Defense & Security Analysis

ISSN: 1475-1798 (Print) 1475-1801 (Online) Journal homepage: www.tandfonline.com/journals/cdan20

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To cite this article: Stefan Markowski & Peter Hall (2014) Mandated defence offsets: can they ever deliver?, Defense & Security Analysis, 30:2, 148-162, DOI: 10.1080/14751798.2014.894294

To link to this article: https://doi.org/10.1080/14751798.2014.894294

Defense & Security Analysis, 2014
Vol. 30, No. 2, 148–162, http://dx.doi.org/10.1080/14751798.2014.894294

Routledge
Taylor & Francis Group

Mandated defence offsets: can they ever deliver?

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Defence *offsets* are elements of defence procurement deals *additional* to the primary content. Offsets are usually expected to yield technological or industrial benefits to the purchasing country (e.g. countertrade, technology transfers, or additional jobs) and military buyers often require suppliers to make offsets available "cost-free." The authors argued previously that such strategies achieve little of value to buyers that lack market power and are unnecessary otherwise, since purchasers with the market power to extract more value for money from foreign suppliers can do so anyway. This article also focuses on the supply side of offset deals. The USA is the world's largest defence offsets supplier but the US government opposes offsets demands as economically inefficient and trade distorting. Even if offsets are inefficient and trade distorting, they may still benefit a materiel-exporting country such as the USA as they may induce exports and create associated benefits for the offsets provider.

Keywords: offsets; mandatory defence offsets; arms trade; defence procurement; countertrade; technology transfer; local content

Preamble

Defence offsets are defined by the Bureau of Industry and Security (BIS) of the US Department of Commerce as

> a range of industrial compensation arrangements required by a foreign government as a condition of purchase of US defence articles and services. This mandatory compensation can take many forms; it can be directly related or unrelated to the defence system. The compensation can be further classified as a Subcontract, Purchase, Co-production, Technology Transfer, Licensed Production, Credit Assistance, Overseas Investment, or Training.[1]

The definition highlights a well-recognised aspect of defence offsets generally: they are compensatory arrangements demanded by governments of materiel-importing countries as a condition of purchasing military goods and services produced by exporting countries. By mandating an offsets scheme, a country displays the belief that it can achieve an outcome different from the deal it would have been able to negotiate in the absence of the scheme: it believes that the mandatory arrangements bestow upon its market power that it would otherwise lack. Further, when an importing nation introduces mandatory defence offsets, it is implied that reasons exist that justify its demands for "compensation" associated with overseas military purchases, in particular, that what it seeks will be, in some sense, welfare-enhancing from its own standpoint or from the

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standpoint of certain sections of its community. If this were not true, it could only be said that policy-makers were knowingly acting irrationally, i.e. contrary to the perceived interests of their nation or some elements of it, or that they had private reasons to seek offsets deals without regard for their broader socio-economic consequences.[2] Whereas mandatory defence offsets are a government policy requirement, defence procurement agencies may also apply offsets at their discretion, i.e. when they see benefit in using them. In this article the focus is on offsets requirements mandated by governments of materiel-importing countries as opposed to discretionary offset arrangements applied by defence procurement agencies.

Why is this "compensation" required in the case of defence-related imports when most non-defence imports are free from such onerous imposts? Some buyer countries would argue that by importing such products using taxpayer-provided funds, they deprive their domestic industries of the opportunity to make them, or parts of them, in-country. This is a weak argument as most such imports could not be sourced locally precisely because the local industry lacks the capacity to make them cost-effectively or to make them at all. A stronger argument in favour of some forms of offset is that they provide an opportunity for the importing nation to engage in activities, which it would otherwise find either impossible or too costly to engage in, such as exporting goods and services, which hitherto were not exported or acquiring technologies which would not otherwise have been accessible.

The prospects of extracting "compensation" depend on the ability of an importing nation to obtain it from foreign suppliers, i.e. its relative market power as an importer. However, if a buyer country in any case has the power to extract a better deal, it is unclear why this needs to be mandated by government as offsets rather than achieved in the form of more broadly specified buyer requirements included in normal import agreements.

An offsets type of arrangement is often negotiated or simply offered in commercial, market-mediated transactions (e.g. "throwing in two products for the price of one") and sometimes buyer demands are widened by bundling together different requirements to achieve economies of scope in procurement or to acquire packages of complementary products. Proposals for such arrangements can be initiated by either party but, equally, either is free to walk away from deals that do not suit them.

From the standpoint of defence offset suppliers, the mandatory imposition of such offset requirements has both disadvantages and potential benefits. The formal position of the government of the USA – the world's largest defence offsets supplier – is somewhat ambiguous. On the one hand, the US government considers offsets "economically inefficient and trade distorting"[3] and prohibits any of its agencies from "encouraging, entering directly into, or committing US firms to any offsets arrangement in connection with the sale of defence goods and services to foreign governments."[4] On the other, BIS also recognises that US prime contractors "generally see offsets as a reality of the marketplace for companies competing for international defence sales."[5] As the world's leading producer of defence materiel and the dominant investor in defence Research & Development (R&D), US official hostility to offsets most likely reflects efforts to protect US defence exporters.[6]

Even if mandatory offsets are inefficient and trade distorting, they may still benefit the national interest of a materiel-exporting country such as the USA. Generally, offsets may induce exports and create associated benefits for the exporting country (offsets provider). Consider, for example, offsets in the form of technology transfers. To put the technology to effective use, the importer may well have (or choose) to import as commercial transactions complementary goods and services from the technology provider. In such a case, the buyer's offset-induced demand for a broader package of deliverables also increases opportunities for the seller to export more than would otherwise have been the case.

Whilst the USA may benefit from some forms of offsets mandated by importing nations, other forms could be detrimental to particular sectoral interests. For example, the US government has long been concerned that offsets-based technology transfers could potentially assist rival foreign

suppliers and, thus, result in the displacement of domestic producers or products unable to withstand increased global competition. Such displacement, however, cannot logically be blamed on offsets. Exporting any product – offset-induced or otherwise – invites imitation in the importing country that could ultimately undermine the initial competitive advantage of the exporting nation.

On the demand side of mandatory offsets requirements, there is also a variety of perspectives. For example, European Union (EU) member states adopt very different attitudes to mandatory offsets and reports commissioned by the European Defence Agency (EDA) and identifies three distinct positions taken by those members of the EU that apply offsets:[7]

(1) Offsets have an adverse impact on market competition and distort materiel, technology and other markets. They should eventually be phased out but pending their withdrawal, "adverse impacts on competition should be mitigated";
(2) While offsets may have adverse impacts, they nevertheless assist in the development of the European Defence Technology and Industrial Base (EDTIB); and
(3) There is a risk involved in mandating offsets as many of them are not consistent with Article 296 of the European Community Treaty and could be declared illegal when challenges are mounted and specific cases come under scrutiny.

Thus, notwithstanding the clouded legal status of mandatory offsets in the EU under Article 296, it is broadly recognised that offsets are likely to have an adverse impact on European defence markets and industries.[8] Nevertheless, given "the still-infant status of our open market efforts," offsets offer "opportunities for individual Member States to build their own skills and develop important relationships for their companies."[9]

Similar logic has been followed by many developing nations seeking to enhance their technological and defence industry base through offsets. India's current policy of mandatory offsets, for example, was introduced in 2005[10] and the Indian Ministry of Defence estimate that offsets will "bring in nearly $10 billion into the country" during 2007–2012.[11]

Whatever defence, technological or industrial objectives offsets mandating nations set out to achieve, they tend to focus on mandating offsets requirements rather than thinking through the most efficient procurement method to achieve these objectives. Mandating offsets per se does not improve the buyer's bargaining position.[12] For example, buyer nations cannot force foreign prime contractors to bid for work that offsets render unprofitable or to comply with offsets requirements that are illegal in the exporter's home country.

Buyer governments often appear to believe that mandatory offsets can be used to extract rents, which would otherwise have been collected by the seller. But if suppliers come routinely to anticipate demands for offsets, they will factor the cost of offsets – to them – into defence deals and use the mandatory provision of offsets as an argument against negotiating price discounts. Buyers will then be left to negotiate "package enhancements" from a particular supplier, even though cash savings would have been preferable since the buyer could use them freely to shop around to achieve greater value for money by buying different elements of the package from different suppliers.

These points have been raised before and for a while, particularly in the 1990s, the appeal of mandatory offsets seemed to have fallen away.[13] Countries such as Australia long ago abandoned mandatory offsets demands and instead have tried to improve their bargaining position through the use of "smarter" procurement methods and by training more market-savvy defence procurement personnel.

It appears that the appeal of mandatory offsets is once again on the rise. This article in part restates the previous argument against the use of mandatory offsets and, in part, attempts to strengthen these arguments by highlighting the importance of informational asymmetries between the buyer and the seller. While mandatory offsets requirements usually increase these

informational asymmetries, they may also elicit sellers' responses such as hidden quality degradation that work to the buyer's disadvantage.

In the next section the different types of defence offsets demands are examined and their application by different countries. Then the advantages and disadvantages of applying mandatory offsets schemes are re-examined. This leads to a section focused on information asymmetries associated with the use of mandatory offsets requirements. The article concludes by drawing inferences for offset policies.

Defence offset categories and offset demands

Offset categories

Defence offsets include local-content requirements in procurement deals, countertrade, co-production arrangements, technology transfers from seller to the buyer, licensed production in the materiel-importing country, financial/credit assistance for the buyer, direct foreign investment in the importing country, or training of the buyer's personnel by the offset provider. Offset requirements are mandated as additional or secondary to the primary materiel import transaction.

Mandatory offsets are often divided into:

- *direct offsets* – items and activities directly *related* to a purchase of defence materiel;
- *indirect offsets* – items and activities *unrelated* to a purchase of arms or equipment often involving civilian activities of no consequence to national security objectives.

In a previous work by the authors,[14] it was proposed that a three-way classification of offsets aligned with forms of industry development policy:

- countertrade (export creation);
- local-content requirements (import substitution); and
- bundling (import broadening) activities.

In the case of countertrade, the importing country makes an arms purchase conditional on a supplier country buying its home-made products as offsets, i.e. the importer is "compensated" for buying defence materiel from a foreign supplier by exporting locally made products, which otherwise would not have been exported or even produced.

In the case of local-content requirements, an arms purchase is conditional on an overseas supplier sourcing an agreed fraction of contract-related work in the importing country. This may involve using existing local suppliers as subcontractors, or licensed production, or direct investment by the seller in the importing country. Whereas local-content requirements may take many specific forms, they essentially involve some form of co-production, i.e. making components in country that otherwise would have been made overseas, or assembling of final products that would have been assembled elsewhere, or drawing on the supplier's design and technological know-how to develop local design or R&D capabilities.

In the case of bundling, an arms-importing country makes purchases conditional on the arms seller's willingness to supply products additional to those comprising the primary transaction.

Defence offsets: a global perspective

Martin estimated that over 130 countries had a countertrade/offsets policy in 1992.[15] There is a paucity of information, however, on the global incidence of specifically defence-related offset

demands and obligations, actual offset deals, and, in particular, the final outcomes and impacts of actual offsets transactions.

More is known about formal defence offsets and local-content policies,[16] but the distinction between mandatory offsets requirements and those applied by defence procurement agencies if practicable (the "best endeavours approach") is often blurred. There is also considerable confusion as to which industry and trade assistance initiatives are de facto offset policies and which ones are not. For example, Australia often uses larger defence acquisitions as an opportunity to secure work for its domestic defence producers but it no longer mandates specific local-content targets. Instead, it relies on "best endeavours" of its defence procurement personnel to secure advantageous local-content deals.[17] The official Australian position is that "In general, offsets … do not work."[18] However, BIS lists Australia as a country applying "official offsets policies" and bundles it together with several other countries that mandate defence offsets requirements.[19]

The most informative and consistent source of data on offsets are the bi-annual reports prepared by the BIS of the US Department of Commerce, which track offsets agreements signed and completed by US defence contractors.[20]

Over the period 1993–2008, BIS estimates 45 countries to have had defence offset agreements with US suppliers (obligating US defence contractors to provide offsets) and US firms reported entering into 677 offset agreements (averaging 42 agreements per year).[21] The cumulative value of these agreements was nearly US$69 billion or 71% of US defence exports worth US $97 billion. On a year-by-year basis, the value of offset agreements as a proportion of the total value of defence contracts with US suppliers has ranged between 34% in 1993 and 125% in 2003. The annual value of offset agreements peaked at over US$9 billion in 2003 (over twice the average annual value of offset agreements, which was US$4.3 billion over the period 1993–2008).[22]

The cumulative value of offset transactions (discharged offset obligations), 1993–2008, was US$49 billion or 51% of US defence export sales. The annual value of offsets transactions peaked at over US$4.7 billion in 2004.[23] BIS reports that between 1993 and 2008, US firms reported 9877 offset transactions with 47 countries with an actual value (in current dollars) of nearly US$49 billion but an offset "credit value" of over US$58billion.[24] The "credit value" is higher than the "actual value" because about 12% of all transactions attracted "value credits" (multipliers) greater than the actual reported value of these transactions.

The most common offset transaction types were: countertrade (purchases) at 36% of all transaction by value, local content (subcontracts) (22%), and bundling, mostly taking the form of technology transfers, at nearly 18%.[25]

BIS also estimates direct offsets completed by US defence contractors over this period to account for about 41% of the actual value of the offsets transactions in 1993–2008[26] and indirect offsets for over 58%.[27]

Different countries' appetite for offsets deals also varies widely. BIS shows countries with offsets requirements roughly divide into equal thirds: those that demand over 100% of the value of defence contracts in offsets; those that target the mid-range of between 50% and 99%; and those that accept less than 50%.[28] Geographically, Europe with an average ratio of 98.4% (and inter-country range between 28% and 172%) has had more appetite for offset deals than other regions, including the Americas (average 97%), Middle East and Africa (average 44% and range 33–116%), and Asia-Pacific (39% and 22–100%).

BIS also shows the UK to be the top recipient of offsets provided by US defence contractors: US$7.2 billion or about 17% of all US offsets transactions in 1993–2006.[29] Over the same period, the top five recipient nations (the UK, Israel, Finland, Poland, and South Korea) accounted for US$21.0 billion or about half of all offset transactions. Table 1

Table 1. Offsets agreements and transactions 1993–2006: top 15 countries in each category.

Top 15 US defence export destinations				
Country	No. of offset agreements	Value of export contracts (US$ billion)	Value of offset agreements (US$ billion)	Offsets to exports ratio (%)
UK	47	12.8	10.5	82
Taiwan	42	11.4	2.5	22
South Korea	67	9.2	5.4	59
Greece	51	7.5	8.5	113
Canada	28	4.6	4.5	98
Israel	49	4.4	2.1	47
Saudi Arabia	n/a	4.1	1.4	34
Turkey	20	3.9	1.8	46
Poland	3	3.7	6.3	170
Australia	17	3.5	1.6	46
Italy	9	2.7	2.5	93
Switzerland	11	2.6	2.0	77
The Netherlands	48	2.1	2.5	119
Spain	26	2.0	1.7	85
Norway	31	1.3	1.4	108
All countries	582	84.3	60.0	71

Top 15 US offsets recipients			
	Actual value of offset transactions (US$ billion)	Credit value of offset transactions (US$ billion)	Multiplier
UK	7.247	7.114	0.98
Israel	4.203	4.357	1.04
Finland	3.501	3.738	1.07
Poland	3.338	4.374	1.31
South Korea	2.841	3.155	1.11
Italy	2.424	2.444	1.01
The Netherlands	2.335	2.642	1.13
Greece	2.311	4.611	1.99
Canada	1.986	1.956	0.99
Australia	1.641	1.693	1.03
Switzerland	1.381	1.387	1.00
Spain	1.238	1.484	1.20
Turkey	1.129	1.189	1.05
Taiwan	1.116	2.033	1.82
Norway	1.002	1.289	1.29
All countries	42.0	48.9	1.16

Source: BIS, *Offsets in Defense Trade, 12th Report to Congress*, Tables 4-1 and 5-2: 4-3 and 5-3.

gives the value of offsets agreed with the top 15 importers of US defence materiel and the actual and credited values (using credit multipliers) of offsets transactions for the top 15 offsets receiving nations.

Between 1993 and 2006, five US industry sectors accounted for over 80% of all offset transactions: Transportation Equipment (mostly aerospace products) – 53%; Electronics/Electrical Equipment (13%); Technical Services and Consulting (5.5%); Industrial machinery (4.5%); and Measuring and Analysing Instruments (4.3%).[30]

BIS offset reports have also attempted to assess the impact of offsets obligations imposed on US exporters of military materiel on US defence preparedness, industrial competitiveness, employment, and trade (see next section).

The picture that emerges from these reports is rather cloudy and confusing. Little is known about how the values of offset agreements in which US defence suppliers are involved are negotiated and determined (e.g. what prices and value multipliers are agreed by the parties prior to offset agreements and how these values are arrived at). As mandatory offsets demands are fully anticipated by exporters who sell defence products to countries that mandate them, it would be helpful to know how contractors "package" their offers and whether the cost of expected offset requirements is included in prices quoted for exportable defence materiel.

BIS reports show the aggregate value of offset transactions differs on a year-by-year basis from the aggregate value of offset agreements. This is because offset transactions are completed over a number of years following the initially agreed offset obligations. However, BIS does not reveal how individual offset completions (discharged obligations) relate to previously agreed offset deliverables. It is thus impossible to know the proportion of offsets agreed by the parties that is subsequently fully discharged. We are not told, either, what happens when offsets obligated by contractors are not delivered. On the buyer's side of offset deals, offsets credited on completion of such transactions often exceed their actual (transacted) value due to the application of value multipliers – but we do not know how these value "enhancers" are determined in practice. Is there, for example, room for "creative accounting" or outright corruption?

There are also challenges in interpreting the calculations and implications flowing from attempts to estimate the true cost of offsets to recipient countries. It is now widely accepted that offsets demands increase the cost of arms purchased under primary deals to which they relate and a number of studies may be cited in support of this claim. For example, Eriksson et al. report that members of the EU pay 5–10% more for imported defence materiel as a result of (direct) offset demands.[31] A number of contributors to Brauer and Dunne estimate the cost premiums to vary between 7% and 15%[32] and Struys argues that, "Belgium pays a 20–30% penalty for imported weapons systems."[33] An official Australian estimate shows the offset-related cost premium for the F/A-18 Hornet programme in Australia in 1985–1990 was about 17%.[34]

There is an apparent ambiguity here. As given in Table 1, the average ratio of offset agreements (by value) to the value of related export contracts is 71% and for some countries it is well in excess of 100% (Greece 113%, the Netherlands 119%, and Poland 170%). If offset recipients pay foreign suppliers on average between 5% and 15% of the cost of primary deal for offsets, why are these offsets "valued" on average at over 70% of the underlying primary contracts? It appears that cost premia are calculated using actual prices paid for contract deliverables while offset "value" is calculated using notional prices agreed by offset suppliers and recipients, which seem to be completely divorced from the actual cost of supplying these items. These high "shadow" prices are convenient for offset recipients keen to demonstrate their ability to "extract value" from suppliers. They are also convenient for suppliers keen to overstate the value of discharged offset obligations. But, from our perspective, it appears that these billions of dollars of reported offset "values" are expressed in "funny money" using arbitrary price sets that much overstate the value of offset deals.

Advantages and disadvantages of offset requirements

Evidence is available to suggest that offsets arrangements may have had real effects, for both defence exporters and offsets recipients. Compliance with offset requirements by US defence exporters between 2002 and 2005, for example, is estimated to have resulted in over 16,000 US jobs (in equivalent work-years) being diverted overseas.[35] Offsets may well not be the sole

cause of job relocation overseas, however, and much of the work involved may have been "off-shored" anyway owing to foreign direct investment and technology transfers in which US defence suppliers would normally have engaged as export-oriented commercial entities. That said, BIS in any case estimates that offset demands imposed on US defence contractors resulted in a *net gain* in US defence industry employment, 2002–2005, because offset-related defence exports were estimated to have generated twice the number of jobs lost (in equivalent work-years) due to offset-related diversion of defence work overseas. It further valued offsets-related technology transfers over the period at nearly 8% of the US annual aerospace R&D spend.

The value of technology transfers to recipients may vary widely with differences in their capacity to make good use of (absorb) the technology and sustain beneficial outcomes over time.[36] But country-to-country variation in absorptive capacity is only one factor contributing to ambiguity in judging the benefit of offsets to recipient countries. As noted above, "values" assigned to offset agreements and transactions diverge considerably from their actual costs and for the materiel buyer, the value of offsets credited to an offset deal also reflects the country's preference for one category of offsets rather than another.

There are some reported "success stories,"[37] however, apparent "success stories" are not always subjected to tests of efficiency and effectiveness. At the very least, the following questions should be asked before any mandatory offsets scheme is considered to be an efficient and effective instrument of defence procurement policy:

- What would have happened in the absence of these mandatory offsets requirements?
- Whatever the apparent benefit, why are these mandatory arrangements the most efficient way to obtain it? Could the same outcome in terms of, say, local content be achieved at lower cost by a different route or a better outcome achieved at the same cost?
- Do these mandatory offset requirements get in the way of optimising defence procurement?
- Do they get in the way of optimising social welfare?

Any attempt to address counterfactuals is difficult. As the authors have argued on previous occasions, mandatory offsets schemes appear to belong to the realm of smoke and mirrors where evidence on costs and effects is hard to extract and/or generalise with any precision because:

- these policies are among many policies that affect employment, technology transfers and use, industry capability formation and market access for sellers;
- desired policy outcomes are affected by a multitude of non-policy factors;
- potentially significant positive and negative externalities need to be allowed for in cost–benefit calculations;
- effects vary widely from case to case;
- effects take long periods to feed through. Costs are usually incurred before benefits accrue – with the latter being discounted more heavily than the former;
- while many costs are reasonably certain, benefits are risky and some may never eventuate – given the changing nature of defence contingencies and the pace of technological change; and
- as noted above, a recipient country's absorptive capacity for offset deliverables is hard to assess and can only be determined with any precision *ex post*.

For these reasons, it is argued that the evidence adduced in favour of mandatory offsets schemes needs to be treated with caution. In judging their efficiency and effectiveness, moreover, it should be recognised that they restrict the buyer's flexibility to negotiate the most advantageous

import deals and to direct scarce national resources to activities that generate the highest net social benefit.[38] This sentiment is echoed by Taylor, who argues that " … any attempt to use a mandatory offsets policy for all government procurement limits the dimensions of the negotiation."[39] In sum, offsets requirements, especially defence offsets, involve addressing a mixture of different objectives and lack of clarity as to what is to be achieved by using them is a key problem in evaluation exercises. Commercial buyers are assumed to be driven by economic self-interest but policy that mandates defence offsets *requires* public agencies to obtain offsets or local production, even if it is unclear what net benefits will accrue to them as a result.[40]

Informational asymmetries

All defence procurement transactions involve a degree of contractual incompleteness: it is impossible to design contracts that are completely unambiguous, provide for every contingency, and are fully enforceable. Mandatory offsets schemes increase this contractual incompleteness by adding usually vague and hard to enforce secondary requirements to primary elements of procurement deals. The argument here is that the resultant clouding of defence procurement transactions is more disadvantageous for the buyer, who must comply with the mandated offset requirements, than the supplier, who may recover the cost of offsets by padding the price of the primary requirement, is left the initiative to structure the offer to comply with offset requirements and, in any case, is free to walk away from unprofitable transactions. In the following two sections, the authors consider mandatory offset demands from the buyer's perspective and next from the seller's.

Buyers

Defence offsets tend to be mandated by materiel-importing nations because they offer the promise to buyers that more local subcontractors will be engaged by foreign primes, that a wider range of new product and process technologies will be transferred to them, and that their export opportunities will be enhanced. However, even if all such package enhancements are genuine and buyers have the capacity to absorb them, how do they know which offers compliant with their mandated offsets requirements represent best value?

First, consider a case when offset requirements are not mandated. In Figure 1, the buyer nation intends to import quantity X_1 of a military product X, say a weapons system, as the primary component of the intended procurement transaction. It is also contemplating the purchase of another product Y, which could be added to the primary requirement to form a joint transaction (X_1,Y_i), where Y_i denotes a particular quantity of Y to be bundled together with the primary requirement X_1. Alternatively, Y could be purchased independently of X. While the requirement X_1 is fixed, the buyer is more flexible as to the required quantity of Y: it has an option to purchase the two products jointly, as the bundled transaction (X_1,Y_i), or separately as two stand-alone transactions (X_1) and (Y_j). For example, the buyer may consider the purchase of a larger quantity of Y if it is more advantageous to acquire it jointly with X.

In the figure, the benefit surface $B(X,Y)$ shows the value of different combinations of X and Y to the buyer. The cost surface, $C(X_1,Y_i)$, is not shown in the figure. However, for illustrative purposes, the authors show costs that would be incurred by the buyer if it purchased indicated quantities of the two products along the continuum of possible product combinations between X_1 and Y_4. For example, if the buyer wishes to bundle the two requirements together into a joint requirement (X_1,Y_1) the value of this particular product combination to the buyer is shown as $B(X_1,Y_1)$ and the cost as $C(X_1,Y_1)$. Thus, the net benefit of this particular joint acquisition is: $B(X_1,Y_1) - C(X_1,Y_1)$.

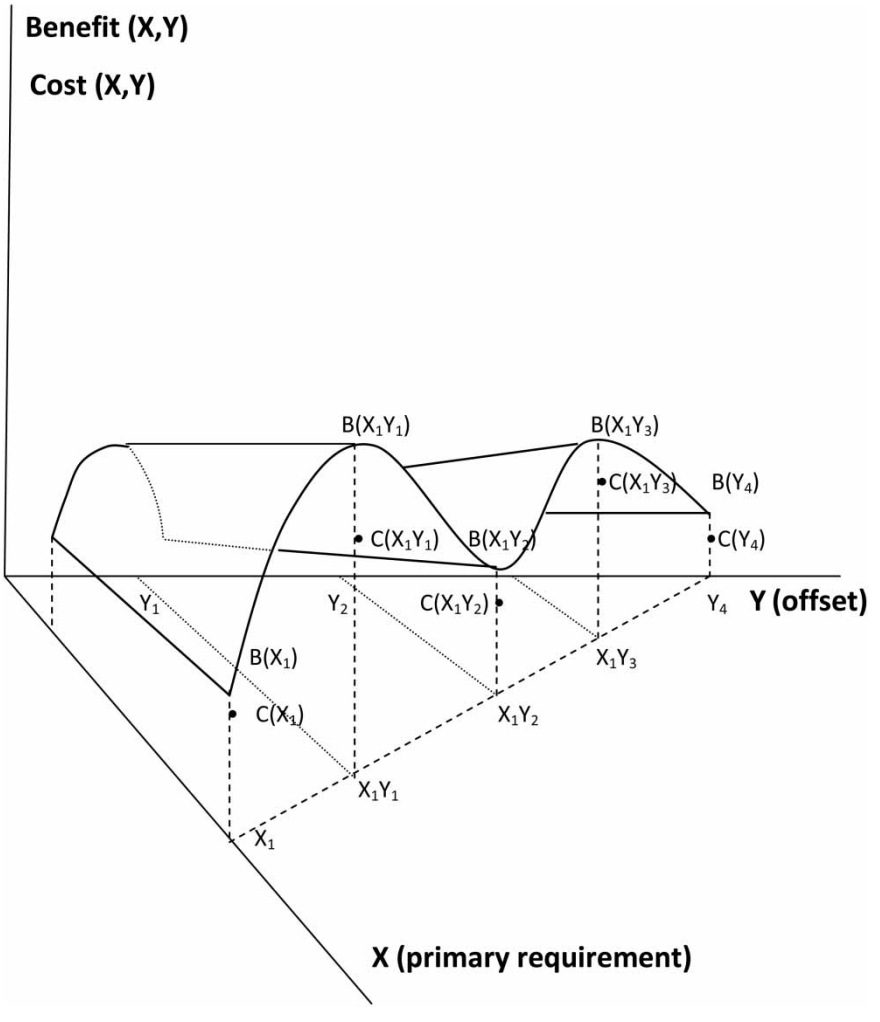

Figure 1. Buyer's perspective.

Also, as shown in the figure, the least cost combination of X and Y, X_1,Y_2 is not attractive as it is also the least benefit option. The higher cost combination X_1,Y_3 is more attractive while the package of X_1 and Y_1 offers the largest net benefit (greatest "value for money").

In general, given its budget constraint, the buyer would prefer to bundle its requirements into a joint transaction if the expected net benefit of bundling X_1 and Y_i together exceeds that the combined net benefit of two stand-alone transactions X_1 and Y_i, that is, if there are economies of scope in procurement. Thus,

$$B(X_1, Y_i) - C(X_1, Y_i) \geq [B(X_1) - C(X_1)] + [B(Y_i) - C(Y_i)].$$

Also, the buyer may prefer to purchase X and Y jointly as long as

$$B(X_1, Y_i) - C(X_1, Y_j) \geq [B(X_1) - C(X_1)] + [B(Y_i) - C(Y_i)], \quad \text{for } j > i.$$

That is, it may take advantage of economies of scope in procurement to acquire a larger quantity of Y than it would have purchased under a stand-alone option.

The issue of interest is how the value-for-money-seeking procurement agency is to know whether to source the two products jointly or separately and in what quantities. In the absence of mandatory offset requirements, it could, for example, use market-mediated source selection mechanisms to solicit cost information while its client Services would provide benefit information. Thus, it could take advantage of a "multi-envelope"-tendering process to identify the least cost offer for each product combination (X_1,Y) it wished to consider. It could then consult its client Services to rank these offers on the value-for-money basis. Finally, it would select the net value maximising quantities of X and Y and the corresponding mode of their acquisition (jointly or separately).

Consider now the case when the government mandates an offset requirement so that it is no longer possible to purchase X_1 as a stand-alone transaction as it now must be bundled with some other product. The latter need not be product Y as it is now left to the offset provider to offer a good or a service that complies with offset requirements. The mandatory scheme may also encourage the provision of indirect offsets in which case the utility of offset deals offered by different suppliers would have to be determined by different government agencies with all the attendant problems of cross-organisational decision-making.

From the buyer perspective, there are two obvious disadvantages of mandatory offset requirements. First, the buyer is no longer in charge of the "package" specification. Instead, it is the government-mandated offsets guidelines that determine what suppliers have to offer to comply with offset demands. The potential heterogeneity of offers would make it very difficult to evaluate "packages" offered on the value-for-money basis. This would be particularly difficult if more than one government agency were drawn into the process when indirect offsets were offered by suppliers. Second, the defence procurement agency is now restricted in its choices of procurement strategies as, under the mandated offsets guidelines, it is directed to seek "in kind" package enhancements rather than equivalent price discounts. In Figure 1, options such as X_1 or Y_4 are no longer available to the buyer.

By depriving it of flexibility to negotiate the most advantageous deals, including deep price discounts, mandatory offset requirements do not appear to serve the best interest of the materiel buyer. This disadvantage would be compounded if it were further mandated that offsets should be provided by suppliers at "no extra cost" to the buyer. As long as compliance with offset requirements is costly to the seller, it is very likely that the real cost of "cost-free" offset provision would be shifted to the buyer in the form of hidden quality degradation.[41]

Sellers

From the seller's perspective, the application of mandatory offset requirements by buyers could be potentially advantageous as long as buyers expect to pay market prices for the sought-for package enhancements. Offsets demands mandated by the buyer nations put materiel suppliers in a relatively advantageous position since they determine what to offer as "compliant offsets" under various mandatory offsets schemes. And, as noted earlier, sellers are free to walk away from non-profitable transactions.

Consider Figure 2, where the cost surface, $C(X_1,Y_i)$, shows the cost, to the seller, of providing different combination of products X and Y. The figure is similar to Figure 1 in that the seller is requested to provide X_1 quantity of product X and to enhance the primary package by adding to it a quantity of another (offset) product. In the figure, the supplier of X_1 is also willing to provide product Y to comply with the offset requirement. Under the offset scheme, it is no longer possible to offer X and Y separately. Thus, the contractor must determine a combination

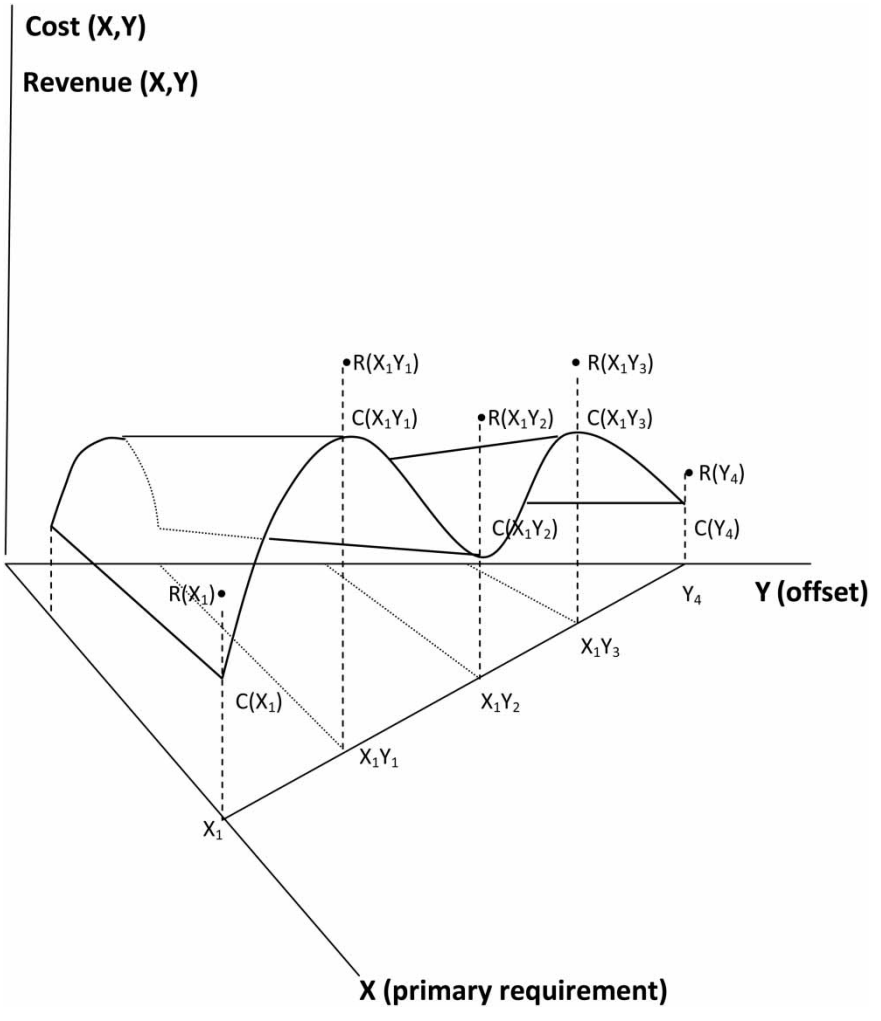

Figure 2. Seller's perspective.

of the two products (X_1,Y_i) that meets the mandated offset requirement but is also sufficiently profitable to supply. While the revenue surface, $R(X_1,Y_i)$, is not shown, revenues associated with the supply of different combinations of X_1, and Y_i are shown in the figure. For example, if the combinations (X_1,Y_1) were to be supplied, the contractor would incur the cost $C(X_1,Y_1)$ and obtain the profit of $R(X_1,Y_1) - C(X_1,Y_1)$. Depending on the degree of competition for the market, the supplier may also select those "supplementary" products that offer best value multipliers, i.e. best fit the buyer's offset credit criteria. As long as the package enhancement is paid for by the buyer, the application of mandatory offsets may broaden the range of profitable supply opportunities. Even if the buyer insists that Y is supplied as a "freebie," the seller may still achieve the required revenue $R(X_1,Y_1)$ if it could charge the high enough price of X_1. Normally, the buyer has little visibility of the supplier's production/supply capabilities and the associated cost structure, especially if it is left to the supplier to determine which product to offer as an offset-compliant package enhancement.

Alternatively, if the supplier is expected to comply with offset demands at no additional cost to the buyer but cannot pay the price of the primary deliverable to cross-subsidise offset provision, it could either walk away from unprofitable deals or, more likely, it would engage in hidden quality degradation to reduce the cost of producing the primary component X (e.g. produce an "export" or an "offset" version of the primary deliverable).

In either case, the seller enjoys informational advantage over the buyer and, paradoxically, the application of mandatory offset requirements is likely to put the seller in more advantageous bargaining position. It is hard to see how mandatory offsets requirements could hurt suppliers.[42] Unless such "package-enhancing" demands assure sellers of adequate returns on resources needed to comply with them, they are always free to "say no to the opportunity."

Concluding comments

Producing and trading in arms is inevitably politically charged. In addition to purely national security considerations, government conduct is driven by a desire for domestic employment, access to technology and the economic strength it can create, the maintenance of economic capabilities, and a desire for operational sovereignty over key systems … [and] … Governments, at their heart, still face powerful incentives to spend their defence R&D and procurement dollars at home to the extent possible.[43]

But there is no obvious rationale for governments to insist on prescribing in detail *how* procurement transactions should best be conducted by defence procurement agencies beyond enunciating general government guidelines and then leaving it to those directly involved in acquisition and purchase activities to find the best ways of transacting business.

In some cases, governments are impatient for results as they operate in "political time and space." And, in others, they have little confidence in the ability of public servants to achieve desirable outcomes. But when defence offsets requirements are mandated as we have described, replete with their associated information asymmetries, it is very hard to target outcomes that are both efficient in terms of the proverbial bang for the defence buck and effective in terms of national resource allocation.

Acknowledgements

The authors wish to thank Mr Robert Wylie, UNSW@ADFA for many insightful comments. Needless to say, the responsibility for the content of this article is theirs.

Notes

1. BIS, *Offsets in Defense Trade, 12th Report to Congress* (Washington, DC: US Department of Commerce, Bureau of Industry and Security, Office of Strategic Industries and Economic Security, 2007), iii.
2. B. Magahy, F. Vilhena da Cunha, and M. Pyman, *Defence Offsets: Addressing the Risks of Corruption and Raising Transparency* (London: Transparency International UK, 2010). Also see P. Hall and S. Markowski, 'On the Normality and Abnormality of Offsets Obligations', *Defence and Peace Economics* 5, no. 3 (1994): 173–88; P. Hall and S. Markowski, 'Some Lessons from the Australian Defense Offsets Experience', *Defense Analysis* 12, no. 3 (1996): 89–314. S. Markowski and P. Hall, 'The Defence Offsets Policy in Australia', chap. 3 in *The Economics of Offsets: Defence Procurement and Countertrade*, ed. S. Martin (Amsterdam: Harwood Academic, 1996), 49–73; S. Markowski and P. Hall, 'Mandatory Defense Offsets – Conceptual Foundations', chap. 3 in *Arms Trade and Economic Development: Theory, Policy and Cases in Arms Trade Offsets*, ed. J. Brauer and J.P. Dunne (London: Routledge, 2004), 44–53; S. Markowski, and P. Hall, 'The Defense Industry in Poland: An Offsets-Based Revival?', chap. 12 in *Arms Trade and Economic Development: Theory, Policy*

and Cases in Arms Trade Offsets, ed. J. Brauer and J.P. Dunne (London: Routledge, 2004), 172–86; S. Markowski and P. Hall, 'Defense Offsets in Australia and New Zealand', chap. 18 in *Arms Trade and Economic Development: Theory, Policy and Cases in Arms Trade Offsets*, ed. J. Brauer and J.P. Dunne (London: Routledge, 2004), 271–83; S. Markowski, P. Hall, and R. Wylie, 'Buyer-Seller Interaction in Defence Procurement', chap. 4 in *Defence Procurement and Industry Policy: A Small Country Perspective*, ed. S. Markowski, P. Hall, and R. Wylie (London: Routledge, 2010), 139–45.

3. BIS, *Offsets in Defense Trade, 12th Report to Congress*, iii.
4. Ibid.
5. Ibid.
6. Thus, offsets requirements "can negate many of the economic and industrial base benefits accrued through the export sale" as "in some cases portions of the prime contractor's business are displaced by exports that include Subcontract, Co-production, or Licensed Production offsets" while "indirect offsets can displace sales from the commercial manufacturing sectors of the US economy" (BIS, *Offsets in Defense Trade, 14th Study*, 3-1). Also, mandatory offset requirements "can endanger future business opportunities for US subcontractors and suppliers, with possible negative consequences for the domestic industry base" and, in particular, offsets-related technology transfers "can also help create or enhance current and future competitors for US subcontractors and suppliers, and in some cases prime contractors" (ibid., 3-1/3-2).
7. E.A. Eriksson et al., *Study on the Effects of Offsets on the Development of a European Defence Industry and Market*, Final Report of 06-DIM-022 (Brussels: FOI and SCS for the European Defence Agency, 2007), 4–7.
8. For example, the EDA Steering Board shares "the ultimate aim to create the market conditions, and the European ETIB structure, in which the practice may no longer be needed – and, meanwhile, to consider how adverse impact on competition and the DTIB might be mitigated", cited in Eriksson et al., *Study on the Effects of Offsets*, 10.
9. Cited in Eriksson et al., *Study on the Effects of Offsets*, 10.
10. All defence import contracts worth at least Rs 3 billion should attract defence-specific offsets equivalent to 30% of the contract value and discharged concurrently with the main contract. L.K. Behera, 'India's Defence Offset Policy', *Strategic Analysis* 33, no. 2 (2009): 242–523.
11. Ibid., 242.
12. Markowski and Hall, 'Mandatory Defense Offsets'.
13. Hall and Markowski, 'On the Normality and Abnormality of Offsets Obligations', 173–88; Markowski and Hall, 'Mandatory Defense Offsets'.
14. Markowski and Hall, 'Mandatory Defense Offsets'.
15. S. Martin, *The Economics of Offsets: Defence Procurement and Countertrade* (Amsterdam: Harwood Academic, 1996), 16.
16. BIS, *Offsets in Defense Trade, 12th Report to Congress*.
17. Markowski and Hall, 'Defense Offsets in Australia and New Zealand'.
18. DoD, *Building Defence Capability: A Policy for a Smarter and More Agile Defence Industry Base* (Canberra: Department of Defence, 2010), 54.
19. BIS, *Offsets in Defense Trade, 12th Report to Congress*, Appendix F.
20. E.g. BIS, *Offsets in Defense Trade, 12th Report to Congress*; BIS, *Offsets in Defense Trade, 14th Study* (Washington, DC: US Department of Commerce, Bureau of Industry and Security, 2009).
21. BIS, *Offsets in Defense Trade, 14th Study*, Ii.
22. Ibid., 4–5 and Table 3-1.
23. Ibid., 6–8 and Table 4-1. To keep these figures in proportion, in 2008, the value of US merchandise exports totalled US$1.29 trillion while defence-related merchandise exports totalled US$16.5 billion (1.29% of total exports), offsets agreements entered into by US defence firms amounted to nearly US$3.5 billion, the actual value of offset transaction completed that year was US$3.2 billion Ibid., 15 and Table 5-1.
24. Ibid., ii and 10, Table 4-3.
25. Ibid., 11.
26. Ibid.
27. Ibid., 9 and Table 4-2.
28. BIS, *Offsets in Defense Trade, 12th Report to Congress*, Table 2-5.
29. Ibid.; BIS 5-3, Table 5-2.
30. Ibid., 2-10/2-11 and Table 2-4.
31. Eriksson et al., *Study on the Effects of Offsets*, 47–9.

32. J. Brauer and J. P. Dunne, eds., *Arms Trade and Economic Development: Theory, Policy and Cases in Arms Trade Offsets* (London: Routledge, 2004).
33. W. Struys, 'Offsets in Belgium: Between Scylla and Charybdis?', chap. 11 in *Arms Trade and Economic Development: Theory, Policy and Cases of Arms Trade Offsets*, ed. J. Brauer and J. P. Dunne (London: Routledge, 2004), 167.
34. DoD, *Review of F/A-18 Industry Program* (Canberra: Department of Defence, 1994).
35. BIS, *Offsets in Defense Trade, 12th Report to Congress*, Ch. 3.
36. For example, the once much heralded offset deal under the Australian F/A-18 Hornet programme involved 47 Australian companies as subcontractors under local content arrangements with prime contractor McDonnell Douglas. Although there was some follow-on work, Australian contractors had little success in commercialisation via offset-related sales and sales beyond offsets. Most US subcontractors in the F/A-18 supply chain denied Australian firms the option to make their products or use their processes after the mandated programme ended DoD, *Review of F/A-18 Industry Program*.
37. For an overview, see Eriksson et al., *Study on the Effects of Offsets*, Ch. 6, 38–43, and Annex 9.
38. Hall and Markowski, 'On the Normality and Abnormality of Offsets Obligations'.
39. T. Taylor, 'Using Procurement Offsets as an Economic Development Strategy', chap. 2 in *Arms Trade and Economic Development: Theory, Policy and Cases in Arms Trade Offsets*, ed. J. Brauer and J.P. Dunne (London: Routledge, 2004), 40.
40. Markowski and Hall, 'Mandatory Defense Offsets', 45.
41. It is sometime argued that the strong case for applying mandatory offset schemes is the presence of market distortions that result in highly abnormal profits (and/or inflated costs) derived by defence suppliers in the absence of "compensatory arrangements." Thus, by enforcing offset demands, buyer nations can reduce "cost padding" and trim excessive profits which are normally "built into" defence transactions. However, if the buyer has the market power to deter cost padding by suppliers and/or reduce their abnormal – profitability, why does it need to mandate offset requirements to achieve it rather than use its bargaining power directly to seek the most advantageous deals?
42. Traditional arguments that offset demands threaten to displace future exports of the offsets provider by creating new competition in the offset recipient country, or displace other suppliers in the offsets providing country if they involve offset-enabled countertrade, are hardly credible as they apply to all exports and exporters regardless of the mode of their engagement.
43. J.P. Bialos et al., *Fortresses and Icebergs* (Washington, DC: Johns Hopkins University and US DoD, 2009), 19.