arrangement to cover the
foreign exchange burden. However, evidence suggests that such arrangements resulted in increased selling prices (Singh, 1998, p. 61). Unlike western countries, the Soviet Union was willing to sell sophisticated systems on long-term credit with low interest rates and payment in rupee terms. It accepted “offsets in the shape of raw materials,” so that a country like India found its offers “too lucrative to dismiss for reasons of quality alone” (Singh, 1990, p. 1088). Between 1971 and 1991, India purchased weapons worth $10.85 billion from the Soviet Union. This included a contract worth $2.56 billion in 1980 and another worth $2.975 billion in 1982. Further agreements, in 1983–84, for naval vessels and aircraft involved credit over 12 years at 2.25 percent interest. India benefitted as “most of these agreements were signed with highly favourable credit terms, often requiring only ten per cent down on purchases, though twenty per cent has been required on aircraft, ship and other short-duration overhaul contracts” (Jacobs, 1991, p. 301). A study by Benoit found that defense imports from the eastern bloc in the 1960s were “not particularly burdensome” because of long-term credits and rupee denominated trade (Benoit, 1973, p. 189).

Defense imports were the most important category of Indian imports from the Soviet Union between the 1960s and 1980s. Therefore, studies about overall Indo-Soviet trade help us to evaluate the effectiveness of the countertrade offset option. Findings of these studies include: (i) rapid trade growth, that is, the creation of new trade by diversifying the composition and direction of Indian exports; (ii) no evidence of switch trade affecting India’s exports to hard currency markets; (iii) prices paid for Indian goods were favorable or no worse than those obtained from other countries; (iv) a somewhat strengthened Indian bargaining position to obtain better terms of trade from other countries and multinational companies; and (v) Indian development programs, including defense, benefitted from the import of raw materials and capital goods from the Soviet Union when it confronted acute shortages of foreign exchange. Concerns raised in these studies cover three areas: (i) the prices paid to vendors for imported equipment and machinery were higher than those offered by competing vendors; (ii) about 20–25 percent of India’s exports were diversionary, that is, they could have been exported to hard currency areas; and (iii) the rupee-rouble exchange rate since the 1970s was not favorable to India, creating a hidden burden of credit repayment (see, e.g., Gidadhubli, 1983; Singh, 1978; Mitra, 1979; Mehrotra, 1990). But other studies appeared to show that the pricing of imports and diversion of trade were not significant problems, and that the exchange rate problem was subsequently renegotiated and an agreement was reached (e.g., Mehrotra, 1990). There was also an argument that, by bartering, India was incurring a foreign exchange opportunity cost (Benoit, 1973, p. 189) but such costs were found to be insignificant, and it was not certain that the Soviet Union would have been willing to accept the types of Indian imports it did accept had it not been for the arms
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Notes: (1) the military budget; (2) direct defense imports including military imports from the former eastern bloc countries; (3) % share of (2) in (1), total defense budget; (4) imports for domestic defense industry; (5) % share of (4) in (1); (6) imports for “civilian” consumption of the military sector; (7) % share of (6) in (1); (8) total foreign exchange requirements of Indian military/industry; (9) % share of (8) in (1), total defense budget

Sources: Terhal (1982, table III) and Deger (1986, table 6.5).
import deals. Likewise, it was not certain that India would have accepted substitute imports from the Soviet Union.

Another Indian goal was that of reducing the foreign exchange burden that comes from importing complete weapon systems. Specifically, the rupee trade arrangements with eastern bloc countries were expected to relieve the foreign exchange burden. A study by Terhal (1982) is one of the few available on the foreign exchange costs of Indian military imports. Table 15.1 is derived mainly from Terhal (1982). Although India gained foreign exchange advantages from offset arrangements, the table shows in column 8 that the total foreign exchange requirements for the Indian military and defense industry more than tripled in real terms between the early 1950s and the early 1970s. This increase is mainly due to increasing requirements of the domestic defense industry which grew tenfold (column 4).

Over the same time period, the foreign exchange requirements for direct import of weapon systems doubled (column 2). (Also see Deger, 1986, pp. 181–184; Terhal, 1981, p. 1996). Terhal estimated that by the late 1960s “the total foreign exchange

Table 15.2: Estimated foreign exchange requirements for direct military imports in India between 1950 and 1972 (US$ million-1972)

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requirements for defense were at least equivalent in value to more than half the Indian import of machinery and equipment” (1981, p. 1996). India’s strategy of reducing the foreign exchange burden through increased domestic defense production was not wholly successful. Further, licensed production involved component and material imports that continued to place a significant burden on India (Maheshwari, 2002, p. 190). Although India’s arms import strategy led to significant advances in industrial capacity and technology accumulation, ultimately its domestic arms industry failed to achieve parity with the latest in international high-tech weaponry. This made India to remain dependent on direct imports for major weapon systems, thereby increasing the foreign exchange burden (Deger, 1986, pp. 136–138). India’s debt burden worsened by the late 1980s and early 1990s. It appears that the repayment burden of defense imports was partly responsible for this.

However, as compared to the burden imposed by direct imports from western countries before the mid-1960s, the foreign exchange requirements of direct military imports from the former eastern bloc countries were significantly lower. Table 15.2 shows that although the overall foreign exchange requirements for direct imports from the eastern bloc increased over the years, the overall foreign exchange burden in the late 1960s and early 1970s was less than that of the late 1950s and early 1960s. The shift toward defense procurement from the eastern bloc started as from the mid-1960s. This suggests that at least the direct imports from eastern bloc countries offered “some relief for the foreign exchange problem” (Terhal, 1982, p. 152). It is quite likely that this burden would have been greater had India relied on direct imports from the west, as by the mid-1960s western grants and loans became insignificant (see table 15.2). Nonetheless, debt service and repayment of liberal credits received from eastern bloc countries, even though payable in Indian rupees, appears to have resulted in a significant burden on the Indian economy. Furthermore, it is likely that the availability of long-term credit from the east encouraged Indian policymakers to approve large scale defense procurement that, over the years, created a permanent economic burden.

In the 1980s and 1990s, India’s defense expenditure has grown significantly which likely diverted resources from civilian needs. India suffered from large fiscal deficits as a result of escalating expenditure that consisted of three components: (i) interest payments; (ii) non-plan expenditure (the most important being on defense); and (iii) plan expenditure. According to the Indian Public Finance Statistics of 1994, the allocation for the defense forces in 1994–95 (Rs230 billion) exceeded the combined allocation for the

<table>
<thead>
<tr>
<th>Year</th>
<th>Value of Direct Imports</th>
<th>Value of Eastern Bloc Imports</th>
<th>Total Foreign Exchange Requirements</th>
<th>Grants and Loans from Western Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968–69</td>
<td>201</td>
<td>70</td>
<td>171</td>
<td>45</td>
</tr>
<tr>
<td>1969–70</td>
<td>162</td>
<td>77</td>
<td>138</td>
<td>53</td>
</tr>
<tr>
<td>1970–71</td>
<td>108</td>
<td>75</td>
<td>97</td>
<td>64</td>
</tr>
<tr>
<td>1971–72</td>
<td>243</td>
<td>97</td>
<td>219</td>
<td>73</td>
</tr>
<tr>
<td>1972–73</td>
<td>205</td>
<td>101</td>
<td>184</td>
<td>80</td>
</tr>
</tbody>
</table>

Notes: (1) total value of direct imports; (2) total foreign exchange requirements; (3) total value of eastern bloc direct imports; (4) foreign exchange requirements for eastern bloc direct imports; (5) grants and loans from western countries.

social and welfare areas (Rs223 billion). Capital expenditure for defense for 1994–95 (Rs68.3 billion) amounted to more than the combined allocation for social and welfare areas, education, agricultural services, railways, and post and telecommunication (Rs65.9 billion). As there was no increase in revenue over the years, “diversion of resources from other sectors to the defence sector has apparently taken place over the years” (Gosh, 1996, pp. 379–381). Therefore, it is likely that India has diverted significant foreign exchange from civilian areas to defense, at least for the time period examined here. This would suggest that the growth in defense procurement has created a permanent burden on the Indian economy, despite credits available on liberal terms from eastern bloc countries.

Conclusions

To achieve self-reliance in weapon systems by minimizing foreign dependence, India consistently employed three major offset options (although not formally set out): licensed production/technology transfers, countertrade or barter, and long-term credit arrangements. They were expected to help establish a domestic defense industry capable of meeting India’s defense requirements and to reduce the foreign exchange burden. Imports from the Soviet Union constituted about 70 percent of India’s total arms imports and involved all three types of offsets. The offset arrangements with western countries were mainly licensed production/technology transfer, and some credit provisions to ease the foreign exchange burden. Although there is some evidence that licensed production and cheap long-term credit retarded indigenous defense R&D, overall they appear to have helped India to develop significant defense industrial capacity and enhance its bargaining position with foreign suppliers today.

However, India failed to create a defense industry capable of supplying advanced weapon systems that would be competitive with western equipment. The technology gap has not closed. Although it was argued that cheap credits may result in increased equipment prices, and appears to be common in western arms deals, this problem is not considered significant for Soviet weapon systems. The countertrade arrangements with eastern bloc countries benefitted India in the short-term by reducing the foreign exchange burden. However, they appear to have been less beneficial in the long-term, as the debt and repayment burden increased. Countertrade does not appear to be an important offset option in relation to imports from western sources. Other offset options such as buyback have not been successful due to inherent constraints in the Indian defense industry. Overall, India’s experience with Soviet offsets was positive. It is evident that despite facing unequal bargaining weight, India “acquired weapons from the Soviets in a manner that ‘looks out for the best interests’ of India” (Jacobs, 1991, p. 301). Since the collapse of the Soviet Union India has had to pay hard currency for all of its defense imports. Evidently, this led to resource diversion, including foreign exchange from civilian needs. India needs to formulate an integrated industrial policy framework by combining offsets, diversification of defense-based industries, and indigenous R&D to reduce its defense-related debt and foreign exchange burdens.
Notes
3. Switch trade: If Russia is paid for arms in Indian commodities, then Russia can export these commodities to hard-currency markets itself, for instance Indian rice via Russia to the UK. This will limit India’s direct hard-currency sales to the UK (see Matthews, 2002, p. 199).

References
Appendix

Table 15.3: Indian weapon imports and offset arrangements

<table>
<thead>
<tr>
<th>Weapon system</th>
<th>Imported from</th>
<th>Period</th>
<th>Offset arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Army</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infantry/special forces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FN-FAL rifles (7.62 mm)</td>
<td>Belgium</td>
<td>1980s/90s</td>
<td>Not known</td>
</tr>
<tr>
<td>Variants of AK-47s</td>
<td>Poland, Bulgaria, Romania, former East Germany</td>
<td>1980s</td>
<td>Not known</td>
</tr>
<tr>
<td>V 58 rifle</td>
<td>Czechoslovakia</td>
<td>1980s</td>
<td>Not known</td>
</tr>
<tr>
<td><strong>Armored vehicles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-90s main battle tank</td>
<td>Russia</td>
<td>2000</td>
<td>$650–750m for 310 tanks+ complete technology transfer+ weapon systems</td>
</tr>
<tr>
<td>T-72M1 main battle tank</td>
<td>Former Soviet Union</td>
<td>1980s</td>
<td>Technology transfer; licensed production of over 1100 tanks by 1998</td>
</tr>
<tr>
<td>T-55 main battle tank</td>
<td>Former Soviet Union</td>
<td>1960s/70s</td>
<td>Assembled locally</td>
</tr>
<tr>
<td>PT-76 amphibious tank</td>
<td>Former Soviet Union</td>
<td>1960s/70s</td>
<td>—</td>
</tr>
<tr>
<td>Vijayanta</td>
<td>UK</td>
<td>1965–1984</td>
<td>Licensed production</td>
</tr>
<tr>
<td>AMX-13 main battle tank</td>
<td>France</td>
<td>1960s/70s</td>
<td>—</td>
</tr>
<tr>
<td>VT-72B armored recovery vehicle</td>
<td>Slovakia (Unimpex s.r.o., Martin)</td>
<td>1994–2000</td>
<td>$122m for 80 vehicles+ licensed production+technical know-how and industrial support to Indian firm BHEL</td>
</tr>
<tr>
<td><strong>Infantry vehicles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMP-1 and BMP-2 infantry combat vehicle</td>
<td>Former Soviet Union</td>
<td>1980s</td>
<td>Licensed production (100 BMP-2/year)</td>
</tr>
<tr>
<td>OT-62/OT-64</td>
<td>Czechoslovakia</td>
<td>1970s/80s</td>
<td>—</td>
</tr>
<tr>
<td>Weapon System</td>
<td>Country/Origin</td>
<td>Timeline</td>
<td>Details</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Casspir mine protected vehicle</td>
<td>South Africa (Vickers OMC)</td>
<td>1999–2001</td>
<td>165 vehicles+technology transfer, training and spares</td>
</tr>
</tbody>
</table>

**Artillery equipment**

| 130mm M-46 field gun (upgraded to 155mm/39 and 155mm/45 caliber) | Israel (Soltam Systems Ltd) | 2001–2003 | Guns+initial upgrade in Israel +supply of kits to upgrade locally at Gun Carriage Factory, Jabalpur |
| 155mm Bofors FH–77B howitzers | Sweden (Bofors Weapons Systems) | 1980s | Deal was worth $1.3b for 410 guns; planned licensed production was abandoned after corruption scandal |
| 122mm BM-21 MRLS | Former Soviet Union | 1980s | Licensed production in India |
| ZSU-23–2/ZSU-23–4 anti-aircraft systems | Former Soviet Union/Russia | 1980s/90s | — |
| 40mm Bofors L/60 and L/70 AD artillery | Sweden | 1980s/90s | Licensed production |

**Other weapon systems**

| Milan/Milan-2 anti-tank missiles | France | 1985–1990s | Licensed production |
| SS-11 anti-tank missiles | France | 1971–1983 | Deal was worth $7.5m; licensed production |

**Air Force**

**Combat aircraft**

| Mirage 2000 | France | 1980s | 40 aircraft+technical assistance for local servicing+license to manufacture spare parts; new order for 10 aircraft |
| Jaguar (Versions—IS, IM & IB) | France and UK | 1970s–1980s | Licensed production; BAe supplied 40 aircraft |
| Gnat | UK | 1963–1974 | Licensed production |
| MiG-21 (different versions—FL, M, & BIS) | Former Soviet Union | 1960s–1970s | Technology transfer and licensed production in India |
| MiG-23 (different versions—MF, BN & UN) | Former Soviet Union | 1980s | — |
| MiG-25 (different versions—R & U) | Former Soviet Union | 1980s | 10 MIG-25R and 2 MIG 25U were supplied |
| MiG-27 ML | Former Soviet Union | 1980s | Licensed production |
| MiG-29 (versions—B Fulcrum—A S | Former Soviet Union | 1980s | Part of a larger deal to buy tank, aircraft and other weapons; $830m was extended in |

The role of offsets in Indian defense procurement policy
| **Fulcrum-C & UB**<br>Fulcrum-B | credits for the deal; licensed production of MIG-29 subsystems and parts |  |
| **Sukhoi SU-30 MK I**<br>flanker | Russia | 1996 | Originally 40 aircraft were ordered for $1.8b and then 10 more added to that; license production of 140+aircraft+ full technology transfer |  |
| **Hawk 115 advanced jet trainer** | UK (BAE Systems) | 2003 | 66 aircraft ordered at an estimated cost of £1bn; technology transfer+licensed production |  |

**Transport aircraft**

| **Ilyushin-Beriev IL-76MD Candid** | Former Soviet Union | 1980s | 28 aircraft supplied |  |
| **IL-78/78M** | Uzbekistan | 2001 | Six IL-78/78M in-flight refueling aircraft purchase at approximately $50 million each |  |
| **Antonov AN-12** | Former Soviet Union | 1960s–1970s | — |  |
| **Antonov AN-32** | Former Soviet Union | 1980s | 80 aircraft supplied |  |
| **HS 748M AVRO** | UK | 1964–1984 | Agreement for assembling |  |
| **Domier Do-228–101** | Germany | 1983–1990s | Licensed production |  |

**Helicopters**

| **Mil Mi-8 Hip** | Former Soviet Union | 1970s | — |  |
| **Mil Mi-17** | Former Soviet Union/Russia | 1980s | 40 additional Mi-17 1 B were ordered for $170m in 2000 |  |
| **Mil Mi-25/35** | Former Soviet Union | 1980s–1990s | Mi-35 deal was worth $172m for 20 helicopters including spares; 15 Mi-25/Mi-35 were purchased from Kyrgyzstan in 1994–95 |  |
| **Mil Mi-26** | Russia | 1980s–1990s | — |  |
| **HAL Cheetah (SA315B Lama)** | France | 1971–1985 | Assembly+licensed production |  |
| **HAL Chetak (Origin-Alouette III)** | France | 1964–1990s | Licensed production |  |
| **PZL-11 Iskra** | Poland | 1960s/1999 | Supplied 50 aircraft from 1968 and additional 12 in 1999 |  |

**Other Systems**

<p>| <strong>TRS-2215 surveillance radar</strong> | France | 1983–1990 | Licensed production |  |</p>
<table>
<thead>
<tr>
<th>Weapon System</th>
<th>Origin</th>
<th>Year Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA-2 Atoll air-to-air missile</td>
<td>Former Soviet Union</td>
<td>1968-1987</td>
<td>Licensed production</td>
</tr>
<tr>
<td><strong>Aircraft Carriers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INS Vikrant (HMS Hercules)</td>
<td>UK</td>
<td>1961</td>
<td></td>
</tr>
<tr>
<td>INS Virat (HMS Hermes R12)</td>
<td>UK</td>
<td>1987</td>
<td>Deal worth about $74m; life-extension re-fits</td>
</tr>
<tr>
<td><strong>Guided missile destroyers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 15 Delhi Class (hybrids of western and Russian technology)</td>
<td>Russia (Severnoye Design Bureau)</td>
<td>1997–2001</td>
<td>Provided design consultancy and technology and imported gas turbines from Russia and Ukraine</td>
</tr>
<tr>
<td>Rajput (Kashin II) Class</td>
<td>Former Soviet Union/Russia</td>
<td>1980–1988</td>
<td>Considerable modifications to Kashin design; modernization by Russia including joint technology development of BrahMos cruise missile</td>
</tr>
<tr>
<td>Talwar (Krivak III) Class</td>
<td>Russia</td>
<td>1997–2004</td>
<td>$1 billion contract for modified Krivak design with stealth feature vertical launch missile system; involves 130 suppliers from Russia, Belarus, Ukraine, India, UK, Germany, Denmark, and others; involves a number of Indian component suppliers</td>
</tr>
<tr>
<td><strong>Guided missile frigates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project 17 Nilgiri Class</td>
<td>Russia</td>
<td>2002</td>
<td>Jointly designed by India (Naval Design Bureau) and Russia Severnoye Design Bureau; design: France (DCN International); project consultancy: Canada (CAE)—overall functional integrator</td>
</tr>
<tr>
<td>Type 16 Godavari Class</td>
<td>Mix of western, Russian, and Indian weapon systems</td>
<td>1983–1988</td>
<td>—</td>
</tr>
<tr>
<td><strong>Guided missile corvettes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veer (Tarantul I) Class</td>
<td>Former Soviet Union</td>
<td>1987–1990s</td>
<td>5 vessels built in the Soviet Union and 8 more vessels built in India through technology transfer; technical assistance from Russia for modification of latest versions</td>
</tr>
<tr>
<td>Drug (Nanuchka) Class</td>
<td>Former Soviet Union</td>
<td>1970s</td>
<td>Three vessels built at Leningrad were supplied</td>
</tr>
<tr>
<td>Class</td>
<td>Country</td>
<td>Years</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Petya II Class</td>
<td>Former Soviet Union</td>
<td>1969–1974</td>
<td>9 vessels supplied</td>
</tr>
<tr>
<td>Nilgiri (Leander) Class</td>
<td>UK</td>
<td>1970s–1980s</td>
<td>6 vessels supplied</td>
</tr>
<tr>
<td><strong>Corvettes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abhay (Pauk II) Class</td>
<td>Russia</td>
<td>1989–1991</td>
<td>Modified for India</td>
</tr>
<tr>
<td><strong>Large/fast craft</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sukanya Class</td>
<td>S. Korea (Tacoma)</td>
<td>1989–1993</td>
<td>7 vessels supplied</td>
</tr>
<tr>
<td>Super Dvora Mk II Class</td>
<td>Israel</td>
<td>1998–1999</td>
<td>2 were ordered from Ramta, IAI; more patrol craft (latest version) are produced locally</td>
</tr>
<tr>
<td>Magar Class</td>
<td>UK</td>
<td>1980s–1990s</td>
<td>Produced locally based on Sir Lancelot design</td>
</tr>
<tr>
<td>Ham Class</td>
<td>UK</td>
<td>1968–1970</td>
<td>Licensed production</td>
</tr>
<tr>
<td>Type 773IM Polnochny C/D Class</td>
<td>Poland</td>
<td>1970s–1980s</td>
<td>8 vessels supplied</td>
</tr>
<tr>
<td><strong>Submarines</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear submarine</td>
<td>Russia</td>
<td>1988–2007</td>
<td>India leased a Russian 670 Skat Class nuclear submarine; training Indians to operate and providing technical assistance to design and build five nuclear submarines in India</td>
</tr>
<tr>
<td>Project 75: standard</td>
<td>France (DCN International)</td>
<td>2001</td>
<td>6 submarines will be supplied + a technology transfer to build the rest in India</td>
</tr>
<tr>
<td>conventional submarine—Scorpene Class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foxtrot Class submarine</td>
<td>Former Soviet Union</td>
<td>1968–1974</td>
<td>8 submarines were supplied</td>
</tr>
<tr>
<td>Shishumar (HDW 209) Class</td>
<td>Germany</td>
<td>1980s</td>
<td>4 submarines were supplied; plan for licensed production in India canceled and the contract was terminated</td>
</tr>
<tr>
<td>SindhuGosh (Kilo) Class</td>
<td>Russia</td>
<td>1986</td>
<td>Technical assistance to establish medium refit and upgrade facilities in India</td>
</tr>
<tr>
<td>Ugra Class submarine tender</td>
<td>Former Soviet Union</td>
<td>1968</td>
<td></td>
</tr>
<tr>
<td><strong>Naval aircraft</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ilyushin I-38 MAY Former Soviet Union 1970 Russia to refit 5 IL-38

SA-316 B Chetak (Alouette) France 1960s– 20 helicopters were supplied in 1963+licensed production

Dornier DO-228–101 Germany 1980s– Licensed to be produced in India (HAL)

Tupolev TU-142 BEAR-F Former Soviet Union 1970s– Russia (Rosvoorouzhenie) to refit the aircraft

Kamov Ka-28 Helix-A Former Soviet Union 1980s– 13 aircraft were supplied

Kamov Ka-31 Helix-B Russia 1999 9 aircraft were supplied at an estimated cost of $207m

Sea King Mk.42A/B/C UK (GKN Westland) 1973–1980 The 1984 deal was worth $900m for 20 Sea Kings + anti-ship missiles; affected by US sanctions (60% was grounded)

MIG-29K Fulcrum-D Russia 50 aircraft at $30m each will be supplied as part of $1.5b Admiral Gorshkov aircraft carrier package

BAe Sea Harrier FRS Mk.51/TMk.60 UK 1984–1999 —

Sources: Ray (1986); Singh (1990); Nugent (1991); Smith (1994); Prasannan (2000); Jacobs (1991); Bedi (2000); Statesman (various dates); The Asian Age (various dates); Independent (4 September 2003); <http://www.bharat-rakshak.com>.
Offset policies and trends in Japan, South Korea, and Taiwan

Michael W. Chinworth

Introduction

For multiple reasons, and for several decades, the United States has entered into a variety of offset agreements with allied nations. The reasons include alliance building, promotion of equipment interoperability, market access, cost reduction, and development of extended production lines. Japan, Taiwan, and the Republic of Korea all have figured prominently in these offsets. For an equally varied set of reasons, all three have sought increased independence in defense production. Technology transfers and production offsets have been important elements in domestic strategies to build local defense industries.

At different periods and levels, all three countries—Japan in particular—have been viewed as economic competitors to the United States. There have been concerns that offset agreements with these countries have assisted local industry in developing domestic weapons substitutes and stimulating commercial industry. Indeed, policy pronouncements by the governments of all three countries express interest in defense related technology transfers to their countries in part because of the perceived economic benefits of defense production.

As autonomous defense research, development, and production capabilities have grown, US offset policies have been criticized as aiding economic competitors in defense and high technology sectors, shifting US employment abroad, and adding to total acquisition costs for other countries (see US Presidential Commission, 2001, pp. i–iv; Press Release, 2001; Clark, 1999, pp. 1,18; Svitak, 2003, p. 20).

US defense programs are undergoing fundamental changes but many offset practices and policies continue. The United States remains interested in the sales potential of these three countries and seeks to continue strong security and political ties. Technology transfers through military programs in general help achieve these goals. But broad changes taking place in the Asia-Pacific region and within these three countries pose challenges for continuation of the traditional offset model. Perhaps more important are shifts in US large-scale defense programs such as the Joint Strike Fighter that seek risk sharing among allies rather than relying entirely on domestic capabilities.

This chapter reviews the development and application of US offset activities toward Japan, South Korea, and Taiwan. It examines offset experiences in each country, and it looks at future directions and issues for each country and their continued reliance on foreign inputs into their respective defense industrial and defense technological bases through offset policies and practices.
Asia and offsets

Offsets to Japan, Korea, and Taiwan evolved out of policies aimed at encouraging purchases of US made weapon systems begun immediately after the conclusion of World War II. The United States began offering inducements to other countries for purchasing US weapon systems that included foreign assistance and, later, local production in part to achieve what were viewed as broader, strategic goals to develop self-defense capabilities, exert US influence in various regions, and help maintain security relations with countries viewed as critical in the cold war competition with nations such as the former Soviet Union.

The US experience with Japan is illustrative. In the immediate postwar period, the United States delivered surplus military equipment to Japan through its military assistance programs. Aid increasingly gave way to direct sales, which in turn gave way to complex forms of cooperation involving increased technology and production transfers to Japan. From 1960 to 1990, the United States licensed more defense technologies to Japan than to any other allied nation, tied only with Italy in terms of the dollar value of transactions and well ahead of all other individual European nations.2

The extent of offsets in defense trade

Offset agreements with Asian nations have fluctuated in recent years relative to those with other countries. According to the US Department of Commerce Bureau of Industry and Security’s (BIS) 2001 report on offsets, US prime contractors signed 279 new offset agreements totaling $21 billion from 1993 to 1998, compared with total US defense exports of $38.5 billion. In 1998 alone, US prime contractors entered into 41 new offset agreements with 17 countries. Total defense exports were valued at $3.1 billion, with corresponding offsets equaling $1.8 billion (57.9 percent of the value of the sales items). One year later, US firms reported entering into 32 new offset agreements with 10 different countries (US DoC BXA, 2001). The total value of new offset agreements was $1.45 billion in 1999, an amount equivalent to 72 percent of the $2.01 billion in US defense exports during that year (US DoC BIS, 2003, p. v).

Europe has assumed greater visibility in these agreements, accounting for $1.3 billion in offsets in 1998 (72.3 percent of all US offsets in value, but representing just half the value of all associated defense sales). In 1998, the average offset percentage with Europe was 81.6 percent, almost 24 percent higher than the global average. Approximately 72 percent of the value of new offset agreements in the 1993–1998 period was attributed to European nations (the UK was responsible for 23 percent). According to BIS, “almost one-half of all new agreements required 100 percent or more in offsets. For the period, offsets with Europe averaged 85.8 percent of the value of the defense sales, and sales to the region accounted for 46 percent of all reported sales” (US DoC BXA, 2001).

Asian nations figure prominently in US offsets. South Korea and Taiwan rank among the leading recipients of offset packages during the 1993–99 period (see table 16.1). In 1999, for example, South Korea led all nations in the number of offset agreements concluded with the United States by logging five such agreements while Taiwan led other nations in the total value of offset packages concluded that year (see table 16.2). Japan has drawn particular attention in the United States through programs such as high
performance fighter aircraft coproduction and co-development (US GAO, 1982). South Korea and Taiwan have been most prominent among all Asian nations in offset arrangements (Chinworth, 2001).

Table 16.1: Top-15 offset recipients (by actual value of offset transactions, 1993–1999)

<table>
<thead>
<tr>
<th>Country</th>
<th>Actual value ($ mn)</th>
<th>Credit value ($ mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finland</td>
<td>3,145</td>
<td>3,372</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2,819</td>
<td>2,839</td>
</tr>
<tr>
<td>Israel</td>
<td>1,206</td>
<td>1,263</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1,068</td>
<td>1,076</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1,017</td>
<td>1,305</td>
</tr>
<tr>
<td>South Korea</td>
<td>824</td>
<td>1,157</td>
</tr>
<tr>
<td>Spain</td>
<td>705</td>
<td>917</td>
</tr>
<tr>
<td>Turkey</td>
<td>615</td>
<td>666</td>
</tr>
<tr>
<td>Germany</td>
<td>551</td>
<td>551</td>
</tr>
<tr>
<td>Italy</td>
<td>529</td>
<td>529</td>
</tr>
<tr>
<td>Greece</td>
<td>489</td>
<td>782</td>
</tr>
<tr>
<td>Australia</td>
<td>475</td>
<td>501</td>
</tr>
<tr>
<td>Canada</td>
<td>428</td>
<td>432</td>
</tr>
<tr>
<td>Taiwan</td>
<td>383</td>
<td>972</td>
</tr>
<tr>
<td>France</td>
<td>310</td>
<td>552</td>
</tr>
<tr>
<td>Total</td>
<td>14,564</td>
<td>16,916</td>
</tr>
</tbody>
</table>

% of value of all offset transactions 91.8 89.9


Changing environments: impact on offsets

Changes in global defense industries and markets may have significant impacts on future offset arrangements with Japan, South Korea, and Taiwan. Two trends stand out. First, rising weapon systems development costs are forcing the US Department of Defense (DoD) to look increasingly to multinational programs for the development and production of major systems. And second, increased globalization of defense industries leads to large prime contractors negotiating work shares and technology transfers prior to full scale production that once would have been offsets implemented after a program was under way. The implications of these trends are examined briefly below.

The DoD’s annual report to Congress has noted the increasing cost of weapon systems coupled with stringent budget constraints. Costs for major systems have become so high
that no one country or industry can finance an advanced system independently anymore. Fewer front line defense systems are being developed in part due to the changing threat environment and the higher cost and risk associated with such development. At the same time, US emphasis on interoperability remains high and, if anything, is increasing. Offsets have been justified to help assure interoperability (assuming they are derived from a US-based system) but the defense department appears to believe that there are other ways of achieving the same end, namely through international partnering, joint development, and risk sharing (US DoD, 2001).

### Table 16.2: Export and offset agreement values by country, 1999

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of new offset agreements</th>
<th>Export value (in $ mn)</th>
<th>Offset value (in $ mn)</th>
<th>Average percent of offsets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan</td>
<td>3</td>
<td>364.2</td>
<td>347.4</td>
<td>95</td>
</tr>
<tr>
<td>Israel</td>
<td>4</td>
<td>564.3</td>
<td>340.8</td>
<td>60</td>
</tr>
<tr>
<td>Greece</td>
<td>5</td>
<td>294.6</td>
<td>290.5</td>
<td>99</td>
</tr>
<tr>
<td>Turkey</td>
<td>4</td>
<td>158.8</td>
<td>145.3</td>
<td>91</td>
</tr>
<tr>
<td>South Korea</td>
<td>5</td>
<td>230.8</td>
<td>132.5</td>
<td>57</td>
</tr>
<tr>
<td>Netherlands</td>
<td>3</td>
<td>36.1</td>
<td>36.0</td>
<td>100</td>
</tr>
<tr>
<td>Australia</td>
<td>3</td>
<td>229.8</td>
<td>27.5</td>
<td>12</td>
</tr>
<tr>
<td>Denmark, Spain, and Sweden</td>
<td>5</td>
<td>132.1</td>
<td>132.6</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>2,010.7</strong></td>
<td><strong>1,452.7</strong></td>
<td><strong>72</strong></td>
</tr>
</tbody>
</table>


The Joint Strike Fighter (JSF) is the potential model for future, complex systems sought by DoD, namely through the establishment of multinational industry teams with levels of participation determined by their respective financial and technical contributions. Rather than developing a next-generation system single-handedly and then licensing it to other countries, the United States appears inclined to seek allied “buy in” at the design and development stages. This reduces cost and risk to the United States while promoting political and defense alliances with major powers. The new model replaces post-production offsets with pre-production sharing agreements. This mirrors what already has taken place in commercial aerospace markets and could mean that offsets increasingly will take the form of pre-negotiated work share arrangements.

Cross-continental investment activity between the US and European defense industries has been significant over the last decade. Overt objections to such activity by the DoD has moderated. Increased access to US markets through acquisitions in some respects is seen as the cost of achieving globalization. The attractiveness and incentive for offset agreements to the US could lessen should this trend continue. At the very least, the nature
of offset agreements could change as this trend continues through prime contractors as well as second and third-tier suppliers.\(^3\)

Increased globalization means greater participation by formerly “foreign” companies in programs once considered to be “domestic.” Partnerships, joint ventures, and cross ownership increasingly characterize the global defense industry. This will influence future allocations of cost and risk sharing, as well as the production of new systems (Barrie and Svitak, 2001, pp. 1, 4; Ahearn, 2003, pp. 2, 13; Markusen and Costigan, 1999). The countries considered here—Japan, South Korea, and Taiwan—have pursued traditional offset packages in the past, but these trends increasingly could influence the availability of new technologies as well as the methods for accessing them. With this background, the experiences of Japan, South Korea, and Taiwan are examined in further detail in the following sections.

**Japan**

According to the US Department of Commerce, Japan does not maintain official offset policies (US DoC BIS, 2003 p. 12) Its arms export policies prevent such practices as countertrade or

**Table 16.3: Japan’s defense budget, JFY 1998–2002**

<table>
<thead>
<tr>
<th>Item</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>2,173.9</td>
<td>2,167.4</td>
<td>2,203.4</td>
<td>2,226.9</td>
<td>2,227.3</td>
</tr>
<tr>
<td>Equipment</td>
<td>944.2</td>
<td>962.9</td>
<td>914.1</td>
<td>917.8</td>
<td>920.6</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>127.7</td>
<td>130.7</td>
<td>120.5</td>
<td>135.3</td>
<td>127.7</td>
</tr>
<tr>
<td>Facility improvements</td>
<td>189.7</td>
<td>182.2</td>
<td>168.7</td>
<td>159.8</td>
<td>157.0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>901.5</td>
<td>860.1</td>
<td>890.6</td>
<td>886.5</td>
<td>906.5</td>
</tr>
<tr>
<td>Base countermeasures</td>
<td>520.6</td>
<td>540.2</td>
<td>544.7</td>
<td>532.6</td>
<td>518.9</td>
</tr>
<tr>
<td>Other</td>
<td>82.1</td>
<td>88.6</td>
<td>93.7</td>
<td>96.3</td>
<td>97.0</td>
</tr>
<tr>
<td>Total</td>
<td>4,939.7</td>
<td>4,932.2</td>
<td>4,935.8</td>
<td>4,955.3</td>
<td>4,956.0</td>
</tr>
</tbody>
</table>

*Note:* Original budgets; in billion yen.

component buybacks. However, Japan has, in various periods, received more defense technology transfers from the United States than any other US ally. In the case of Japan, it is appropriate to view such transfers in the same light as traditional offsets due to their significant economic, industrial, and political impact.

Japan has sought greater self-sufficiency in defense research, development, and production throughout the postwar period. The policy of *kokusanka*—indigenous defense production—has been promoted by industry and government alike.\(^3\) Government procurement policies favor domestic procurement as the first priority for the Japan Defense Agency (JDA). If this cannot be achieved, JDAs second priority is licensed local
production. The third and lowest ranking priority is a straightforward import of a foreign produced item.

These options have been spelled out in defense policy statements. Overall procurement of defense equipment, however, has flattened since JFY 1997 (table 16.3), leaving domestic industry with overcapacity and government with the problem of supporting a defense industry with insufficient sales to survive. Government policies have adjusted somewhat to accommodate this shift in market conditions, defense budgets, and policy viewpoints:

“Defense capability provides the ultimate guarantee of national security, and its functions cannot be replaced by any other means. In order to appropriately build up and operate this crucial defense capability, it is essential to maintain the foundations that support it in terms of equipment.

The existence of such a base is thought to constitute deterrence, not only because it allows high-tech sophistication and the modernization of equipment, but also because it helps secure a high operating ratio and sustainability. Moreover, the maintenance of an advanced domestic production and technology capability is also important because it provides the nation with the power of negotiation with other countries when introducing equipment from abroad.

On the other hand... procurement volume has followed a downward trend... Under such circumstances, defense manufacturers are making efforts to rationalize their business and improve efficiency …” (JDA, 2002, p. 290).

Japan’s kokusanka model could be supported when budgets were expanding and when foreign technology was more readily available. But budgets have declined and the availability of technology from its primary supplier, the United States, has been reduced due to fewer major program startups. With lower budgets and less technology available, Japan has found itself with a defense industry that is operating at far less than 50 percent of capacity and looking anxiously at opportunities to license next generation systems from other countries that at best are years away from production. Under those conditions, it is virtually impossible to realize a self-sufficient defense capability, much less the intended economic and technological stimulus sought in defense production. Indeed, it could be argued that the industry has become a burden on an economy that faces extensive structural problems and has entered its second decade of economic stagnation.

Recognizing the implications of this dilemma, both government and industry are in limbo. Some restructuring has taken place to accommodate lower production. For example, Nissan Motors sold its aerospace and defense units to Ishikawajima-Harima Heavy Industries (IHI), but only under the direction of its new French ownership. Shipbuilding also has undergone some consolidation among producers. But these exercises have not resulted in reduced capacity or the abandonment of any single defense sector: domestic companies still expect to provide all major systems to JDA through local production whenever possible. Several major defense contractors have indicated an interest in principle in eliminating their defense divisions, but are reluctant to implement
plans without having a greater understanding of the government’s future directions and intentions in defense procurement.8

Changes in government policies, particularly on arms exports, could further affect long-term strategies. Government policies currently restrain the export of defense items and technologies, with the sole, formal exception being technology exports to the United States. Constitutional restrictions against collective security could be interpreted as prohibiting participation in multinational weapon development and production programs. The government has reviewed its arms policies with an eye on injecting flexibility to allow greater defense industry interaction with other countries, the US in particular, but disagreement remains over whether slight adjustments or wholesale revisions in existing policies are required to permit this.

Outlook—Japan

While Japan is sorting out its defense future, US major programs are taking a considerably different direction, as evidenced by the JSF program. This could be particularly important in the near future for Japan. The question is the degree to which Japan is willing to change its policies to accommodate global and bilateral defense industry restructuring. An important early test case involves the replacement of the ageing P-3 aircraft fleets deployed in both the United States and Japan. The two countries collectively deploy three-fourths of all P-3s globally. The United States has begun a Multi-Mission Aircraft (MMA) program with an arm modeled on the JSF program for international participation, MMA International (MMAI).

The DoD has invited Japan to participate in MMAI, suggesting that it could have considerable influence on the direction of the entire program because of its significant P-3 deployments. For several reasons, this approach poses problems for Japan. First, Japan still wants to support its kokusanka policy. In fact, government has decided to launch a domestic aircraft program to replace its P-3s. If pursued stridently, Japan could miss out on opportunities when new JSF-like programs are organized, specifically MMAI. Second, domestic alternatives, as the defense white paper pointed out, have been pursued in part simply for negotiating leverage. Most likely, that leverage is not as effective with multinational programs of this sort. And third, fundamental policy edicts could constrain Japan’s ability to participate in multilateral programs, even when they originate in the country guaranteeing its security. For the moment, then, Japan is attempting to continue its traditional emphasis on domestic procurement, even as its own market shrinks and its budget outlook remains gloomy. In addition, potential offsets from major programs, such as MMAI, could be constrained should the country miss opportunities to adapt to new models of production sharing.

South Korea

The Republic of Korea has undergone the same transition from military assistance to complex technology transfers and production agreements as Japan.9 But differences exist in the experiences of the two countries. The security threat to South Korea has been more overt than that to Japan, for example, prompting greater emphasis on indigenous
capabilities. There are numerous parallels, however, including the lengthy alliance with the United States, an ambivalence toward its primary ally that has encouraged domestic production, and a desire to build autonomous capabilities for industrial policy reasons.

The Nixon Doctrine, which called for greater self-reliance in local security and a reduced profile by the United States in the region, stimulated increased interest in achieving self-sufficient defense production through technology imports and work share agreements. In return for greater self-reliance, the United States loosened its export restrictions to allow more generous defense technology transfers to most countries in the region, including Taiwan, South Korea, and Japan (Nolan, 1986, pp. 26–28; Swaine and Mulvenon, 2001, pp. 129–134). Deliberations in the early days of the Carter administration on US troop reductions produced uncertainties for South Korea as well (Berry, 1989).

Periodic affirmations of US commitment to South Korea have stabilized political relations but have not eliminated justifications for increased domestic production since these commitments also have come with assertions for the need to assume greater responsibility for self-defense by the South Korean government (Snyder, 1996). The impact on defense procurement of possible Asia-Pacific force structure realignments alluded to by the George W. Bush administration has yet to be determined (Armitage, 2003; US GAO, 2003).

Tensions with North Korea and domestic economic conditions have shaped procurement and offset trends as well. Force modernization and expansion programs developed in 1995 by the South Korean government in response to what it felt was a growing security threat from North Korea were curtailed with the 1997 economic crisis. It led to cancellation of 47 defense procurement projects scheduled for 1998 worth 400 billion won and to delays in 200 other projects. Overseas procurement was reduced as well. With signs of economic recovery a few years later, the government resumed its expansion plans. Spending plans for 2003–07 include $27.5 billion for major systems (Jane’s, 2002a).

Today, South Korea’s objectives in its defense industrial policies are clear. The government seeks to build a domestic production capability in all systems areas, with sufficient capacity to export domestically developed and manufactured items to other countries. At the national policy level, there are five major thrusts behind South Korea’s acquisition policy: first, improve the capability to develop military science and technology; second, pursue efficient and economic acquisition projects; third, strengthen overall military power through system integration and weapon systems capability improvement; fourth, pursue acquisition projects linked to national economic policy; and, fifth, enhance efficiency, professionalism, and transparency in acquisition (Park, 1999; Kausal and Markowski, 2000, pp. 3–31; KDIA, 2002). Central to these objectives is the acquisition of leading-edge technologies and production capabilities from foreign sources. For most of the post-war period, this has meant the United States, but South Korea has shown increased willingness to cooperate with defense industries of other countries.

For decades, two issues have been debated regarding South Korea’s defense imports, namely the degree to which South Korea seeks a domestic capability that excludes foreign participation and the actual level of dependency on the United States as a primary supply source. The latter issue also is directly related to the actual share of South Korea’s
defense market captured by US firms. In a 1990 study, the US Congress’ Office of
Technology Assessment wrote that the South Korean government did not “appear to aim
for an independent defense industry with minimal or no foreign involvement” (US OTA,
1990, p. 111). In fact, the “South Korean Government and industry leaders clearly prefer
to collaborate with US firms [because] security is a primary consideration,” and the
United States is its key ally (US OTA, 1990, p. 112). Contrary views exist, holding for
example that South Korea seeks greater independence because the United States is
expected to eventually withdraw militarily from the peninsula (Snyder, 1996, p. 224).

Assessments of Korea’s defense market have conflicted as well. According to the US
Department of Commerce, technology transfers and other offsets from the United States
have resulted in lower direct sales and a smaller portion of new programs than in
previous years. By the department’s estimates, South Korean producers have increased
their share in the local defense market from 28 percent of total sales in 1997 to 45 percent
one year later and 44 percent by 1999 (Isbell, 1997, p. 143). In contrast, a DoD report
asserts that dependency on the United States as a supply source remains high, as high as
80–90 percent of total sales, despite periodic fluctuations.

Assessments by non-government sources estimate that just 20 percent of South
Korea’s defense procurement is truly indigenous. The continued importance of the United
States to South Korea’s defense establishment is reflected in that as of January 2000 the
country had $8.2 billion in equipment orders with the US. Roughly 80 percent of future
foreign orders are expected to be placed with the United States. The continued reliance of
South Korea on the United States as a supply source has led some observers to assert that
this prevents comprehensive integration of the domestic Korean defense industry and,

Much of the apparent contradiction in these interpretations is inherent to offset and
import calculations. Although originally obtained from another country, an item or
underlying technology may be considered “domestic” if incorporated into an indigenous
system or purchased through a domestic agent. In either case, however, two trends in
South Korean markets are clear: first, foreign producers are facing far more stringent
requirements due to the formation and aggressive application of an official offset policy
by South Korea’s government, and, second, there is increased competition within the
South Korean market by a growing number of potential non-US suppliers, particularly
from European countries. These trends are examined in greater detail below.

**Korea’s offset policies**

Korea’s Ministry of National Defense applies offset requirements for any defense
transaction in excess of $10 million. The minimum required offset is 30 percent, but has
been raised to 70 percent for some recent, high-profile programs, with the government
seeking economic multiplier effects of as much as six to one. The government makes no
distinction between direct and indirect offsets, although it tends to favor technology
transfers and purchases that involve domestic production. In principle, foreign contractors
can be banned from future procurement competitions for failure to meet offset obligations

The T-50 jet trainer is an example of the sort of program sought by South Korea. It
demonstrates several potential trends. In this program, Korea Aerospace Industries is the
prime contractor, and Lockheed Martin acts as the main subcontractor. Lockheed is responsible for avionics and flight control development, wing production, and other technical assistance. A joint KAI-Lockheed marketing company, T-50 International, will handle worldwide marketing of the aircraft. Lockheed marketing presentations suggest an initial order of 100 aircraft by the Korean Air Force with potential global sales of 600 aircraft. The Korean government will fund 70 percent of the program’s cost, KAI will provide 17 percent, and Lockheed Martin the remaining 13 percent. Lockheed will have an estimated work share of 22 percent, compared with 44 percent for KAI. Other US manufacturers will account for the remaining 34 percent (Lockheed Martin, 2002).

Certain characteristics of this program are worth noting since they reflect long-term ambitions of the Korean government and Korean industry:

1. South Korea maintains the financial/budgetary lead with US suppliers;
2. there are significant technology transfers in all areas of the system from foreign suppliers to domestic Korean manufacturers;
3. the program poses few constraints on South Korea for global exports; and
4. the program reflects significant offset content.

Table 16.4: F-15K offset package: estimated values

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of projects</th>
<th>Estimated offset value ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology transfer</td>
<td>30</td>
<td>1.5</td>
</tr>
<tr>
<td>Parts manufacturing</td>
<td>11</td>
<td>1.3</td>
</tr>
<tr>
<td>Depot maintenance</td>
<td>2</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Korean program participants
-Government: ADD, ROKAF, KIDA, DQAA, KARI
-Industry: KAI, KAA, LG Innotek, Samsung-Thales, Daewoo Heavy, WIA, Hanwha


US-European competition: Korea as an example of third-country market sales

The second major trend in South Korean offsets is competition among a more diversified set of foreign suppliers in the Korean market. Offsets may be most problematic for the United States when they are part of sales to non-EU countries. It is in these third-country markets where competition between European and US producers may be most severe, and this provides considerable leverage to South Korea to negotiate offset agreements to fulfill its broader objective of increasing the domestic defense industry’s self-sufficiency (Isbell, 1997, p. 143).

The recent competition for providing a next generation fighter to Korea illustrates the concerns. In 1999, Dassault, Boeing, CAS A/Eurofighter, and Rosvoruzhnie (now Rosoboroexport) began competing for a 40-unit, twin-engine aircraft procurement initially valued at 4.3 trillion won (roughly $3.2 billion at 1999 exchange rates; by mid-2003, the initial estimate had risen to 5.2 trillion won or $3.9 billion). The competitors
offered, respectively, their Rafale, F-15K, Typhoon, and Su-35 aircraft in the competition. South Korea explicitly included offsets as a criterion for this competition, yet information exchanges in the bidding remained incomplete (Sherman, 2002a, 2002b). In May 2001, the South Korean government raised its offset requirement to 70 percent of the procurement package, aiming to boost its local aircraft industry. Three rounds of bidding ended in the South Korean government rejecting all packages as too costly and lacking in offset incentives. Accusations of bid tampering emerged. Innuedos included suggestions of payments to government officials and leakage of information concerning companies’ offset packages and bidding prices (Sherman, 2002a). One inevitable result was increased pressure on companies to offer more generous terms to secure the order or to deliberately walk away from the bidding. Boeing eventually emerged as the winner in the competition with a package claiming $3.3 billion in offsets (see table 16.4).

The case illustrates a reality for US companies operating in third markets in general and in the three countries discussed here in particular. Despite treaty relations with many countries and the proclaimed competitiveness of US products, American companies cannot assume a superior competitive position in third countries, even with allies such as Korea. Likewise, Taiwan already has indicated its willingness to source with European firms in part due to attractive offset packages, and Japan, always interested in supporting its indigenous industry, also has threatened from time to time to rely more heavily on European suppliers (Sherman, 2002c). Ironically, increased competition could mean improved economic gains through offset programs for these countries even as aggressive pursuit of these advantages could threaten the broader security ties they maintain with the United States.

Effectiveness of Korea’s policies

It is safe to characterize South Korea’s effort to build its domestic defense industry through offsets as work in progress. It would be premature to label the country’s policies and experiences as a collective failure, but it also would be generous to characterize them as a success.12

The mixed performance to date appears to be due to multiple factors. Much of the problem may be attributable to structural problems within the South Korean defense industry itself. Due to budget fluctuations, economic adjustments resulting from the 1997 financial crisis and internal restructuring, the industry is operating at between 30 and 50 percent of total capacity (Jane’s, 2001). Even generous technology transfers do not have the stimulative effects desired for a loss-leading industry. Other structural problems exist. The defense industry has been dominated by a small number of large conglomerates—the chaebol—with little diffusion of production to small and medium-sized industry. At the end of 1995, for example, 82 Korean defense contractors produced 308 types of defense equipment but the top ten chaebol accounted for 75 percent of all defense production (Jane’s, 2001). This minimized the multiplier effects of technology transfers and necessitated continued dependence on foreign firms through procurement of spares and maintenance. Economies of scale are not achieved, defense production remains costly, and foreign firms remain cost-competitive compared with domestic alternatives.

The 1997 financial crisis forced certain changes as well. The defense industry consolidated and the domestic market was opened, cautiously, to foreign investors. The
number of prime contractors dropped from 19 to 12. Industry consolidation is exemplified by the formation of Korea Aerospace Industry (KAI), a merger of units from Daewoo, Hyundai Heavy Industries, and Samsung Aerospace Industries in October of 1999, streamlining the military aerospace industry significantly. For the same year, joint venture investments by Thomson-CSF of France represented important steps in improving access for foreign firms into the Korean market but also for access by domestic firms to foreign capabilities.13

Outlook—South Korea

South Korea has the most ambitious offset policies of the three countries examined here. It also faces fewer policy constraints such as Japan’s arms export restrictions and fewer political sensitivities such as Taiwan’s mainland relations management. Still, the country is restricted by a number of factors, including political corruption, concern by the US over third-party transfers, industrial competitiveness, political uncertainties on the peninsula, and continued dependence on imported technology.

These constraints are among the reasons for Korea seeking a more diversified set of suppliers, and having concluded technology cooperation agreements with Turkey, the United Kingdom, Germany, Spain, Russia, Romania, Malaysia, Thailand, the Philippines, Indonesia, New Zealand, and Australia (Kausal and Markowski, 2000). Unlike Japan, there is less concern among South Korea’s foreign defense suppliers over the potential loss of defense technologies into commercial industries. Korea’s goals, though, are clear: the country seeks a fully self-sustaining domestic defense industry across all major sectors and will use offsets as the means of achieving this objective.

South Korea continues to devote a large share of its budgets to the military, and procurement remains an important element of those budgets. It is likely that defense spending will continue at relatively high levels for the foreseeable future, the occasional economic crisis notwithstanding. Less constrained than Japan in its export policies and ambitions, South Korea will continue pressing for favorable offset packages to build domestic capacity and its international markets.

With these generally upward trends in spending and defense production, the country may not face the immediate problem of sustaining domestic capacity that remains highly dependent on foreign technology injections and sourcing agreements. One of the foremost criticisms of offset agreements is that countries may find themselves with unneeded defense production capacity once major programs end (as appears to be the case in Japan). With its emphasis on expanding domestic and export markets, however, South Korea may be able to avoid this issue.

Taiwan

Multiple factors have influenced Taiwan’s continued interest in offset packages to stimulate domestic defense production. Facing mainland China’s formidable military and a tenuous international political position, Taiwan seeks inputs into its domestic production base to help assure its security. The potential stimulative effect of defense production as well as the promise of technological spinoffs are among the economic
benefits cited by defense production proponents. The alliance-building aspects of offsets and military sales in general are as important for Taiwan as they are for the United States. While the United States promotes defense sales and technology transfer to help assure allegiances of other countries, Taiwan seeks those sales to assure a continued commitment by the United States to its own security (Nolan, 1986, p. 37; Lo, 2000, pp. 186–191).

At the same time, Taiwan has promoted a certain degree of self-reliance in defense since the 1970s (Bitzinger, 1997, p. 87). The United States ended economic assistance to Taiwan in 1965 because of its rapid economic growth. More fundamentally, the United States implemented policy changes through recognition of the mainland as the sole government of China and through implementation of the Nixon Doctrine (Nolan, 1986, pp. 26–28; Swaine and Mulvenon, 2001, pp. 129–134). Taiwan’s justification for self-sufficiency was underscored further in 1982 when then-President Ronald Reagan announced his intention of gradually reducing arms sales to the country, although sales have continued under subsequent administrations (Lo, 2000, pp. 186–188). With few realistic options for assuring its own defense, virtually any adverse diplomatic development can heighten Taiwan’s sense of insecurity (van Vranken Hickey, 1996, pp. 237–238).

Despite these continued motivations, a constrained defense production base coupled with its unique political/military challenges hamper Taiwan’s ability to leverage its interest in defense production for domestic gain. Offset policies were formalized on 12 August 1993 by the Ministry of Economic Affairs (MOEA) when the Industrial Cooperation Steering Committee (ICSC) was formed. The committee incorporated offset procedures for civil and military procurement involving overseas bidders through a series of ad hoc committees responsible for different industrial sectors. MOEA’s Industrial Development Bureau (IDB) and Committee for Aviation & Space Industrial Development are responsible for implementing current offset agreements.

Officially, the government seeks between 30 to 60 percent in offsets in arms sales above $50 million through its Industrial Cooperation Program. Taiwan favors technological inputs to foster local industry. While recognizing that the aggressively export-oriented strategy of South Korea would not be plausible in its own circumstances, Taiwan nevertheless seeks to extend its regional reach through offset agreements (US DoC BIS, 2003). A key difference between Taiwan and other countries is that it seeks targeted offsets in an effort to build key industry sectors selectively. Unlike Japan and South Korea, Taiwan does not seek self-sufficient production for all systems.

Any offset arrangement will face political considerations given China’s adamant opposition to military support for Taiwan by other countries. In the case of sales from the United States, the Taiwan Relations Act (PL 96–8) factors into sales. The Act contains provisions assuring continued arms sales to Taiwan for its territorial security. But every sale generates controversy. Even when sales are concluded, critics contend that technology transfers are so limited that the deployed systems are woefully lacking in capability (see, e.g., US Congress, 2001).

Offset policies have brought some industrial successes for Taiwanese industry, for example having secured offset agreements with Lockheed Martin (for the F-16 fighter), Dassault Aviation (Mirage 2000–5 fighter), and Raytheon (Patriot missile system). This last deal included establishment of Raytheon’s first overseas missile maintenance center,
in Taiwan, to service the Asia-Pacific region. The Dassault sale resulted in a cooperative agreement committing up to $780 million in contracts for Taiwanese industry, including the establishment of a maintenance center for the 60 Mirage 2000–5 fighters ordered by Taiwan (Jane’s, 2002b).

In addition to limited market size and political considerations, practical obstacles exist that limit the economic impact of offset agreements with Taiwan. Analysts have noted that few companies or research organizations within Taiwan have sufficient capability to manage large military programs. Taiwan’s state-run Aerospace Industry Development Corporation (AIDC) has been prominent in the manufacture of combat aircraft, aircraft engine development, avionics development, component production, and flight testing. The Taiwanese legislature approved a proposal in May 1995 to privatize the AIDC, in part to attract foreign investment and technology partners. Taiwan hopes that the AIDC eventually will become a major aircraft maintenance and upgrade center for the region. Presently, the main focus of the AIDC is in the military sphere, with less than 15 percent of its work being in the commercial sector (Jane’s, 2002b). But AIDC is isolated from a good deal of Taiwan’s economy, the small and medium-sized businesses that account for the majority of its economic activity. This isolation minimizes the multiplier effects of offsets. The ICSC was established in part with this problem in mind (Wang and Shin, 1997, p. 87).

Taiwan’s weapon purchases have been extensive. From worldwide sources, including the United States, Taiwan received $20.7 billion in arms deliveries from 1994 through 2001, second only to Saudi Arabia among developing countries. Purchases have been consistent: Taiwan received $10.6 billion in arms between 1994 and 1997, and $10.1 billion between 1998 and 2001. The US share of these totals has been significant. Deliveries of US defense items and services to Taiwan totaled $4 billion in the 1993–1996 period, and $7.6 billion in 1997–2000 (Kan, 2003; Grimmett, 2001; 2002).

Such extensive activity in the international arms market would imply multiple opportunities for offsets and indigenous industry growth for Taiwan. But the combination of modest industrial capacity and severe political constraints has continued Taiwan’s dependence on foreign defense technology and imports. Efforts to develop indigenous systems in the 1990s resulted in items that remained heavily dependent on imported technology; not all domestic development programs were successful. The result was a shift in strategy that emphasized a return to traditional offset models in defense procurement with more selectivity to foster key indigenous capabilities (Bitzinger, 1997).

**Outlook—Taiwan**

Taiwan’s course with domestic military production in general and offsets in particular is unlikely to change dramatically in the coming years. The government’s policies have varied over the years, attempting to generate complete self-sufficiency through offset arrangements. Policies now appear to emphasize a more sophisticated mix of domestic development, capabilities enhancement, and strategic industrial alliances with both political and economic aims.

If implemented fully, further privatization of Taiwanese industry and market openness should assist the country in its desire to build global relations. Integration with the international economy as a whole, not just defense industries, clearly is important to
Taiwan for both political and economic reasons. For the time being, however, it can be expected that Taiwan will pursue a strategy of extracting maximum possible offsets with as diversified a set of global companies as possible. Given China’s looming presence, the political gains of offset agreements will continue to be at least as important to Taiwan as their economic benefits. The traditional pattern of offset negotiations can be expected to continue, but with more modest aims that reflect recognition of the limitations, and potential, of Taiwanese industry.

Conclusions

Future offset agreements with Japan, South Korea, and Taiwan will depend on a number of factors, including regional security, globalization of defense industries, changes in weapon development processes, and domestic economic conditions. The perceived threat posed by China and North Korea will continue to influence defense policies and procurement plans among all three countries. Globalization will influence early teaming arrangements that determine resource inputs, access to advanced technologies, and production shares for complex, advanced systems. Changes in weapon development and production models, particularly in the United States, may have a critical impact since they have been the source in the past of technology and production transfers to these countries. Finally, future economic shocks, such as the 1997 crisis that gripped South Korea and other Asian nations, and prolonged economic stagnation in Japan could affect spending plans and, therefore, the potential for new offset agreements.

Industry restructuring, globalization, and emerging models for the development of new weapon systems could have the most profound long-run influence on offset agreements. They certainly change their complexion: typically, offsets have been post-production agreements but increased globalization results in more pre-production agreements that determine work share and technology transfers. The option, or choice, of participating in these globalization trends is available in varying degrees to Japan, South Korea, and Taiwan. Firms in all three countries have a range of overseas alliances, but closer integration into the US market is limited in practice. In the case of South Korea, economic and corporate restructuring since the 1997 financial crisis delayed such options, but it is clear that its government and domestic industry seek more extensive arrangements. Taiwan’s options in this regard are limited for political reasons but a degree of closer integration with US industry is being promoted for economic and political reasons. Changes will be implemented slowly, however, for similar reasons.

The country that arguably has the potential for significant transformation to defense industry globalization also is most constrained by domestic policies, particularly its industrial policy strategy. Japan’s policy restrictions on arms exports and collective security offer challenges for industry in forming more creative alliances with firms in other countries. Many analysts and government officials believe, however, that these strictures can be adjusted to allow more creative arrangements that would benefit industry and Japan’s self-defense capabilities. But even if such adjustments are made, a rigid kokusanka attitude ultimately will hamper industry in forming creative alliances and business relations that would continue the flow of imported technologies into Japan’s industrial base.
Offsets are unlikely to disappear. Sales involving small volumes or to developing economies will likely be characterized by traditional offset agreements. Moreover, it remains unclear whether the JSF model promoted by the US DoD will extend to future, large-scale programs or will remain a hybrid example. As a result, markets will exist where present offset models will continue due to circumstances beyond the control of major sellers. It is virtually certain that as long as the combination of policies emphasizing distributed production, alliance building, and economic development remains, defense contracts involving Japan, South Korea, and Taiwan will include technology transfers, work share agreements, and similar features.

Notes

The author would like to thank the following individuals for their extensive assistance and patience in preparing this chapter: Bruce C. Bade, Jeffrey A. Bloom, Charles Burgess, Frances M. Cevasco, Eugene Chin, Brian Marshall, Yuzo Murayama, Douglas Ramsey, William A. Reinsch, Gregg A. Rubinstein, and Robert A. Wampler.

1. Offsets for this chapter are interpreted broadly, ranging from traditional barter offsets to more complicated agreements involving licensing or risk sharing arrangements. This is more inclusive than the current definitions offered by the US Department of Commerce’s Bureau of Industry and Security (BIS—formerly the Bureau of Export Administration, BXA), the office responsible for tracking offsets and assessing their economic impact. BIS considers offsets as “industrial compensation practices required as a condition of purchase in either government-to-government or commercial sales of defense articles and/or defense services as defined by the Arms Export Control Act and the International Traffic in Arms Regulations.” These take one of two forms: direct offsets (“contractual arrangements that involve defense articles and services referenced in the sales agreement for military exports”) or indirect offsets (“contractual arrangements that involve goods and services unrelated to the exports referenced in the sales agreement”). By this standard, only barter, counterpurchases, countertrade and buybacks qualify as defense offsets.

The definitions have evolved somewhat over time from standards originally developed by the US Department of the Treasury and the Aerospace and Electronics Industries Associations in a 24 May 1983 survey. Those definitions are available in OMB (1988), US GAO (1984), and Federal Register (1994). The standards used for defining offsets in this chapter reflect those used by other government agencies prior to the 1994 definitions. For example, US GAO included coproduction, licensed production, subcontractor production, overseas investment, technology transfer, and countertrade in its early assessments of offsets.

2. The United States licensed technologies associated with 27 different weapon systems to Japan over this period. Major systems included all front-line aircraft such as the F-4 and F-15, with a co-developed version of the F-16 capping the general trend toward increased offsets through technology transfers and local production. Raytheon’s Patriot surface-to-air missile system as well as then-leading edge radar-and infrared-guided air-to-air missiles were
produced locally, initially through assembly of knock-down kits followed by higher local content through license-produced components and subsystems (see, e.g., Rubinstein, 1999; Chinworth, 1999).

3. Data compiled by the Committee on Foreign Investment in the United States (CFIUS), established in 1975 to monitor foreign direct investment activities that potentially affect US national security, provides an insight into such activity. Since 1988, nearly 1,300 foreign acquisitions have been reported to CFIUS through 2000, about 17 percent of all 7,400 acquisitions of US companies by foreign interests during the same time period. While these reporting requirements were prompted by a concern over loss of sensitive US technology through foreign acquisitions, the data support the notion of a rapidly globalizing US defense industrial base. European firms are involved heavily in these direct investment activities. US GAO surmises that with the proliferation of dual-use technologies and the gray area of “national security,” CFIUS cases reflect only a fraction of total investment cases ultimately applicable to defense concerns (US GAO, 2000, p. 8).

4. For an historical perspective on kokusanka, see Green (1995).


6. Japan has indicated a desire to diversify its supply sources. Inroads by other countries to date have been modest, but notable nonetheless (see Chuter, 2003, p. 6).

7. Kyodo News Service, “IHI, Sumitomo Heavy to Merge Shipbuilding Operations,” 13 November 2001. IHI and Sumitomo Heavy Industries, Ltd. merged their respective shipbuilding units into a single, jointly-owned subsidiary in 2002 after announcing the arrangement the previous year. IHI’s 1,500 employees joined Sumitomo’s 235 employees in the new venture, Marine United. The new company constructs both commercial and military vessels. For additional information on individual company restructuring see Reed (2002), pp. 91–127.

8. With multiple responses permitted, 23 of 41 prime contractors surveyed by the Nippon Keidanren’s Defense Production Committee indicated they would be willing to merge their defense units with other companies. Seventeen respondents indicated a desire to establish cooperative R&D relations with domestic firms. An equal number indicated interest in forming alliances with foreign firms. Only ten companies showed a lack of interest in any of these options. See Nippon Keidanren (2002).


10. A subsequent US OTA report concluded that “unlike many of the other developing countries, South Korea has pursued partnership with US and foreign defense firms rather than self-sufficiency. Future government efforts to strengthen South Korea’s partnership strategy, such as supplying components to major US aerospace defense firms and increasing defense exports, greatly depend on continued US willingness to transfer military-related technologies” (US OTA, 1991, p. 126).

11. To quote from the online version of the report (US DoD, 2000):

“Korea continues to demonstrate overwhelming preference for US military equipment. The proportion of ROK military purchases from the US as a percentage of total foreign procurement has ranged from 59.2 to 98.9% in CY 1990–1999. The decade average is 78.6%. In the
last ten years, eighty percent of all Korean overseas procurement came from the United States.

FMS agreement levels have fluctuated significantly in recent years due to the financial crisis of 1997–98. FMS agreement levels ranged from $889 million in FY 96 to $267 million in FY 98 and back up to $511 million in FY 99. FY 00 is projected to reach the $700 million level. Through restructured payment schedules, [the government of South Korea] has been able to make on time FMS cash payments. As of 31 Jan 00 there were 822 active FMS cases worth $8.4 billion.

Direct Commercial Sales (DCS) levels have also fluctuated significantly due to the financial crisis ranging from $388 million in FY 96 to $70 million in FY 98 and back up to $235 million in FY 99. For the past decade, [the] US defense industry enjoyed the majority of the DCS market share with the 90–99 decade-long average standing at 56%.”

12. One measure might be exports. Jane’s Information Group estimates that South Korea’s exports have risen from $45.4 million in 1996 to $200 million by 1999. However, this jump was due primarily to a single sale to Venezuela (see Jane’s, 2001). Export numbers reported by the US State Department are significantly lower, fluctuating between $60 million and $20 million for the period of 1991–99 (US BVC, 2002, p. 132).

13. Increased foreign investment was indicated by KAI’s seeking 200 billion won in foreign equity investment and the formation of joint ventures with foreign firms. Samsung and Thomson-CSF of France formed a new venture in 1999 to produce missiles, radar, and other military equipment. Thomson-CSF also formed a venture with Ssangyong Information and Communications Corp. to produce a digital, battle-coordination system, the Korea Naval Tactical Data System (KNTDS), for its main battle fleets. In both cases, the foreign partner is prized for its potential technology inputs, access to capital, and global market reach.

14. The Indigenous Fighter Aircraft (IDF), for example, ran into cost and quality control problems limiting its production run. Some analysts anticipated the difficulties facing the program (see, e.g., Cheng and Chinworth, 1996).

References


17
Offsets and defense industrialization in Indonesia and Singapore

Richard A. Bitzinger

Introduction

Asia’s newly industrialized economies (NICs)—Indonesia, Malaysia, Singapore, South Korea, Taiwan, and Thailand—constitute an important subset of the developing world’s so-called second-tier of arms producing states. They comprise some of the most economically advanced countries in the developing world, possessing growing wealth, sizable industrial capacity, and increasingly sophisticated technology bases, particularly in the area of electronics. They have pursued roughly similar paths of economic and industrial development, involving large-scale state investments, technology imports, applied research, and synergistic civil-military links (see US GAO, 1994). It is therefore no surprise that over the past 30 years most Asian NICs have embarked on some manner of local armaments production, both as a means of encouraging arms self-sufficiency and of driving general economic development.

Among the Asian NICs, South Korea and Taiwan have engaged in the most ambitious efforts at defense industrialization and have made the most progress toward achieving autarky in arms production. Both countries have reached a level where they are able, with varying degrees of success, to design and manufacture their own fighter aircraft, armored vehicles, surface combatants, and even missile systems (see, e.g., Cheng and Chinworth, 1996; Chinworth, 2004). At the other end of the scale, arms manufacturing in Malaysia and Thailand has been sporadic and decidedly low-tech: during the 1980s, for instance, Thailand assembled German-designed trainer jets from imported kits, and Malaysia licensed-produced Swiss turboprop trainers and South Korean-designed offshore patrol vessels. More recently, Malaysia has begun construction of six MEKO-100 corvettes under license from the German firm Blohm and Voss. For the past decade, however, Thai and Malaysian armament production has largely centered on supplying local armed forces and police with basic items like uniforms, small arms, ordnance, and radios, and for servicing and overhauling military equipment (Singh, 1989; Jane’s, 2002).

Indonesia and Singapore took an interesting middle road when it came to the breadth and depth of defense industrialization. In both countries, armament production, while not as large-scale as in South Korea or Taiwan, was nonetheless wide-ranging. In some sectors—for example, Indonesia with respect to aerospace, or Singapore regarding systems integration capabilities—these countries pursued very ambitious indigenization agendas. In both cases, too, the central government played an instrumental role in assuming most of the risk of weapon development and production, both by directly
establishing and nurturing domestic arms industries, and by supplying a captive home market for their products.

Offsets were a noteworthy feature in both Indonesia’s and Singapore’s defense industrialization efforts. When it comes to developing countries, offsets and arms production have generally gone hand-in-hand—or, to put it another way, few developing countries have failed to pursue offsets as a means of promoting indigenous arms production. Indeed, offsets—licensed production, coproduction, technology transfer, etc.—as a condition for arms purchases have been perhaps the most important course of action taken by less-developed countries in order to abbreviate and quicken the process of defense industrialization and arms manufacturing.

Indonesia and Singapore employed offsets differently and to different ends. Jakarta embraced offsets in a traditional way, as a mechanism to ultimately reduce the country’s dependency upon foreign suppliers and to drive economic development. Consequently, Indonesia is the only country in southeast Asia to attempt a large-scale indigenous aircraft development and manufacturing program. Singapore, in contrast, has used offsets sparingly and in accordance with strategic needs. As a result, it mostly pursued offsets that involved technology transfers that, in turn, met more immediate military requirements, such as the capacity to engage in weapon maintenance and overhaul, and system upgrades. By addressing their respective successes and failures in exploiting offsets to meet their national goals for defense industrialization, the experiences of Indonesia and Singapore offer interesting insights and caveats when examining the challenges and prospects facing aspiring developing-world arms producers.

Arms production decision making and offsets

A country’s primary goals for indigenous armaments production and defense industrialization can have a considerable impact on how it pursues offsets. Countries can have several reasons for developing and producing their own weapons, but typically one or two objectives will emerge as the most crucial. Those key aspirations will, in turn, generally affect how a country approaches the whole process of defense industrialization and how offsets fit into this process.

Obviously, one of the strongest rationales for indigenizing armament production is strategic (see Evans, 1986, pp. 100–101; Nolan, 1986, pp. 12–14; Sanders, 1990, pp. 11–17; Brzoska and Ohlson, 1987, pp. 279–280; Brauer, 2002, pp. 106–107). In a basically anarchic international security system, so the argument goes, states are naturally impelled to seek an independent defense capability. In order to defend its territory satisfactorily, a state requires a reliable source of armaments, and the most dependable source is generally a domestic one. Self-sufficiency in arms procurement is therefore a crucial strategic goal. Additionally, relying too heavily on arms imports means exposing a country to cutoffs or to technology hold-backs, thus increasing the risk that it will be unable to acquire the weapons it deems essential to its defense. Embargoes, sanctions, and other types of supplier restraints, real or potential, have tended only to reinforce the perception on the part of many countries that they must establish a secure, indigenous source of armaments. South Africa initiated indigenous armaments production in direct response to the 1963 and 1977 UN-imposed arms embargoes. As a result, by the late 1980s, Pretoria could
claim to be “95 percent self-reliant” in military procurement, including fighter aircraft, armored vehicles, artillery, and surface combatants (Landgren, 1989, pp. 63–123).

Reduced reliance on foreign sources of arms is also often viewed as a means for strengthening national political independence. Arms dependencies leave the buyer open to attempts by the supplier to withhold deliveries in order to coerce the former into making concessions on issues both national (such as human rights) or international (such as combating terrorism and drug trafficking or opposing a common regional threat). In the case of Japan, for example, proponents of kokusanka (autonomy in arms production) perceived this industrial strategy as providing Tokyo with greater freedom of action in international affairs. At the same time, kokusanka arguably helped to strengthen Tokyo’s security relationship with the United States and permits Japan to play a larger role in the bilateral alliance (Green, 1995, pp. 22–26; but see Chinworth, 2004).

Another strategic rationale driving defense industrialization in many second-tier arms producing states, especially those aspiring to regional or even great-power status, are the more intangible aspirations of status and prestige (Green, 1995, pp. 11—13). Possessing an independent defense industrial capability feeds directly into some state’s concepts of national power, not only by creating military power but also by demonstrating its industrial and technological prowess, thereby confirming its status as a great power in the broadest sense. This “rich nation/strong army” complex is not confined to aspiring great powers. Such “techno-nationalism” can be detected on the part of many smaller arms producers. Brazil’s military rulers, for example, embarked on an ambitious defense industrialization program in the 1960s based in part on the belief that a powerful army was unsustainable in the absence of a strong domestic arms industry (Franko-Jones, 1992, p. 57; Perlo-Freeman, 2004).

If strategic concerns are one side of the coin driving autarky in arms production, economics is generally the other. In some countries it is increasingly the more important of the two. Arms production has often been perceived as providing many potential economic benefits to the nation as a whole. Defense industrialization promotes backward linkages spurring the expansion and modernization of other sectors of the national economy, such as steel, machine tools, and shipbuilding (see, e.g., Brauer, 2002, p. 108; Willett, 1997, p. 114; Huxley and Willett, 1999, p. 51). Industrialization and technological advancement feeds into the development of domestic arms-manufacturing capabilities, such as building up general skills and know-how, and provides lead-in support or equipment for arms production. The construction of warships, for example, stimulated the establishment of indigenous shipbuilding industries, while production of military vehicles required steel mills and automotive factories to provide critical parts and components, such as armor plating, chassis, and engines, and skilled labor to assemble these vehicles.

As a result, in many developing countries, armaments production has become a sizable component in the national economy. China’s vast military-industrial complex, for example, provides jobs for more than 3 million workers, and engages engineers and technicians in over 1,000 enterprises, each constituting multiple factories, research institutes, trading companies, technical schools, and universities, along with housing units, schools, day care, hospitals, and recreational centers (Frankenstein, 1999, pp. 191–192). At its peak in the late 1980s, South Africa’s arms industry employed nearly 132,000 workers, accounting for 9 percent of South Africa’s manufacturing employment.
and 1.5 percent of its gross national product. Armscor, South Africa’s preeminent defense conglomerate, was one of the country’s largest industrial groups (RSA DoD, 1998). During the 1980s, over 20 percent of Israel’s industrial workforce was engaged in arms manufacturing, and for a time Israeli Aircraft Industries (IAI) was the country’s single largest employer (Steinberg, 1987, p. 172; Sanders, 1990, p. 53).

Armament production can also serve as a “technology locomotive” spurring the growth of new industries and new technologies, particularly in the area of aerospace, electronics, and information technologies sectors (Elliot and Bonsignore, 1998, p. 31; Cheng and Chinworth, 1996, pp. 245–246). Military aerospace programs, for example, often constitute the basis for civilian aircraft production. Defense industrialization can also function as an important import substitution strategy, and instead of sending capital, and especially government monies, out of a country via arms imports, indigenous arms production can help to create jobs, ameliorate trade imbalances, and protect foreign currency reserves.

Finally, by exporting arms, defense firms can constitute an important source of foreign currency earnings. Brazil in particular pursued an aggressive export-led defense industrialization strategy, and by the late 1980s it had emerged as the world’s largest exporter of wheeled armored vehicles as well as being a major supplier of lightweight trainer planes and multiple rocket launchers to a number of armed forces in Latin America, Africa, the Middle East, and even western Europe (Economist, 1991).

Defense industrialization in Indonesia and Singapore: differing motives, differing approaches to offsets

It is a simplification, but it is probably safe to argue that Singapore’s approach to defense industrialization has been guided mainly by strategic and military rationales, while armament production in Indonesia has been driven mainly by their anticipated economic benefits.

Indonesia

The genesis for Indonesia’s defense industry very much revolved around the concept of exploiting indigenous armaments production as an instrument for national development and industrialization (Huxley and Willett, 1999, p. 50). Defense industries were supposed to contribute directly and indirectly to the nation’s technological and industrial modernization, both by the creation of new strategic industries, manufacturing military and commercial products, and by raising in general the country’s level of technical expertise, manpower skills, and industrial infrastructure. Indonesia began armament production in earnest in the mid-1970s, with the establishment of several state-owned “strategic enterprises,” the most important of which were PT Industri Pewsawat Terban Nusantara, or IPTN (aviation and aerospace), PT PAL (shipbuilding), PT Pindad (small arms and munitions), and, later, PT Centronix (defense electronics) (Singh, 1989, p. 251). Of these, IPTN was particularly revealing of Indonesia’s greater goals harnessing armament production for industrial modernization and development. IPTN was the personal brainchild of its founder and first director, B.J. Habibie, who was also the
country’s Minister for Research and Technology (and who briefly was to replace Suharto as Indonesia’s President in 1998). Habibie (who later headed up PT PAL and PT Pindad) explicitly viewed the establishment of an aerospace industry as both an instrument and a model for advancing the country’s overall technology and industrial base (Huxley and Willett, 1999, p. 50; Bailey, 1992, pp. 51–52). IPTN was to serve as an indicator of Indonesia’s intentions to become a modern industrialized nation and “to prove that a Third World, Muslim-majority country could make a hi-tech leap into global aviation” (Cohen, 2000, p. 45).

The key to realizing these goals was an evolutionary industrial development strategy that explicitly used offsets to acquire the necessary research, design, and manufacturing expertise in order to give “optimal results in the efforts of mastering aviation technology in a relatively short period of time, [i.e.,] 20 years” (Indonesia, n/d). Subsequently, IPTN pursued a technology-transfer philosophy dubbed “Begin at the End and End at the Beginning.” As laid out in IPTN’s official history, this process is intended “to absorb advanced technology progressively and gradually in an integral process and based on Indonesia’s objective needs” (Indonesia, n/d). Therefore, “in building aircraft, it does not necessarily start from components,” but from directly learning “the end of a process,” i.e., the final assembly of aircraft, and then working backwards to component manufacturing (Indonesia, n/d).

This technology development program was to run through four distinct, progressive phases. Phase one involved the “mastery of manufacturing capabilities” through subcontracting and licensed production of foreign aircraft designs, “providing the opportunity for both management and the workforce to gain knowledge, skills, and experience” (Bailey, 1992, p. 52). Phase two entailed the integration of technology and through expansion of workforce skills via joint projects with foreign partners. Phase three, technology development, entailed initial efforts to design, develop, and manufacture aircraft entirely on its own. Finally, during phase four, “basic research,” IPTN was to entail the indigenous research and development of basic technologies, such as materials, propulsion, and electronics. Breakthroughs made at this stage would be fed into future aerospace programs.

This evolutionary and incremental process of defense industrialization is familiar to many as the “ladder of production” model as laid out by Krause and others (Krause, 1992, p. 171; Brzeska and Ohlson, 1989, pp. 15–27; Katz, 1984, pp. 8–9; Willett, 1997, pp. 116–118; Brauer, 2002, p. 105). According to this model (see figure 17.1), initial armament production tends to revolve around the assembly of foreign weapon systems from imported parts and components (knock-down kits). The next step usually consists of the licensed production of foreign weapon systems, with some—and in many cases, eventually nearly all—of the actual manufacturing of
components and subsystems performed indigenously. Joint development programs with foreign partners which continue to rely heavily on imported know-how but which also nourish incremental improvements in the country’s independent military R&D base usually follow this stage, and a country will often then attempt to indigenously produce more complex weapon systems. Lastly, a country may attempt to design and develop its own advanced weapon systems—such as fighter aircraft, missiles, submarines, large surface combatants, or military electronics—either across-the-board or by carving out certain niches or specialties.

The ladder of production model relies heavily on foreign technical assistance at the initial stages. These inputs often come in the form of offsets, particularly licensed assembly and production, and considerable foreign assistance in establishing turnkey factories. The underlying objective of this model, however, certainly the way it was intended to work in the case of Indonesia’s arms industry, is to exploit foreign aid and inputs so as to gradually but surely wean oneself off such assistance, in other words, to use offsets as a means of boot-strapping the local defense industrial base to become not only self-sufficient but to eventually be globally competitive in certain industrial sectors.

In the case of IPTN, phase one, beginning in the mid-1970s, saw the company undertaking the licensed production of several kinds of foreign-designed aircraft, including the NC-212 light transport plane (from CASA of Spain), the NB-105 utility-lift helicopter (from Germany’s MBB), the NAS-332 Super Puma helicopter (from France’s Aerospatiale), and the Bell 412 helicopter (from the United States). Initial production tended to entail the relatively simple assembly of imported kits, but subsequent aircraft in these production runs involved greater domestic content and work share, until most were built almost entirely indigenously (Bailey, 1992, p. 52). Also during this phase IPTN manufactured components for F-16 fighters and British Hawk trainers purchased by the Indonesian air force.

Phase two, which began in the early 1980s, centered on the co-development of the CN-235 transport aircraft in a 50:50 joint venture with CASA of Spain. Design work began in 1980 and the aircraft first flew in 1983. The CN-235 was adapted both for military purposes (as a cargo and maritime patrol aircraft) and for civilian use as a commuter plane; it was also the first airplane that IPTN produced for export. Altogether, IPTN built around 75 CN-235s between 1983 and 2002, including 31 aircraft sold to the United Arab Emirates, Brunei, Malaysia, Pakistan, South Korea, and Thailand (Jane’s, 2003).

Phase three began in the late 1980s and continued through to the 1990s. The centerpiece of this phase was the N-250, a 50-seat turboprop commuter aircraft designed and manufactured entirely in Indonesia, but still using a large number of foreign components, such as the engine, avionics, and landing gear. The N-250 flew in 1995, and two prototypes were built and tested. Another phase-three program was the N-2130, an 80 to 130-seat passenger jet that could cap Indonesia’s emergence as a world-class aerospace producer; the N-2130 was unveiled in 1997. By 1997, IPTN had grown to a workforce of almost 16,000, including 1,500 engineers, and the company was intending
to become “the Toyota of aerospace,” with an aircraft to meet every niche in the 20 to 130-seat range” (Bailey, 1992, p. 52; Cohen, 2000, p. 46).

Shipbuilding and small arms followed paths only slightly different from that of IPTN. PT PAL has constructed two types of German-designed patrol boats, while PT Pindad has produced, under license, assault rifles from Belgium, submachine guns from Italy, mortars from Finland and Israel, and grenade launchers from Singapore (Singh, 1989, p. 251).

**Singapore**

For its part, Singapore has pursued quite different defense industrialization objectives than has Indonesia, and these goals have led it to approach the idea of offsets differently. Singapore, in contrast to Indonesia’s modernization strategy, developed an arms industry primarily for strategic reasons. As a small nation with limited natural resources, a declining birthrate, a shortage of skilled manpower, no strategic depth, and sandwiched between two large and potentially threatening neighbors, local armament production has been focused first and foremost on meeting the immediate needs of the Singapore Armed Forces (SAF). In addition, since high technology is seen as a critical force multiplier, arms procurement decisions have been generally measured against what Singapore can afford to do by itself and what is more sensibly bought from foreign sources (Huxley and Willett, 1999, p. 50; Yam, 1999).

When it comes to indigenous arms production and defense industrialization, Singapore, as opposed to Indonesia, therefore regards potential economic benefits as secondary to the task of bolstering the country’s defense capabilities. As one observer stated more than a decade ago:

> “…the Singapore defense industries are not viewed as part of the country’s economic development strategy, as they are in Indonesia, but rather are viewed as an integral part of the country’s concept of Total Defense” (Singh, 1989, p. 259).

Consequently, Singapore has tended to take a more pragmatic and selective approach toward defense industrialization. It has never sought nor even harbored the goal of autarky in armament production, and the country has remained entirely dependent upon foreign sources for such critical weapon systems as fighter aircraft, helicopters, submarines, tanks, and all kinds of tactical missile systems (air-to-air, surface-to-air, antitank, etc.). Instead, the local defense industrial base is geared primarily toward guaranteeing the supply and maintenance of critical systems, and toward developing the capability to upgrade and modify imported weapon systems (Matthews, 1999, p. 20).

Local arms production is centered on the state-owned Singapore Technologies Engineering (STE). STE has its roots in Chartered Industries, established in the mid-1960s to produce small-arms ammunition for the SAF. After going through several expansions and reorganizations, STE now comprises four main subsidiaries: ST Aerospace (aircraft manufacturing and maintenance), ST Electronics (sensors, communications, software, and combat systems), ST Kinetics (land systems and ordnance), and ST Marine (shipbuilding). By 2002, STE employed over 11,000 workers.
and boasted revenues in excess of US$1 billion (Huxley, 2000, pp. 11–12; Karniol, 2003). STE has developed considerable expertise in logistics and depot management, in the maintenance and overhaul of aircraft and aircraft engines, and in ship repair (Karniol, 2003). In addition, it has built up its systems design, engineering, and integrations skills necessary to undertake modernization and upgrade programs on behalf of the Singaporean armed forces, including (Huxley, 2000, pp. 13–14):

- refurbishing and refitting Republic of Singapore Air Force (RSAF) A-4S fighter aircraft with a new engine and new avionics;
- upgrading RSAF F-5 fighters with a new cockpit avionics suite and radar; modernizing the army’s M-113 armored personnel carriers; and
- retrofitting the Navy’s patrol boats with Harpoon anti-ship cruise missiles and Barak air-defense missiles.

In accordance with its minimalist economic goals for defense industrialization, offsets have played a much more modest role in Singapore’s arms industry than in Indonesia’s. In fact, Singapore has no formal offsets policy per se, but instead engages in Industrial Cooperation Programs with foreign suppliers that require technology transfer and training as part of licensed production arrangements or off-the-shelf buys (Huxley, 2000, p. 10). These cooperative agreements, in turn, have mostly been used to expand the local defense industry’s maintenance, repair, and upgrade capabilities. STE, for example, has a collaborative arrangement with Pratt and Whitney to overhaul turbine engine blades, which supports its capacities to overhaul RSAF F-16 fighter aircraft and submarines (Karniol, 2003).

Production offsets have been even more limited. Licensed production has generally been employed in those defense sectors where Singapore believes it can best contribute to eventual self-sufficiency in design, development, and production, and where it believes that indigenous production can meet national defense requirements and still be cost-effective and technologically world-class. For example:

- during the 1970s and 1980s, Singapore constructed both 45-meter and 62-meter missile patrol boats under license from Germany’s Lürssen, as well as Landsort-class mine hunters under license from Sweden’s Kockums; building upon these experiences, Singapore during the 1990s built its own indigenously designed Fearless-class of offshore patrol vessels and Endurance-class of 8,500-ton landing ships;
- Singapore reportedly turned to a foreign company, Belgian-based SRC International, to help develop its indigenous FH-88 155mm howitzer (Huxley, 2000, p. 14);
- Singapore licensed-produced the M-16 rifle during the 1970s, as well as manufacturing foreign-designed small arms (the Ultimax 100 and the SAR 80), before graduating to producing an entirely indigenous assault rifle, the SAR 21 (Huxley, 2000, p. 14).

Even in some of these cases, however, offsets have not led to greater self-sufficiency in armament design and manufacturing. The country’s next generation of warships, for
example, will be a licensed-produced version of the French *Lafayette*-class frigate. Singapore is arguably truly self-sufficient only in the area of small arms and ammunition, artillery, and light armored vehicles.²

In conclusion, Singapore appears to have adopted a *core competencies* or *niche production* approach to its defense industries. It deliberately decided to concentrate arms manufacturing in those areas where it believes it has particular key strengths—and also greater potential to either export its products or find foreign partners—and either abandoned or declined to enter those areas where it believed that arms production would not be economically viable or technologically competitive. In so doing, Singapore is a rarity among developing-world arms producers in that it does not appear to follow the ladder of production model of defense industrialization. More to the point, it appears to be content with remaining at the lower rungs of the ladder.

**Recent developments in the Indonesian and Singaporean defense industries**

**Indonesia**

By the mid-1990s, Indonesia’s defense industry, and certainly its aerospace business, appeared to be riding high. IPTN in particular enjoyed preferential treatment as a strategic enterprise, backed up by strong central government support (Jakarta invested billions of dollars in the company, while Habibie was part of Suharto’s inner circle) and a captive market (Indonesia’s military and domestic commuter airlines were compelled to buy IPTN products, even when they did not match their needs; for example, two Indonesian domestic airlines were forced to buy CN-235 transports as commuter planes, even though they performed poorly in this role [see Jane’s, 2003]). The company had grown from an initial 500 workers to more than 15,000 by 1997, and its main factory at Bandung featured a state-of-the-art manufacturing facility, including several dozens of advanced computerized numerically controlled tools (Jeziorski, 2000, p. 77). It had one major indigenous program, the N-250 commuter plane, already flying and another, the N-2130 regional jet, on the drawing board. Indonesia appeared to be making considerable strides toward meeting its goals of self-sufficiency and toward creating a world-class defense and commercial aerospace sector.

Much of this apparent success was illusory, however. In reality, IPTN was a bloated, state-owned white elephant, employing many more workers than it needed and was awash in excess production capacity. Moreover, Indonesia was finding it increasingly difficult to break into civil aviation manufacturing at the level of a systems integrator or even as a major partner in collaborative aircraft programs. The Indonesian government poured nearly US$1 billion into the N-250 program, but despite this huge investment, the aircraft continued to experience considerable teething problems (Cohen, 2000, p. 45). In particular, the plane failed to receive certification from the US Federal Aviation Authority, which made it almost impossible to market the aircraft overseas. At the same time, orders had already begun to dry up for its other products, particularly the NC-212 light transport aircraft and helicopters (Jeziorski, 2000, p. 77; Cohen, 2000, p. 46).
The 1997–98 Asian financial crisis was the defining event that forced Jakarta to reexamine and ultimately dramatically scale back its ambitious plans for its aerospace industry and instead to greatly downsize its arms industry. As a condition of the bailout by the International Monetary Fund, the central government was forced to cut off all support to IPTN, and by 2000, the company had run up a debt of US$570 million. In response, the company underwent major restructuring. This included a name change (to Indonesian Aerospace, or IAe), the divestiture of unneeded production capabilities (particularly in the area of engineering), and—most significant of all—the elimination of around one-third of its workforce, or 5,000 employees (although IAe anticipates that it may have to cut an additional 3,500 jobs in the near future; see Cohen, 2000, p. 46). The company has put both the N-250 and N-2130 civilian airliner projects on hold, pending the possible infusion of foreign capital, which so far has not been forthcoming, and has largely fallen back on marketing its workhorse product, the CN-235. New sales of the CN-235 have been slow, however, just eight to South Korea and four to Pakistan. Overall, the future of Indonesia’s defense industry is not bright.

Singapore

Singapore’s defense industry appears to be thriving, largely because of its core competencies/niche production business strategy. In particular, in recent years efforts to commercialize and globalize its business activities have become more critical to Singapore’s arms industry than offsets have ever been. The past decade or so has seen STE engage in a concerted effort to reduce its dependency upon contracting to the country’s armed forces. ST Aerospace (ST Ae) greatly increased its commercial subcontracting business over the past decade, manufacturing components for western

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companies such as Eurocopter and Boeing. It has also become a global maintenance and overhaul center for commercial aircraft. Consequently, roughly half of STAe’s revenue comes from non-military work (Huxley, 2000, pp. 16–17; Karniol, 2003).

Just as important have been the Singapore defense industry’s efforts to increase its international footprint through co-development alliances, joint ventures, and transnational mergers and acquisitions (see table 17.1). STAe, for example, is a member of the US-led international consortium currently engaged in the development of the F-35 Joint Strike Fighter. It is collaborating with Eurocopter France in manufacturing and marketing the EC-120 light utility helicopter, and with Israel’s Elta to upgrade F-5 fighter aircraft for the Turkish and Brazilian air forces (Huxley, 2000, p. 19). ST Kinetics teamed with up with a US firm, Teledyne Brown Engineering, in an (ultimately unsuccessful) attempt to sell its Bionix IFV to the US Army to meet the latter’s Interim Armored Brigade concept. Singapore has signed defense technology collaboration agreements with several other arms producing countries, including Australia, France, Norway, South Africa, and the United Kingdom. In the case of Sweden, it has created a bilateral technology development fund to jointly finance cooperative R&D projects; Swedish-Singaporean cooperation has been particularly close in the areas of undersea warfare and biochemical defenses (Huxley, 2000, p. 10). Finally, Singapore’s defense industry has expanded its overseas operations, with STE taking a 25 percent stake in the Irish company Timoney, which produces suspension systems for armored vehicles, and also acquiring the US shipbuilder Halter Marine as a wholly owned subsidiary. Altogether, STE has more than 2,500 workers, nearly a quarter of its labor force, employed outside Singapore (Karniol, 2003).

This globalization strategy has had a significant impact on further diminishing the nation’s already low attachment to offsets as an industrial policy. With specific regard to participation in the Joint Strike Fighter, for instance, Singapore “has rejected the concept of industrial offset outright, preferring instead to leverage its military purchases to gain the expertise it needs to become a major partner in international aircraft development and upgrade programs” (Doyle, 2001, p. 38). In this regard, the JSF program fits neatly into Singapore’s strategy, as this program explicitly rejects the idea of guaranteed work shares and other kinds of offsets. In addition, whoever successfully sells next-generation fighter aircraft to the country is expected “to make a long-term commitment to their relationship with Singapore” (Doyle, 2001, p. 38).
Conclusions

Indonesia and Singapore offer both a cautionary tale and an interesting role model for other aspiring arms producers in the developing world. Indonesia’s experiences show that offsets offer no great shortcuts, either economic or technological, when it comes to achieving viable, self-sustaining defense industries. Arms production is a “capital and technology-intensive industry” requiring significant investments in equipment and personnel (Baek and Moon, 1989, p. 157), and offsets alone are insufficient to provide for these requirements, especially as a country attempts to move up the ladder of production. Indigenous, and often quite substantial, sources of financial, industrial, and human capital must also exist independently in order for a nation to make progress toward the independent development and production of advanced weapon systems (Brauer, 1991, p. 166). Offsets cannot substitute for a strong science and technology base.

An observation made with regard to the efficacy of offsets in defense industrialization in South Korea and Taiwan is equally appropriate in the case of Indonesia:

“Offsets…have had limited impact in fulfilling larger plans for becoming self-sufficient producers across a range of systems (much less becoming global players in high tech industries). This apparent failure could be attributable to overly ambitious plans by central governments, as well as a measure of naiveté in understanding the dimension of domestic resources needed to fully exploit such transfers. There is no doubt that domestic capabilities have grown…as a result of technology licensing, production buybacks and other forms of offsets …However, offsets have not resulted in anything approaching the creation of global competitors in a vast range of systems…nor are they likely to in the immediate future” (Cheng and Chinworth, 1996, pp. 275–276).

On the other hand, Singapore can be viewed as a model of how a smaller arms producing state can leverage its strengths in certain niche areas to become a vital player in the international arms business and also create a globally competitive, profitable defense industrial base. Singapore has joined other second-tier arms producers, such as Sweden and South Africa, who are increasingly using a core competencies strategy to emphasize the unique contributions it can make in partnership with collaborative weapon programs such as the JSF (Bitzinger, 2003). In part because of this approach, STE has been consistently profitable for several years, and employment and revenue per employee have both increased (Singapore, 2003).

For second-tier arms producers like Singapore, repositioning oneself to play a subordinate role in a more globalized division of labor may make considerable economic and technological sense. It is certainly one of the most cost-effective ways to preserve and maintain national defense industries, and it permits smaller arms industries to make maximum use of their few competitive advantages in the global arms market, particularly with regard to lower labor costs and market access. Moreover, it keeps these arms industries open to cross-fertilization from foreign technologies; indeed, one of the
greatest drawbacks to autarky is the risk of inadvertently isolating one’s defense industrial base from innovative foreign technologies, foreign capital, and global markets. Of course, such subordination means abandoning any goal of autarky in armament productions and concede a formal, pervasive, and maybe even irreversible dependency on foreign defense industries. In addition, globalization entails a fundamental shift away from insulating one’s arms industries toward opening up and exposing these industries to the oft-times harsh economic realities of the international arms marketplace. Yet however little these countries may like to admit it, they appear to have few alternatives.

Notes

The assessments and arguments expressed in this chapter are strictly those of the author and should not be interpreted as representing those of the Asia-Pacific Center for Security Studies or the US Department of Defense.

1. I use the term second-tier arms producers to define a rather diverse group of countries comprising those industrialized countries possessing small but often quite sophisticated defense industries—for example, Australia, Canada, the Czech Republic, Norway, Japan, and Sweden—as well as those developing or newly industrialized countries engaged in ambitious, relatively recent (i.e., since the end of world war II, or, more accurately in most cases, since the 1960s or 1970s) defense industrialization efforts—e.g., Argentina, Brazil, China, India, Indonesia, Iran, Israel, Singapore, South Africa, South Korea, Taiwan, and Turkey. The first-tier of arms producing states comprises United States, the United Kingdom, France, Germany, and Italy; these five countries possess the world’s largest and most technologically advanced defense industries, and together they account for more than three-quarters of the world’s total armaments production. Moreover, they dominate—either singularly or collectively (particularly in the case of the major West European arms producers, who are increasingly regionalizing their arms production activities)—the global defense research and development (R&D) process. Third-tier arms producing states are defined as those possessing very limited and generally low-tech arms production capabilities; countries in this group would include Egypt, Mexico, and Nigeria. For a longer discussion of the problems and prospects facing the world’s second-tier arms producers, see Bitzinger (2003).

2. ST Kinetics produces three types of indigenously designed light armored vehicles, the Bionix tracked infantry fighting vehicle, the Terrex wheeled armored personnel carrier, and the All-Terrain Tracked Carrier, reportedly a reverse-engineered version of the Swedish Bv-206 all-terrain personnel carrier (see Huxley, 2000, p. 15).

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Defense offsets in Australia and New Zealand

Stefan Markowski and Peter Hall

Introduction

Few countries have experimented as widely with defense offsets as Australia has. The instruments range from voluntary to mandatory offsets obligations to gradations of increased reliance on local content requirements but without formal offsets. Policy experiments with local content requirements continue. The 1998 Defence and Industry Strategic Policy Statement (DoD, 1998), which is the government’s official industry policy statement as of September 2003, makes no reference to offsets or specific local content targets but reaffirms a set of procurement rules for foreign companies competing for Australian defense business.

New Zealand promulgated its defense offsets policy in 1991 within its Government Purchasing Guidelines. Furthermore, the Australia and New Zealand Closer Economic Relations Treaty (ANZCERTA) and the Government Procurement Agreement (GPA) between the two countries provide for equal treatment in government purchasing for each other’s domestic suppliers. ANZCERTA, in effect, underpins a customs union between the two countries.

This chapter is structured as follows: the first two sections sketch out the development of the countries’ offsets and local content polices, the third section addresses the use of defense procurement, including offsets, to pursue industry development strategies, and the final section concludes the chapter.

Australian industry involvement initiatives

Within the Australian Industry Participation Program (AIPP) of 1970, defense offsets relied on foreign contractors’ own “best endeavors” to identify opportunities to discharge offset obligations arising from Australian defense-related purchases. Offsetting activities allowed under the program included local content, bundling, and countertrade, as defined in Markowski and Hall (2004). In 1986, AIPP was replaced by the Australian Industry Involvement (AII) program. The aim was to help establish a sustainable, defense-related industrial capacity in the country. AII was comprised of two components, called “Defence Designated and Assisted Work” (Designated Work), essentially a local content requirement, and “Defence Offsets” (Defence Offsets) which were trade and/or production obligations in addition to local content requirement, i.e., additional local production, countertrade, or bundling.
Offset obligations were set at 30 percent of the imported content of contracts exceeding A$2.5 million and with an imported content of at least 30 percent. To count toward the fulfillment of offset obligations, activities needed to offer prospects of technology transfer to local industry, and they were to be new, internationally competitive, and sustainable after the initial offset obligations were discharged. Moreover, such activities were not to result in any procurement price increase. Offset multipliers were used to enhance the value of some particularly desirable offset activities such as R&D and training.

Under AII, mandatory requirements replaced the best-endeavors basis for offset compliance. Legally enforceable Project Deeds specified the scope, value, and schedule of defense offset obligations. Credit Deeds were adopted to encourage contractors to set up long-term industry programs, and credits earned that way could be used to discharge future offset obligations. Pre-agreed Liquidated Damages applied if contractors failed to deliver on their offset commitments.

In 1988, the scope of AII was widened to include a third category, called Australian Production. This was defined as direct participation by Australian industry (local content) in a procurement contract deemed to occur at competitive prices (without cost premiums to Australia). Designated Work remained a local content component but one that would usually involve a cost premium. And Defence Offsets were defined as a program of new activities in Australia, which met four criteria:

- **new work**—no re-labeling of existing activities;
- **commercial viability**—sustained international competitiveness in terms of quality and price;
- **no price padding**—offsets were not to inflate the contract price; and
- **technological sophistication**—offsets activities were to be as sophisticated technologically as the imports that gave rise to them.

Within our definition of offsets (Markowski and Hall, 2004), Australian Production and Designated Work are categorized as a local-content type of offset, and Defence Offsets under the AII program could take the form of (additional) local content, bundling, or countertrade. In 1989–90, the share of AII in defense equipment contracts was about 70 percent, of which Australian Production and Designated Work accounted for over 60 percent and Defence Offsets for nearly 10 percent (DoD, 1991, p. 18).

The 1988 Australian Defence Offsets Program (ADOP) targeted new capabilities to enhance Australia’s ability to maintain and adapt military equipment, produce munitions and spare parts, and acquire technologies needed for the long-term needs of the Australian Defense Force (Hall and Markowski, 1996). Four years later, following the 1992 Price Review of Defence Policy for Industry, the Department of Defense decided to reduce its reliance on ill-focused offset mechanisms and ADOP was abolished de facto and replaced by more specific provisions implemented through normal contracts. Australian Production and Designated Work requirements evolved into a combined local-content requirement.

By the mid-1990s, all government procurement above A$10 million had the policy-driven aim of maximizing opportunities for Australian (and New Zealand) industry development. Under a refocused AII, all defense acquisitions valued above A$5 million were subject to local content and industry development considerations to be achieved at
no significant cost premiums. Priority areas were capabilities that the defense department regarded as strategically important for a particular acquisition as well as highly beneficial for long-term industry development.

Following the 1996 Defence Efficiency Review, AII policy was refocused once again. Named after the then-junior Defense Minister, the “Bishop Procurement Rules” for foreign companies operating in the Australian defense market were introduced. Local content requirements are implicit in Bishop Rules, and although offsets are not mentioned explicitly, reference to “demonstrated independence of action from overseas parents” of Australian subsidiaries “through exports” could be interpreted as an indirect countertrade requirement. In contrast to earlier applications of the requirement, the policy emphasis shifted from project-specific local content demands to a general demand for an ongoing and significant commitment by foreign defense suppliers to the Australian economy. In 1996–97, 87 percent of expenditure on defense logistics was spent in-country, 55 percent of capital equipment was sourced locally, and 99 percent of expenditure on capital facilities was spent in-country (DoD, 1998, p. 5).

The 1998 Defence and Industry Strategic Policy Statement (DISPS) views AII as the defense department’s main tool for drawing overseas contractors into developing local industry capability. It incorporates the Bishop procurement rules and assigns the department the task of developing a culture that fosters “competitive industry as an integral component of ADF capability” (DoD, 1998, p. 2). Specific percentages of AII are set on a project-by-project basis (ANAO, 2003, p. 70). Tenderers for defense projects worth at least A$5 million with an import content are required to seek from the Industrial Supplies Office information on local industry capabilities when scouting for industry participation. In tender bids, the department looks for AII plans that foster long-term partnerships between prime and subcontractors. On the demand side, government purchasing officers for contracts of over A$ 100,000 describe in the publicly accessible “Buying Australian” database the measures taken to provide Australian industry with opportunities to win contracts.

DISPS relies on competition to deliver value for money in sourcing ADF supplies. However, competition has often been criticized in Australia as wasteful for leading to excess capacity, high transaction costs, and higher prices (ASPI, 2002, p. 23). With a strong focus on local content but small and uneven demand for different types of equipment, it has often been asserted that domestic suppliers find it difficult to compete against imports and make long-term investments in capacity.1

As of September 2003, AII comprises two main components: local content (premium-free Australia/New Zealand supplies) and strategic industry development activities (SIDA), used as an alternative to local content when opportunities for local content do not exist (ANAO, 2003, p. 65). SIDAs are categorized either as primary activities (e.g., R&D, exports, innovative and risky activities) or as enabling activities (e.g., technology transfers, training, and provision of infrastructure). Although this is not formally stated, SIDAs are likely to involve cost premiums for local sourcing. The current AII framework can be seen as a further evolution of the earlier concepts of Australian Production and Designated Work. Between 1999 and 2001, local content accounted for over 80 percent of AII activities and SIDAs for the rest (ANAO, 2003, table 1, p. 66).

To address the issue of sustaining key industry capabilities and to reduce the “wastefulness” of competition, in 2001 the government foreshadowed the adoption of a
strategic approach to defense procurement (DoD, 2002). The project-by-project approach would be replaced with four long-term, multi-project (sectoral) plans aimed at sustaining key defense-related industry capabilities. To achieve these strategic objectives, there is a strong preference for dealing with a small number of larger and more broadly based contractors. This would allow the Defence Materiel Organisation to outsource the overseeing of the performance of lower-tier contractors.

If as a result of the sectoral plans, a number of (sectoral) defense industry champions were formed, the resulting model could be similar to that associated with the administration of offsets by the Australian Submarine Corporation in the early 1990s. Under that model, the local prime would be responsible for ensuring AII compliance by overseas subcontractors. It could, however, use its associated market power to extract rents from subcontractors and reinforce sectoral dominance rather than serve the strategic interests of Australia or the country’s broader national economic objectives.

New Zealand industry involvement initiatives

Following a 1990 review, the New Zealand Ministry of Commerce produced *Government Purchasing Guidelines: Opportunities for Local Industry*. In 1991, the Minister of Defense promulgated a *Defence Offsets Policy* in line with the *Guidelines* (NZMoD, 1995). This is part of a broader New Zealand Industry Involvement (NZII) program which comprises two elements, namely New Zealand industry participation (local content) and defense offsets.

New Zealand industry participation

Where significant quantities of imports are sourced from non-Australian/New Zealand (ANZ) suppliers, the defense ministry invites tenderers to propose a program of local involvement in the supply (meaning, under ANZCERTA, New Zealand and Australian). All offers to include local industry are to be made voluntarily and should be “based on sound commercial practices.” This recognizes that opportunities for local involvement are limited due to the small scale of defense industries in New Zealand and Australia but that there are market niches where local suppliers are internationally competitive. Local content may include any element of the product life cycle. Export facilitation (countertrade) and broader technology diffusion (bundling of other requirements) are also encouraged.

In encouraging suppliers to volunteer industrial participation activities in projects, the ministry seeks to reduce its cost of equipment ownership, provide competitive local firms with opportunities to support defense ministry projects, encourage foreign suppliers to develop commercial relationships with local firms of long-term benefit to the Ministry of Defense, and develop and sustain local industrial capability that can competitively support defense equipment.

The Ministry is not to pay any cost premiums for a program of New Zealand industrial participation (NZIP). Three levels of activity are distinguished, and are assigned multipliers ranging from three to one, reflecting value to the Ministry. NZIP arrangements are most likely to apply to major capital items (over NZ$5 million). Once
agreed, deliverables under NZIP are included in and subject to the provisions of the supply contract that may include liquidated damages in the event of non-compliance.

Offsets

Defense offsets are described in the Guidelines as business activities of “defence relevance, directed to New Zealand companies or bodies, which are of commercial and technological significance and contribute to the development of New Zealand industrial capability.” Fulfillment of offset obligations arise when a foreign supplier contractually undertakes to direct appropriate business to a local company or to the Ministry of Defense. Activities that may qualify as defense offsets include:

- certain (usually applied) forms of R&D;
- a wide range of technology transfers;
- defense-relevant joint ventures with New Zealand companies;
- training;
- maintenance capability; new, defense-related exports and export marketing services; and other activities, e.g., providing facilities for New Zealand industry or venture capital.

Thus, defense offsets may take the form of local content, broadly defined countertrade, or bundling. Like their 1990s Australian counterpart, defense offsets in New Zealand must meet the criteria of commercial sustainability, the absence of price padding, technological sophistication, and new work.

In contrast to NZIP, offsets should “be sought” (i.e., are mandatory) at a level of 30 percent (negotiable) of the import content of the procurement contract. To be considered as New Zealand or Australian supplies, the local value-added must account for at least 50 percent of the value of the final product. Multipliers may be used to enhance the value of offsets for products significantly enhancing New Zealand’s industry capability.

Offset credits (against future offsets obligations) sometimes operate. When the level of NZIP exceeds 30 percent of contract value, the Ministry may waive all or part of the offset obligation. It may also allow exchange of offset obligations with NZIP. If the level of NZIP is less than 30 percent, the Ministry may require additional offsets to complement the NZIP.

Defense procurement and industry development objectives

Industry-related procurement strategies

Offsets are one of several delivery mechanisms available within the defense procurement process to achieve industry development objectives. Their application should not be divorced from the broader industry development objectives of the procurement agencies that apply them. Such objectives may be strategic, relating to the development of defense-related industry capabilities as the “fourth arm of defense,” or economic, to meet other industry development objectives identified by the government. In practice, the
distinction between strategic and economic objectives is blurred.\textsuperscript{3} Assuming such objectives to have been already determined, we ask about the role (if any) that offsets play in different industry-oriented procurement strategies and if mandatory offsets and local content requirements provide the best means of achieving the outcomes sought from such strategies.

In terms of industry-related procurement strategies, the ministry or department of defense may operate in the dimensions of location of supply (home versus overseas) and potential impacts on local industry capability, taking account always of final cost and delivery schedule. At one extreme, it might seek solely to achieve “best value for money” (i.e., the best price-performance-schedule combination), irrespective of the location of suppliers and without any specific aim to promote domestic industry development. We refer to this “best value for money” approach as the \textit{laissez faire} strategy. Mandatory offset requirements are incompatible with a \textit{laissez faire} strategy but negotiating over the bundling of different requirements is a normal part of trade—international and domestic. Buyers are free to solicit and suppliers are free to consent to the delivery of packages that include the supply of goods as well as the formation of in-country industry capabilities.

At the opposite extreme, the defense department or ministry may be required as a matter of general government policy to support specified domestic industry suppliers, or even a specific supplier. We call this approach the \textit{buy local} strategy. Value for money here is not a decisive consideration. This strategy may be applied to support the national defense industrial base, government-specified domestic industrial sectors, activities, or individual organizations (e.g., IT and shipping, exports and R&D, and a national airline, respectively), and/or domestic industry or the national economy overall. Offset requirements do not apply in this case, as, by definition, offset schemes apply only to foreign contractors (or domestic importers of foreign goods and services).

Between these extremes, defense procurement objectives may explicitly include domestic industry development and preferential terms for foreign inputs. Here value for money will continue to be sought, but subject to additional constraints and requirements. We refer to this approach as the \textit{best value for money with industry development objectives} strategy. This strategy may involve demands for offsetting local industry commitments from foreign contractors and domestic importers. These may take the form of local content requirements, countertrade, or bundling. Again, this strategy may be applied to support all or only part of the domestic economy.

A fourth approach, international work share arrangements, constitutes what we refer to as the \textit{buy multinational} strategy. This approach aims to enhance the participation of local suppliers in the global supply chains of multinational prime contractors. It includes agreed work share arrangements (e.g., the Eurofighter project), best-endeavor industry participation agreements (e.g., the Joint Strike Fighter project), and/or multinational agency-mediated industry participation (e.g., a membership in OCCAR).\textsuperscript{4}

\textit{Industry-related procurement strategies in Australia}

With the exception of the pure \textit{laissez faire} strategy and membership in a multinational procurement agency such as OCCAR, Australia has tried every procurement strategy described in the preceding section. New Zealand has not experimented as much. For this reason, we concentrate in this section on the Australian experience.
Between the 1950s and the early 1980s, the *buy local* strategy was used for certain products (e.g., shipbuilding, vehicle assembly using government-owned production facilities) for strategic and general economic reasons. Local preference margins applied to most government procurement, giving local suppliers a price advantage over imports. Radical microeconomic reforms from the early 1980s exposed Australian civil manufacturing to global competition. In this context, government procurement was seen as a means of securing technology transfers and stimulating investment in new high-value added activities, and offsets were seen as an effective way of pump-priming industry development by allowing Australian firms to acquire new technologies from foreign manufacturers.

In defense procurement, the *best value for money with industry development objectives* became the dominant, industry-related strategy, implemented through the AIPP and AII programs. “Under the AII framework, defence spending is to be directed to Australian industry when it is competitive with overseas sources, or to meet strategic and/or operational defence requirements” (ANAO, 2003, p. 11). As AII matured, poorly targeted, best-endeavors offset demands were replaced with apparently more enforceable mandatory offset obligations. A “stick and carrot” regime was also used to induce foreign suppliers to engage in the local economy (e.g., offset credits) and to penalize non-compliance (e.g., liquidated damages). Over time, the emphasis shifted from offsets defined broadly (countertrade, additional local production, and the bundling of primary equipment acquisitions with additional requirements such as technology transfers or training) to raising local content targets.

By the early 1990s, offsets, as defined under ADOP, had been relegated to the back burner to be used only in exceptional circumstances. The *best value for money with industry development objectives* strategy changed to a *best value for money with industry engagement objectives* strategy. This allowed the defense department to seek local content in contracts rather than target broadly specified reciprocal arrangements. Under the Bishop Procurement Rules, high local content targets are no longer to be achieved *per se* but the department tries to target the particular components of projects it requires to be undertaken by ANZ suppliers.

The joint Australian-New Zealand ANZAC frigate project provided an opportunity to experiment with the *buy multinational* strategy. Under the ANZAC Ship Treaty, Australian and New Zealand industry was treated as a combined national defense industrial base with local content work subcontracted to Australian and New Zealand firms on a best-endeavors basis. This application of the strategy remains an example of a successful, albeit one-off, initiative. Australia’s participation in the United States’ Joint Strike Fighter (JSF) project may be viewed as a further evolution of the *buy multinational* strategy (see below).

The Department of Defense now appears to follow an *eclectic procurement* strategy, comprising the previous *best value for money with industry engagement objectives* approach, the *buy local* approach (seeking long-term partnering arrangements with selected prime contractors), and a *buy multinational* strand (e.g., Australia’s participation in the Joint Strike Fighter program to secure long-term involvement of local firms in global supply chains). The strategy also includes a commitment to demand management to facilitate the long-term smoothing of domestic demand. The *eclectic strategy* is about as mature as it could be in providing scope for government to achieve a desirable balance.
between the often-conflicting objectives of national security and industry involvement. The challenge, however, is in its application and management, and in knowing precisely why and when a particular procurement option is to be selected.

The defense department has not fully embraced this task. The 1998 DISPS foreshadowed greater focus on strategic priorities in AII. This was to be achieved through more transparent links between industry support objectives maximizing ANZ industry participation at the project level and broader industry development objectives described in *Defence Needs of Australian Industry* (DoD, 2000b). To date, the department has not implemented the suggested approach. In 2001, the government’s decision to adopt sectoral industry plans switched the policy focus from industry-wide to sectoral considerations. Thus, it could be argued that strategic priorities for AII would be set out in sectoral plans. As of September 2003, the sectoral plans remain under consideration by the government and it is not apparent how the stated intention of using a smaller number of prime contractors and key industry partners can be combined with the general principle of maximizing ANZ industry involvement in defense procurement.

It is apparent that the most recent Defence Capability Plan (DCP), a long-term projection of new asset acquisition by the ADF and a key element of the 2000 Defence White Paper (DoD, 2000a), has been overtaken by events (ASPI, 2003). A basic dilemma for the defense department, in an uncertain and turbulent strategic environment, is whether it is in a position to make long-term commitments to industry that would provide it with more predictable workloads. As Australia’s strategic posture is increasingly determined by events beyond the government’s control (e.g., the US government’s response to Iraq in 2003), and subject to short warning times, it is not clear how the department might give AII a better focus on strategic, long-term priorities. AII may need to have its emphasis shifted from in-country production to the provision of through-life support for largely imported weapon systems.

The envisaged acquisition of technologically advanced weapon systems (e.g., replacements for F-111 and F/A-18 aircraft, new air warfare destroyers, new combat systems for the Collins class submarines) over the next 15 to 20 years will present a further challenge for AII. The projected acquisitions will involve a leap into (US-dominated) product technologies that are likely to place new demands on industry support in Australia and, in turn, trigger a major restructuring of local defense-related industries. This is already evident from Australia’s involvement in the Joint Strike Fighter (JSF) program where, for a US$150 million “access fee,” Australia acquired Level III (informed) Partner status. This form of the *buy multinational* strategy is being viewed as a template for many future Australian acquisitions, and an inter-departmental JSF Industry Advisory Council has been set up to assist local industry in embracing the attendant technological challenges and in bidding for future JSF work (ANAO, 2003). In principle, traditional offset and work share arrangements are specifically excluded from the JSF program as all subcontractors are expected to be internationally competitive. In practice, *de facto* reciprocal trade is likely to emerge.

While the rhetoric of Australian industry participation in the project sounds like the familiar rationale for AII (ANAO, 2003, p. 50), the reality is that participation in the JSF supply chain is likely to be limited to firms that are well established and have a track record of highly competitive supply. There appears to be little scope for pump-priming new or untested suppliers as was the case under AII over the past 15 years (e.g., the
Australian Submarine Corporation). The JSF program may produce reciprocal work for Australian firms, probably in through-life support, but they will have to be highly competitive.  

While the old-style AII aimed to develop new industry capabilities in Australia, JSF suppliers are likely to be drawn from existing successful producers. Whereas import substitution dominated the old-style AII arrangements, successful participants in the JSF component supply chain will be largely export-oriented (an informal but de facto buyback operation). As Australia draws closer to the US and interoperability with US-made systems becomes an operational necessity, the scope for sourcing equipment from non-US suppliers will decrease and JSF-style variants of the buy multinational procurement strategy may come to dominate large Australian acquisitions in future.

**Industry development outcomes**

Australia’s defense industrial base enables it to pursue a significant degree of self-reliance, an essentially strategic matter. Early in the 1990s, the defense department identified several industry capabilities critical to the self-reliance of Australia’s defense forces: C3I, IT, surveillance, weapon platforms, weapon systems, munitions, and logistics support. There is a broad commitment to maintaining these capabilities in-country, although as the example of shipbuilding shows, it is not clear which of these capabilities are really strategic in-country “must haves” and which belong to the “nice-to-have” category (ASPI, 2002).

While monitoring of AII has not been very accurate (ANAO, 2003), local content and SIDAs are said to have accounted for a relatively high proportion (average 57 percent) of new contract value in 2000–01. In that year, AII as a percentage of contract value for new capital equipment was 43 percent for aerospace systems, 68 percent for electronic systems, 44 percent for land systems, and 70 percent for maritime systems (ANAO, 2003, table 3, p. 69).

Industry outcomes associated with offsets have failed to live up to their promise (DoD, 1994; Hall and Markowski, 1996). An offsets database has been maintained by the defense department since the early 1970s and was analyzed by the authors in the mid-1990s (Hall and Markowski, 1996). The analysis revealed that although the post-1986 mandatory offsets regime had resulted in higher average annual offset obligations, its best-endeavors predecessor had done better than might have been expected. The 1986 mandatory offsets regime apparently produced a higher ratio of offset obligations acquitted as a proportion of all obligations. Over the 12 year period (1981/82 to 1993/4), the two dominant categories of acquittal, at 33 percent and 24 percent, respectively, were part production and assembly (i.e., local content) and purchases of Australian-made products (countertrade). Technology transfers and overseas market assistance (bundling) accounted for 18 percent and 6 percent of acquittals. But without further analysis, compliance with offset requirements should not be interpreted to benefit the defense department and/or the economy at large.

Industry and the department usually deny the presence of local content related cost premiums, and the calculation of such premiums is of course difficult when it is not clear what is to be compared with what.  

That said, the Department of Defense itself calculated that the cost premium paid for local industry participation in assembly of F/A-18 aircraft
in the late 1980s amounted to 29 percent of the value of the additional work required to be done in Australia (DoD, 1994, annex A, p. 8).

Overall, a recent report by the Australian National Audit Office (ANAO) has found that “…Defence had set up a well structured approach to ensure that AII considerations are addressed in the procurement phases of capital equipment projects. Stakeholders in the AII Program, including industry, with near-unanimity, agreed that the AII framework is an essential element in achieving reasonable outcomes in Defence procurement for Australian industry and Defence” (ANAO, 2003, p. 14). But the report also notes that “…Defence had no agreed outcomes or outputs to be achieved in the pursuit of either of its AII Program objectives [and] in the absence of quantitative and/or qualitative performance measures for the AII Program as a whole, it was not practicable for Defence to demonstrate whether, over the many years of its existence, the AII Program has been making real progress, or is losing ground, in seeking to meet its objectives” (ANAO, 2003, p. 14).

Conclusions

Australia’s experience of using different industry-related strategies and delivery mechanisms in defense procurement, including best-endeavors and mandatory offset schemes, is arguably richer than that of any other small industrial economy. Although the term offsets has had a rather specific meaning in the context of the Australian (and New Zealand) Industry Involvement program, the whole program can be described as offsets using our definitions (Markowski and Hall, 2004). Both AII and NZII are a combination of local content arrangements, which we describe as a form of countertrade, and additional offsets, which may take the form of additional local content requirements, bundling, or other countertrade.

The Australian experience shows that both best-endeavors and mandatory offset schemes are a rather inefficient means of achieving strategic industry development outcomes. They are poorly targeted as they relate to all defense capital imports rather than focus on specific industry capabilities of particular strategic significance. If the formation of a local industry capability is to be achieved for strategic or broader economic reasons, it is best to combine this requirement with the (primary) demand for equipment and seek the delivery of both in contract. As we argue in Markowski and Hall (2004), broadly targeted schemes are unlikely to deliver better social outcomes than an unencumbered negotiation allowing the procurement organization to seek the best social value for money. However, to be successful in negotiating good strategic or general economic outcomes, the procurement agency must be able to focus its industry development program on specific industry capabilities. Demanding some vaguely specified industry capability enhancements at no additional cost is usually counterproductive.
Notes

1. It is unclear that the stop-go cycle of demand actually impedes investment, results in large cost premiums, and undermines the strategic role of local industry as the fourth arm of defense. Since the late 1980s, a number of large (by Australian standards) projects (e.g., the Collins class submarine, ANZAC frigate, and coastal mine hunter) have shown that in-country production can start relatively quickly. Project-specific resources can be assembled with short lead times while the Australian economy is mature enough to provide complementary infrastructure support. Australia imports designs for most of its home-made weapon systems and the ability to surge into larger volumes of production is of limited value in modern, “come as you are” warfare. Thus, it is not at all clear why the sustainment of specific defense industrial production capabilities is essential for strategic reasons. Economic arguments are even harder to sustain, given the small and often capricious domestic demand, the rate of technological change (imposing large R&D costs), poor prospects for technology spillovers into the civil sector, and very restricted export opportunities.

2. Broader benefits of the in-country production of weapon systems have often been claimed in Australia but the only systematic attempt to validate this claim are two Tasman Economics studies. For example, it is argued that the ANZAC ship projects increased Australian GDP by between $200 and $5,000 million per year over the 15 year construction phase and created some 7,750 full time equivalent jobs (Tasman Economics, 2000; 2002). For this to be regarded as a net benefit to Australia, it is necessary to assume that no cost premiums are associated with the project relative to alternative imports and that, as the only alternative to in-country sourcing of the frigates, the ships would have been fully imported from overseas. Many such “what-if” scenarios can be chosen to demonstrate much smaller value of the project to the Australian economy. The essential point, however, is that if no cost premiums are involved it is generally advantageous to procure weapon systems in country. This broadens the Australian manufacturing base and may result in some technological spillovers and skill transfers to other industries. While the existence of such benefits has been claimed, and some supporting evidence has been provided by the two Tasman studies, little is known about the long-term impact of in-country defense procurement on human capital formation and use elsewhere in the economy. Further research in this area would be most useful.

3. For over a decade, warship building (submarines, frigates, mine hunters, and patrol boats) has been represented as strategically necessary. But modern warfare is very much a “come-as-you-are” affair and in-country capability to build new platforms in emergency appears to be of little strategic benefit (ASPI, 2002). It is the ship repair, cross platform system integration, and IT-related industry sectors that appear more significant from a strategic point of view. There is also little evidence of any prospect for significant technological spillovers from warship building to the broader economy.

4. OCCAR is a joint procurement agency of France, Germany, Italy, and the UK that aims to improve the efficiency of European armament collaboration through competitively let contracts.

5. Interestingly, New Zealand introduced its ADOP-inspired mandatory offsets program at the time when Australia was having second thoughts about the effectiveness of offsets.

6. Better demand management and partnering with industry have since become a mantra of defense industry policy (DoD, 1998; DoD, 2002). This approach has been combined with policy moves to achieve greater integration of the Australian national defense industrial base with the global defense industry. To improve demand management, significant efforts have been made to involve industry in defense capability planning.

7. Given the country’s geographic remoteness, it is reasonable to expect the aircraft to be serviced in-country although the scope for repairs and re-work will be limited as aircraft
components are modularized with serious re-work to be undertaken by their original manufacturers.

8. Tenix, the prime contractor for ANZAC ships, advised an industry consultant that anecdotal evidence put the premium at plus/minus 5 percent. The defense department has no recent estimates but it has earlier anticipated the cost penalty for the ANZAC ship local content to be around 3.5 percent (Tasman Economics, 2000, pp. 9–10). For the mine hunter project, “representatives from the Department of Defence contacted in the course of this study did not indicate that the Department paid a premium” (Tasman Economics, 2002, pp. 73).

References


Defense industrial participation: The South African experience

J.Paul Dunne and Guy Lamb

Introduction

South Africa faces one of the world’s most controversial arms deals involving offsets. The degree of coverage, of both relative transparency and simultaneous lack thereof, and of public debate is unprecedented and has provided important and disturbing insights into the workings of the international arms trade. This makes it an important case study for research on the economics of offsets.

In September 1999 the South African cabinet approved a R29.9 billion arms acquisition program for its armed forces, the South African National Defense Force (SANDF).1,2 To justify its decision to purchase arms from foreign suppliers and to win public support for the deal, government stressed the potential positive effects of sellers’ proposed industrial participation offers (offsets) on investment, job creation, and growth in South African defense-related industry and the national economy at large. At the time of approving the program, it was stated that foreign suppliers had made offset offers worth an extraordinary R104 billion, more than three times the value of the arms deal itself. This would result in the creation of more than 65,000 jobs over a period of 7 years.3 Since then the deal has been mired in controversy and has seen considerable debate and public scrutiny, to an extent unrivaled in any other country.

This chapter considers this experience. The next section provides historical background that briefly explains the unusual nature and development of South Africa’s arms industry, its offset policy, and the arms procurement package that led to the present controversies. Then an attempt is made to evaluate the general impact of the arms deal, before considering its more specific costs and benefits. The important political fallout of the deal is then outlined. The final section draws some conclusions.

South Africa’s defense-related industry and offsets

From the 1960s until the beginning of the transition to democracy in 1990, South Africa maintained a high and increasing military burden4 in support of the apartheid state. The military burden peaked in 1977 at just under 5 percent of GDP. This reflected the purchase of large amounts of imported weapons prior to the imposition of a mandatory United Nations arms embargo in 1977 (Batchelor, Dunne, and Lamb, 2002) and led to the creation of a military-industrial complex centered around the state-owned arms producer Armscor, with private firms acting as subcontractors. Resources flooded into the arms and other strategic industries, creating growth, but leading to inefficient allocation of investment and to serious economy-wide problems in the 1980s (Batchelor, Dunne, and Saal, 2000). Between 1989 and 1997, South Africa’s defense expenditure declined by
more than 50 percent, and the public sector was restructured and commercialized. Armscor’s production side was split off to form Denel in 1992.\(^5\) The defense firms pursued a number of supply-side adjustment strategies, with Denel and the three largest private sector defense groups (Reunert, Grintek, and Altech) experiencing financial problems. All of the private firms reduced their dependence on defense work to less than 20 percent of turnover with significant increases in non-defense work and export orders. This took place in a policy vacuum, with the government adopting a “hands-off” approach to defense industrial adjustment as military spending declined (Dunne, 2003; Goga, 2003). As from 1996, a national Defense Review (RSA, 1998) put defense industrial policy back on the agenda. Of four force design options, the one that emphasized reduced manpower and increased capital intensity\(^6\) was approved by cabinet and parliament in April 1998.\(^7\) Armscor subsequently issued requests for tenders to foreign suppliers to meet SANDF’s new equipment requirements, with all potential foreign suppliers being notified of the government’s new offset policy and requested to submit appropriate proposals with their tenders.

The approval of a large arms import procurement order was an explicit recognition that an all-purpose defense industry could no longer be supported but that specific companies may prosper in niche markets. It was the offsets, that is the defense industrial participation (DIP) policy, that was to facilitate this. Developed from a national industrial participation (NIP) policy, which came into being in 1996,\(^8\) the DIP policy aimed to retain and create jobs, abilities, and capabilities, allow a sustainable defense industrial capacity with strategic logistic support capabilities, to promote value-added arms exports, promote like-for-like technology transfer and joint ventures, and maintain skilled indigenous manufacturing capabilities. It included requirements that there should be no increase in the arms purchase price as a result of industrial participation,\(^9\) that offsets must represent new, not merely redirected, business, that it must be economically and operationally sustainable, that it must result directly from the arms purchase contract,\(^10\) and that the fulfillment of any obligation was to lie solely with the seller. Allowable industrial participation projects and activities were investments, joint ventures, subcontracting, licensed production, R&D collaboration, export promotion, and supply partnerships.\(^11\)

For NIP policy related to Department of Defense (DoD) purchases, the value threshold was set at US$ 10 million (or equivalent), with DIP obligations split 50:50 between national (i.e., non-defense) and defense priorities. All DIP activities were to be managed by Armscor and all non-military portions by the Department of Trade and Industry (DTI) in accordance with NIP policy provisions. The discharge period for all DIP obligations was 7 years. A penalty of 10 percent is to be levied by
### Table 19.1: South Africa’s arms acquisition program

<table>
<thead>
<tr>
<th>Program</th>
<th>Number of units</th>
<th>Supplier</th>
<th>Cost (R millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tranche 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corvettes</td>
<td>4</td>
<td>Germany</td>
<td>6,917</td>
</tr>
<tr>
<td>Submarines</td>
<td>3</td>
<td>Germany</td>
<td>5,354</td>
</tr>
<tr>
<td>Light utility helicopters</td>
<td>30</td>
<td>Italy</td>
<td>1,949</td>
</tr>
<tr>
<td>Jet trainer/light fighter</td>
<td>12/9</td>
<td>Britain/Sweden</td>
<td>7,110</td>
</tr>
<tr>
<td>Total: Tranche 1</td>
<td></td>
<td></td>
<td>21,330</td>
</tr>
<tr>
<td>Tranche 2:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jet trainer/light fighter</td>
<td>12/19</td>
<td>Britain/Sweden</td>
<td>8,662</td>
</tr>
<tr>
<td>Total: Tranche 1 &amp; 2</td>
<td></td>
<td></td>
<td>29,992</td>
</tr>
</tbody>
</table>

**Note:** *Total value of IP activities as a percentage of purchase cost

**Source:** Department of Defense, Defense Acquisition Package, 18 November 1998.

Armscor, with the approval of the DoD, on unfulfilled portions of DIP obligations for contracts worth US$10 million or more.12

In September 1999, cabinet approved a revised version of the arms acquisition package and made available public information about the cost of each of its components, together with some details about the foreign suppliers’ NIP proposals (see table 19.1).13 The total direct cost of the acquisition program was estimated at R29.9 billion (at 1999 prices and exchange rates), to be paid out over a period of at least 8 to 14 years, with equipment to be delivered between 2000 and 2008. Benefits were to be realized in three categories:

- Direct defense-related offsets (about 20 percent of the total), including direct purchases from South Africa’s defense industry, technology transfers, and export orders for local defense firms;
- Indirect offsets, or counterpurchases, by foreign defense suppliers of non-defense goods and services from South Africa (about 45 percent); and inward investment in South Africa’s defense and non-defense industries by foreign defense suppliers and companies associated with the suppliers (about 35 percent).14

Each of the arms acquisition program items carried a 5 percent penalty clause for non-delivery on NIP and DIP projects and activities.

The official original cost of the arms deal was R30 billion, but as a result of changes in the exchange rate and increases in managing costs, this jumped to R53 billion. Unofficial estimates are much higher. The original total NIP estimate was R110 billion, but is now
estimated to be R140 billion, again largely the result of currency fluctuation and other problems.\textsuperscript{15}

\textbf{The impact of the arms deal}

One of the most important benefits of the arms deal was to be its impact on local industry. Local companies did benefit through direct DIP activities by foreign suppliers buying subsystems and components, either under license or in collaboration with the foreign suppliers. The effect has been to provide orders to domestic companies and opportunities for companies to develop niches in the international arms market. For instance, Denel has been contracted to build the tail section for the RAF’s Hawk fighter trainers.\textsuperscript{16} It is also building landing gear fuselage sections for the Gripen jet fighter, and rudders and ailerons for other BAE Systems aeroplanes, although these are not overly high-tech manufacturing operations. There is an increasing participation of European defense groups and investors in the South African industry, at prime contractor and subcontractor levels. (This is part of ongoing restructuring and expansion of international defense groups such as EADS and Thales.) In-country divisions can influence government-to-government dealings to the benefit of the parent company and local subsidiary.

The value of purchases from South Africa’s defense industry are dependent on their competitiveness (in terms of price, quantity, and delivery) and capabilities, and on whether foreign suppliers are confident that local inputs can be successfully integrated into their weapon systems. But market-driven downsizing and restructuring has led to a loss of capabilities, including skilled human resources, in many sectors and sub-sectors of the local industry. For instance, South Africa’s maritime and naval shipbuilding industry, concentrated in Durban and Cape Town, has downsized dramatically in recent years with the attendant loss of valuable capabilities and skills. The country’s only naval shipyard, Dorbyl Marine, closed in the early 1990s because of poor trading conditions. The industry thus lacks the capacity to design and manufacture major naval ships, including submarines, although a few companies have the capacity to design and manufacture small harbor patrol boats. The local maritime industry does, however, have limited capacity in naval electronics (including shipborne radar systems), systems integration (combat suites), ammunition (including naval bombs and mines), research and development, and ship repair and maintenance. Batchelor and Dunne (2000) had in fact suggested that this sector was not particularly well placed to benefit from the Navy’s acquisition program without significant investments to upgrade and expand its existing capabilities. Some of these predictions have become reality: for example, in January 2003 the corvette delivery schedule was set back by a year due to the installation of faulty copper communication cabling by a South African company.\textsuperscript{17}

In contrast, South Africa’s aerospace industry, concentrated in a few companies in Gauteng province (which includes Johannesburg and Pretoria), had a relatively well-developed capacity to design and manufacture missiles, aerospace engines, and fixed and rotary wing military aircraft. The industry also has significant capabilities in electronics (including radar), avionics, systems integration, weapon systems, and ammunition. Batchelor and Dunne (2000) suggested that this sector was well placed to benefit from
the arms deal, and this would appear to have been the case. With the finalization of the arms package, a number of European defense companies, including the preferred suppliers, made investments in South African defense companies, particularly aerospace and information technology companies. Most of this investment has involved equity purchases rather than fixed investment in plant and capital. The equity investments were linked to arms purchases from countries such as Germany, Italy, Sweden, and Britain but are also part of larger initiatives by European governments to promote increased trade between South Africa and themselves. There is also a growing number of joint ventures between European and South African defense firms. These are significant in that they involve technology transfers and should allow South African defense firms to become part of the European’s global supply chains. In addition, some evidence of a significant impact on South Africa’s defense exports is noted. In particular, European governments have been “prompted” to purchase South African defense products, despite criticism from European defense industries. Some of the preferred European suppliers also helped South African defense firms bid for, and win, other foreign defense contracts.

An important aspect of the arms deal was employment creation. South Africa has an unemployment rate of around 30 percent. Initial estimates suggested that the R104 billion worth of industrial participation commitments would create approximately 65,000 jobs. This sounds impressive but amounts to a cost of R1.6 million per job and is extremely high, nearly 20 times the average cost per job in South Africa’s defense industry. Batchelor and Dunne (2000) estimated that the R14.5 billion worth of potential DIP activities could create, or sustain, approximately 40,000 jobs (based on R350,000 per job) in the local defense-related industry. While foreign suppliers’ defense purchases from local defense-related industry, together with the prospect of increased defense exports, is likely to have a positive impact on job creation in South African defense firms, any such estimates are open to question. Even if these estimates are accepted, they represent considerably fewer jobs than could be created if the funds were used for purposes other than buying arms.

Government also attempted to use the arms purchases to leverage substantial investment in the non-defense sectors of South Africa. Here, it attempted to “direct” this investment to particular sectors (minerals and energy) of the industrial economy and to specific parts of South Africa such as the provinces of KwaZulu Natal, the Western Cape, and the Eastern Cape. It also sought to link this deal’s NIP project with other national economic and industrial policy initiatives, such as DTI’s Spatial Development Initiatives and Industrial Development Zones. Batchelor and Dunne (2000) suggested that many of the promised investments were highly dubious, and they seem to have been proved right. Their main example of potential problems was the German submarine consortium’s NIP proposal (valued at nearly R19 billion) that included the construction of a stainless steel plant by the German company Ferrostaal at Coega, near Port Elizabeth, and the establishment of a US$10 million venture capital fund to help small and medium manufacturing enterprises in the stainless steel industry. The steel plant was intended to form the anchor tenant for a planned deep water port at Coega, but this is not happening and the initiatives that have replaced it are mired in controversy (see Haines, 2004). For example, a condom factory in East London was to be constructed with substantial investment from Ferrostaal. Despite government statements that this initiative was one of the offset successes, it had still not materialized by August 2003. In fact, the record of
employment creation associated with investment in strategic industries (e.g., state companies Armscor, Sasol, and Mossgas) and massive capital-intensive mega-projects (e.g., the Columbus and Alusaf steel projects) in South Africa is not particularly impressive. For many of the mega-projects foreign exchange earnings are not repatriated, vertical integration does not take place, and job creation effects in downstream industries are not fully realized (Fine, 1997). It is not clear why the projects related to the arms deal should be any more successful.

Finally, due to the severe lack of reliable data providing an accurate analysis of the state of affairs of NIP developments is virtually impossible at this time. Nonetheless, DTI is providing a positive spin on NIP delivery and related job creation. For example, in August 2003, DTI announced that most NIP projects were on track, had already created 5,000 jobs, and would result in the establishment of a total of 15,000 direct jobs and 50,000 indirect jobs by 2011. Independent defense analysts and investigative journalists have suggested otherwise. The non-defense industrial participation developments that have been reported in the media certainly seem idiosyncratic: they include a spinning and yarn-dying project at Cape Mohair in Port Elizabeth ($1.3 million investment from Agusta), the manufacture of gold jewelry at Oro Filk Gold in Cape Town ($5 million investment, also by Agusta), an investment in a timber mill near Sabie by BAE/Saab ($90 million), and an upgrade of swimming pool facilities in Port Elizabeth aimed at promoting tourism from Scandinavia ($10 million).

Overall, it is clear that the arms deal has had a positive effect on South Africa’s economy, particularly in defense-related industry —after all, the billions must buy something—but there is little evidence that the predicted level of benefits have been or will be reached. Due to lack of full transparency and data access, net benefits cannot be assessed. There is also the important issue of the opportunity cost of the resources used in the deal; this is considered in the next section.

**Evaluating the costs and benefits of offsets**

As mentioned, the arms deal reflected renewed attention to defense industrial policy. Instead of ignoring the industry, the concern was about whether to retain some degree of arms production capability and what the possible economic costs of losing the industry might be. But this need not have concerned the government. A body of scholarly literature suggests that military spending is unproductive and generally yields either no statistically significant or a negative effect on economic growth in developing countries, with the negative economic effects exacerbated by investment in domestic arms production (Brauer, 1991; Dunne, 1995; 1996). Indeed, Batchelor and Willett (1998) argue that the expansion of the domestic arms industry (during the 1970s and 1980s) distorted the trajectory of the country’s industrial development (and) imposed a number of long-term economic costs on the economy. The absorption of scarce resources (capital, labor, and foreign exchange) and the crowding out of non-military public and private investment and of non-military R&D contributed to the underdevelopment, declining productivity, and poor international competitiveness of the civilian economy.

Despite marked downsizing and restructuring, South Africa’s defense-related industry remains highly capital, skill, import, and research intensive, with very limited links to the
civilian economy. The country has retained an advanced arms production capacity, although not over a comprehensive range of systems and not independently of the major international players. Given the nature of the international industry and intense competition among the group of peripheral producers that South Africa finds itself in, it is not clear that its prospects are particularly rosy.

In constructing the arms deal, it is clear that the South African government made a serious attempt to develop industrial participation policies that reflect lessons learned by other countries. But there are fundamental problems with offsets in general, and with the South African case in particular, that are apparent from the available literature which does not instill confidence that the benefits promised to South Africa’s economy will ever be realized. The impact of offsets is often found problematic in terms of job creation, the strengthening of backward and forward linkages, and technology enhancement (e.g., Struys, 2001). Nor do they constitute a “third way” for economic development of LDCs (Batchelor and Dunne, 2000). A study of Saudi Arabia’s defense offset programs reveals that instead of a projected 75,000 local jobs, the various programs generated employment in the region of 2,000 (Matthews, 1996). Few countries appear to have been successful in using defense offsets to embed and extend technology transfers. Those domestic defense industries that are expected to benefit from offset deals are often characterized by technologies developed within the particular confines of the defense sector, that have limited links with civil industry (Batchelor and Dunne, 2000). What is required is a “high degree of local technological absorptive capacity” to be achieved through a state-sponsored “civil-military, Science and Technology strategy” (Matthews, 1996), but this is unlikely to be forthcoming. There is also the possibility of firms reneging on contracts and simply paying agreed penalties. In addition, there is the question of capacity within government (e.g., DTI and Armscor) to fully monitor implementation of NIP and DIP offers over time.

Doubtless, some portion of South Africa’s defense industry is benefitting from direct offsets, and while it might struggle to retain the capabilities to produce a range of advanced weapon systems it could become part of the global industry as subcontractor to some of the foreign equipment suppliers. But while the aerospace and electronics industry would seem to be benefitting significantly, there is the question of whether they can survive once the orders off the current arms deal are filled. It is not clear that the companies will be internationally competitive to allow follow-on industrial development to be sustainable. The concerns about the capacity and capability of the local naval industry to fully benefit, particularly in relation to Navy orders, is even greater. Indeed, whether South Africa should be maintaining a defense industrial base at all is an important question, given the evidence that it can be a drain on the economy. Off-the-shelf purchases would have been cheaper and would have allowed government to allocate savings to encourage conversion from military to non-military industries. This would have permitted it to develop those areas of the economy with the highest potential for economic growth and job creation, thereby dealing more effectively with the current high levels of unemployment.

It would also seem that many of the foreign suppliers’ NIP offers are questionable. For instance, it is not clear whether South Africa is getting state-of-the-art technology in areas of growth, or old technology in areas of overcapacity (e.g., stainless steel). The dangers are clear. After the economic damage caused by resource misallocation to strategic
industries and capital-intensive mega-projects under *apartheid*, it is important not to make the same mistakes again. It is not clear from our survey of the issues that the implications for industrial policy implicit in some of the offset offers have been fully thought through. It is certainly the case that the alternatives have not been given adequate consideration. A related issue is whether government should be using its industrial participation policies (and its human resources) to support the maintenance of indigenous defense production capability. Instead, it could support a strategic capability to assess and make informed choices among competing weapon systems (i.e., an intelligent customer capability). This would seem preferable given the costs of maintaining local defense production capability, the current state of certain sectors of the defense industry, and the fact that the international market has relatively stagnant demand and excess capacity.

All-in-all, it would seem clear that the use of the arms deal to benefit local industry had a high opportunity cost. Moreover, moving South Africa into the murky world of international arms trade also brought negative externalities, discussed in the next section.

**Political fallout**

In political terms, the arms deal brought significant negative externalities. The deal reverberated throughout government departments, parliament, cabinet, the ruling party, and the public. In late 1999, in the immediate aftermath of cabinet’s approval of the arms procurement program, allegations appeared in the public domain that certain officials who had been responsible for deciding on who the successful suppliers would be had received bribes from certain bidders. One of the most vocal South African accusers was a Member of Parliament for a small opposition party.29 These allegations, largely due to pressure from parliament’s Public Accounts Committee, resulted in a series of investigations into the decision making process with respect to the arms deal, the most significant of which being the joint investigation undertaken by the offices of the Auditor General, the National Directorate of Public Prosecutions, and the Public Protector. According to the report of the investigation, “no evidence was found of any improper or unlawful conduct by Government” (RSA, 2001, p. 373). But the report suggested that certain government officials had acted in an improper and irregular fashion. Particular mention was made of conflict of interest of the Chief of Acquisitions in the Department of Defense at the time.30 The essence of this conflict of interest was that his brother owned a company engaged in direct links with one of the successful bidders, the Thomson Group (now Thales) and would benefit from contracts awarded to Thomson. The Chief of Acquisitions was suspended from DoD in 2002 and resigned shortly thereafter.

Further evidence of improper practices came to light in 2002 when the ANC Parliamentary Chief Whip31 was arrested on fraud and corruption charges. Allegedly, he received a bribe from one of the bidders, and it was charged that he actively concealed the bribe from parliament. In February 2003, he pleaded guilty to the fraud charges in the Pretoria Commercial Crimes Court but was acquitted on the corruption charges. He subsequently was sentenced to four years in prison. Evidence also entered the public domain that suggested that the Minister of Defense at the time decisions on arms procurement were made32 had a conflict of interest. It appeared that he and four other
senior defense officials had controlling stakes in a company, Log-Tek (later Conlog Holdings), with direct links to successful bidders. The Directorate of Special Operations (known as the Scorpions), which falls under the National Directorate of Public Prosecutions (Department of Justice), initiated an investigation into the arms acquisitions deal and pursued other possible improper practices. As of late 2003, they are investigating allegations of corruption, tax evasion, and fraud against the brother of the Chief of Acquisitions at the time of the deal. They also investigated allegations made against South Africa’s Deputy President, namely that he attempted to solicit bribes from Thomson (now Thales) with respect to the arms deal and to future contracts, This investigation received extensive coverage in national and international media. In August 2003, the Director of Public Prosecutions announced that no legal action would be taken against the Deputy President on the grounds that even though “there is a prima facie case of corruption against the deputy president, our prospects of success are not strong enough.”

Given the nature of the international arms trade, with its secrecy, non-transparent negotiations, and the importance of commissions and bribes (Sampson, 1991), it is no surprise that there would seem to be evidence of wrongdoing in the South African case. The meeting of an inexperienced government with the shady dealings of the international arms industry was always likely to lead to such problems. The resulting impact on the workings of a new democracy have been particularly damaging and must be counted as an important if not quantifiable cost of the arms deal.

Conclusions

Post-apartheid South Africa faces a number of economic challenges which include attracting foreign direct investment and creating jobs. To help deal with this, government decided to spend nearly R30 billion on imported arms for its armed forces. At no point did government consider trying to limit the purchase costs of the acquisition program by simply buying the cheapest off-the-shelf weapons (or even second-hand weapons). Instead, it invested considerable effort into negotiating offset offers from foreign equipment suppliers to benefit local defense-related industry and the national economy. Leaving aside the issue of whether the expenditure on arms was necessary at all on security grounds, the choice of imports with offsets was risky. The purported economic benefits of offsets have been questioned and what little empirical evidence had been available already suggested that they tend to have a much smaller impact on the local economy than is usually promised. It is difficult to judge whether arms prices are reasonable since there are no standardized goods and fixed prices in the defense market. It is also unclear whether the work attached to offsets is genuine new work and whether it is sustainable once the term of the arms deal expires. Thus, there are considerable doubts about whether South Africa as a whole has or will benefit from the deal. At the same time the political costs are clear.

In sum, this chapter suggests that the South African government cannot claim that the country has benefitted from the decision to go the arms offset route. A more sensible strategy might have been to leverage investment into sectors with a capacity for mass employment creation, sectors that can make a positive contribution to South Africa’s
infrastructure capacity, and toward meeting basic needs in public utility sectors such as housing, transport, tourism, energy, and communication. The South African experience provides valuable insights into the positive and negative aspects of defense offsets for small industrializing and developing economies but, on the whole, casts further doubts on the claimed benefits of purchasing arms with offsets and the advisability of them engaging in such deals.

Notes

J.P. Dunne is grateful to the ESRC for support under research grant R00239388.

1. The rand went from around 5 to the £ in 1990 to 18 in 2002 before starting to decline. In late 2003, it is around 11 to the £ or around 6.5 to the US$.

2. The original program and list of preferred suppliers was approved by cabinet in November 1998. The revised program, approved by cabinet in September 1999 was divided into two tranches: the first, costing R21.3 billion, will include 3 submarines and 4 corvettes from Germany, 12 jet trainers from Britain, 9 light fighters from Britain and Sweden, and 30 light utility helicopters from Italy. The second tranche, costing an additional R8.6 billion will include 12 jet trainers from Britain and 19 light fighters from Britain and Sweden. The 4 maritime helicopters from Britain, and the balance of 10 light utility helicopters from Italy are excluded from the revised program.


4. Military burden is military expenditure as a percentage of GDP.

5. Armscor’s procurement policies, including more transparent and competitive procurement from local and foreign suppliers, fundamentally altered the cosy relation evident between public and private sector industry during apartheid. In addition, since 1994, the ANC-led government’s commitment resulted in a number of black-empowerment deals and equity partnerships between black-owned companies and the (largely white) private sector.

6. It proposed reversing the trend of increasing personnel and operating expenditure to allow for increased capital expenditure by cutting personnel levels in the SANDF from 100,000 to around 70,000 by 2000/01. The proposed rationalization process would reduce the share of personnel expenditure to 40 percent and operating expenditure to 30 percent of the total defense budget, thereby allowing capital expenditure to increase to 30 percent, a level last achieved in 1993/94 (see RSA, 1998).

7. This option recognized that there was no short or medium term military threat to South Africa, and that the defense budget would remain restricted for an extensive period of time. This option also envisioned the acquisition of a wide range of major defense equipment, and these purchases would require cabinet and parliamentary approval (RSA, 1998, pp. 34–48).

8. Offsets, or industrial participation as it is officially referred to in South Africa, became mandatory for all government purchases in September 1996. NIP obligations affect all government and parastatal purchases or lease contracts (goods, equipment, and services) with an imported content equal to or exceeding US$10 million (or the equivalent thereof). The obligation must equal or exceed 30 percent of the value of the imported content of the purchase or lease and must be fulfilled within 7 years from the effective date of the industrial participation agreement. The prospective foreign seller/supplier has to submit and implement business projects that would generate credits equaling or exceeding the 30 percent obligation. A 5 percent performance guarantee is required prior to the contract being awarded. The mission of the NIP policy is “to leverage economic benefits and support the development of South African industry by effectively utilising the instrument of government
procurement.” The stated objectives of NIP policy are: sustainable economic growth; the establishment of new trading partners; the generation of inward foreign investment; increasing exports of “value added” goods and services; R&D collaboration; job creation; human resource development; technology transfer; and the creation of economic advantages for previously disadvantaged communities.

9. This is very difficult to police as there is no fixed price for imported arms.

10. The exception is the Strategic Partnership Agreement (SPA), a long-term agreement between government and supplier that is not linked to a single tender.

11. In evaluating industrial participation proposals, a credit system is used that allows for the accumulation of credits.

12. Armscor levies a penalty up to 30 percent on the unfulfilled portion of DIP obligations for contracts worth between US$2 million and US$10 million.

13. Parliament’s approval was not sought. Instead, the Executive argued that parliament’s approval of the Defense Review (RSA, 1998) equated with approval of an acquisition program.


15. In terms of the suppliers’ currencies, the total commitments for the main consortia were BAE/Saab US$7.2 billion and Ferrostaal €2.85 billion.


17. Allegedly, the original cabling had to be removed to install better quality cabling (Mail and Guardian, 3 January 2003 and 15 February 2003).

18. For example, in early 1999 Denel’s Somchem division was awarded a R1 billion contract to supply fuses for the AS90 155mm howitzer guns used by British peacekeeping forces in Bosnia (Business Day, 6 January 1999).

19. According to Statistics South Africa, the unemployment rate is estimated to be 29.4 percent, but the South African Institute of Race Relations (SAIRR) suggests that it may be as high as 36 percent (see SAIRR, 2001, p. 333).

20. As presented by government in September 1999.

21. In 1997 the cost per job (remuneration costs per employee) in the public sector defense industry (Denel) was R93,722 while in the private sector (e.g., Reunert) it was slightly lower at R82,838. However, this is not an accurate reflection of costs associated with maintaining or creating jobs in the defense industry. In 1997 turnover per employee in the public sector defense industry (Denel) was R231, 898 while in the private sector (e.g., Reunert) it was more than double—R464,633 (Batchelor and Dunne, 2000).

22. Reallocation of defense spending to other forms of government spending have been shown to increase employment and output (see discussion in Dunne, 1996).


28. Botha (2003) makes claims for the success of the deal, but the study is singularly uncritical and unconvincing. For example, the paper puts a very positive spin on the contracts placed, using Armscor sources and interviews with Armscor officials to provide data on contracts placed. There are also a number of claims based on company sources, with no evidence cited. The report accepts all of these claims uncritically, without any attempt to seek evidence. In addition, there is no reference to published studies on the South African defense industry and the arms deal in the report.

29. Ms. Patricia de Lille of the Pan African Congress.

30. Mr. Shamin “Chippy” Shaik.
31. Mr. Toni Yengini.
32. Mr. Joe Modise (who died in November 2001).
33. Mr. Schabir Shaik, who is to appear in the Durban High Court in early 2004 on charges of corruption, tax evasion, and fraud, many of which relate to the arms deal.
34. Mr. Jacob Zuma.
35. Sunday Times, 24 August 2003. Shortly after this announcement, allegations emerged within the public domain that the Director of Public Prosecutions, Ngcuku, had been a spy for the security forces during apartheid. With a serious crisis brewing within the ANC, President Thabo Mbeki, in an attempt to limit the political damage, launched a judicial commission of inquiry, the Hefer Commission, into the spying allegations.
36. Indeed, this led Transparency International to call for an end to offset deals (Transparency International, 2002).

References

Appendix: National industrial participation policy

The evaluation of industrial participation proposals and the awarding of credits are based on the following methodology:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Methodology</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable economic growth</td>
<td>Revenues accumulated over the fulfillment period</td>
<td>$1=1 credit</td>
</tr>
<tr>
<td>Export promotion</td>
<td>Export revenues = additional credits</td>
<td>$1=1 Credit + LC*</td>
</tr>
<tr>
<td>Job creation</td>
<td>Salaries and wage costs accumulated over the fulfillment period</td>
<td>$1=1 credit</td>
</tr>
<tr>
<td>Training and development</td>
<td>Training and development costs accumulated over the fulfillment period</td>
<td>$1=1 credit</td>
</tr>
<tr>
<td>SMME promotion</td>
<td>Outsourcing to SMMEs</td>
<td>$1=1 credit</td>
</tr>
<tr>
<td>Previously disadvantaged individuals</td>
<td>Outsourcing to PDI SMMEs PDI ownership % x revenues % = credits</td>
<td>$1=2 credits</td>
</tr>
<tr>
<td>Investment</td>
<td>Capital outlay or capital injections</td>
<td>$1=2 credits</td>
</tr>
<tr>
<td>R&amp;D expenses</td>
<td>All costs</td>
<td>$1=2 credits</td>
</tr>
<tr>
<td>Technology transfer</td>
<td>On a case by case basis linked to revenues</td>
<td>$1=1 credit</td>
</tr>
</tbody>
</table>

Note: * LC = local content

Defense offsets and regional development in South Africa

Richard J.Haines

Introduction

Providing offsets has become a major part of the international trade in arms, but there is debate over how substantive the benefits of offsets are. Questions have been raised about the accuracy of the estimated benefits to the economy (e.g., the actual value-added as compared to the purported value-added) and about what sort of linkages offsets form with the economy. This debate is of particular importance in South Africa where a large defense offset deal, on the order of $5 billion, announced in late 1998, is now taking shape in terms of the conceptualization and implementation of projects. The arms-related offset package—called the Strategic Defense Program—is one of the government’s expanding set of industrial participation projects. It includes both defense-related countertrade investment (the Defense Industrial Participation or DIP scheme) and non-defense related investment (the National Industrial Participation or NIP scheme). Both types of offsets, but especially the former, have been promoted by public and private sector protagonists as a significant stimulus to industrial and developmental investment. The job creation element is also emphasized, although now less vigorously so than during the inception of the program. This chapter makes an original contribution to the literature in that it examines some of the purported offset-benefit issues at the regional and local levels. The chapter consists of three case studies, prefaced by an overview of South Africa’s regions and the relation between its regional development planning and the recent arms trade offset deal.

Regional industrial development

Regional development planning in South Africa

Ideally, industrial participation policy would contribute to and reinforce existing efforts to achieve integrated regional and national development. This demands considerable coordination from the participating agencies and a coherent and time-consistent understanding of how potential projects and investments should be selected, spatially allocated, and embedded in existing structures and capacities. Consistency, let alone coherence, is not always evident in South African policy initiatives. Apartheid conditioned regional industrial development from the 1960s to the late 1980s. Unsurprisingly, this resulted in policy failure and contributed to unbalanced development
that persists to this day. Post-apartheid, the mid-1990s saw the development of an ambitious attempt, called the Regional Industrial Location Strategy (RILS), to mesh overlapping forms and approaches to regional industrial development planning with the core and peripheral areas of South Africa. A joint project of South Africa’s Industrial Development Corporation and the Department of Trade and Industry, RILS was never seriously implemented, in spite of voluminous documentation created by mid-May 1997. As a practical matter, by the late 1990s government had shifted to a simpler regional development option that emphasized the establishment of “development corridors,” referred to as Spatial Development Initiatives (SDIs). This scheme was launched formally at an investment conference in May 1996, involving the Department of Trade and Industry (DTI), the Development Bank of South Africa (DBSA), the Industrial Development Corporation (IDC), and the Department of Transport (DT). A spatial development initiative entails the identification of geographic clusters of economic activity, to be built on and enhanced by targeted private and public investment. In theory, spatial development initiatives provide the private sector with opportunity to utilize government resources to realize the economic and profit potential of underutilized and marginalized regions of the country. From the government’s point of view, a central concern is to promote a shift from import substitution activities to international competitiveness (i.e., export-driven development). An important aspect within the SDI concept is the establishment of Industrial Development Zones (IDZs). These are specific geographically defined areas. Selected firms receive incentives to establish themselves there. The arms-deal related offsets were to play into the current state of regional development planning and objectives.

**Provincial profiles**

Today, there are nine provinces in South Africa (see tables 20.1 and 20.2). Without question, the dominant province is Gauteng, incorporating both Johannesburg, the core of the mining industry, and Pretoria, the seat of the executive branch of government. The Johannesburg-Pretoria area holds the largest concentration of manufacturing industry followed by Durban and Cape Town, the major metropolitan centers of the provinces of KwaZulu Natal (KZN) and the Western Cape, respectively. The next tier of manufacturing-oriented cities comprises Port Elizabeth and East London, located in the predominantly rural Eastern Cape province. Depending on which statistics one looks at,
Table 20.1: Gross Geographic Product (GGP), and GGP per person (by province, 2001)

<table>
<thead>
<tr>
<th>Province</th>
<th>GGP(^a) (R bn)(^b)</th>
<th>GGP (R per person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>40.4</td>
<td>8,917</td>
</tr>
<tr>
<td>Free State</td>
<td>29.5</td>
<td>15,196</td>
</tr>
<tr>
<td>Gauteng</td>
<td>221.9</td>
<td>39,089</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>75.7</td>
<td>11,924</td>
</tr>
<tr>
<td>Limpopo</td>
<td>22.9</td>
<td>6,869</td>
</tr>
<tr>
<td>Empumalanga</td>
<td>47.1</td>
<td>21,331</td>
</tr>
<tr>
<td>North West</td>
<td>31.9</td>
<td>15,508</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>10.9</td>
<td>18,242</td>
</tr>
<tr>
<td>Western Cape</td>
<td>102.9</td>
<td>34,986</td>
</tr>
<tr>
<td>South Africa</td>
<td>583.4</td>
<td>19,508</td>
</tr>
</tbody>
</table>

Notes: \(^a\) At constant prices; \(^b\) Due to rounding, figures may not add up.

Table 20.2: Economically active population by province, 2002\(^a\)

<table>
<thead>
<tr>
<th>Province</th>
<th>Employed</th>
<th>Unemployed (strict)(^b)</th>
<th>Unemployed (expanded)(^b)</th>
<th>Unemployed (strict) as % of EAP(^c)</th>
<th>Unemployed (expanded) as % of EAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>1,628,000</td>
<td>638,000</td>
<td>1,052,000</td>
<td>28.1</td>
<td>39.2</td>
</tr>
<tr>
<td>Free State</td>
<td>767,000</td>
<td>386,000</td>
<td>531,000</td>
<td>35.5</td>
<td>40.9</td>
</tr>
<tr>
<td>Gauteng</td>
<td>2,776,000</td>
<td>1,027,000</td>
<td>1,532,000</td>
<td>27.0</td>
<td>35.6</td>
</tr>
<tr>
<td>KwaZulu Natal</td>
<td>2,002,000</td>
<td>1,047,000</td>
<td>1,757,000</td>
<td>34.3</td>
<td>46.7</td>
</tr>
<tr>
<td>Limpopo</td>
<td>870,000</td>
<td>505,000</td>
<td>1,069,000</td>
<td>36.7</td>
<td>55.1</td>
</tr>
<tr>
<td>Empumalanga</td>
<td>753,000</td>
<td>320,000</td>
<td>539,000</td>
<td>29.8</td>
<td>41.7</td>
</tr>
<tr>
<td>North West</td>
<td>822,000</td>
<td>364,000</td>
<td>708,000</td>
<td>30.7</td>
<td>46.3</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>233,000</td>
<td>100,000</td>
<td>162,000</td>
<td>30.0</td>
<td>41.0</td>
</tr>
<tr>
<td>Western Cape</td>
<td>1,542,000</td>
<td>352,000</td>
<td>528,000</td>
<td>18.6</td>
<td>25.5</td>
</tr>
<tr>
<td>Total 2002</td>
<td>11,393,000</td>
<td>4,738,000</td>
<td>7,876,000(^a)</td>
<td>29.4</td>
<td>40.9</td>
</tr>
<tr>
<td>Total 2001</td>
<td>11,837,000</td>
<td>4,240,000</td>
<td>6,961,000</td>
<td>26.4</td>
<td>37.0</td>
</tr>
<tr>
<td>2002 vs 2001</td>
<td>–3.8%</td>
<td>11.7%</td>
<td>13.1%</td>
<td>11.4%</td>
<td>10.5%</td>
</tr>
</tbody>
</table>

Notes: \(^a\) Due to rounding, figures may not add up (also, Statistics South Africa disregards sample
sizes smaller than 10,000 as unreliable); b strict and expanded definitions of unemployment; c economically active population.


the Eastern Cape is the poorest or second poorest province of South Africa (see Hosking and Haines, 2003).

The Free State, in the center of the country, consists of a mix of gold mining (30 percent of the total South African gold output), agriculture, and synthetic oil and related chemical industries tied into the parastatal Sasol. Mining plays a dominant role in the economy of the North West Province as well (55 percent of state GDP). Bordering on Botswana, it is also one of the leading agricultural production areas. The Northern Cape, along the Atlantic Ocean, and bordered in the north by Namibia, also is mineral rich, with sheep farming and capital-intensive agricultural production along the Orange River being key economic activities as well. However, the level of development assistance in the province has been low, a reflection in part of the vastness of the area and its relative remoteness from the rest of South Africa. In recent years the provincial government has encouraged the development of and investment in marine industry.

Empumalanga, sharing borders with Swaziland and Mozambique, is one of the smaller provinces. It has a strong mineral-energy sector, supplemented by forestry and commercial agriculture, and game tourism as key economic activities. Limpopo, the gateway to sub-Saharan Africa (it borders to Botswana, Zimbabwe, and Mozambique), shares with the Eastern Cape the status as the poorest of the provinces. Its exports are predominantly primary agricultural products. Exploitable resources such as rain-fed agriculture, forestry, minerals, and tourism are underutilized and would seem to offer viable investment opportunities. Both Limpopo and Empumalanga provinces, the latter especially, form part of the “Maputo Corridor,” a transport-oriented spatial development initiative that is to link Gauteng province to the harbor in Maputo, Mozambique, and should open new tourism opportunities. Both provinces also have a territorial share in an emerging transnational game park, linking South Africa’s Kruger National Park with game parks in neighboring Mozambique.

A DTI document notes that “[i]n terms of geographic patterns, the dominance of metropoles has continued, with limited economic opportunities in smaller settlements and rural areas, particularly in those areas that were homelands” (DTI, 2003 c, p. 19). If anything, despite government’s avowed intention of shifting economic, specifically industrial, activity to the coastal areas, the hegemony of the industrial metropolitan complex in Gauteng has strengthened. Worse, there is also a shift of certain higher-end tertiary and secondary industrial production away from Durban to the Johannesburg area, and to a lesser extent also to Cape Town. Government acknowledges “that it needs to do more to improve the coherence of existing strategies to promote a more equitable geographic spread of investment and economic activities” (DTI, 2003c, p. 28). A core element in such an exercise is to develop appropriate value-chains within and beyond the national economy and to utilize instruments such as spatial development initiatives.
Defense industrial participation in South Africa

When South Africa’s parliament decided on a major weapons upgrade for the South African army—fighter planes, jet trainers, helicopters, submarines, and corvettes—the issue of offsets quickly took center stage. All contracts with a value above US$ 10 million are subject to a fifty percent offset or industrial participation policy (DTI, 1997), administered jointly by the Department of Trade and Industry (the NIP scheme) and the Department of Defense (the DIP scheme), the latter jointly managed and administered by Armscor and the DoD acquisition division. In practice, the relevant directorate in Armscor is playing the lead role in the management of DIP obligations, with DoD and the Denel central office playing supportive roles. The Armscor directorate responsible for offset management cooperates closely with a specialist industrial participation section at DTI.

A considerable amount of effort was put into attempts to wring as many concessions as possible from the potential suppliers, both in the form of defense-related and non-defense industrial participation. A major justification for the offset packages became the purported economic benefits the deals would offer, with some focus on the number of jobs to be created (initially 65,000 but subsequently reduced), and the likely impact on local industry. The range of offsets included direct contracts with South African defense firms, investment in Denel (see Dunne and Haines, 2001b), and diverse non-defense investments ranging from automotive components, manufacturing, telecommunications, stainless and specialty steel plants, gold jewelry, plastics, and high-quality textiles. Offset credits are given as well for technology transfer and for economic empowerment. A number of the projects under the NIP and DIP schemes have still to be finalized; others are in exploratory and negotiation phases. Still other projects have been abandoned and new ones initiated. Nevertheless, both Armscor and DTI seem pleased with the progress.

Ministry of Finance and DTI personnel who assisted in the final stages of negotiation in the late 1990s, once the structure of the deal was essentially in place, are convinced that they achieved particularly good deals. The anticipated export percentages of the projects, as estimated in 2000, were seen as well in excess of the stipulated 50 percent level, and returns on the overall cost of the procurement package were estimated to be on the order of 94.5 percent. It was also estimated that during the duration of the deal, anticipated exports would be in the region of 280 percent of the original purchase price. Such claims are common for offset deals but the growing body of international literature on the impact of offsets suggests the need for circumspection and rigorous evaluation. The overall impact of offsets is often problematic in terms of job creation, the strengthening of backward and forward linkages, and technology enhancement (Martin, 1996; Matthews, 1996; 2002; Brauer and Dunne, 2002; Dunne and Haines, 2001b). It has been argued that they do not constitute a “third way” for the economic development of developing countries (Matthews, 1996; 2002; Batchelor and Dunne, 2000). Nor have offsets provided much of an injection to efforts at regional industrial development. For
instance, a 1981 study of regional defense spending in the UK argued “that the scope for using defence expenditure as a direct tool of regional policy is limited, and that most regional benefits are likely to be spin-offs rather than a direct result of policy” (Short, 1981, pp. 104–105).

**DIP offsets and regional development**

The DIP component of the arms deal is informed by strategic considerations of DoD and Armscor, namely of maintaining an in-country defense capability and ensuring its long-term existence. The offsets have provided a substantial lifeline to the South African defense industry but undercut any remaining aspirations for South Africa to maintain its own defense industrial base. While the industry response in general has been favorable, there are some dissenting voices especially from the aviation sector. Batchelor and Dunne (2000) raised concerns about the capability of local industry to benefit from the deals. They suggested that while the aerospace sector seemed best placed to benefit and to prove itself attractive to foreign companies, the electronics and maritime sectors were likely to struggle. This would seem to have been borne out by developments (Dunne and Haines, 2001b). The effect appears to have been to provide opportunities and orders to domestic companies to develop niches in the international market through links with foreign companies (see Dunne and Lamb, 2004).

The recent arms deal will probably reinforce the current economic situation and existing inequalities in South Africa. Most of the contracts and/or investment are being channeled to Denel companies or sub-contractors which are largely situated in Gauteng. Some 90 percent of DIP business has been channeled to Gauteng province. Smaller concentrations are in Cape Town and Durban, and almost nothing anywhere else in the country. Only one defense sub-contractor in the Eastern Cape, Comau Aims Corporation in Uitenhage, has so far received contracts under the DIP scheme. Certain peripheral regions will receive no measurable benefits at all. While this is not inappropriate given the acknowledged rationalization of the defense industry, this does not contribute to regional development in the peripheral areas.

Technology transfer between international and defense-related industries in South Africa and related “spin-in” and “spin-off” applications is an area requiring policy-relevant research. Few countries appear to have been successful in using defense offsets to utilize sufficiently, and embed and extend technology transfers. Those domestic defense industries that are expected to benefit from offset deals are often characterized by a “technologically sophisticated conservatism” (BAEC, 1987, p. 33) that does not lend itself to the densification of intellectual and social capital. Thus the degree to which successful offset projects can contribute to technology transfer to South Africa can be questioned. Increasingly, the larger international arms companies incorporate local defense contractors and sub-contractors into extensive supply chains, manufacturing a shifting set of discrete components. Also important are issues of the retention and possible conversion of technologies that South Africa built up in its defense industry during the late apartheid years and thereafter. The contention of the local defense and software firm CCII that the corvettes purchased from Thales would be utilizing more costly and less technologically advanced combat suites when a cheaper and more sophisticated version is available locally is worth broader reflection. Areas of expertise
in South African missile technology are also apparently underutilized, although BAE Systems appears to be revaluing the potential contribution of companies such as Kentron in the Denel stable. More important, possibly, is the seeming lack of urgency by DTI, Denel, and Armscor to adapt leading-edge technologies of South Africa’s defense industry and associated clusters of expertise to non-military applications (AMD, 2002).

**NIP projects and regional development**

Regarding NIP projects—offset projects not reciprocally linked to South Africa’s arms industry but to its civilian industry—the allocation of potential projects entailed compromise between DTI and the willingness of the arms sellers and their partners and agents to identify, conceptualize, and implement projects in particular regions of the country. Although on paper there is a reasonable geographic spread of projects and investments, there has not been sufficient pressure on the vendors to direct investments to economically marginal locations. Currently, only seven provinces have projects up and running, with the more peripheral and poorest provinces, Limpopo and Northern Cape, failing to benefit at all (although the latter is projected to receive some projects, see DTI, 2002; 2003a). And while KwaZulu Natal is the second highest beneficiary at present, this is (as discussed later) somewhat at odds with perceptions in policy circles in the province.15

The KwaZulu Natal offsets are primarily from the BAE/Saab stable, and it seems that SANIP (BAE/Saab’s NIP operation) could have marketed their investments more widely with the relevant agencies, as opposed to undertaking firm-to-firm investments (Haines, 2003). The competence of arms sellers in maximizing offset credits through shrewd investments make the interventions seem more substantive on paper than on the ground. However, investments in KwaZulu Natal biotech firms have proved vital for its emerging bio-tech industry. A soft loan of US$ 2 million for SA Bioproducts proved crucial for the survival of the firm and has contributed to the creation of new production facilities and to the expansion of domestic and export sales. Similarly, a BAE/IDC equity investment of R10 million (with a total of R23 million scheduled on performance) has enabled Biocontrol Products to expand its product base and assist in sales to the African market. Another related activity by the BAE/Saab consortium includes an investment in a diesel economizer firm in Durban. The consortium is also considering involvement in a proposed bio-tech initiative linking KwaZulu Natal and the Eastern Cape. In contrast, the emerging information technology software and services sectors in KwaZulu Natal and Cape Town appear to have been bypassed with the exception of a relatively modest DIP investment in Cape Town-based defense sub-contractors. Indeed, even Gauteng has had relatively little information and communication technology investment through NIP.

The most dominant set of NIP offsets is located in the heavy and extractive industries. Stainless and specialty steel plants, and ferrochrome and aluminum production are the central projects here, and there is some buy-in with respect to the gold mining industry. The production of silicone and silicone dioxide, and the mining and/or processing of titanium are also important. With the significant exception of metals production and processing within the Coega IDZ (see below), and possibly of titanium extraction, the projects generally follow existing spatial patterns within the mineral-energy complex. This emphasis is in line with the country’s traditional preference for such projects (Fine
and Rustomjee, 1997) and a tendency to see South Africa’s development trajectory as (realistically) proceeding from a platform anchored in mineral production, processing, and export. Certain NIP projects may help stimulate export production in selective sectors, and a few of the projects hold some promise of encouraging new forms of local production such as the effort to produce medical waste containers for export. There is also some selective information technology investment that might bear fruit. Other projects such as coordinating tourist charter packages and funding the upgrade of a municipal swimming pool in Port Elizabeth are difficult to assess in regard to their value-added contribution to the local economy.

To gain more detailed understanding of the dynamics between regional economic development planning and arms-deal related offsets, the next section examines three cases that were meant to exhibit a particularly strong regional focus: The Coega Industrial Development Zone in the Eastern Cape province; projects related to shipbuilding, primarily in KwaZulu Natal; and natural resource projects (gold and mohair) in the Western Cape and the Free State.

**Case studies**

**The Coega Industrial Development Zone (IDZ)**

The Coega Industrial Development Zone, or Coega IDZ, located some 22 kilometers from Port Elizabeth, has become the flagship of NIP offsets (Dunne and Haines, 2001a; Hosking, Haines, and Bank, 2002). A key factor in government’s selection of the German submarine and corvette offerings—despite high tender prices in both cases—was the industrial participation benefits offered by the respective consortia. Of these projects, the potential contribution of Ferrostaal to specialty steel and steel beneficiation projects in the IDZ was crucial.

Preceding the arms deal, in August 1996, local business elites and facilitators established a development company—the “section 21” (not-for-profit) Coega Development Corporation, CDC—to promote the idea of building a new port at the mouth of the Coega river and a 10,000 hectare IDZ adjacent to it. Conditioning factors were, among others, the adoption of an export promotion strategy by central government, a surge of interest in spatial development initiatives and export processing zones (CES, 2000, p. 2), as well as an expression of interest by Gencor (now Billiton) in building a major new zinc refinery in the Eastern Cape. With government seed funding, CDC immediately undertook feasibility studies, completed by July 1997. However, the interest of the two prospective anchor tenants—Kynoch and Billiton—waned. By the end of 1999 the components of the project on which the feasibility studies had been based were in jeopardy as private sector investment was not forthcoming. The most likely explanation for government reluctance to then end its commitment to the Coega project was that DoD and DTI needed sites for offsets negotiated as part of the arms deal deliverables (CGIS, 1999).

Under the arms offset deal a hub of integrated specialty steel producing facilities were earmarked for Coega. Reflecting the growing optimism in government regarding this new arrangement for Coega, CDC expanded the IDZ from 10,000 to 14,000 hectares, and later
to 17,000 hectares. Government estimates of jobs to be created also grew, from around 40,000 to 240,000, and CDC applied for permits to run the Coega IDZ (CES, 2000, p. 5). However, as the year 2000 progressed it became clear that the negotiation and ratification associated with the arms offset deal were going to take longer than initially thought. Troublesome questions were raised not only over the personal integrity of some of the negotiators (Dunne and Lamb, 2004) but over how the new production capacity at Coega would fit in with South Africa’s existing steel industry. The wisdom of locating the steel plant offsets at Coega was being challenged in various quarters, and even in the steel industry itself, for instance by Highveld Steel at Witbank. At the time, South Africa’s steel industry was undergoing a phase of reorganization and consolidation. Coega lost momentum and by 2001, CDC seemed to devote more time to attacking critics than to developing new positives for the project (CDC, 2001). During 2001 and 2002 a massive government-funded newspaper and broadcast media advertising campaign was mounted, and in it optimistic claims were made about what the project will achieve. Still, the area covered by the IDZ was reduced from 17,000 to 12,000 hectares (CDC, 2001, p. 10), and CDC began to argue that the government did not, after all, need an anchor tenant for Coega to be viable and that, if government just built the harbor, tenants would come on their own (e.g., Hosking and Haines, 2003). For want of a viable anchor tenant, DTI was obliged to change strategy in late 2000 and promote a diversified export-oriented industrial park that would place heavy industrial development alongside a light industrial sector. The strategy had a strong element of faith about it.

One problem with the situation was that it left unanswered the crucial question of exactly what facilities were to be built at the Coega harbor and what sort of shipping was to be provided for. An apparent solution was found by involving a private sector shipping partner, P&O Nedlloyd. This company agreed to build and run a container facility and logistics park at the port (with another company, TCI Infrastructure) and provide a new stimulus to the Coega project. Concurrently, around R5.2 billion was assigned to the construction of port infrastructure by the National Ports Authority and the upgrading of railway links between the port and Gauteng by the state-owned Spoornet. CDC then commissioned a cost-benefit analysis to be carried out of the revised project, and in July 2001 the consultants declared the project economically desirable (Merit, 2001). But the analysis left something to be desired since the bulk of the attention focused only on Nedlloyd’s plan for container traffic. Moreover, conclusions were based on controversial projections of demand for container shipments through Port Elizabeth, questionable benefit pricing decisions, and simplistic assumptions regarding the cost of building and maintaining the necessary linking infrastructure with Gauteng. Furthermore, external environmental costs were not taken into consideration (Le Quesne, 2001; Hosking, 2002). Merit’s analysis drew hostile comments, among others from Durban’s Chamber of Commerce and Industry. It became clear that some other plan would be needed to justify the volume of government funds channeled into the Coega project (Hosking, 2002). This was provided by a proposal by the French company Aluminum Pechiney to build, invest in, and run a new $1.6 billion aluminum smelter. While no specific offset credits are to be offered to the smelter project itself, these will be available to potential beneficiation projects downstream of the smelter.

An environmental impact assessment for the aluminum smelter project was carried out, and in the light of this and other factors Aluminum Pechiney decided to build their
next smelter in the Coega IDZ. Criteria used to weigh Coega against an alternative site (in Australia) were the availability of cheap energy, the technical suitability of the site, tax benefits, transportation costs, environmental impact, and political risks (CSIR, 2002). During 2003, two new threats developed, namely an escalating foreign exchange value of the rand (pushing up investment costs) and a hostile take-over of Pechiney by the Canadian company Alcan (a part of Alcoa). While Alcan stated its intention to proceed with the plant, doubts remain regarding the implementation. Meanwhile, the scale of the Coega IDZ has been reduced to 4,200 hectares (Moosa, 2002) but not the marketing drive associated with the project.

Should the proposed new Pechiney aluminum smelter and the P&O Nedlloyd container terminals and TCI logistics park indeed be built, it can be expected that they will all have to function on extremely tight margins. Pechiney’s new supply capacity will be created at a time when the world aluminum market is oversupplied, a factor which has seen the world’s leading aluminum producer, Alcoa, cutting back on production and facing the problem of excess capacity. In the face of this oversupply, metals protectionism is on the rise. Similarly, a look at the map of South Africa confirms that Nedlloyd and TCI Infrastructure will face severe land transport cost disadvantages relative to the ports of Durban, Richards Bay, and Maputo in the competition for container traffic from Gauteng, Empumalanga, Free State, Limpopo, and Zimbabwe. Consequently, these companies can be expected to try and reduce their outlays to a minimum, especially ones on which they enjoy some flexibility, e.g., the costs they incur in complying with environmental and social obligations and contributions toward replacing natural capital in the Algoa Bay area that their plants and operations are expected to destroy. As conceived now, new employment at the Coega port and IDZ will probably be the most expensive, in terms of capital per job, of any major facility in Africa. It is now anticipated to create somewhere between 850 and 2,700 jobs while using about seven times as much capital as estimated in 1999 (Hosking, 1999). Moreover, there will be significant opportunity costs in mariculture industry (Muller, 1997), the fishing industry (Wooldridge, Klages, and Smale, 1997), the citrus industry (Niven, 1997), and the tourism and recreation industries. In addition there will be significant human capital costs due to the anticipated negative impact of the plants on human health (Katsouyanni, et al., 1997). Alternative ways of generating the same numbers of jobs exist following different development strategies for the area, those that would use rather than destroy the region’s globally unique natural capital and not push up the price of water and electricity in the area as the currently planned IDZ would (Hosking, 2002). One alternative strategy would prioritize basic needs infrastructure investment throughout the Eastern Cape and, at Coega, the development of eco-tourism and small-scale agriculture and mariculture.

To its credit, CDC has been systematic in involving local firms and consortia in its procurement process and in drawing up a skills register. But for the impoverished people of the Eastern Cape a credible mechanism by which they may benefit from the seemingly modest spin-offs that the Coega project may generate has yet to be established. The region has massive unemployment and poverty problems, and this project will do little to alleviate them despite its huge capital requirements. Also, it appears unlikely that the capital intensive heavy industry targeted for the IDZ will allow much opportunity for the development of small and medium enterprises that are repeatedly identified as crucial for meaningful poverty alleviation. In addition, the capital intensive nature of the industries
suggests that they will make a relatively modest, if any, contribution to redress the chasm between an affluent few and a vast, dispossessed majority in the Port Elizabeth area. More generally, it is questionable whether the Coega project will address the structural needs and failings of the bulk of economic activity in the Eastern Cape. Finally, the returns to government in the form of revenue from the Coega project may well be modest. The IDZ concept has its intellectual roots in the export promotion zones (EPZ) idea, and it is clear that there have been as many problems experienced with EPZs as there have been successes. As the world is already heavily populated with EPZs, to succeed, internationally competitive incentive packages must be provided. These come at a cost, one of which is reduced revenue to government. Yet if these incentives are not provided, EPZs more often than not flounder (Jauch, 1997; Hosking and Jauch, 1997). Meanwhile, the Coega project is proceeding, pushed extensively and expensively by corporations that have not been overly eco-sensitive in the past (Bond and Hosking, 2002). There are, hence, numerous reasons to expect the continuing underdevelopment of the Port Elizabeth area and the entire Eastern Cape province, as Coega distracts attention of state and society from environmental and developmental problems and sustainable solutions. The project has consumed significant time and funding that could have been utilized more effectively, and urgently, for addressing in a more direct manner the developmental needs of the Eastern Cape. In the short-term at least, the attempt to link arms trade offsets to Coega has not been successful and has not contributed substantially to the overall betterment of the province.20

The shipbuilding industry

In 1999, a Durban-based shipbuilding cluster was formed by 19 marine engineering and shipbuilding companies. With initial funding from DTI, it was given a mandate to plan the industry’s growth and determine the best means of promoting South Africa’s reentry into the international shipbuilding markets. The Durban cluster forms the basis of the South African Shipbuilding Consortium that has established links with relevant firms in South Africa and is looking at the Strategic Defense Program (and other government procurement offsets) to revitalize a shipbuilding industry historically centered in Durban. Revitalizing the industry would include refurbishment of the Southern African Shipyards facility, the only shipyard in South Africa to cater for and construct vessels over 45 meters, and of contiguous port infrastructure. In recent years, the Durban facility has demonstrated its capacity for local and export manufacture of motor yachts, tugs, and purpose-built vessels.21 To date, there is some offset investment by BAE Systems in its subsidiary Elgin, Brown, and Hamer, a Durban ship repair facility. There is some sub-contract work on general government procurement for the boat building yard, Far Ocean Marine, a firm specializing in larger boats, offset-related investment in expanding and upgrading the ship repair yard in East London (in the Eastern Cape),22 and in constructing a new ship repair facility in Cape Town. But there are no defense offset investments in shipbuilding proper. This is seen as reflecting the current preference of the Minister of Trade and Industry for the promotion of boat building as opposed to shipbuilding.23

The consortium draws attention to the relatively competitive nature of the industry worldwide. The South African industry has had to struggle without subsidies (compared for example to 25 percent subsidies for Spanish shipbuilding) and the high cost and poor
custom design capacity of local steel and aluminum producers. It also stresses that the building of the corvettes with little or no participation by South African shipbuilders, and the administration of associated offsets, is contributing to a significant dilution of technological expertise built up in the industry since the 1960s. That Chile has managed to assemble similar German corvettes under licence is a further source of grievance. The consortium argues that Chilean shipbuilding infrastructure and expertise is of a lower level than that of their South African counterparts. The perceived ambivalence of DTI to the Durban-based consortium is also seen as having reduced the chances of a Durban firm in competing for a Department of Environmental Affairs and Tourism’s patrol vessel tender.

Despite setbacks, the consortium is redoubling efforts to reopen the debate on shipbuilding in South Africa. This would include a reassessment of the current paucity of investment in the industry by the Navy’s ship acquisition policy and determining possible remedial measures. In addition, a strategy has been developed for establishing South Africa as a niche producer for Africa and as a hub for maintenance, logistics, and training for the continent. While ambitious, it takes cognizance of South Africa’s growing trade and economic relations within Africa and dovetails into international material support for NEPAD (New Partnership for Africa’s Development). The NEPAD initiative fits with DTIs new emphasis on value chains beyond the national economy and with its stress on countering de-industrialization trends in Africa. In addition to arguments advanced by the consortium, there is evidence suggesting that revitalizing the industry is possible. First, a study initiated in 1995 by the Industrial Development Corporation (IDC) on downstream applications from the carbon steel cluster, had as one of its components a study of the shipbuilding industry. The sub-industry was seen as having potential in terms of value-added, steel consumption, and labor intensity (IDC 1998). Second, a recent University of Natal study shows that the shipbuilding and ship repair industries play an important role in supporting upstream and downstream industries in the Durban metropolitan area. The employment multiplier for shipbuilding is greater than that of ship repair due to the more diverse nature of required inputs. If the shipbuilding sector as represented by Southern African Shipyards and its joint-venture partners were to operate near full capacity, the employment multiplier is estimated at 9 (Hawes, 2002, p. 16).

Growing emphasis on steel and metal production by members of arms supplier consortia, Ferrostaal in particular, niche market, and specialty shipbuilding would seem to present a distinct opportunity for synergies and beneficiation. But there is a lack of integration with the diverse offset offerings of the arms sellers. One problem is the current position of the formerly state-owned ISCOR, the dominant steel producer in South Africa. Manufacturing industry commentators are critical of government’s introduction of a foreign shareholder to ISCOR and maintain that the steel producer is stunting downstream job creation. In addition to the rise of the rand, ISCOR steel prices rose around 30 percent during 2002 and 2003, with the steel producer apparently basing its prices on developed as opposed to transitional economies. Consequently, it is said that Russian steel is increasingly used in specialized ship and large boat building. In a word, whereas the Coega IDZ plan in the Eastern Cape looks like a project that consumes huge amounts of state funding to little effect, a more genuine economic potential of linking arms trade offsets to steel and shipbuilding in KwaZulu Natal seems not to have gone forward at all.
Mohair, gold, and value chains

Several small-scale projects by arms sellers regard high-value luxury goods such as mohair and gold jewelry. Although these projects are still in the early phase of development, and research is provisional, an examination is instructive. A fairly traditional offset investment is that of the Agusta helicopter consortium in a firm called Cape Mohair. A documented US$1.5 million has been allocated, and export sales of US$13.2 million are projected over a seven year period (DTI, 2002). This project is in line with similar Agusta investments linked to Italian specialty manufacturing in clothing and jewelry. Cape Mohair is part of a national and international group of companies with primary ownership vested in a private holding company based in Switzerland. Investment funds are routed from the parent company to the Port Elizabeth firm. The resulting expansion of the local firm allows for niche production by converting two sets of machines for specialty work. However, this move left the plant short of relevant machinery for its more traditional and bulk-oriented manufacture of mohair tops. Moreover, the investment only contributes to partial beneficiation of raw mohair as end-user products and garments are made from mohair tops by two existing, independent companies in Plettenberg Bay and Cape Town (Hosking, Haines, and Bank, 2002). Also, the projected export sales of US$13.2 million may be optimistic as the company’s major sales of late have been primarily on the domestic front. Moreover, the mohair industry is particularly prone to fashion shifts and years of high profitability are followed by years of low profitability.

While the (small) investment in a single mohair company industry in the Eastern Cape is useful, it has yet to be integrated into a broader, cluster-type strategy that would improve the R&D, manufacturing, and export capacity and promotion of Eastern Cape and South African mohair products more generally. A joint venture with Filk Spa of Italy and a local producer, OroAfrica, as part of Agusta’s NIP commitments, illustrates some of the dynamics and contradictions of the process. Filk entered into the joint venture in 1998. This contributed to improved fortunes for OroAfrica, and a 25 percent buy-in of AngloGold in June 2000 helped raise sufficient capital for the company to move from Johannesburg to Cape Town. Technology transfer appears to be modest at this stage, with state-of-the-art machinery remaining the preserve of the Italian parent. Some degree of training is provided for selected staff at the Italian plant and is combined with training by AngloGold in Cape Town as part of on-the-job training. Estimates of 115 jobs created appear to be on the optimistic side. Overlapping production of OroAfrica and Filk complicate the estimation of export credits and job creation figures; specifically, through a technical anomaly, the value-added portion is not calculated separately, and the whole value of the product can be claimed as an export credit (Wellman, 2003).

BAE Systems have found a similarly profitable investment in the town of Virginia, in the Free State, with the gold mining firm Harmony Gold. Of interest are two related projects. First, a gold beneficiation project in conjunction with IDC and Harmony Gold has a three-fold objective: the creation of a manufacturing facility for the production of value-added gold products, the establishment of a gold technology industrialization fund, and sponsorship for students at a jewelry school. Second, BAE/Saab established, with the same partners, SARM Gold Chain to produce high-carat rope chain for export. This is labor intensive and employs about 500 women and the figure is anticipated to rise. Further, there are moves to expand beneficiation to other precious metals such as silver.
on a home production basis to the poor sections of the population of Virginia. While such efforts constitute definite if modest contributions, critics of the offset package such as journalist Sam Sole have raised questions regarding the beneficial access (for US$1 million) of BAE Systems to Mintek technology, the long-term intellectual property implications of such a deal, and the potential technology and export credits it could claim in exchange for what amounts to a relatively modest investment.

While investments in gold and mohair are of course valuable *per se*, at least to the firms involved, it is unclear just how they are related to sectoral and regional policy more generally. Indications are that the relevant industry associations and government and parastatal departments are considering more coordinated local effort regarding the beneficiation of gold and jewelry but specific plans have not been publicized. Moreover, as Riaan Coetzee of the Industrial Development Corporation points out, the gold and mohair industry projects actually date back to the 1980s. Their development has been on the cards for some time, and critics rightly question whether their export promotion has come about as a result of the Strategic Defense Program, or whether the projects happened to fit conveniently with the need to generate offset “success” stories.

### Conclusion

Several general lessons emerge. First, the sectorial and spatial deployment of national and defense industrial participation offset schemes is found to confirm rather than challenge existing patterns and inequalities in the South African economy. Strong emphasis is placed on capital intensive industries in the industrial core of the country, often coupled with astute piggybacking and financial leveraging by arms sellers keen to generate offset credits. As Dumas (2004) points out, the foremost objective of the arms seller is to make a sale, not to contribute to economic development. While the projects conform to sectoral accents in DTIs new emphasis on the creation and expansion of value chains within South Africa’s economy, spatial targeting has been carried out on a fairly informal basis with a reasonable degree of discretionary power left to the arms sellers. As the major recipient of NIP and DIP offsets, and key beneficiary from other industrial participation programs, the hegemony of Gauteng province is set to continue. Moreover, and put mildly, employment creation by offset projects is limited, particularly in the peripheral regions.

A second finding concerns the substantial hidden costs associated with offsets, as illustrated by the example of the Coega IDZ. To be effective, substantial additional state investment in infrastructure and other resources is needed but unlikely to be forthcoming. Yet this kind of cost is not factored into official assessments of the Strategic Defense Program and the associated offset work. Among other items, one needs to take into account the (weak) institutional capacity of state structures to implement a workable industrial participation program. Environmental costs also need to be accounted for (but usually are not). This in turn points to the need for more sophisticated offset monitoring by the relevant state agencies, or even formal, independent offset auditing (see Brauer, 2004; Sköns, 2004). Third, the possibility for utilizing increased and more diverse steel and aluminum products in industries such as shipbuilding, with demonstrated capacity for niche export production, have not yet been seriously explored. Focusing on offsets that
would utilize international inputs to diversify local industry has diverted attention from indigenous means of achieving this. Government takes too negative a view on the possibilities of qualified import substitution (Bruton, 1998). This is not to advocate the retention of obsolete industries but to stress the importance of addressing the problems of unemployment and globalization, especially in secondary centers and peripheral regions of South Africa.

Fourth, offsets should have been used more deliberately in shoring up and help stem job losses in sectors such as textiles and clothing and in generating synergies with new or potentially emerging industries. For example, policy makers need to combine, at the regional level, the country’s abundant natural resource base with industrial and high technology development. They need to be clearer with regard to the regional implications of national policy and to attempt to develop mutually reinforcing coherence between regional and national planning. This also requires that shortcomings in institutional capacity within state agencies be addressed and that partnerships with non-state agencies be considered.

**Notes**

1. The 1998 arms trade deal was initially estimated to yield 65,000 new jobs, with earnings of R110 billion (for the original R31 billion value of the deal). These estimates were downscaled early in the program. The estimate of earnings for example was subsequently reduced to R70 billion over a period of 11 years (Defence Systems Daily, 15 September 1999; RSA, 1999).
2. Although focusing on the Strategic Defense Program, some core findings and insights are relevant for industrial participation programs in general.
3. Interview, Mr. Gerrit van Wyk, Industrial Development Corporation, Johannesburg, 6 May 1997.
6. The legislature is in Cape Town, the Constitutional Court in Braamfontein, near Johannesburg.
7. Denel is South Africa’s main arms producing consortium, whereas Armscor is primarily an arms procurement and arms export marketing agency. See Dunne (2003) for history and details.
9. By late 2001, 85 percent of the DIP goals were achieved. Interview, Mr. Johan van Dyk, Denel, Pretoria, 13 December 2001.
10. Interview with Dr. P. Jourdan, then Director of Special Projects, DTI, Pretoria, 30 May 2000.
14. Interview, Mr. R. Young, CCII, Cape Town, 14 November 2001; see also RSA (2001), especially chapter 11.
15. In KwaZulu Natal there is also concern about government’s seeming reluctance to consider investment in the planned King Shaka multi-modal sea-air-railway logistical platform (interview with Mr. F. Peterson, Durban Metro Economic Development Division, Durban, 19
September 2002; interview with Mr. R. Pershad, Durban, 20 September 2002). The Durban Chamber of Commerce’s opposition to the Coega Industrial Development Zone in the Eastern Cape (see the Coega IDZ case studies discussed later on in the chapter) and its request for additional infrastructural investment in the Durban port, which is profitable, are felt to be among the reasons for national government’s perceived lack of enthusiasm for the city and the province. This is reinforced by the fact that KwaZulu Natal’s provincial government is the only one of the nine provinces that is not under the ruling ANC’s control. In the Western Cape, research revealed a not dissimilar perception among local private and public sector policy agents that the allocation of projects within the provinces was conditioned in part by political imperatives. For example, Westgro’s experience confirms the view that the selection of initiatives occurs more on a project-by-project basis with relevant consortia than as the result of an integrated and systematic process (interview with Mr. W. Thomas, Executive Director, Westgro, Cape Town, 16 November 2001).


17. The arms offset link has been generally downplayed by the Coega Development Corporation (CDC), the state-endorsed agency charged with administering the project (e.g., CDC, 2001, p. 31; Financial Mail, 27 July 2001).

18. For instance: “Ultimately, Coega will enable Africa to regain the economic might it enjoyed when Alexandria was the commercial and industrial capital of the world. The African renaissance is well and truly under way.”

19. Although several specialty steel projects were scheduled to be launched during 2003 and 2004 (DTI, 2003a), there remains doubt whether they will all be implemented. For instance, a planned rolling mill that the GSC Submarine consortium was to establish in the Coega IDZ has apparently been scrapped (Business Day, 30 July 2003). And concerns were voiced in the national press regarding the lack of transparency surrounding the projects, especially those associated with the submarine consortium (Mail and Guardian, 24 July 2003; Business Day, 30 July 2003).

20. There are, it is true, more sanguine assessments of the economic impact of the Coega IDZ than that offered here. For example, the Economist Intelligence Unit (EIU, 2003) maintains that the project “will give a huge boost to the IDZ and to the region as a whole. At present, the main stumbling block to the deal seems to be finance, the project requiring an estimated investment of US$ 1.6bn.” And Nel (2003) puts forward higher direct and indirect job creation estimates and anticipates more substantive backward and forward linkages between the project and the local and provincial economy. The Coega project has also been associated with a property boom in the Port Elizabeth area of late, benefitting mostly middle and upper-middle class residents. However, the rise in property prices should be seen in the context of a dramatic increase in the prices of coastal property in selected areas in the Eastern Cape and South Africa more generally. Should these more optimistic assessments bear fruit, it would be a welcome miracle.


22. Interview with Mr. M. Hawes, Chair, South African Shipbuilding Consortium, Durban, 17 June 2003.

23. Interview with Mr. M. Hawes, Chair, South African Shipbuilding Consortium, Durban, 17 June 2003.


25. Interview, Mr. M. Hawes, Chair, South African Shipbuilding Consortium, Durban, 17 June 2003.

26. Interview, Mr. M. Hawes, Chair, South African Shipbuilding Consortium and CEO, Southern African Shipyards, Durban, 17 June 2003. Southern African Shipyards tended for this vessel at $23.8 million, compared to a $19.5 million tender by the Dutch shipyard Damen. Subtracting out of the South African’s tender $4.2 million of a variety of taxes, rent
paid to the Port Authority, and profits reemployed in the South Africa economy, the net cost to the country is already on par with the Dutch offer. In addition to this, there would be about 60 percent local-content acquisition and multiplier effects flowing therefrom and a foreign-exchange outflow of only 40 percent rather than 100 percent if the contract were given to the Dutch firm. (Obviously uninterested, Blohm and Voss, the German shipbuilding firm responsible for building South Africa’s new corvettes, tendered for this vessel at $55 million.)

27. Steps include the formalization of the South African shipbuilding cluster and the use of state procurement and offsets to stimulate local industry. These include: (a) that DTIs declared non-defense industrial participation policy of 10 percent for the Corvette Procurement Program must be set in motion and the promised offset to, or an equivalent investment in, the shipbuilding industry be realized; and (b) that the naval ship acquisition policy and the role of Armscor in ship acquisition and marketing in Africa must be reexamined to ensure that future shipbuilding opportunities are not lost due to inappropriate packaging of countertrade deals or lack of information regarding local capabilities.

28. The shipbuilding consortium is now looking at potential export markets, including those of SADC (the Southern African Development Community) and other African states. It notes expanding opportunities for a shipbuilding partnership for reequipping maritime African countries with new customs, police, and defense patrol vessels. There is also the need for replacing the current range of African-owned cargo ships, tourist and passenger vessels, commercial harbor craft, and utility ships.

29. Interview with Mr. M.Hawes, Chair, South African Shipbuilding Consortium, Durban, 17 June 2003.

30. While a multiplier of 9 seems unduly optimistic, Hawes’ case material does suggest that a revival of the shipbuilding industry would have a significant ripple effect on the Durban economy.

31. Interview with Mr. M.Hawes, Chair, South African Shipbuilding Consortium, Durban, 17 June 2003.

32. By mid-2002 only US$ 470,000 of the allocated $1.5 million has been invested in the local firm. Interview with Mr. S.Strydom, Financial Director, Cape Mohair, Port Elizabeth, 19 September 2002.

33. Interview with Mr. S.Strydom, Financial Director, Cape Mohair, Port Elizabeth, 19 September 2002.

34. Interview with Mr. S.Zikode, Chief Director, Industrial Participation Secretariat, DTI, Pretoria, 20 November 2003.

35. Mintek, a partly state-funded body, is a technology provider specializing in mineral processing, extractive metallurgy, and related fields. It works closely with industry and research organizations, “offering R&D expertise, service test work, equipment, and novel process technologies for the precious metals, base metals, ferro-alloys, and industrial minerals sectors world-wide” (http://www.mintek.ac.za/ [accessed 4 December 2003]). A good deal of the investigative media coverage in the UK and South Africa has focused on the BAE/Saab related offsets. Journalists have queried the optimistic claims regarding the novelty, nature, and scope of the various projects undertaken or proposed and have explored the hidden costs of offset transactions. South African journalist Sam Sole raised the point that BAE/Saab would be in a position to claim technology transfer credits from its partnerships with Harmony, Mintek, and the Industrial Development Corporation. (Source: interviews with Mr. Sam Sole, Mail and Guardian, Durban, 27 October 2003 and, by phone, 4 December 2003.)

36. Interview by Gillian McEwan with Mr. R.Coetzee, Research Director, Industrial Development Corporation, 27 July 2001.
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