

Reforming Defense Procurement: Lessons from France*

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Abstract

Is it possible to generate more efficient outcomes with respect to public procurement in general and defense acquisition in particular? Or are cost overruns inevitable when it comes to major engineering projects, like the development of modern weaponry? In this article, we draw on a unique data set of nearly 50 French armaments contracts in order to examine how one government has reformed its defense acquisition process over the past twenty years. Beginning in the early 1990s, France embarked on a series of policy reforms that enabled the state to contain skyrocketing weapons costs. We emphasize three, inter-related aspects of the defense acquisition environment in France that favored cost containment: first, hard budget constraints; second, the great technical capacity that the French government brought to bear on the weapons acquisition process, coupled with its iterative relationship with a small number of suppliers; and third, the use of contracting techniques that empowered project managers.

KEYWORDS: defense, reform, hard budget constraint, contracting, institutions

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Around the world, governments are developing fiscal stimulus packages in order to combat the “Great Recession” that began in 2008. Accompanying this new round of deficit spending, they are also seeking cost savings in order to maintain some semblance of budget discipline. In particular, many governments—including those of the United States and several European Union members like France and the United Kingdom—are now targeting their defense budgets for savings¹, which is crucial since the armed forces generally claim a large share of public discretionary spending².

Unfortunately, these same governments have found over the years that their weapons platforms often face cost overruns and delayed delivery schedules. As a consequence, presidents and prime ministers have frequently made the reform of the defense acquisition process a policy priority, with the aim of reducing the price tag associated with developing military hardware. President Barack Obama, for example, launched in March 2009 a new set of defense acquisition reforms in the United States³.

Why are cost overruns commonplace in defense acquisition, and in public procurement of major engineering projects more generally?⁴ Are these problems primarily due to the “inefficient” contractual methods that governments use to make purchases from the private sector, as many economists have argued over the years (e.g., Tirole 1999)? Or is contractual performance endogenous to “deeper” institutional arrangements that powerfully shape business-government relations (McNaugher 1989)? Answering these questions is of central importance if defense procurement reform is to succeed.

The Rand Corporation’s Thomas McNaugher, for example, has long rejected the economists’ common assertion that the root of the acquisition problem is found in a government’s contracting techniques. Instead, he places the blame for poor performance squarely on institutional factors, such as the role of the Congress in weapons acquisition in the United States, which places political pressure on the Pentagon to spread the wealth of a given program to as many congressional districts as possible, raising costs⁵. Because the problems associated with the weapons acquisition process are ultimately systemic, rather than embedded in the micro-details of defense contracts, McNaugher (1989) asserts that efforts to engage in meaningful reform are ultimately “futile”.

¹ Michael O’Hanlon, “Financial Crisis Constricts U.S. Defense Budget,” *Brookings Institution*, February 2009. “European Defense Spending Shrinks,” *Defense Update*, April 2009.

² Data on military expenditures around the world are available from the Stockholm International Peace Research Institute at www.sipri.org.

³ John T. Bennett, “Obama Takes Aim at Acquisition,” *Defense News*, 9 March 2009, <http://www.defensenews.com/story.php?i=3979781>, downloaded on 9 April 2009.

⁴ For a contractual approach to these problems see Juan-Jose Ganuza (2003).

⁵ On the “pork barrel” politics of defense contracting, see Gansler (1989), McNaugher (1989) and Mayer (1991).

But how generalizable is McNaugher's assessment of the American case? And is he even correct when it comes to the impossibility of improving defense procurement in the United States? In this article we focus on acquisition reform in the case of France, and the way in which the French state confronted rising weapons costs and falling defense budgets with the end of the Cold War. In making our arguments, we rely on an original data set of nearly 50 French defense contracts, and the results of a questionnaire that we sent to 120 public officials with responsibilities for military procurement. Personal or telephone interviews were also conducted with each one of our respondents, and additional data came from government reports and the secondary literature.

We trace how the French government, through a battery of contractual and institutional changes, has tried to shape the behavioral incentives of the actors on both sides of the military's supply and demand equation⁶. In particular, the French recognized that if cost overruns were to be curbed, defense executives had to be given strong incentives to manage programs in a cost-conscious manner, while public officials, for their part, needed disincentives to endlessly tinker with projects in order to meet the myriad (and often conflicting) objectives (socio-economic, military, and political) that politicians often set for large public investments, raising their price tag as a result. To be sure, in France as elsewhere cost overruns still occur owing to such risk factors as unforeseen technological contingencies, changes in government policy, poor project management, and exogenous shocks of various kinds (e.g., sudden increases in prices for inputs)⁷. But the cost overruns that result tend to be relatively minor in scope; on the order of 5-10 percent per weapons platform, versus an average overrun of 26 percent per platform in the United States⁸.

What enabled the French government to attack the problem of cost overruns? Here we emphasize three, inter-related aspects of the defense procurement environment in France that have worked in favor of cost control: *first*, the hard budget constraints that the French defense sector has faced since the early 1990s, which gave public managers a strong hand over project management⁹; *second*, the technical capacity that the *Délégation Générale pour l'Armement* (DGA) brings to bear on the weapons acquisition process, coupled with the iterative relationships it has with a handful of defense contractors; and

⁶ This point is neatly made in the context of economic development by Easterly (2001).

⁷ On risks occurring in the French defense procurement sector, see Oudot (2008a).

⁸ On cost overruns, see Government Accountability Office (06-409T). As we will discuss below, the level of "average" cost overruns depends on how the "average" is defined and calculated. In particular, the arithmetic average—which the GAO seems to use—does not take into account the effects of contract size; as a consequence, we look at both the arithmetic and geometric averages in our account of the French case, and thus the spread in averages from 5-10 percent.

⁹ On the role of hard budget constraints in project management, see Rodden, Eskeland and Litvack (2003), Besfamille and Lockwood (2004).

third, the use of contracting techniques that empower DGA project managers, in particular by assigning clear financial responsibility to those who deviate from their contractual obligations.

The article is in five parts. Following this introduction, we provide a quick overview of why contracting arrangements have been at the focal point of economists' concerns about cost overruns, and why their normative prescriptions have emphasized the need to change contracting techniques. Next, we provide a discussion of the policy reforms that were introduced in France in the early 1990s that were aimed at cost containment. We then exploit findings from our questionnaire and dataset to perform a regression analysis that examines the conditions under which the French government accepts the financial burdens associated with cost overruns. *As we will see, one notable feature of the French procurement system is that it has put into place a "responsibility principle" in which those who are responsible for cost overruns must pay for them.* Section five provides conclusions and suggestions for policy-makers and defense analysts.

The Political Economy of Defense Contracting

Economic models of the defense procurement process have traditionally focused on the contracting arrangements used by governments in their dealings with private sector firms, with the underlying assumption being that contracts represent, in essence, structures of governance or methods of control. This focus reflects the pervasive influence of transaction cost economics—which “poses the problem of economic organization as a problem of contracting”—on the study of weapons acquisition¹⁰. By clearly specifying the terms of an agreement between buyer and seller (say an agreement to buy a specific weapons system within a certain time frame and budget), contracts contribute to economic efficiency, particularly when nested within a functioning legal environment that provides for effective contract review and enforcement in the event of disputes. Thus, research on contracting has had as its normative purpose the design of “efficient” contracts; in other words, contractual mechanisms that reduce the transaction costs or “frictions” associated with doing business by aligning the interests of buyers and sellers¹¹.

Economists were drawn to the study of defense contracting after World War II for a compelling empirical reason. During the late 1940s, the U.S. Department of Defense (DoD) began to shift away from its near-exclusive wartime reliance on fixed-price (FP) contracts for the delivery of weapons

¹⁰ See Oliver Williamson (1967, 1985 p.20).

¹¹ This literature is not only voluminous but also nuanced, in that there are many different “schools of thought” with respect to contracting, with transaction cost economics representing but one major tendency. For an excellent review of the literature see Bolton and Dewatripont (2005).

systems—in which the government simply contracted for a given quantity and quality of armaments at a pre-determined price—to a reliance on Cost-Plus (C+) contracts, especially in the early research and development (R&D) stages of new weapons development (today, about one-half of all DoD contracts in dollar terms take the form of C+ or some variant thereof, with a growing percentage incorporating an “award” or performance-fee; GAO 08-782T). One outcome that seemed to be associated with that contractual decision was the sudden emergence of large cost overruns. For social scientists, this led to some intriguing puzzles. Why were weapons costs suddenly rising? Why had the Pentagon changed its contracting techniques? How were these two events related? And what could be done to control the costs of modern weaponry?

Why did the post-war shift from FP to C+ contracting occur? After the war, as weapons became more complex to design and build, defense industry executives complained to the Pentagon that the acquisition process now entailed a great deal of uncertainty about platform performance which could not be contracted against *ex ante* (as we will see in the following sections, France also adopted C+ contracts after the war as it began to rearm with modern weaponry). While the government might state its desire to purchase, for example, a new jet fighter with certain characteristics, it was hard for the firms to know in advance, at the time they signed the contract, whether they would be able to reconcile all the design criteria that the Pentagon had specified (e.g., weight, range, avionics, weaponry, and so forth) within the fixed budgetary envelope that FP contracts provided.

While the Pentagon came to accept the industry’s reasoning, the underlying pathologies associated with C+ contracts quickly emerged. If the government bore all the unforeseen risks (e.g., financial) associated with a project as the industry demanded, then a “moral hazard” problem came into existence, meaning that the firms might be induced to engage in behavior that was at odds with the Pentagon’s interests. This, of course, exemplifies the “principal-agent” problem that is fundamental to the economics of industrial organization¹².

Take a simple model of a C+ contract, which neatly illustrates the procurement problem that the government faces when it tries to govern industry behavior using this particular mechanism. Under this contract type, a defense firm’s profit is given by:

$$\pi = a + x(B) - C$$

where: π = the contractor’s total profit.

a = the fixed fee paid by the government to the contractor.

¹² Comparisons of FP and C+ contracts may be found in Bajari and Tadelis (2001), Bajari, McMillan and Tadelis (2009), and Eremenko (2007). One can readily see that the contracting issues discussed here represent a subset of the “principal-agent” problem.

x = the percentage of audited production costs that the government agrees to pay.

$(0 \leq x \leq 1)$; the firm's share is then $1-x$.

B = the "audited" production cost.

C = the firm's actual production costs.

As an example, assume that a contractor receives a \$10,000 fee for a project, along with full reimbursement of its audited production costs. Assume that the total cost of the project that gets billed to the government is \$150,000, while the firm's actual production costs are \$90,000 (we will discuss below how it is possible for audited costs to be higher than actual production costs). Then, with x (the percentage of audited costs assumed by the government) = 1, the firm's profits are given by:

$$\pi = 10,000 + (150,000 - 90,000) = \$70,000.$$

As this simple example illustrates, *to the extent that the government pays all the audited production costs, the higher the incentives that exist for the firm to inflate those costs relative to its actual production costs. This is the essence of the moral hazard problem.*

With $C+$ contracts, firms have strong incentives to maximize their audited costs, for obvious reasons. Since the firms have "inside information" about their actual production costs which are difficult for the government to verify (thus, an *information asymmetry* exists between the firms and the government), it becomes almost impossible for the Pentagon or GAO to prove *ex post* that any cost overruns that occurred during an acquisition program were due to the firm's "padding" of expenses as opposed to the unforeseen difficulties and challenges associated with the production of complex systems. In the commercial world, these problems are already acute, but buyers can place limits on costs via competitive re-bidding of contracts and through the use of bonding companies; further, buyers in the commercial world can generally obtain solid *ex ante* information about true costs since most of the items purchased for a civilian project are available from multiple suppliers, and in today's world can be compared by a few clicks of the internet¹³.

Now if much of the contractor's profit ultimately derives from audited costs that are, in fact, greater than actual costs, why doesn't the government invest more in "monitoring" or auditing industry behavior *ex ante*?¹⁴ The Rand Corporation (2007 p.xxi), for example, has urged the government to make "better

¹³ For a review of construction contracts for instance see Bajari and Tadelis (2001).

¹⁴ To be sure, one does not need to assume that defense firms act as profit-maximizers; rather they can also be viewed as cost-maximizers, where an increasing cost base can serve a multitude of political and economic purposes. A high cost base, for example, could imply lots of workers on the payroll, making it more likely that politicians will lend their support to a given weapons project.

cost estimates” of programs before they are launched, which would give it a baseline against which a weapon’s *ex post* costs could be assessed. But as Baron and Besanko (1988) pointed out in a pioneering article many years ago, precise contract monitoring of this type requires high investment costs by the government. In particular, industrial economist Jean Tirole (1999) (himself an engineer by training) has pointed out that monitoring defense contracts entails a significant amount of accumulated technical knowledge, which the government must be willing to acquire. Further, even if the government possesses good *ex ante* cost information—as some have claimed is in fact the case for the Pentagon—it must also have an acquisition design mechanism or set of rules that holds companies to these costs during the life of the program¹⁵.

In short, the government has to decide whether the costs of obtaining better monitoring capability about costs are greater than the benefits, given its own incentive system, and upon reflection we can see that the state may opt to purchase only a minor amount of such capability if any at all. This could be because the government believes it has other, less expensive methods for controlling costs—for example, through the use of competition—or it could be that, owing to reasons of political economy, cost controls are not a serious policy priority after all. Indeed, many scholars have argued that the political economy of defense contracting in the United States leads Congress to “spread the wealth” of a weapons project to as many districts and constituents as possible, working against any efforts taken by the Pentagon that are aimed at cost containment (Gansler 1989, McNaugher 1989, Mayer 1991, Gholz and Sapolsky 1999/2000).

Because economists have focused almost exclusively on contracting arrangements in their analysis of what fails in defense procurement, it is unsurprising that nearly all their normative efforts to control cost overruns have boiled down to changes to these contracts. These policy recommendations have been influential, not only in the past but apparently with the current American Administration as well, which is making a return to FP contracts one of the cornerstones of its defense procurement reforms. Earlier attempts to reduce cost overruns have included changing contracts from annual to multiyear, which—it is argued—would encourage firms to make greater investments in productivity enhancing technologies, and from C+ to performance-based or award-fee contracts, which, it is again argued, would do a better job of aligning the firm’s incentives with those of the government. In one report after another, however, organizations like the Rand Corporation (2008) and the Government

¹⁵ In contrast to the Rand Corporation, some analysts and public officials claims that the Pentagon does an excellent job of assessing program costs *ex ante*, but that the existing procurement rules and processes undermine this initial analysis by motivating cost overruns. See Marvin Sambur: “Commentary: Two Rules for Defense Acquisition,” 16 March 2009, www.federaltimes.com, downloaded on 10 April 2009.

Accountability Office (08-782T) have pointed out that these reforms have not met their cost-cutting objectives. *What this suggests is that if cost overruns are to be controlled, a coherent set of self-enforcing policies is required that confronts both contractual and institutional shortcomings.* As we will see in the following sections, that is the great lesson that stems from the French experience.

Defense Acquisition Reform in France

That France has enjoyed a relatively efficient weapons procurement system has long been recognized by defense experts¹⁶. In trying to understand this apparent success, researchers in the past have tended to focus on the economic structure of the country's defense industry, and particularly its reliance on exports. The reasoning is as follows.

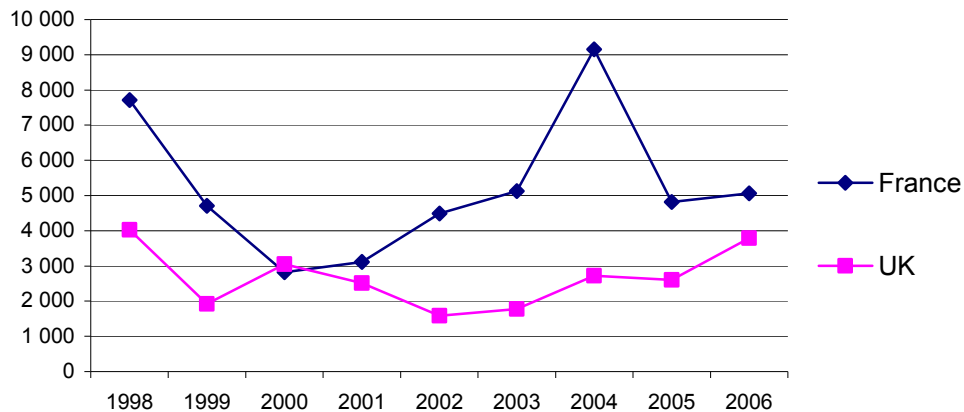
Given that the French domestic market for weapons is small, firms have had to seek export markets for their output in order to be profitable, where they face tough competition from producers based in the United States, Britain, and other countries. In that harsh economic environment, the French have had to deliver a "value for money" proposition in order to survive. They have allegedly done so through the adoption of efficient production techniques and by making incremental rather than quantum improvements to existing weapons platforms. This combination has enabled French defense companies to turn out systems that meet the requirements of the nation's military and many export clients around the world. In short, like export-oriented producers in any industry, the French have had to perform in order to survive (Kolodziej 1988).

While export pressures undoubtedly explain much about French performance, we emphasize here other factors that we consider to be equally if not more decisive in controlling costs. After all, if market characteristics alone were the driving force behind efficiency in weapons procurement, then one might expect the United Kingdom to have a similar record to the French (see Figure 1 on French and British exports). But Britain's National Audit Office (2005) reports that Ministry of Defence (MoD) programs are also chronically delayed and over-budget, despite numerous reforms aimed at cost containment (e.g., "value for money" and "smart acquisition" purchases). While we have not pursued the case of British defense procurement in any depth, and lack the contract data and questionnaire feedback that we have received from the DGA, interviews with

¹⁶ See Robert Perry, *A Dassault Dossier: Aircraft Acquisition in France* (Santa Monica, CA: Rand Corporation, 1973, R-1148-PR); Arthur Alexander, *Weapons Acquisition in the Soviet Union, United States, and France* (Santa Monica, CA: Rand Corporation, 1973, P-4989); U.S. Congress of the United States. Office of Technology Assessment, *Lessons in Restructuring Defense Industry: The French Experience* (Washington, DC: Office of Technology Assessment, June 1992, OTA-BP-ISC-96).

MoD officials notably point to technical weakness among acquisition managers as a leading cause of poor outcomes, given that it has faced difficult times in recent years in recruiting the “best and brightest” scientists and engineers (perhaps one silver lining of the current recession is that it will enable governments to acquire more technical capacity)¹⁷.

Figure 1: Arms exports in the UK and France



Source: SIPRI yearbook 2008; in US\$M at constant 2006 prices.

So if export-orientation alone does not explain efficient procurement outcomes, what other tools did the French government use in its efforts to contain cost overruns in defense acquisition? Our argument focuses on the self-enforcing relationship between the government’s hard budget constraints, the DGA’s technical capacity and its iterative relationships with a relatively small set of defense firms, and the contractual arrangements it has developed. One issue that we must consider in our conclusion concerns the durability of this procurement system given some current challenges.

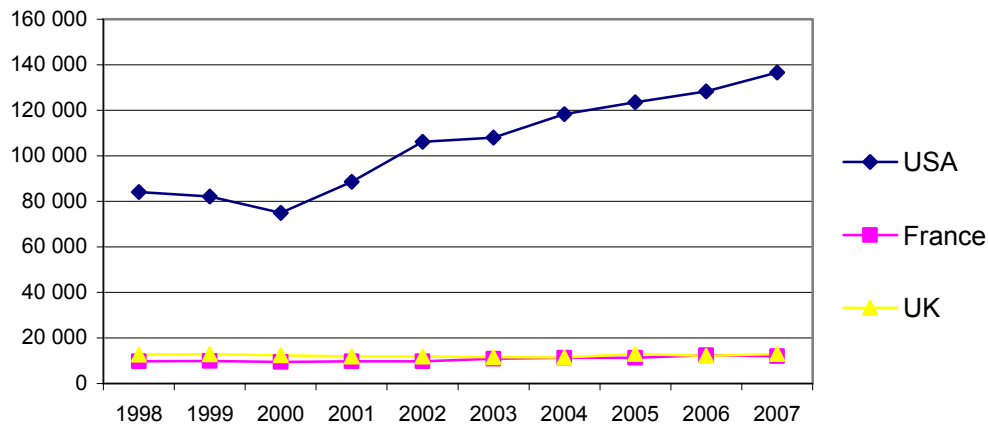
The magnitude of the budgetary problem that the French Ministry of Defense (MoD) faced in the early 1990s is reflected in both the data and in some of the tough management decisions that shrinking budgets forced the government to take. During the period 1970-1980, the French defense budget had climbed by 33 percent in real terms (Nato 1990 p.3). But these years also witnessed rising concerns within the French military about the increasing costs associated with armaments programs, as such costs were outstripping the budget hikes they were receiving, meaning they could afford to launch fewer new programs and buy fewer quantities of new platforms (Kirat, Bayon and Blanc 2003 p.184-186).

¹⁷ Interviews, U.K. Ministry of Defence, November 2008.

Beginning in the late 1980s, as the Cold War came to its conclusion with the collapse of the Soviet empire, the days of higher defense budgets also came to an end, and between 1990-1997 authorized procurement budgets actually fell from 116 billion francs (still the currency during those years, but equivalent to about 17.7 billion of today's euros) to somewhat less than 89 billion francs (or 13.5 billion euros), or a drop of more than 20 percent (see Figure 2 for some data on defense equipment budgets in France and the United States). In dealing with these rapidly declining budgets, the government took drastic measures, including halting nine ongoing weapons programs (by definition, hard budget constraints imply "that 'bad' investment projects will be terminated", Besfamille and Lockwood 2004 p.3), and it reduced the budgets of another 13 ongoing programs by 6 billion francs (€ 915 million). Further cuts were made in other areas of the defense procurement budget, including spending on research and development (from 5.29 billion euros in 1990 to 3.1 in 1998¹⁸).

Given this environment, it became near impossible for programs to "borrow" money or obtain credit from one another as had traditionally been the case. That is, in the past the Minister of Defense would scramble at the fiscal year's end to match programs in surplus with those in deficit in order to make ends meet. Now, with nearly every project confronting a budgetary shortfall, defense programming became a "zero-sum" game (Kirat, Bayon and Blanc, 2003 p.189).

Figure 2: Defense equipment spending



Source: SIPRI yearbook 2008, US\$M with 2005 price and exchange rates.

¹⁸ Source : Ministère de la Défense, Annuaire statistique de la défense, *La Documentation française*, juin 2000, p.108.

From a managerial perspective, given these harsh budgetary realities, project leaders at the DGA were given strong marching orders to focus on cost reductions in current systems and to prevent future cost overruns. Specifically, the agency was tasked with finding contractual and other methods for controlling costs in the early stages of a weapons program, when overruns seemed most prevalent; more on this below. The point we wish to emphasize for the moment is that the technical capacity of the DGA (which gave it strong monitoring abilities), *when coupled with hard budget constraints*, motivated and enabled the government to engage in arrangements with its suppliers that provided firms with strong incentives to control their costs.

That France had the capacity to carry out these reforms reflects the nature of the French state. Unlike in the United States, where each of the armed services has its own defense procurement agency and where Congress looms large with respect to how the government buys its weapons, the French defense acquisition system is extremely centralized. One single executive agency, the *Délégation Générale pour l'Armement* (DGA), is responsible for the contracting and management of all weapons programs, from initial inception to delivery, including export sales¹⁹. France's legislative body, the National Assembly, has little ability to intervene in specific weapons programs, since it only votes up or down on a "global" package of defense expenditures, as presented by the government in its multi annual "defense programming law" ("loi de programmation militaire"). As Kolodziej (1988) has put it, "The DGA is the hub around which the French arms industry turns" (p.244)²⁰.

The head of the DGA reports directly to the Defense Minister. This ranking is consequential, as it gives the DGA tremendous prestige within the French government. And because the Agency is viewed by the French elite as such a prestigious organization, it is able to recruit the nation's best and brightest scientific and engineering talent.

Indeed, entry into the DGA and promotion to the title of "armaments engineer" (which is bestowed upon project managers) normally requires an engineering degree from one of the "Grandes Ecoles," preferably the most desirable of them all, the *Ecole Polytechnique*. While there is no precise American equivalent of the Grandes Ecoles system, it would be something like restricting the recruitment of senior procurement officials to graduates of a handful of engineering schools like MIT or CalTech (Kolodziej 1988). One major implication of this recruitment policy is that DGA prides itself on the technical knowledge about weapons systems that it brings to the acquisition process. The DGA has traditionally conducted a great deal of military research "in-house",

¹⁹ A useful introduction to the DGA is found in Houttemane (2008).

²⁰ Although the book was published twenty years ago its analysis of the DGA and the French procurement system remains compelling.

which has enabled it to specify in detail the weapons it seeks to build and the price it is willing to pay (we note this is rapidly changing, providing one reason for some concerns we will raise in the conclusion about the durability of the French model).

Further, the vast majority of *current* DGA project managers has also worked in either industry or in the French arsenals, giving them “hands-on” experience with the weapons acquisition process (again, with privatization of both industry and arsenals and divergent career tracks, younger engineers are less likely to have had this kind of factory floor experience). Thus, because the DGA has possessed detailed knowledge about the platforms it wants to acquire, and because it monitors its contractors quite closely (we also note that the French government continues to retain “golden shares” or veto power over major decisions in most of the defense firms), the information asymmetry problems between industry and government are greatly reduced (Kolodziej 1988).

Further, the world of French defense acquisition is a small one. Government managers and industry executives went to the same schools—often the *Ecole Polytechnique*—and have enjoyed similar career paths, migrating between state and private sector functions. A relatively small number of prime contractors and major suppliers remain in the defense business, making for iterated and cozy relationships with the DGA. These relationships, of course, could easily lead to abuses in contracting; for example, firms could demand high prices for their weapons “up-front”, thus establishing a ceiling on contractual arrangements that includes a healthy profit margin.

As we have seen, however, the DGA has put into place several reforms aimed at checking such potential abuses, and again the power of the hard budget constraint must not be overlooked, as it sets the upper bound on what the military can purchase. We would also emphasize that, given the fact that the DGA is a centralized buyer facing a relatively small number of firms, a cozy but “correct” (as the French would say) relationship could serve each party’s long-run interest. Through iteration, firms learn what the traffic will bear, aided by a French state that wants them to remain in business for reasons of defense self-sufficiency, without too much competitive pressure from international producers. Publicized abuses of the system, in contrast, could put unwanted public pressure on the French state to reform its procurement practices, in particular by opening the market to more European if not American firms. After all, the French generally view the pan-European Airbus project as a great success, and it is one that could conceivably be replicated on the military level if the French had the political will to engage in a greater degree of weapons collaboration.

Vigilant of potential abuses of its iterated relations with a handful of French defense contractors, the DGA also made several changes to their acquisition process in light of growing concentration at the prime contractor level

during the 1990s. First, rather than award a prime contractor an overall contract for the delivery of an entire system, the DGA separated the systems integration and major sub-contract competitions. Thus, while there might be little or no competition when it comes to building a jet fighter —Dassault has a virtual monopoly which could only be broken via effective competition from non-French firms— there is a greater degree of competition at the level of most major components, such as avionics. Indeed, the United States Embassy has warned American firms that seek to do defense business in France that there is a “high level of local competition”²¹.

Second, as part of its *ex ante* cost and risk assessment procedures, the DGA during the early 1990s began entering into “pre-contractual” negotiations with its suppliers which were explicitly aimed at identifying potential risks to cost projections during the development phases of a new program (Kirat, Bayon and Blanc, 2003). What this entailed was working with a number of different suppliers to gauge project risks and to identify where cost overruns were most likely to occur. *We would highlight the fact that, since most cost overruns occur in the early stages of a project’s lifetime, given the uncertainties associated with a new technology, effective ex ante monitoring, as exemplified by credible pre-contractual risk assessments, is especially crucial to the cost containment process.*

In addition, formal contracts are also used as management tools to control costs, and in the following section we discuss this issue in greater detail, making use of our data base of nearly 50 defense contracts along with supporting questionnaires and interviews. We will show in the following section that contracts are used to ensure that both industry and government meet their obligations.

French Defense Contracts: What the Data Say

We have stated above that budgetary constraints and technical capacity interacted with French contracting arrangements to limit the cost overruns associated with the weapons acquisition process. Specifically, during the late 1980s the DGA decided that it could no longer rely on C+ contracts (like the United States, the French had adopted C+ contracts in the postwar period as a method for governing more complex weapons programs) as an instrument for controlling costs. The DGA thus returned to Fixed Price (FP) contracting, but with a distinctive Gallic twist. For unlike FP contracts that placed *all* project risks on the industry, the French adopted a unique approach to risk sharing and the additional costs that unanticipated risks incurred. Given the Pentagon is contemplating a return to

²¹ Robert Connan, *Aerospace and Defense in France*, U.S. Commercial Service in France, n.d.

fixed price contracting in the U.S., the French experience here may be especially relevant.

How have the French managed the weapons acquisition system using FP contracts? Recall that with such contracts, firms are required to make final bids on the delivery of finished systems, and they must (at least in theory) accept all the risks associated with any cost overruns that occur. After signing an FP contract, the firms cannot run to the Defense Ministry to plead ignorance about the real costs of a project and request more money as compensation, because if the government altered the FP contract *ex post* then other competitors might protest the original contracting decision, which was supposedly given to the low-cost bidder (Gil and Oudot 2008). Again, it was for this very reason that American defense industry leaders argued after the Second World War that if the Pentagon wanted cutting-edge weapons, it would now have to adopt C+ contracts, which would provide firms with a fixed fee or profit along with reimbursement of their actual production costs (Dupre and Gustafson 1962).

Because it is impossible for project managers and industry executives to know *ex ante* what all the unforeseen design challenges of building a new weapons system will be, FP contracts must be “incomplete” by their very nature, inevitably leading to costly renegotiations between firms and the government over who bears the responsibility for the extra costs that are incurred, and how those costs will be divided (in economic parlance, FP contracts are thus “inefficient” mechanism devices for governing complex projects, Bajari and Tadelis 2001). *As we will see below, renegotiations (along with informal contractual “amendments”) are indeed commonplace in French defense contracting, and to preview our analysis, we find that the French have introduced something like a “responsibility principle” to FP contracting, meaning that those who are responsible for failing to meet contractual obligations, whether government or industry, must generally pay the costs.* When firms are clearly responsible, they must take the charges against their profits. When the government is the cause of the contractual changes, then the costs are usually deducted from the DGA’s procurement budget, creating a “zero-sum” game for project managers. *We have therefore stumbled upon what can only be called a contractual paradox: while the French have transformed an inefficient contractual design into something like an efficient management tool, the United States has traditionally used relatively efficient contracts (as noted, economists generally agree that cost-plus contracts make sense in the presence of project uncertainty) to inefficient ends*²².

But is the government able to enforce this principle of responsibility, or do powerful industrial firms and the DGA ultimately get *relatively* unorganized French taxpayers to pay for any cost overruns, as theories of collective action

²² For a defense of FP contracts in public procurement, see Tan (1996) and Oudot (2008b).

would lead us to predict? What do the data say about cost overruns in the French case and the way in which such overruns get divided between government and industry, and how do we explain these data? We now address these questions.

Our claims about French performance are based on an original data set composed of 48 defense procurement contracts signed by the *Délégation Générale pour l'Armement* on behalf of the Ministry of Defense and 18 firms. These 48 contracts were written in support of 47 major weapons programs (two contracts were on the same program). While we cannot guarantee that our sample of programs and contracts is fully representative of the defense procurement process—we were not given access to *all* French defense contracts, and there are no nuclear weapons contracts in our data set—we nonetheless are confident that our sample does not select on our key dependent variables of cost overruns and risk or cost sharing between the government and the firms; in other words, we do not believe that our sample, taken as a whole, constitutes an “easy case” for us.

All the contracts in our dataset are related to armaments production, and each military service is represented. The projects also vary substantially in complexity, ranging from the development of brand-new hardware to upgrades of older platforms. A further, qualitative assurance concerning our sample is due to the fact that we were given unprecedented access to this data set in part because DGA is revisiting its reliance on FP contracts and it reported to the authors that it is interested in learning more about their performance. Since, to the best of our knowledge, DGA has never conducted this type of contractual analysis before (nor has any other public or private agency in France done so), we have no reason to believe it anticipated what the results of this study would be. We should also note that the GAO and U.K. National Audit Office (NAO) also rely on relatively small samples of defense contracts in conducting their published research on weapons costs, and we have no evidence that their selection is any more or less representative than is ours.

In addition to our data collection and analysis, we addressed 120 detailed questionnaires²³ to program managers within the DGA and received 51 responses. Thus, our response rate on questionnaires was 42.5 percent. *The objective of the questionnaire was to gain the government executive's perspective on how a given acquisition program performed and the specific role that contracting techniques and agreements among other policy tools played in controlling costs. In particular, we sought the views of project managers regarding how any cost overruns were allocated between industry and the state following an informal contractual amendment or formal contractual renegotiation* (we sometimes refer to both formal and informal changes to contracts that deal with cost overruns as *risk allocations* in what follows).

²³ The questionnaire, in French, can be accessed to:
http://tel.archives-ouvertes.fr/docs/00/18/71/50/PDF/Oudot_jean-michel_these.pdf p.287-309.

We also wanted to know whether project managers dealt with cost overruns differently when projects were bigger, when certain contractors were used, or when contracts were awarded on a competitive vs. a negotiated basis. Along with the contracts we have been given access to, we also believe that this in-depth questionnaire of defense procurement executives is similarly unique in the study of the weapons acquisition process. Information coming from questionnaires was systematically checked through personal or telephone interviews with every respondent to ensure consistency with the written answers we were supplied, and in addition we interviewed 13 defense-industry executives²⁴. *Thus, our information on how risks (and the associated cost overruns) are allocated in the French weapons acquisition process was gleaned through an analysis of formal contracts, and via questionnaires and interviews with program managers and executives.*

Contracts included in the dataset were signed between 1994 and 2005, with the average contract running for five years²⁵. As already noted, a wide variety of weapons systems or major sub-systems were included (e.g., electronics, missiles, and armor), representing acquisitions for each military service. The average value of these contracts was €134.7 million, ranging from €0.2 million to €3 billion. *The average cost overrun among these contracts was €6.03 million, which represents 4.5 percent of the average contract price. Taking the geometric (instead of the arithmetic) average, the cost overruns double to 9.5 percent of the contract price.* We contrast these figures with the average cost overrun reported by the GAO of 26 percent in the American case (we believe this is the arithmetic as opposed to the geometric average, though the GAO does not specify which it uses in its estimations)²⁶.

As already noted, the French defense contracts in our dataset are of the FP variety, in nearly all (98 percent) of the cases. And as we would expect from this contractual form, *the official terms stipulate that all unforeseen contingencies or risks will be supported by the contractors.* However, our data show that decisions taken *ex post* by DGA project managers differ markedly from these *ex ante* initial risk allocations, and reflect the outcome of contractual renegotiations (both formal

²⁴ We also received anecdotal support for our findings. At a meeting of the World Economic Forum in Istanbul in September 2008, for example, one of the authors chanced upon a French defense industry executive who, upon learning about this research project on defense contracting, spontaneously launched into a prolonged critique of the DGA and FP contracts, “which force the suppliers to take on project risks”!

²⁵ While most of the contracts we analyzed are completed, a couple of them are still active. These are operation and maintenance contracts that in France tend to be given for long periods of time.

²⁶ Again, the GAO does not report on the methodology by which it selects weapons platforms for analysis or its method for calculating cost overruns; as a consequence, we understand that our results may not be strictly comparable. Still, since other studies that we have cited here have also noted the relative efficiency of the French system, we believe our findings are robust.

and informal) which take place on the basis of what we call a “responsibility principle,” meaning that the agent who is responsible for deviating from the terms of the contract is expected to bear the costs associated with that deviation. *We stress the importance of this principle in providing both government and firms with strong incentives to control costs.*

In order to examine empirically how the costs associated with contractual changes (because of unforeseen contingencies or “shocks”) are allocated following an amendment or renegotiation, we coded each change that was named by a project manager (in a questionnaire and interview) by its possible locus. These sources of possible contractual changes included the Ministry of Defense/DGA (which might seek to renegotiate or alter a contract owing to changes in military specifications); the contractor (which might have failed to exercise sufficient oversight of its suppliers); exogenous forces (e.g., the failure to obtain licenses, say from the United States, to import a particular technology); or indeterminate (meaning that the project manager could not trace the reason for the contractual change to any single party or event). Table 1 shows in detail how the costs associated with these contractual changes were allocated within the French defense procurement system.

In this table, the number of observations (133) equals the number of contractual changes *as reported by project managers* that led to cost overruns, again based on our initial data set of 48 defense contracts (thus, on average, each contract experienced more than 2.5 contractual changes). On the X-axis we examine the source of that change (again, as identified by the project manager), and on the Y-axis the agent(s) responsible for bearing the financial consequences of any associated cost overruns. *The purpose of this exercise is to see who pays for the costs overruns that are incurred during the life of a weapons acquisition, and in particular whether such overruns are ultimately borne by the government (and thus by the taxpayer), as seems to be the case in the United States.*

Table 1: Who bear cost overruns?

COST BEARER		RESPONSIBILITY for cost-overruns				Total
		Ministry of defense	Contractor	Exoge nous	Indeterminate	
Ministry of defense	Nb. of obs.	33	0	2	3	38
	Line %	86,84	0	5,26	7,89	100
	Col. %	63,46	0	6,25	13,04	--
Ministry of defense & contractor	Nb. of obs.	8	0	13	15	36
	Line %	22,22	0	36,11	41,67	100
	Col. %	15,38	0	40,63	65,22	--
Contractor	Nb. of obs.	11	26	17	5	59
	Line %	18,64	44,07	28,81	8,47	100
	Col. %	21,15	100	53,13	21,74	--
TOTAL	Nb. of obs.	52	26	32	23	133
	Line %	39,10	19,55	24,06	17,29	100
	Col. %	100	100	100	100	--

The table can read be as follows: out of the 133 contractual changes that took place, 52 were due to the Ministry of Defense/DGA (meaning it made some material change to a program that resulted in cost overruns or project delays); 26 were due to the contractors (meaning that they were unable to meet their contractual obligations); 32 stemmed from exogenous forces (generally meaning sudden price increases or denials of import licenses from source countries); and 23 were due to some combination of factors whose ultimate source could not be identified by the project manager (thus we have used the code “indeterminate”).

Of the 52 cases in which the Ministry of Defense/DGA was deemed responsible for the change it assumed complete financial responsibility in 33 cases; in 8 cases it shared the costs with the contractors (normally on a 50-50 basis); and in 11 cases it managed to get the contractors to pay entirely. In contrast, fully 100 percent of the shocks caused by contractors were supported by contractors. *Thus, while the Ministry of Defense managed to transfer part of its responsibility in some cases to the contractors, the firms were unable to do likewise.*

How do we explain this surprising outcome? We would argue that the state’s ability to transfer some of its own risks onto its suppliers—which is certainly a counter-intuitive finding, at least from an American perspective—reflects the power of the French state in public procurement. Basically, the data reflect the government’s ability to make “take it or leave it” offers to firms during a contractual renegotiation; in essence, the state is able to use renegotiations as a mechanism for testing what the market will really bear. Interviews indicated that *this situation generally arose when the DGA project manager had hit his budget constraint and faced the prospect of either project termination or downsizing,*

again providing evidence of how such budget constraints can be used as a powerful tool for cost containment. We emphasize that the French state is also backed by the force of law when it acts in this way; the terms of public procurement contracts permit the state to require contractors to bear all project risks²⁷.

As noted in the previous section, one potential objection to our findings is that prime contractors simply pad their costs “up front”, setting a high ceiling that permits them to live with fixed price contracts and a small percentage of cost overruns. But we would note that this could also be the case in the United States, since analysts have often argued that the Pentagon makes even less robust efforts to estimate costs *ex ante* (though again we note that this charge is contested). By providing credible *ex ante* estimates of weapons costs, the French at least provide a baseline for future cost escalation, which is a reform that the Rand Corporation has urged upon the United States. Pre-contractual competitions are also meant to reveal the “true” costs of weapons systems. Further, the French face hard budget constraints that make defense contracting a “zero-sum game,” meaning that high costs for one system lead to fewer or no purchases of another platform. This is not to say that contractors are unable to pad costs, but efforts have been made to constrain that behavior, again in comparison to, say, American defense contractors. Further, the “cozy” nature of the DGA-private sector relationship, and the fact that the French wish to preserve the defense-industrial *status quo*, may contribute to a willingness to accept lower profits on each defense deal in return for a steady stream of business over the long-run.

In order to check the robustness of our findings from the questionnaires with respect to the “responsibility principle” and, in particular, to examine them in light of some control variables and fixed effects, we conducted an econometric analysis using simple OLS regressions as well. While all definitions of our variables may be found in Table 2, results are presented in Table 3. As one can see, the results strongly support our claim that something like a “responsibility principle” is at work in French contracting (and recall that even the Ministry of Defense bears *all* the financial burdens associated with the changes it makes to contracts over 63 percent of the time). *Given the dependent variable of who pays the cost-overruns (or, more felicitously, who is the “risk bearer,” labeled PARTSUPPORT in the table), the financial responsibilities assumed by the Ministry of Defense and of the contractor are significant in all estimates), and the coefficients associated with RESPMINDEF (responsibility of the Ministry of Defense) and RESPCONTRACTOR (responsibility of the contractor) suggest a robust result.* These findings are independent of the controls and fixed effects we

²⁷ Note that project managers also indicated that they tried to “make it up to the firms” in future contracts when they passed risks onto them; this indicates that the DGA and the firms view themselves as taking part in an “iterated game” rather than a one-shot transaction.

introduced (particularly the size of the contract; whether or not the contract was awarded on a competitive or negotiated basis; and the type of weapons system).

For example, one might expect that the “responsibility principle” is less likely to hold when contracts are negotiated rather than competitively bid, since the state seemingly has no alternative but to stick with the same contractor until project completion. As a consequence, that contractor would seem to have power to grab rents from the system irrespective of whether it was responsible for a cost overrun. But we find no support for that hypothesis²⁸.

Table 2: Definition of variables

VARIABLE	OBS.	MEAN	STD. DEV.	MIN	MAX	DEFINITION
PARTSUPPORT	133	0.42	0.43	0	1	Share of the financial consequences supported by the ministry of defense. Continuous variable taking value 0 when all the financial consequences of the risk are supported by the contractor, 1 when the ministry of defense supports all these consequences, 0
RESPMINDEF	133	0.39	0.49	0	1	Takes value 1 if the ministry of defense is responsible for the sources of the risk, 0 otherwise
RESPCONTRACTOR	133	0.2	0.4	0	1	Takes value 1 if the contractor is responsible for the sources of the risk, 0 otherwise
RESPEXOGENEOUS	133	0.24	0.43	0	1	Takes value 1 if exogenous forces are responsible for the sources of the risk, 0 otherwise
RESPALL	133	0.17	0.38	0	1	Takes value 1 if all factors (ministry of defense, contractor, exogenous) are responsible for the sources of the risk, 0 otherwise
FINANCIAL IMPACT	110	0.05	0.6	0	0.29	Financial impact of risk in €M / reference price (€M)
COMPETITION	133	0.21	0.41	0	1	Takes value 1 when the contract awarding process is competition, 0 otherwise
NEGOTIATION	133	0.54	0.5	0	1	Takes value 1 when the contract awarding process is negotiation, 0 otherwise

²⁸ For an analysis of the relationship between awarding criteria and renegotiations, see Gil and Oudot (2008).

Table 3: OLS estimates

	Model 1 Partsupport (robust t)	Model 2 Partsupport (robust t)	Model 3 Partsupport (robust t)	Model 4 Partsupport (robust t)	Model 5 Partsupport (robust t)	Model 6 Partsupport (robust t)	Model 7 Partsupport (robust t)	Model 8 Partsupport (robust t)	Model 9 Partsupport (robust t)	Model 10 Partsupport (robust t)
Respmindex	0.483*** (7.227)	0.372*** (5.147)	0.261** (3.060)	0.452*** (5.574)	0.392*** (4.407)	0.390*** (4.373)	0.391*** (4.327)	0.244** (2.640)	0.414*** (4.806)	0.449*** (4.610)
Respcontractor		-0.345*** (-7.816)	-0.457*** (-7.246)	-0.266*** (-4.642)	-0.330*** (-4.871)	-0.334*** (-4.798)	-0.323*** (-4.422)	-0.470*** (-6.629)	-0.331*** (-4.097)	-0.330*** (-4.135)
Respexogenous			-0.191* (-2.243)					-0.147 (-1.452)		
Respass				0.191* (2.243)	0.126 (1.281)	0.123 (1.240)	0.147 (1.452)		0.264* (2.501)	0.247* (2.391)
Financial impact					0.370 (0.746)	0.356 (0.715)	0.103 (0.201)	0.103 (0.201)	0.411 (0.821)	0.493 (1.037)
Competition						0.018 (0.241)	-0.061 (-0.712)	-0.061 (-0.712)	-0.025 (-0.237)	0.056 (0.536)
Negotiation							-0.121 (-1.573)	-0.121 (-1.573)	-0.157 (-1.422)	-0.229+ (-1.976)
Constant	0.235*** (6.716)	0.345*** (7.816)	0.457*** (7.246)	0.266*** (4.642)	0.311*** (4.009)	0.309*** (3.913)	0.393*** (4.307)	0.540*** (5.735)	0.478*** (3.421)	0.183 (1.484)
Contractor FE	No	No	No	No	No	No	No	No	Yes	Yes
Equipment type FE	No	No	No	No	No	No	No	No	No	Yes
R-squared	0.309	0.397	0.417	0.417	0.362	0.362	0.374	0.374	0.547	0.586
Nb of obs.	133	133	133	133	110	110	110	110	110	110

Robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 1%.

In sum, during the early 1990s the French state faced the challenge of rising weapons costs and declining defense budgets. Given real budgetary constraints, the DGA was charged with putting into place mechanisms for controlling the costs associated with new weapons programs. Making use of its technical expertise, the agency put into place stronger *ex ante* risk analyses of the projects on its desk (e.g., via “pre-contractual” discussions with suppliers), and more dramatically it terminated the use of C+ contracting. Instead, the French re-introduced FP contracts but with a twist: now, the government would make use of a “responsibility principle” in which risks would be assumed at their source (though the government itself would prove a partial exception to this rule).

What are the lessons of the French experience for non-French students of defense procurement? What can researchers learn from comparing, for example, the American and French systems and outcomes? And what does the future hold for weapons acquisition in both countries? We turn to these questions in the concluding section.

Conclusions

The inability of the Pentagon to deliver weaponry on-time and within budget has long troubled scholars and policy-makers. As a consequence of that failure, nearly every presidential administration has called for procurement reform, putting into

place one policy fix after another²⁹. It might be asserted that the objective of all these efforts has been to promote a closer alignment between public policy and private interests, by giving firms stronger incentives to deliver complex systems in a cost-conscious manner. In recent years, for example, the Pentagon has increasingly turned to “performance-based” and “award fee” contracts, which are designed to reward cost-saving behavior.

The government’s own evidence, however, suggests that these myriad fixes have failed to do the trick. Cost overruns and delays are not only endemic, but they appear to be getting worse. And this is not simply due to growing project complexity. Even weapons upgrades suffer a similar set of ills.

Why is that the case? As McNaugher (1989) rightly argued twenty years ago, the problems that exist are largely systemic in nature, reflecting American domestic politics and the relationship between the defense industry and the state. Contractual changes alone will not change outcomes, since contracts are embedded within particular institutional configurations.

Unlike McNaugher, however, we do not believe that defense acquisition reform is “futile”. In particular, we have tried to demonstrate that the French state—which is often viewed by observers as being incapable of economic reform (Levy 1999)—put into place a number of policy changes during the 1980s and 1990s that promoted greater efficiency within its procurement regime. Like the United States, the French grew concerned at that time by the rising costs of modern weaponry, especially when coupled to falling budgets. But in France, real budget constraints forced the government to act decisively, and to give highly capable project managers the tools they needed for cost containment.

To be sure, the French system is hardly perfect, and questions might be raised about the durability of even those parts of the system that one might wish to see preserved. Specifically, we have argued that one central element in the French procurement model has been the impressive technical capacity found in the DGA. This enables DGA engineers to work closely with suppliers and to monitor the firms closely once programs are underway. Since many DGA managers themselves did stints in the defense industry, they know much more than the average auditor about the technologies and production techniques used to build modern weaponry.

But the data suggest that the Ministry of Defense is progressively outsourcing its R&D spending, suggesting that the DGA may be losing some of this in-house technical capacity. The defense industry and arsenals were also mostly privatized during the 1990s, drawing firmer divisions between industry and state that make it more difficult for government officials to perform stints

²⁹ A recent Pentagon report counts 128 official studies that have aimed at defense procurement reform. See Defense Acquisition Performance Assessment Project, *Defense Acquisition Performance Assessment* (December 2005).

within firms, and on the factory floor. In a related vein, as with the United States, an increasing number of the “best and the brightest” are seeking careers in the dynamic private sector rather than in government, where the possibilities of achieving high pay and rapid promotion may be much greater. Members of the French elite are still strongly attracted to public service, but whether the state will continue to dominate technical knowledge in the national security space is much less certain.

A further challenge to the French model is provided by the shrinkage of its armed forces coupled with ever-fiercer competition in export markets. Now that the United States has shown its willingness, in the F-35 Joint Strike Fighter (JSF) program, to co-develop and co-produce even its most advanced weaponry with friends and allies around the world (in particular, the JSF incorporates low-observables or stealthy technology), it may become all the more difficult for countries like France (Kapstein 2004). Thus, the very future of an independent French defense-industrial base may be put into question, raising the prospect of a more integrated European armaments industry and acquisition system.

What lessons, then, can defense analysts and policy-makers in the United States (among other countries) usefully glean from the French experience? One obvious place to start, given the current economic crisis and the availability of world class engineers on the job market, would be for the Pentagon to recruit the very best and brightest into the acquisition corps, and to give that corps greater status within the government, perhaps following the example of the Defense Advanced Research Projects Agency (DARPA)³⁰. That requires not only a more rigorous system of recruitment into the agencies of defense procurement, but also the appointment of project managers with longer tenures in, and more programmatic authority for, a particular weapons system.

In the United States, the accumulation of technical knowledge has been hampered not just by a failure to recruit top notch scientists and engineers (again with DARPA representing a notable exception); it is equally undermined by a “revolving door” management structure in which program managers have an average tenure of less than two years on the job, vs. four years in France (and again we note that DGA officials only become program managers after 15-20 years in other assignments). Under these conditions, it is impossible for managers to gather the technical understanding of a project needed to guide it towards the government’s mandated objectives. Indeed, the GAO believes that the lack of management continuity constitutes a major reason for program shortfalls (GAO 08-782T). Because managers rotate frequently, they have few incentives to become really expert with respect to a particular program.

³⁰ See, for example, Defense Systems Management College, *Program Management 2000: Know the Way: How Knowledge Management Can Improve DoD Acquisition* (Fort Belvoir, Va: Defense Systems Management College Press, January 2000).

As we have seen, however, technical competence is not enough: even the most capable managers need the right tools and incentives in order to accomplish their missions. In particular, French project managers faced hard budget constraints that gave them powerful incentives to find innovative ways of containing costs. Without these constraints it is unlikely that contractual reforms or other changes to the acquisition process would have made much difference.

The French experience with fixed price contracts provides another lesson of potential importance to the United States as it reforms its defense acquisition system and places renewed emphasis on this contractual variant. As we have seen, FP contracts *do not* eliminate cost overruns or even renegotiations with the government. Understanding these limitations, the French put into place a responsibility principle that, in general, requires those who are responsible for cost overruns to pay for them. This seems to have contributed to reducing the cost inflation that the French once suffered.

But we have also seen that contractual changes alone are insufficient to generate improved procurement outcomes. As McNaugher argued two decades ago, contracts are deeply embedded in institutional arrangements. This means that the Obama Administration must confront the institutional impediments to meaningful defense reform, including those created by the U.S. Congress. The effort may be “futile”, but if nothing else the French case demonstrates that, when faced with hard budget constraints, governments are capable of reforming their usual way of doing business.

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