

# Arms Trade Offsets and Development

Jurgen Brauer

College of Business Administration;  
Augusta State University,  
Augusta, GA 30904, USA;  
phone +1-706-667-4544,  
fax +1-706-667-4064;  
[jbrauer@aug.edu](mailto:jbrauer@aug.edu);  
[www.aug.edu/~sbajmb](http://www.aug.edu/~sbajmb)

and

J. Paul Dunne

School of Economics;  
University of the West of England;  
Frenchay Campus, Room 3D22;  
Coldharbour Lane;  
Bristol BS16 1QY;  
United Kingdom;  
phone +44-117-344-2053;  
[john2.dunne@uwe.ac.uk](mailto:john2.dunne@uwe.ac.uk);  
<http://carecon.org.uk>

June 2005

## Abstract:

An increasingly important facet of the international arms trade are so-called offsets, arrangements that obligate the arms seller to reinvest (“offset”) arms sales proceeds in the purchasing country. In justifying arms expenditure and in promoting local industrial activity, offsets are claimed to offer significant benefits to developing countries, yet until recently there has been little research on how well offsets work in practise. This paper considers some of the issues and current empirical evidence. We find virtually no case where offset arrangements have yielded unambiguous net benefits for a country’s economic development. As a general rule arms trade offset deals are more costly than ‘off-the-shelf’ arms purchases, create little by way of new or sustainable employment, do not appear to contribute in any substantive way to general economic development, and with very few exceptions do not result in significant technology transfers, not even within the military sector.

A version of this paper was presented to the 8<sup>th</sup> *International Conference on Economics and Security*, University of the West of England, Bristol, June 2004. We are grateful to the participants for comments.

## 1. Introduction

Offsets are an increasingly important part of the international trade in arms. When countries procure defence equipment from a foreign supplier they look to reduce the cost in a number of ways. They may become involved in the development and (co)production of the product, e.g., joint production, licensed production, or sub-contractor production. Foreign direct investment, technology transfer, and countertrade are other methods of compensation, which may take place in the civilian rather than military sector. Each form of involvement – lumped together under the concept of “offsets” – carries its own implications for costs, programme risks, control over specifications and wider industrial and economic benefits (Hartley, 1995). Countries apply different criteria for whether offset obligations are required for a particular transaction and what types of offsets are acceptable. While a generally agreed-upon definition of offsets has yet to emerge, by way of illustration the United States government defines offsets as ‘industrial compensation practices required as a condition of purchase in either government-to-government or commercial sales of defence articles and/or defence services’<sup>1</sup>. The UK definition is more restrictive (Martin, 1996).

In principle, offsets hold out great promise for developing and emerging economies. They can spend their budgets on arms and yet also help their industrialisation, both through developing their arms-related industries and other related and unrelated industries. One of the most recent, and globally high profile, deals has been that of South Africa whose government in September 1999 approved a R29,9 billion arms acquisition programme for the South African National Defence Force (SANDF).<sup>2</sup> To justify this decision to purchase from foreign suppliers and to win public support for the arms deal, the South African government stressed the potential positive effects of the proposed industrial

---

<sup>1</sup> This definition is taken from “Offsets in Military Exports” (U.S. Department of Export Administration, Washington D.C., December 1998).

<sup>2</sup> The original programme and list of preferred suppliers was approved by cabinet in November 1998. The revised programme, approved by cabinet in September 1999 was divided into two tranches: the first tranche, 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 programme.

participation offers (the local term for offsets) on investment, job creation and growth in the local-defence related industry and the national economy. At the time of approving the programme, government stated that the foreign suppliers had made industrial participation offers worth R104 billion which would result in the creation of more than 65,000 jobs over a period of 7 years (Batchelor and Dunne, 2000; also see Batchelor and Dunne, 1998).

The difference between the expected benefit and the actual ones is stark, and the country is presently involved in dealing with the fall-out. The degree of coverage, of transparency and of debate is unprecedented and has provided important, and disturbing, insights into the workings of the international arms market. It has highlighted the increasing importance of offsets in international trade and the problems and pitfalls for both buyer and seller countries<sup>3</sup>.

This paper considers the economics of offsets for developing and emerging economies. It draws upon the recent collection of studies in Brauer and Dunne (2004), one of the two collections of this type available, the other being Martin (1996). Section 2 considers general economic issues; section 3 focuses on the nature of offsets in developing and emerging economies; section 4 presents some of the available evidence on the impact of offsets; and section 5 concludes. The emphasis is placed on the empirical evidence.

## **2. Economic Aspects of Defence Offsets**

It is useful to distinguish between direct offsets, which includes goods and services directly related to the equipment the purchaser is buying (e.g., local co-production of parts of the weapon system being purchased), and indirect offsets, i.e., military or civilian goods and services unrelated to the specific defence equipment purchased. This can include foreign investment and countertrade (barter, counter-purchase and buy-back).

---

<sup>3</sup> The background to, and the experience of, South Africa may be found in Dunne (2003), Batchelor and Dunne (2000), and Batchelor and Willet (1998).

Such offset deals are an increasingly important part of the international trade in military equipment, especially in the aerospace industry (Martin, 1996, Udis and Maskus, 1991).

The nature of offset agreements depends upon the type of buyer. In the case of a country with an existing defence industry, the emphasis of the offsets will often be on limiting the impact on the domestic industry by compelling a relocation of economic activity from the supplier to the purchasing country, including technology transfers. This relocation of economic activity may also be linked with offsets that focus on non-military products.

While government publications often herald offset agreements as beneficial to the purchasing country, the issue is much more complex and the costs and benefits of such programmes have been the subject of some debate. The current state of research suggests that offset agreements more likely reflect attempts to politically justify foreign procurement, especially in emerging democracies, than that they reflect proven economic benefits (Brauer and Dunne, 2004).

If a country with a local defence industry decides to procure new weapons systems then it has to decide whether to produce the weapons locally or to purchase from a foreign supplier. Local production is likely to be the more expensive option and the desired level of technology may not be available. If the decision is made to import then there is usually a search for a foreign supplier that offers the “best” package of weapon system and offset deal. If a local defence industry exists, it is bound to be adversely affected by procurement orders going abroad, but evidence suggests that for small countries maintaining a local defence industry is expensive and uneconomic in any case (Dunne, 1995, 1996). This means importing arms may be economically more sensible, especially as there is usually a premium attached to offsets with the result that the purchase price is higher than it would have been in the absence of offsets.

The economic welfare issues are unclear. Offsets relocate production to the purchasing nation. This trade diversion can be welfare reducing in that imports, including arms imports, can create wealth by allowing domestic labour resources to be moved to more

productive (internationally competitive) areas of the economy. It must be acknowledged, however, that the international arms market is not perfectly competitive, and offsets may improve efficiency if they side-step non-tariff barriers and lead to a search for more efficient subcontractors. Offsets may be considered as a subset of the myriad price-quality-quantity trade-offs which characterise negotiations for large transactions (Martin and Hartley, 1995). They may lead to reduced transaction costs (reducing the number of contracts per trade) but may also inhibit the flexibility of negotiating advantageous deals and result in inefficient procurement (Hall and Markowski, 1994; Markowski and Hall, 2004b).<sup>4</sup>

Competitive bidding leads companies to compete on offsets and invent ingenious ways to deal with them. This sometimes leads to unrealistic offset agreements. The complexity of some agreements has led to the establishment of specialist agencies (e.g., Australia, Spain) within government to deal with offset programmes. This has helped both purchasers and suppliers to overcome the problems of the past, but there still remain problems. For instance, it is possible that the supplier may plan to renege, building into the purchase price the cost of renegeing (moral hazard); it is often unclear how much of the offsets is genuinely new work; what is the technical content; and which companies and regions will benefit from the offsets. In addition, defence offsets have often been inappropriately linked with development aid.

For a small country the issue may be to maintain an intelligent customer capability (intelligent buyer) and to be able to maintain and upgrade systems rather than to retain domestic production capability. This might be achieved through maintaining technological capabilities in research establishments and requiring technology transfers, rather than retaining a local defence industrial base. If there are to be defence offsets then they could be used for developing civil products and/or to assist with the conversion of

---

<sup>4</sup> The impact on the supplying firm can be negative if, for example, it ends up with lower quality components as part of countertrade. Countertrade can destroy local industry, tending to affect smaller contractors. This has been recognised in the U.S. with workers from a subcontractor demonstrating against countertrade negotiations which could have replaced their input.

defence companies rather than attempts to maintain local defence capabilities. Any other solution could be considered second best.

### **3. Offsets in Developing and Emerging Economies**

When an arms deal is agreed and offsets are negotiated developing countries can consider both defence and non-defence offset deals. Depending on government policy objectives, they may wish to export some agricultural products or a low-tech civilian good, or they may wish to develop or maintain a defence industrial base and develop into niche markets. As Brauer (2002) and Kinsella (2000) discuss, the nature of arms production varies across developing countries and depends to some extent on aspirations to become a member of the defence producing elite. The nature of arms production is complex ranging from simple maintenance activities to completely independent R&D and production (Krause, 1992), with most developing economies closer to the former. Their motives for developing these capabilities range across the strategic, political and economic spectrum.

Arms importing countries' offset objectives do of course evolve over time and their strategies change as their objectives evolve. Some developing economies have targeted certain arms niches that they wish to learn to master for themselves and they structure arms import acquisition and offset demands toward the fulfilment of that goal (e.g., Singapore, Taiwan). Other countries (e.g., Brazil, India, Indonesia) appear driven by regional power ambitions that would dictate the development of an indigenous ability to produce a comprehensive range of weapon systems in-country and so they pursued or pursue an arms sourcing and offset strategy with broad technology transfer requirements. Yet other states (e.g., South Korea) seek an ability to produce a wide spectrum of systems not because of regional power ambitions but because of a generalized desire and increasing ability to broadly participate in all industrial markets. Still other states appear to view arms offsets as an opportunity to revive a collapsed or failed indigenous arms

industry (e.g., Poland). And still other countries (e.g., South Africa) appear to view arms offsets as a way to simply get the arms and keep the money at home as well.<sup>5</sup>

While offset policies vary among states there are some common characteristics. These characteristics include (1) that importing countries generally mandate offset requirements by law, often to 100 percent of the arms contract value, (2) that offset requirements kick in for minimum contract value, often as low as US\$5 million, (3) that multipliers are frequently attached to offset deals, meaning that a specific transaction value (say, \$10 million) can be multiplied to count toward a higher value (say, \$15 million) in fulfilment of the offset obligation, (4) that virtually all arms trade contracts now contain clauses that subject arms exporters to a variety of penalties for non-fulfilment of offset obligations (e.g., exclusion from consideration for future contracts in the country). In addition, there are expectations (5) that offsets will reduce arms acquisition costs, (6) that job creation and generalized economic development will result in the arms acquiring country, (7) that the offset will result in new and sustainable work (i.e., that the offset not merely replace work that would have been sourced in-country anyway and that it not be one-off but continuous work), and (8) that the offsets result in general and specific technology transfers since technology is seen as the key to future economic prosperity.

Elements crucially missing in these offset characteristics are offset contract monitoring, auditing, and feedback to the importing country's defence contract-issuing organization. Very few countries have ever carried out even a single formal and independent offset-contract audit to determine to what degree, if any, the hopes with which offset contracts are invested come to fruition.

#### **4. Impact of Offsets**

In the political and news media arena, the expectation is that offsets will reduce arms procurement costs to the importing country; and certainly that there be no cost premium

---

<sup>5</sup> On the arms exporting side of the ledger, arms exporters (e.g., in the U.S., U.K, Sweden, and others) almost always see offset requirements as a costly distraction and nuisance (e.g., Mawdsley and Brzoska, 2004, p. 106), something that has to be done to win contracts but that they would prefer to be able to avoid.

as compared to off-the-shelf arms purchases. But this is illusionary: the administrative cost of offsets alone is believed to cost arms sellers anywhere from 7 to 10 percent of contract value (Markusen, 2004, p. 71), and this cost must be recovered in some form.

In Brazil, Perlo-Freeman reports that “the sheer size and complexity of major warship projects have given rise to serious cost inflation and delays, unmitigated by export orders” (2004, p. 197) and across all arms acquisition categories he notes “the added cost of such deals compared with off-the-shelf procurement” and that “this was accepted by the government as a necessary price for obtaining technology” (2004, p. 197). This assessment also reflects India’s experience where licensed technology programs in tanks, aircraft, and naval vessels “faced delays and cost overruns, and resulted in spectacular failures” (Baskaran, 2004, p. 218). In its dealings with western suppliers, such as Britain, France, and Sweden, India tended to make use of credit arrangements “to cover the foreign exchange burden. However, evidence suggests that such arrangements resulted in increased selling prices” (Baskaran, 2004, p. 221). Likewise, India’s arms relation with Russia and Eastern Europe “appears to have resulted in a significant burden on the Indian economy” (pp. 223-224).

Regarding South Korea, Chinworth writes that 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” (2004, p. 243). For Indonesia’s civilian aircraft program, based on offset deals, Bitzinger reports that its “apparent success was illusory ... In reality, [it] was a bloated, state-owned white elephant, employing many more workers than it needed and was awash in excess production capacity” (2004, p. 264). For instance, the government poured about US\$1 billion into a particular civilian airliner that eventually failed to receive FAA certification and thereby made it impossible to bring the aircraft to market anywhere.

South Africa’s recent arms procurement deal with certain European nations was trumpeted to generate some 65,000 new jobs yet Dunne and Lamb argue that while “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 – ... there is little evidence that the predicted level of benefits have been or will be reached” (2004, p. 289). In 2000, personnel at the South African ministries of finance and of trade and industry estimated the overall return on the arms deal “to be on the order of 94.5 percent ... [and] that during the duration of the deal, anticipated exports would be in the region of 280 percent of the original purchase price” (Haines, 2004, p. 303). But in his case study, Haines finds “substantial hidden costs associated with offsets” (p. 312). For example, substantial state investment in regional infrastructure and other resources would be needed for offsets to work as planned but were not forthcoming for the cases and regions he examined. “Yet this kind of cost is not factored into official assessments of the Strategic Defense Program and the associated offset work” (p. 312).

Even if offsets result in higher total contract cost, is it true as politicians claim and as the news media repeat that general economic development is stimulated? The evidence is mixed, with the balance of evidence pointing to adverse experiences.

A focused approach, in this case targeted on certain key industries, has been taken by Taiwan. This differs from Japan and South Korea, both of which have aimed – without success – at self-sufficient production in all defence systems. Taiwan realized early on that certain “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” (Chinworth, 2004, p. 245). Limiting work directed toward its civilian sector to 15 percent of all offset work “minimizes the multiplier effects of offsets” (Chinworth, pp. 245-246). In Poland, offsets are seen as a way to rebuild its ailing defence industry but whether this succeeds and how many sustainable jobs are to be created remains to be seen. At least, the Poles appeared to have learned from other countries’ experiences that promises of general economic development will likely go unfulfilled (Markowski and Hall, 2004a, p. 172).

Whatever the official rhetoric for public consumption, a number of countries have been clear that their primary purpose with arms trade offset work regards not general economic

development but development of the indigenous arms industry, for example Japan, South Korea, Taiwan, and Poland. This is also true of Brazil where “offset policy and practice ... 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 fulfil a certain view of its place in the world” (Perlo-Freeman, 2004, p. 199).

As mentioned, countries that did harbour and pursue expectations of general economic development appear to have given up on this objective (e.g., the Nordic countries). Nonetheless, some countries still pursue this dream. These include Indonesia and South Africa. The case of Indonesia also illustrates a particular vulnerability. Bitzinger writes: “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” (2004, p. 264). South Africa also has yet to learn from the prevailing experience. Its officials sought to link offset projects “with other national economic and industrial policy initiatives, such as ... Spatial Development Initiatives and Industrial Development Zones,” even though analysts suggested that many of the promised investments were dubious; the analysts now seem to have been correct (Dunne and Lamb, 2004, p. 288). In his study on regional economic development in South Africa, Haines for instance finds few, if any, positive effects, with the arms deal reinforcing the current economic situation and existing regional and other inequalities in South Africa (Haines, 2004, p. 303). Overall, virtually no evidence exists that general economic development goals are ever achieved via offsets.<sup>6</sup>

Another criterion often exploited by officials is that offsets should not merely be replacing work that would have been sourced in-country anyway and that their employment creation should not be one-off but continuous. Brauer argues that a minimum condition for successful indigenous arms production efforts is that civilian industry must already exist from which a state may branch out into military-related work

---

<sup>6</sup> This holds even when developed economies are considered. Germany, in the 1950s, may be the only exception to the rule. Back then, military and civil technologies and production processes were much more closely related to each other than they are now. Indeed, post-WW2 the factories that had been converted to produce military equipment were reconverted to civil. This is something most unlikely to happen now (Southwood, 1991).

(Brauer 1991, 2000). Perlo-Freeman reports that Brazil's anticipated Mirage fighter replacement (on the order of US\$700 million) is not thought likely to result in sustainable work unless unexpected export orders were to come in (2004, p. 195). Indeed, of all of Brazil's extensive indigenous arms production ventures started since the 1930s with various forms of offsets only a single one – Helibras – might be deemed commercially viable (p. 196).

Indonesia's attempt to create an indigenous military and civilian aircraft industry collapsed in the wake of the 1997 financial crisis in East Asia. The main aircraft corporation, IPTN, was forced to restructure and, by 2000, accumulated a debt of US\$570 million. It also had to lay off "around one-third of its workforce, or 5,000 employees" and anticipates to lay off an additional 3,500 jobs in the near future (Bitzinger, 2004, p. 264). The most egregious job generation claim is that of South Africa. As mentioned, it claimed that its most recent arms offset deal will result in 65,000 new jobs over seven years. To Dunne and Lamb, "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" (2004, p. 288) and it is "not clear that the companies will be internationally competitive to allow follow-on industrial development to be sustainable" (p. 290).<sup>7</sup>

Once more, the main lesson is that there is virtually no positive and certainly no compelling evidence that offsets create new, let alone sustainable jobs.

With regard to general and specific technology transfer directed either toward military or civilian industry the record is mixed for advanced economies, and generally negative for developing and emerging economies. To be sure, some studies report that military-directed technology transfers originating with offset deals are considered successful in some country's own terms, at least in certain cases. Thus Perlo-Freeman (2004) argues that for Brazil Embraer, and the associated aeronautics industry, may represent the

---

<sup>7</sup> An earlier case study on defence offsets in Saudi Arabia "reveals that instead of a projected 75,000 local jobs, the various programs generated employment in the region of 2,000" (Matthews, 2002; also see Matthews, 1996).

clearest success of the technology transfer strategy. They have gradually ascended the technological ladder and their military and civil technologies have worked together effectively, producing a world-leader in the regional jet market. This has, however, been achieved through massive government investment and subsidy, and at the end of the day Brazil is nowhere near achieving fully autonomous arms production in any sector (2004, p. 198).

Likewise, for India, Baskaran (2004) argues that while there is no question that certain technologies were successfully transferred, the industry failed to acquire capabilities sufficient to close the technology gap with developed countries and keep pace with technological change in weapon systems (p. 219; also p. 224). A particular problem seemed to be that technology transfers at the level of whole systems worked less efficiently than at component level as sellers tended to withhold core technologies (Baskaran, 2004, p. 220). This hints at what Chinworth found for the case of Taiwan, that its efforts to develop indigenous systems in the 1990s resulted in items that remained heavily dependent on imported technology and that not all domestic development programs were successful (p. 246).<sup>8</sup> The relatively more successful case of Singapore suggests that they learned from the experience of the other countries. As Bitzinger (2004) argues, “Singapore’s defense industry appears to be thriving, largely because of its core competencies/niche production business strategy” (p. 264). The available offset work is limited in scope but sustainable, even spilling into the non-defence sector. Tellingly, the requirement rather than consequence of this strategy is its significant impact on further diminishing the nation’s already low attachment to offsets as an industrial policy, and in the case of its participation in the U.S. Joint Strike Fighter project the country explicitly rejected the idea of offsets (pp. 265-266).

Finally, with regard to South Africa, Dunne and Lamb (2004, p. 288) argue that it must be acknowledged that the country has some indigenous industrial capacity that could be exploited if South African firms were to be integrated into an emerging European or

---

<sup>8</sup> The Indigenous Fighter Aircraft, for example, ran into cost and quality control problems limiting its production run.

global arms production supply chain. However, an industrial potential need not and may not translate into actual experience. As regards the non-defence industry, the authors question the value of the offset deal. For instance, they suggest that it is unclear 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) (Dunne and Lamb, 2004, p. 290).

## **5. Conclusions**

It is generally accepted that arms imports are needed for legitimate defence purposes, although for many countries this may reasonably be disputed (Dumas, 2004). There is nonetheless a crying need for countries to obtain a much better idea of what works under what circumstances, and what does not work (Taylor, 2004, and Markowski and Hall, 2004b, offer some guidelines). This is particularly true for developing countries, where the opportunity cost of military expenditure can be extremely high. To date, the evidence does not suggest that offsets advance countries' long-term economic or military goals. To summarize this evidence, it is now quite clear that offsets do not result in arms acquisition cost reductions, that offsets do not stimulate broad-based civilian economic development, that neither substantial nor sustained job creation occurs, not even within the military sector, that almost no successful technology transfer into the civilian sector is observed, and that only limited technology transfer into the military sector occurs, often over decades and at high cost. Moreover, whatever technology is transferred is quickly outpaced by continuous technology advances in the main developed countries, especially the United States.

Clearly the benefits of offsets to the procuring country are open to question, and the only way of determining the true value of an offset arrangement to a country is to make a detailed analysis. When this has been done the impact on the economy has been much smaller than expected or promised (Martin, 1996, Matthews, 2002, Brauer and Dunne, 2004). The onus to prove otherwise lies with those who would champion the case of offsets. Regrettably, their case relies on pre-offset assertions, rather than post-offset evidence. As Hartley points out, the incentive is to exaggerate benefits and understate or

ignore the costs (2004, p. 121). It would seem that developing countries should beware the lure of arms offset deals. They have little to gain and much to lose.

## References

Baskaran, A (2004) "The Role of Offsets in Indian Defence Procurement Policy," chapter 15 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Batchelor, P and Dunne, J P (2000) "Industrial Participation, Investment and Growth: The Case of South Africa's Defence Related Industry." *Development Southern Africa* 17(3), pp. 417-35.

Batchelor, P and Willett, S (1998) *Disarmament and Defence Industrial Adjustment in South Africa*. Oxford: SIPRI and Oxford University Press.

Batchelor, P and Dunne, J P (1998) "The Restructuring of South Africa's Defence Industry." *African Security Review* 7(6), pp. 27-43.

Bitzinger, R A (2004) "Offsets and Defense Industrialisation in Indonesia and Singapore," chapter 17 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Brauer, J (1991) "Arms Production in Developing Nations: The Relation to Industrial Structure, Industrial Diversification, and Human Capital Formation." *Defence Economics* 2(2), pp. 165-75.

Brauer, J (2000) "Potential and Actual Arms Production: Implications for the Arms Trade Debate." *Defence and Peace Economics* 11(5), pp. 461-80.

Brauer, J (2002) "The Arms Industry in Developing Nations: History and Post-Cold War Assessment," chapter 5 in J Brauer and J P Dunne (eds.) *The Economics of Military Expenditure and Arms Production and Trade in Developing Countries*. New York: Palgrave.

Brauer, J and Dunne, J P, eds. (2004) *Arms Trade and Economic Development: Theory, Policy, and Cases in Arms Trade Offsets*. London: Routledge.

Chinworth, M W (2004) "Offset Policies and Trends in Jpan, South Korea and Taiwan," chapter 16 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

- Dumas, L J (2004) "Do Offsets Mitigate or Magnify the Military Burden?" chapter 1 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.
- Dunne, J P and Lamb, G (2004) "Defence Industrial Participation: The Experience of South Africa," chapter 19 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.
- Dunne, J P (2003) "The Making of Arms in South Africa," in *Economists Allied for Arms Reduction (ECAAR) Review 2003*. Pearl River, NY: ECAAR.
- Dunne, J P (1996) "Economic Effects of Military Spending in LDCs: A Survey," in Gleditsch, N et al. (eds.), *The Peace Dividend*. Amsterdam: North Holland.
- Dunne, J P (1995) "The Defence Industrial Base," in Hartley, K., and Sandler, T. (eds.) *Handbook of Defence Economics*. Amsterdam: Elsevier.
- Haines, R J (2004) "Defence Offsets and regional Development in South Africa," chapter 20 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.
- Hall, P and Markowski, S. (1994) "On the Normality and Abnormality of Offsets Obligations," *Defence and Peace Economics* 5(3), pp. 173-88.
- Hartley, K. (2004) "Offsets and the Joint Strike Fighter in the UK and the Netherlands," chapter 8 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.
- Hartley, K (1995) "Industrial Policies in the Defense Sector," in Hartley, K. and Sandler, T. (eds.) *Handbook of Defence Economics*. Amsterdam: Elsevier.
- Kinsella, D (2000) "Arms Production in the Third Tier: An Analysis of Opportunity and Willingness," *International Interactions* 26(3), pp. 253-286.
- Krause, K (1992) *Arms and the State: Patterns of Military Expenditure and Trade*. Cambridge: Cambridge University Press.
- Markowski, S. and Hall, P. (2004a) "The Defence Offsets in Poland: An Offsets-based Revival?" chapter 12 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.
- Markowski, S. and Hall, P. (2004b) "Mandatory Defense Offsets – Conceptual Foundations," chapter 3 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Markusen, A. (2004) "Arms Trade as Illiberal Trade," chapter 5 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Martin, S, ed. (1996) *The Economics of Offsets*. Amsterdam: Harwood.

Martin, S and Hartley, K (1995) "UK Firms' Experience and Perceptions of Defence Offsets: Survey Results." *Defence and Peace Economics* 6(2), pp. 123-39.

Matthews, R (1996) "Saudi Arabia's Defence Offset Programmes: Progress, Policy and Performance." *Defence and Peace Economics* 7(3), pp. 233-51.

Matthews, R (2002) "Saudi Arabia: Defense Offsets and Development," chapter 8 in J Brauer and J P Dunne (eds) *The Economics of Military Expenditure and Arms Production and Trade in Developing Countries*. New York: Palgrave.

Mawsdley, J and Brzoska, M (2004) "Comparing British and German Offset Policies," chapter 7 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Perlo Freeman, S. (2004) "Offsets and the Development of the Brazilian Arms Industry," chapter 13 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Southwood, P (1991) *Disarming Military Industries: Turning an Outbreak of Peace into an Enduring Legacy*. New York: St. Martin's Press.

Taylor, T. (2004) "Using Procurement Offsets as and Economic Development Strategy," chapter 19 in J Brauer and J P Dunne (eds) *Arms Trade and Economic Development: Theory Policy and Cases in Arms trade Offsets*. London: Routledge.

Udis, B and Maskus, K (1991) "Offsets as Industrial Policy: Lessons from Aerospace." *Defence Economics* 2(2), pp 151-64.

United States Department of Commerce, Bureau of Export Administration (various years). *Offsets in Defense Trade: Annual Report to Congress*. Washington, DC: U.S. Government Printing Office.