

THE PROPER USE OF OFFSETS IN INTERNATIONAL PROCUREMENT

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ABSTRACT. This paper evaluates offsets in government procurement. The analysis addresses Udis and Maskus' (1991, p. 163) call for "a serious effort to develop criteria to distinguish between beneficial offsets and detrimental offsets." Since institutions and economic infrastructures differ across countries, governments considering offsets for international procurement need to be cognizant of the efficiency tradeoffs between markets, offsets, and other policies. A prescriptive model is developed that explains these tradeoffs under various economic settings. Mandatory procurement policies that require offsets for all government procurement above a particular threshold are found to be detrimental to the country's welfare.

INTRODUCTION

Consider the following ultimatum by the government procurement office of Australia. The government would only purchase military aircraft from a U.S. firm if the firm can convince the U.S. Navy and Marine corps to buy lollipops from an Australian firm, Allen Sweets Ltd. This arrangement actually occurred, and so do hundreds of similar offsets each year. Offsets are contracts that require the seller to transfer extra economic benefits to the buyer as a condition for the sale of goods and services. In many instances, governments prefer to realize these benefits in the form of in-kind transfer instead of bargaining for price discounts.

Although few outside of those actually engaged in the practice of offsets are aware of this contractual arrangement, it has become a

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popular tool of government procurement. Common in exchanges involving aerospace goods and services, offsets permeate the market for defense systems and weapons. These arrangements also arise when governments purchase telecommunications equipment, computers and a myriad of other goods that need not embody high technology.

The arrangement, at its most fundamental level, is straightforward: a purchasing government obliges a foreign seller to include extra benefits with the sale of the base good. The foreign firm may then sign individual offset contracts with local firms in the purchasing government's economy. Aside from this buyer-seller relationship, offsets vary considerably in form. Offset transactions may take--but are not limited to--any of the following forms: subcontracting, technology transfer, countertrade, foreign investment, marketing assistance, training, co-production and licensed production.

Although Organization of Economic Cooperation and Development (OECD) international trade statistics do not track offsets and other compensation agreements, studies show that the market is sizeable. For example, estimates of countertrade as a percentage of the world trade range from a conservative eight percent to a high of 20 percent (Hammond, 1990). Countertrade that is a result of government procurement requirements qualifies as an offset; an agreement between two companies does not. Most aerospace and defense goods sold to foreign governments include offsets ranging from approximately 10 to 150 percent of the sale price. In the United States defense industry alone, 32 U.S. companies signed 173 new offset arrangements between 1993-1996 valued at \$15.1 billion (U.S. Department of Commerce, 1998). These data indicate that offsets accompanied the sale of 173 U.S. defense products during the period. The actual number of offset contracts is far greater than 173 because the seller typically agrees to provide offset work to a number of firms (not included in the base 173 figure) in the purchasing government's economy.

According to Wood (1992), at least 130 countries maintain some form of an offset program. Countries with starkly different economies and institutions are equally likely to use offsets. Developing and industrialized nations both employ offsets, as do virtually all regions of the world.¹ The United States is one of the few large economies without

an explicit offset policy. Offsets are neither an academic curiosity, nor an exceptional contractual arrangement. Table 1 shows that between 1993 and 1997, U.S. defense firms alone accumulated approximately \$19 billion in offset obligations to support \$35 billion worth of exports.

TABLE 1
Summary of U.S. Defense Offset Arrangements, 1993-1997

| Year | Area | # of Deals | Base Export Value | Offset Value | Offset ratio | Time |
|--------|-------------|------------|-------------------|------------------|--------------|------|
| 1993 | Europe | 14 | \$2,985,052,745 | \$2,338,052,745 | 78.33% | 84 |
| 1993 | Other Areas | 15 | \$10,959,987,068 | \$2,456,381,450 | 22.41% | 84 |
| 1993 | Total | 29 | \$13,945,004,080 | \$4,794,434,195 | 34.38% | 84 |
| 1994 | Europe | 20 | \$1,508,233,660 | \$764,829,660 | 50.71% | 88 |
| 1994 | Other Areas | 29 | \$3,284,186,291 | \$1,283,885,998 | 39.09% | 71 |
| 1994 | Total | 49 | \$4,792,419,951 | \$2,048,715,658 | 42.75% | 78 |
| 1995 | Europe | 26 | \$4,944,349,000 | \$5,159,249,000 | 104.35% | 104 |
| 1995 | Other Areas | 19 | \$2,457,697,200 | \$874,868,816 | 35.60% | 77 |
| 1995 | Total | 45 | \$7,402,046,200 | \$6,034,117,816 | 81.52% | 93 |
| 1996 | Europe | 34 | \$1,924,154,000 | \$1,919,144,000 | 99.74% | 104 |
| 1996 | Other Areas | 50 | \$1,063,668,414 | \$351,532,595 | 33.05% | 66 |
| 1996 | Total | 16 | \$2,987,822,414 | \$2,270,676,595 | 76.00% | 92 |
| 1997 | Europe | 29 | \$3,754,290,000 | \$3,058,600,000 | 81.47% | 74 |
| 1997 | Other Areas | 29 | \$2,090,229,255 | \$788,036,633 | 37.70% | 73 |
| 1997 | Total | 58 | \$5,844,519,255 | \$3,846,636,633 | 65.82% | 74 |
| 1993-7 | Europe | 123 | \$15,116,043,672 | \$13,239,875,405 | 87.59% | 92 |
| 1993-7 | Other Areas | 108 | \$19,855,768,228 | \$5,754,705,492 | 28.98% | 74 |
| 1993-7 | Grand Total | 231 | \$34,971,811,900 | \$18,994,580,897 | 54.31% | 84 |

Notes: (1) Other areas include all countries outside of Europe.

(2) Time refers to the average time (in months) allowed for fulfillment of the offset obligation.

Source: U. S. Department of Commerce (1999).

Consider two representative government purchases involving offsets. In April 2003, the government of Poland announced the purchase of 48 F-16 jets valued at \$3.5 billion from the U.S. company Lockheed Martin. In return, Lockheed Martin agreed to provide the Polish economy with a package of benefits including investment, technology, transfer, and job creation worth more than \$6 billion dollars over 10 years. It was the attractiveness of the offset package that gave Lockheed Martin the edge over rivals from France and a British-Swedish consortium. (Lockheed Martin, 2003)

In order to win the bid to supply a telecommunications infrastructure for Saudi Arabia, AT&T also included offsets. In 1994, AT&T agreed to provide billions of dollars in new work and technology transfer for the Saudi economy (Matthews, 1996, p. 250). By 1998, AT&T had fulfilled most of its obligations by teaming with local Saudi businesses to form equal equity joint ventures. The joint ventures are now successfully supplying production inputs to AT&T and other export markets.

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 procurement good. In most settings, the exchange of goods for money in markets is more efficient than barter.

Why then, do governments often 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 at all clear that the expected net benefits of offsets exceed those of other policy tools. Indeed, offsets may be helpful to an economy in some circumstances, and quite damaging in other settings. Commenting on the state of policy art, Udis and Maskus (1991, p. 163) "recommend a serious effort to develop a criteria to distinguish between beneficial offsets and detrimental offsets before attempts at international control of the phenomenon are mounted."

This paper develops a criterion to determine when the offset is an appropriate policy instrument for government procurement. The paper presents a policy matrix that offers some general guidelines to government officials considering offsets as part of a broader procurement strategy. Using transaction cost theory complemented by the capabilities

view of the firm,² 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 paper 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 *variable* offset policy, which uses offsets for a particular class of goods and relies on markets in other cases, is preferable in most settings.

The organization of the paper is as follows. The first section differentiates offsets from other government policies. Before advocating any sort of offset policy, it is necessary to specify the circumstances in which offsets are preferable to other instruments. The second section develops a prescriptive model to assist procurement officers (and ministries of finance/development) in the selection of an optimal policy instrument. A conclusion follows.

OFFSET POLICY DESIGN

The offset is a flexible policy instrument that can serve multiple objectives. Depending on the objectives of the purchasing government, an offset can be designed to support any of the following: generation of jobs, technology transfer, increased workloads, promotion of joint ventures, labor training, management services, and safeguarding the base exchange.

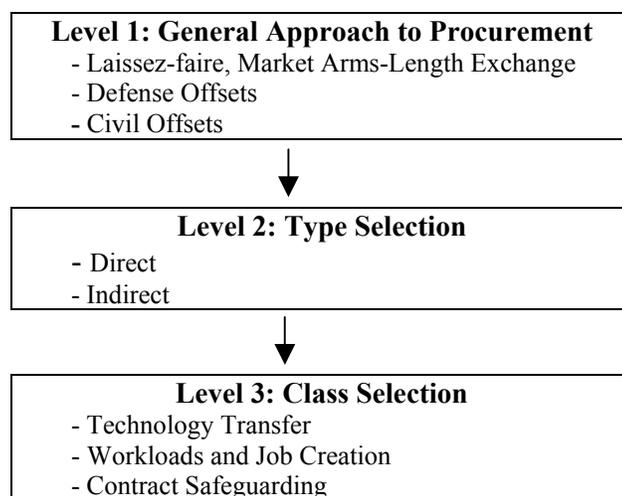
There are numerous ways of promoting the economic objectives listed above. Tax incentives, subsidies, tariffs, local content protection, export promotion, and investment are commonplace in the government intervention lexicon. All of these policies can—to varying degrees of success—achieve a number of the objectives. On the other hand, these policies can be dreadfully inefficient. In competitive markets where information transfers seamlessly and contracts are complete, such intervention techniques hamper economic growth. The market is remarkably well suited to induce competition, transfer technology, lower costs, and foster the benefits therein.

By leaving the price margin of monetary exchange, offsets can introduce inefficiencies to the economy similar to those endemic in the policies listed above. However, if the offset is designed properly in a procurement setting marked by imperfect competition, poor information transfer, and incomplete contracts, it can actually be welfare enhancing.

The fact that the offset policy is merely an attachment to an international procurement is what differentiates it from other government policies. When procuring goods in imperfectly competitive markets, the price is typically set above cost. Governments can use their bargaining power (as a large buyer) to extract some of this surplus from sellers. The extraction can yield dollar savings from a discounted price; alternatively, the government can opt for a package of benefits in the form of an offset. We will return to this critical decision in the next section with the policy matrix.

As shown in figure 1, after selecting an offset in conjunction with a civil or defense purchase, the procurement officer must decide between a direct and indirect offset (level 2). Direct offsets require the seller to transfer to the purchasing government's economy benefits that are related to the base procurement. For example, when Boeing sells its airplanes to other countries, the company often provides subcontracting work to firms in the purchasing government's economy. Airplane tires, wings, and subsystems production would all qualify as direct subcontracting work. A direct offset is ideal for countries wishing to generate workloads, employment, and technology transfer for an established industry.

FIGURE 1
Offset Policy Design by a Purchasing Government



Indirect offsets are more flexible. The benefits package need not be related to the base procurement. Indeed, developing countries often employ indirect offsets as part of a broader economic growth strategy. Indirect offsets worth several billion dollars were an integral part of British Aerospace's (BAe) bid to supply the Kingdom of Saudi Arabia with a massive defense program. The indirect offsets included investment, joint ventures, and technology transfer to multiple industries.

Level 3 of offset policy design further delineates the benefits package. Here, the procurement officer matches the offset (direct or indirect) to the targeted objective. The officer will frequently match the seller with a particular industry or firm to foster the employment gains, workloads, and technology transfer. Level 3 safeguarding is sufficiently esoteric to save its discussion for another time.

POLICY SELECTION MODEL³

We can make some general recommendations for procurement policy by varying the parameters of the matrix: the degree of exchange hazards, Z ($Z \in [0,1]$), and the expected benefit to the offset recipient of interaction with the seller (B is low or high). Consider the matrix in Figure 2.

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 hazards are high (approach the index value of 1) and the expected benefit index, B , is high. 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 the government does in fact boast some degree of market power, it can bargain for price discounts of the procurement good.

FIGURE 2
Procurement Policy Matrix

| | | | | |
|---|-------------|---|---|---|
| Index of Expected Reputational Economies (B) | <i>High</i> | Augmented Markets Government facilitated co-ops | Variable Offsets Enlarged opportunity set | Mandatory Offsets Benefits outweigh the costs |
| | <i>Low</i> | Markets Free-market competition is superior | Turnkey Contracts Performance bonds help | Product-in-Hand Contracts Extension of turnkeys |
| | | 0 | 1 | |
| | | Degree of Exchange Hazards, Z | | |

There is no a priori reason to leave the price margin in this economic setting. This policy prescription holds irrespective of the government’s overarching development strategy. Employing offsets in a perfectly functioning market tends to reduce welfare for three reasons: (1) sellers are already pricing at cost (hence no opportunity for further rent extraction by the government), (2) technology is already transferring efficiently, and (3) offsets incur an administrative burden.⁴ 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. 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 procurement team 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.

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 a domestic firm(s) based entirely on price and quality competition. Therefore, the high-powered incentives of market competition remain largely intact. The administrative burden of the augmented market policy exceeds that of pure markets (scenario 1), but not by a sizeable amount.

Governments are already experimenting with the augmented markets procurement policy. Mathews (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, co-production, and direct foreign investment.

The Australian Partnerships for Development (PfD) is an example of a successful augmented markets policy. Created in 1990, the PfD encourages foreign companies to undertake long-term investment in research and development (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).

The program maintains a competitive bidding process for domestic firms wishing to participate, while using its 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 markets policy is well conceived and appropriate for an environment with low exchange hazards and a positive reputation/future interaction variable.

Turnkey Contracts

In a procurement setting exposed to moderate exchange hazards 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 hazards 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 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.⁵ Table 2 lists the advantages and disadvantages of turnkey contracts.

Turnkey contracts improve the integrity of the exchange, but they do not eradicate 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 outcome.⁶ 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. Profitability of a firm depends, to a large degree, on how it can adapt to economic change. Detailed instructions and the transfer of ancillary capabilities in a sterile environment frequently do not prepare the firm for exogenous shocks. The seller has incentive to perform its duties in an overly perfunctory manner with the foreign staff to minimize cost, and more importantly, to guard core competences. Algeria’s problems with turnkey contracts have been well documented in this regard (see Oman, 1984, pp. 48-50).

Information asymmetries and other imperfections render market exchange hazardous and inefficient as the technological intensity of production increases. The government can use its buying power to

TABLE 2
Turnkey Contracts in Procurement

| Advantages | Disadvantages |
|---|---|
| <ul style="list-style-type: none"> - Ownership and control in the post-contract stage is retained by the owner/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 | <ul style="list-style-type: none"> - 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 the crucial tacit knowledge |

Note: * Because responsibility for the multiple stages of design and production resides with one entity, one can expect better coordination between the stages and fewer disputes.

Source: Adopted from United Nations (1983), pp. 10-11.

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 good choice. In this case, the buyer's primary interest is 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

The variable offset policy is suitable for exchange environments characterized by moderate hazards 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. Negotiators can compare the net benefits 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, however, comes added responsibility for procurement officers. Governments using variable programs require bureaucrats to compare the complex intertemporal costs and benefits associated with offsets to the 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 particular economic environment. 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 & Markowski, 1994).

Mandatory Offsets

Mandatory offsets are ideal for procurement that is subject to severe exchange hazards 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.⁷

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, 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, Tollison and Tullock (1980, p. 10) argue persuasively that “once markets are not allowed to work [on the price margin], 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.”

Variable offsets are susceptible to higher levels of rent-seeking than the mandatory policy because procurement officials have free reign to choose between prices (markets) and content modifications (offsets). Price changes directly affect government expenditures, 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 technological intensity goods 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 hazards are 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.

We can make a simple analogy to offsets using the housing market.⁸ Suppose you could purchase either a completely furnished house that boasts extras (a bundle) like a swimming pool and a deck for a given price, or another house that includes no additional amenities. Not surprisingly, the unfurnished house has the lower price. Nontrivially, after performing the cost accounting you find that the price differential is far greater than the total cost of purchasing the extras as components. If transaction costs are low, the buyer may benefit from purchasing the unfurnished home, depending on the consumer's utility function.

However, if you announce to the housing market that you will only consider bids that include bundled extras, real estate agents will act accordingly and reduce the size of the market. *This is the pitfall of a mandatory offset policy applied indiscriminately.*

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). These goods qualify as potentially severe exchange hazards, and the expected benefit from the seller's reputational capital is high.

Conversely, many West European governments require 100 percent mandatory offsets for most large-scale 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 West European welfare because the opportunity cost of imposing offsets for goods that do not present an exchange hazard is price margin savings.

After observing the dissatisfactory results of a mandatory policy in the 1980s, Malaysia switched to a variable program in the 1990s.⁹ 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 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. According to Liesch (1991, p. 121), "government mandated countertrade [offsets] programs seem particularly prone to this outcome."

Product-In-Hand Contracts

The sixth economic setting of the policy matrix combines severe exchange hazards 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, 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.¹⁰ 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.

CONCLUSION

This paper enumerated the pros and cons of several policy instruments used in government purchasing, with a focus on offset arrangements. The offset is an attractive option for procurement officers, mainly because its benefits are visible and can double as an economic development strategy, while its costs are masked. However, care must be taken to determine whether it is in fact the most cost-effective policy to achieve the stated aims of the government. Indeed, among the thousands of products that governments purchase annually, only a small minority would be suitable for an offset. Several points are worth emphasizing.

First, procurement officers should conduct a benefit-cost estimate to determine whether the offset is superior to other instruments. For

example, might bargaining for price discounts on the base good and then using these proceeds to purchase new technology on the open market be preferable to the offset? Alternatively, perhaps government could provide a subsidy to a targeted industry and foster growth more effectively in the domestic economy compared to the offset.

Second, when an offset is selected as an attachment to the transaction, the government should construct a well-defined contract. The contract should specify (a) a list of products and/or firms in the domestic economy that the seller can partner with to fulfill the offset obligation; (b) a schedule for fulfillment of various stages of the offset obligation; and (c) a penalty clause for non-compliance. Research has shown that such specification is desirable.¹¹

Third, governments should build databases to allow for formal accounting of the offset programs. Like other government policies, offsets involve massive amounts of public funds. The performance of these funds ought to be accounted for by an offset audit team. Then and only then, argues Brauer (2002, p. 13), can the “public-at-large decide whether the losses or profits are worth the original objective.”

NOTES

1. The one exception is South America. As of January 2003, a majority of the governments in this region did not have an official offset policy. There are some indications, however, that the countries are heading in that direction.
2. Transaction cost economics explores the costs of using markets--outside of the firm's production function. Economic capabilities, generally speaking, are the skills and competences that labor possesses. The capabilities view of the firm considers the firm to be a pool of core and ancillary competences that become 'routinized' over time to perform production activities.
3. Portions of this section originated in Taylor (2003).
4. See Taylor (2001) for a discussion of how offsets alter the marginal, average, total, and transaction costs of the seller.
5. 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. Such compensation schemes are rare, however, because sellers are unwilling to assume this level of risk, and also because the output price rises significantly.

6. Some trial periods last only 24-48 hours.
7. 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.
8. I attribute this analogy to discussions with Stefan Markowski, Department of Economics and Management, Australian Defence Force Academy.
9. Interview with Mr. Ahmed Khalili, Director of the Malaysian Offset Program, June 2, 1998.
10. Hennart (1989) reports that product-in-hand contracts are 50 to 100% more expensive, on average, than turnkey contracts.
11. See Hall and Markowski (1996), and Markowski and Hall (1998) for analysis of offset performance in Australia. In general, offset contracts that included a penalty clause raised the average rate of compliance.

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