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COST EFFICIENCY OF DEFENSE PROCUREMENT: WHAT WE CAN AND CAN'T LEARN FROM FRENCH LESSONS

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ABSTRACT. During the late 1980s, in the wake of the end of cold war and shrinking defense budget, the *Delegation General for Armaments* (DGA), the French government agency that is responsible for the contracting and management of all weapon programs, implemented a wide range of restructuring efforts to reform French defense industry. For instance, one notable change was to migrate from cost-plus contracts to fixed-price contracts to control the then prevalent cost overruns. Today, nearly all French weapon procurement contracts are fixed-price based. Research has found that while in France as elsewhere cost overruns still occur, such problem tends to be relatively modest in scope. Specifically, Kapstein and Oudot (2009) document that French cost overrun is normally within the 5-10 percent range as opposed to an average 26 percent overrun in the U.S.

Given the French experience has in general been perceived to be successful (OTA Background Paper 1992, Kapstein 2009), what can the U.S. learn from French lessons? Today the U.S. confronts a very similar and difficult cost overrun problem that led DGA in the late 1980s to the reform of the system. We argue that while U.S. can certainly learn useful lessons from the French experience, significant differences nevertheless exist between the two countries in the context of the political and economical environment. These institutional differences indicate that a “copy and paste” approach will not work in U.S. Rather, an individual based assessment of the French experience would make more sense. We aim to address this issue.

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INTRODUCTION

After WWII, the U.S. shifted away from its near-exclusive wartime reliance on fixed-price contracts for weapon procurement to cost-plus contracts, especially for the early development stage. The rationale was that as the modern weapons became more complex and uncertainty about the cost was so high that it was almost impossible to come up with a good cost estimate *ex ante*. Cost-plus contracts were introduced to effectively shift risks from the contractors' shoulders to the government. In late 1940s, France followed suit and widely adopted cost-plus contracts in its defense acquisition practice. However, the benefit of risk-sharing associated with cost-plus contracts came with a price, i.e., the large and prevalent cost-overruns. The problem in France became so big that in late 1980s the DGA decided that it could no longer rely on cost-plus contracts. A return to fixed-price contracts was pushed by the DGA and as a result, today fixed-price contracts are by far *the* dominant contracting tool in the French defense procurement system.

At present, large cost overruns in the U.S. has led to widespread criticisms from various sources in Congress, the Administration, and taxpayers (GAO report 2009, O'Hanlon 2009, The Presidential Memorandum, March 4, 2009). Struggling for solutions, some individuals might be tempted to call for adoption of the French solution to address a similar problem in U.S. today. However, a number of fundamental institutional differences exist between the U.S. and France, which include but are not limited to the following:

- (a) The U.S. defense industry belongs to private sector while nearly four-fifths of the French defense industry is controlled by the state and broadly managed by the government. It is not unusual that the chairman of a "national champion"
- (b) ² defense firm is named by the President on the recommendation of the Prime Minister and the Minister of Defense.

² Due to the small size of the French domestic arms market, French government has encouraged industry consolidation that has resulted in usually only one firm, a "national champion", at the prime-contract level in a

Also, government representatives frequently sit on the company's board of directors.

(c) The relative power between the legislative branch and the executive branch of the government is different in France and the U.S. While the U.S. Congress is powerful in almost all elements of the major defense weapon systems, the French Parliament (National Assembly and Senate) exert much less influence. Specifically, the National Assembly has little ability to intervene in specific programs other than voting on a multi-annual package of defense expenditures.

(d) The U.S. has a long and strong tradition of believing in the free-market economy and competition. Governmental involvement and intervention into the private sector is viewed by individuals to be counter-productive and inefficient. On the contrary, the nature of French state encourages a cozy relationship between the French government and the defense industry. In such a cooperative environment, disputes are worked out in secret and the approach is "top-down" with limited oversight from the public or Parliament.

(e) In contrast to the U.S., where each individual armed service has its own contracting agency, France has one *single, centralized, prestigious, and powerful* government agency, the DGA, in charge of *all* the contracting and management of *all* weapon programs. The director of the DGA directly reports to the Minister of Defense and oversees a staff of about 54,000 people. As a powerful and prestigious organization, DGA is able to attract the best scientific and engineering talent. As a matter of fact, DGA's top engineers and scientists, called "armament engineers", graduated almost exclusively from the elite schools. While it is indeed true that French people take pride in working for the DGA, similar statement cannot be made in the United States. Lamm and Reed (2009) document that about 25 percent of the civilian workforce in the DoD and service contracting agencies do not have a bachelor's degree.

specific sector. Examples include Dassault Aviation for fighter aircraft and Aerospatiale for helicopters.

To summarize, the above institutional differences need to be taken into consideration when researchers try to make serious and actionable policy recommendations.

THE FRENCH “SUCCESS” FACTORS

Prior Study (Kapstein and Oudot, 2009) shows that among many factors contributing to the French success, the following three are notably instrumental:

- (1) The budget constraints in late 1980s forced DGA to take steps to focus on cost reductions and prevent future cost overruns. The harsh budgetary realities gave project managers strong incentives to improve efficiency.
- (2) The technical capacity that DGA possessed led to both precise *ex ante* cost and risk assessment and effective *ex post* project monitoring. This technical capacity and the resulting assessments and monitoring reduced the information asymmetry between the DGA and the contractors, serving as a major building block of French defense acquisition system.
- (3) Over time, DGA has developed a “responsibility principle” as a major element of the fixed-price contracting environment. The principle implies that those who are responsible for cost overruns, whether the government or the contractor, must bear the extra cost in the case of a cost overrun and renegotiation.

ON WHAT WE CAN'T LEARN OR IS HARD TO MIMIC

The nature of the French state is very different from that of the U.S. Those differences, often hard to change, will impose limit in mimicking French success.

a) *A French-style full-spectrum migration from cost-plus contracts to fixed-plus contracts is inappropriate in U.S. due to the fundamental differences between the U.S. and French defense acquisition systems.*

The French success is a success of the system rather than a particular contract type. Numerous factors, including many institutional reasons, were necessary to make fixed-price contracts in France a success. The most important contributing factor to French success is not the adoption of fixed-price contracts. Rather, it is *little information asymmetry* between the defense industry and the French government that makes the fixed-price contracts and the whole system work.

If information asymmetry is not a major concern, we would agree that fixed-price contracts should be preferred. Unfortunately, this is not the case in the U.S. for two reasons: 1) a typical U.S. weapon program by far dominates a typical French weapon program in terms of degree of scale and complexity. Accordingly, *ceteris paribus*, information asymmetry is more serious in the U.S. 2) U.S. acquisition workforce as a whole does not enjoy the intellectual capacity that enables the government to effectively reduce information asymmetry as does their French counterpart.

In the presence of significant information asymmetry, the mindset that fixed-price contracts are more cost efficient than cost-plus contracts becomes problematic. The fundamental issue is that the government does not possess necessary information to form a reasonable cost estimate for major weapon programs. Hence the government ultimately has to rely on the more informed contractor (often times single-sourced) to provide a cost estimate as the basis for contract price.

If fixed-price contracts are enforced, we would expect two impacts on the contractors' incentives. First, risk-averse contractors will demand a "risk premium" in submitting their cost estimate. This rational behavior, while not an issue ethically, leads to the taxpayers'

extra transfer to the contractors because this payment is unnecessary should the risk-neutral government chooses to bear the risk (as the government often does in a cost-plus contract). Consequently, a deadweight welfare loss is incurred. Secondly, an opportunistic contractor will seek additional "information rents" due to information asymmetry. The key observation is that information asymmetry makes it very difficult, if not impossible, for the government to dispute the inflated cost estimate. We therefore conclude that fixed-price contracts in the absence of information symmetry and market competition will likely lead to a higher government payment than do cost-plus contracts.

b) While the budget constraint will certainly become more restrictive in U.S., the impact on contractors' choice is not clear. Hence, it is questionable to use a harsh budget constraint to deliver cost efficiency.

Extra caution should be exercised in advocating use of artificial and extra hard budget constraints to promote cost efficiency. If forced into a "***take it or leave it***" game, the risk-averse and profit-maximizing firm may choose to leave it even if the execution of the project is essential to the national interest. This may be an example of a classic "adverse selection" problem.

c) The successful use of the "responsibility principle" in conjunction with fixed-price contracts in France is unlikely to be replicated in the U.S. due to the institutional differences existing between the two countries.

The function of the "responsibility principle" is built on the nature of French state, i.e., a strong control of the defense firms by the state, the cozy relation between the firm and the state, the extremely powerful DGA and the relative weak role of the Parliament and the public. At least formally and officially, none of the above is true in the U.S.

ON WHAT WE CAN LEARN

a) One lesson we can learn from French is to make an effort to reduce the information asymmetry and associated agency problem that give rise to cost overruns.

At the center of this issue is how to improve the quality of acquisition work force. The huge talent gap between the U.S. and French contracting agencies is certainly a major issue that should be addressed seriously. We do not expect this issue can be resolved overnight due to many institutional and historical factors such as the pay gap between the private sector and the public sector in the U.S. Yet actions need to be called upon from the top to improve the quality of acquisition work force. The newly passed Weapon Systems Acquisition Reform Act (WSARA) has exerted some effort along the organization line. However, more needs to be done.

b) Another useful implication of the French system is to increase the use of multiyear contracts in the U.S. major weapon programs.

Shortly after the French Parliament approved a defense budget that provides for spending of EUR 185 billion over 2009-2014, the DGA on December 31, 2009 awarded Dassault Aviation a multi-billion euro, multi-year production contract to deliver 60 Rafale F3 combat aircraft. This contract provides an excellent illustration of how DGA's power of allocation can ensure multiyear funding for high-priority weapons systems even within a shrinking defense budget, a task that is very difficult, if not impossible, in the United States.

The rare use of multiyear contracts³ in the U.S. has a lot to do with the power of Congress. In contrast to the French case, where the Parliament votes only on an overall 6-year spending envelope rather than individual weapon systems, the U.S. Congress micromanages individual programs and has ultimate authority in approving, revising, and terminating programs. Moreover, in the U.S. annual contracting is the norm. Multiyear contracting requires special congressional authority and review on a program-by-program basis. The statutory criteria for a multiyear procurement require that a candidate program make realistic cost estimates, expect to achieve substantial savings, and provide adequate evidence that the program is stable in terms of funding, requirements, and design.

³ According to GAO-08-298, DoD spends about 10 billion annually on multi-year procurement. So the vast majority of repeated contracting takes the form of multiple annual contracts.

Despite the fact that it is very difficult to change the *status quo*, at least three benefits warrant the serious consideration of promoting greater use of multiyear contracts.

First, multiyear contracts reduce costs through alleviating the hold-up problem. The basic idea is that firms can produce more cheaply if they produce them in larger “batches”. By committing to a larger order that is not subject to change every year, the government gives the contracting firms right incentive to engage in efficient production.

Second, the multiyear commitment provides both assurance to the supply chain and confidence to the potential export customers. The presence or absence of both assurance and confidence will likely affect overall schedules and delivery dates.

Last but not least, Rogerson (1994) proposed a “Regulatory Lag” theory to explain why multiyear contracting might be advantageous to DoD. In the current situation of the repeated contracting relationship which is characterized by a series of annual contracts, the nature of non-commitment gives rise to the following “ratchet effect”. If the firm truthfully reveals their private information and in turn exert effort to reduce the cost (i.e., the firm performs well) early in the relationship, the government will use that cost information in the next period contracting and leaves no benefit to the firm. Hence the firm has incentive to retain information and not be overly efficient. Stated differently, the contractor’s actual ability to perform is concealed. If the contractor’s actual ability to perform is never revealed, then the benefit of a repeated game, which is the gradual elimination of information asymmetry, goes away. On the other hand, if the government wants to correct for the fear of a ratchet effect, the government has to offer a very generous reward for ethical and efficient behavior. The offer may create a reverse incentive problem: only this time it is the unethical and inefficient firm, tempted by the generous reward, that wants to mimic the efficient organization temporarily (because it is infeasible for them to mimic permanently) and then quit the relationship. This is called the “take-the-money-and-run” strategy. Rogerson (1994) realized this problem and called for more use of multiyear contracting. He argued that “multiyear contracting has been both underused and misused”. In particular, under his “Regulatory Lag” proposal, “DoD essentially makes the

following bargain with the firm. In return for revealing its ability to lower costs, DoD will let the firm keep the benefits for the duration of the multiyear in which costs are lowered. However, on subsequent contracts, DoD will take the benefits itself.”

One might argue that information asymmetry can be addressed by the Truth in Negotiations Act (TINA, 1987). Under TINA, defense contractors must submit detailed “current accurate and complete” cost estimates when they negotiate the price of a contract with DoD. A violation of TINA would impose significant litigation risk to the firm. However, as argued by Rogerson (1994), “TINA cannot force defense contractors to reveal the lowest possible cost that they could produce at if they exerted an optimal effort. Rather, it essentially tells them that the price they negotiate must be close to the cost they actually incur. In this way, it converts a fixed price contract into something much more closely resembling a cost reimbursement contract. From an economic point of view, stricter enforcement of TINA is by no means unambiguously better than lax enforcement. It may be that in some cases, weakening TINA would, by removing the risk of prosecution, encourage firms to seek out additional ways of lowering costs, which would then benefit the government in future contracts.”

ON WHAT WE CAN DO DIFFERENT

a) Following the logic that a complete migration from cost-plus contracts to fixed-price contracts in the U.S. is not optimal, a better design of cost-plus contracts is needed to address the cost overrun problems.

Although cost-plus contracts are often maligned as not cost-effective, this type of contract has certain advantages over fixed-price contracts in DoD’s major defense acquisition programs. In addition to traditional risk-sharing benefits, Wang and San Miguel (2011) argue that, if properly designed, a cost-plus contract mitigates the agency problem which underlies the disadvantages associated with conventional cost-plus contracting methods. Specifically, a “budget-based cost-plus scheme” is introduced for demonstrating that the contracting firm will voluntarily and truthfully reveal the contractor’s unbiased prior beliefs about the projected cost. This reduces both

information asymmetry between DoD and the contractor and abuse to the system that arises from the agency problem (the conflict of interest between the contractor and the government).

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