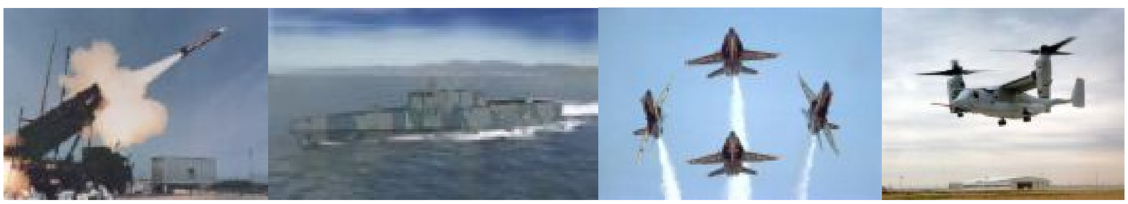
Cost Overruns and Defense Contracting



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Abstract

This paper will show that incentive fee contracts in the Department of Defense (DOD) for the development phase are not effective in eliminating the cost overrun problem faced by the DOD. This will be examined first by analyzing the optimal share ratios with the Weitzman model on two specific DOD development programs, then through a comparison of various programs with extreme cost overruns and varying contract types and fee structures. Finally, reasons explaining the cost overruns will be explored.

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Introduction

The Department of Defense (DOD) of the United States currently consumes 20% of the president's discretionary budget, or $439.3 billion dollars (for fiscal year 2007), which amounts to a total of 3.7% of the Gross Domestic Product (GDP) of the US (Wikipedia). The United States spends more on its military than that of the next 14 largest countries combined and over eight times more than the official military budget of China (Wikipedia). This money is divided up among the four main branches of the military: the Army, the Air Force, the Navy, and the Marines. It is imperative that the government receive a quality product for the money that they spent, not only to ensure the safety military personnel, but also to ensure the defense of all citizens from outside threats. But, does the military really get the full "bang for their buck"?

During the early 1960s, the DOD contracting process was overhauled by then Secretary of Defense, Robert McNamara, in order to ensure that the government did not waste money on cost overruns so that the total amount of funds could be available to pursue as many projects as possible. One result of this overhaul was an examination of risk sharing between the government and contractor through the contract's fee structure; specifically incentive fees rather than fixed fees (Carlilse).

But do incentive fees prevent cost overruns? Should the government take further action in order to ensure the effective execution of government funds? This paper will provide a brief overview of the government contracting process. Next, a brief explanation of the model used to determine optimal share ratios will be studied, followed by a detailed cased study of two specific DOD programs and a determination of their optimal share ratios. Then, an overview of multiple DOD programs and their differing contract fee structures and associated cost overruns will be presented. Finally, possible reasons to explain the break-down in the DOD contracting process will be explored.

Defense Contracting: The Basics:

When negotiating contracts between the government and a contractor (where the government if the principle and the contractor is the agent), two of the main considerations are the contract vehicle and the fee structure. When determining these two factors, the contractor's incentive is to maximize their profit, while the government's incentive is to maximize the amount of national defense (McCall).

There are two main types of contracts used by the DOD; cost reimbursable and fixed cost. The following table provides a general overview of these two types of contracts (Carlilse).

TABLE 1

[redacted]

Within these two contract types there are two sub-types: fixed fee and incentive fee. This gives a total of four contract types: Firm Fixed Price (FFP), Firm Price Incentive Fee (FPIF), Cost Plus Fixed Fee (CPFF), and Cost Plus Incentive Fee (CPIF). This paper will focus on CPFF and CPIF contracts that are negotiated during the System Design and Demonstration (SDD) Phase of a program's life. SDD takes place prior to production but after the concept refinement and technology development phases have been completed. SDD uses research and development (R&D) funds to finance a program. This phase typically uses a Cost-Plus pricing contract vehicle due to the amount of risk present since the system is still being developed. From there, the contractor and government decide on a fee structure, either a fixed fee or incentive fee.

There are several steps in contracting the government contracting process. They are described in the following table:

TABLE 2

[redacted]

It should be noted that there is a technical evaluation prior to the cost/price comparative analysis (step 5). This paper will first examine step 2 of determining a contract vehicle, however the cost/price comparative analysis step is also imperative to negotiating a fair and reasonable contract.

CPIF contracting is thought to lower cost overruns by sharing the risk of overruns on a program between the government and the contractor (McCall). FFP contracts place all the risk on the contractor and CPFF place all the risk on the government. In the early 1960s, CPIF contracting was touted as the solution to the problem of cost overruns in defense procurement. By sharing the risk, the contractor was given *incentive* to keep costs down while still meeting the technical requirements of the contract's specifications.

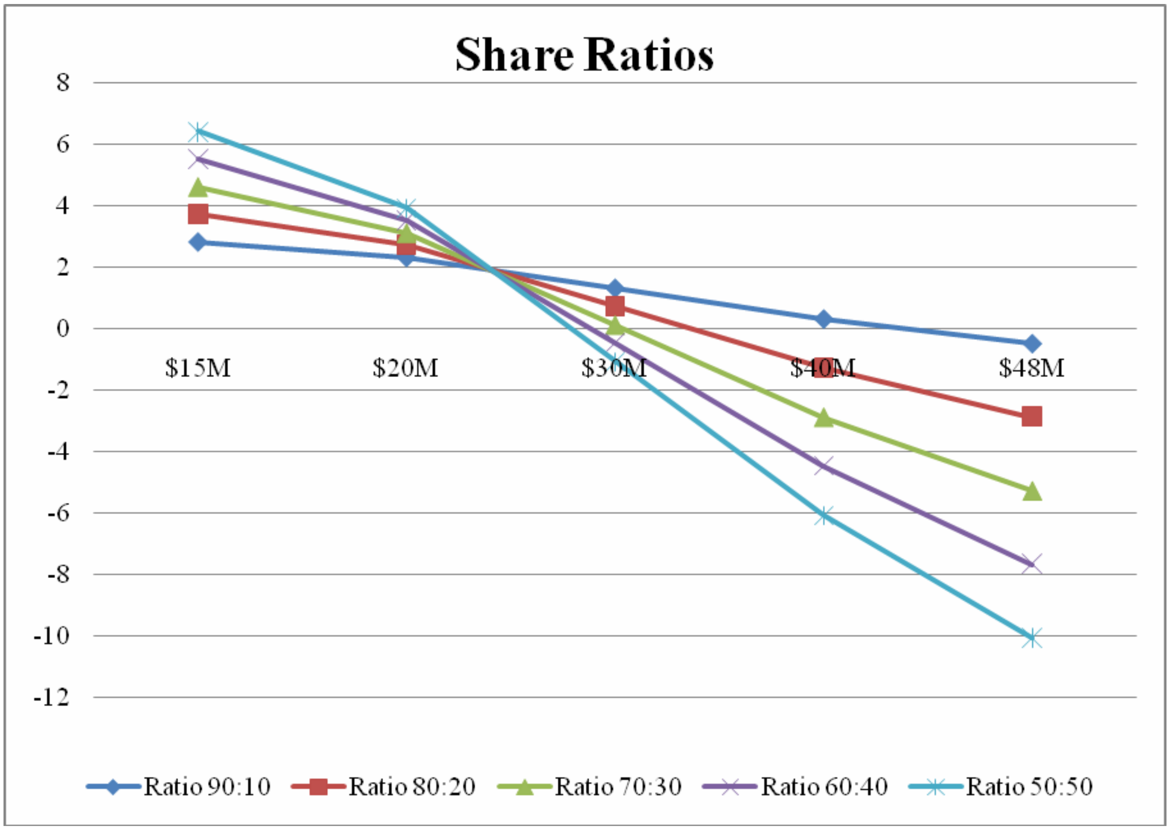
In DOD contacting, a CPIF contract has the following payout structure:

$$AP = BP + S\ (TC-FC) \quad (1)$$

Where AP is the adjusted profit, BP is the base profit, S is the share ratio, TC is the target cost, and FC is the Final Cost. The base profit, share ratio, and target cost are all agreed upon by the government and contractor at the negotiation stage (step 6) of the contracting process. So when the contractor begins to overrun, their fee is reduced by a percentage of the overrun (share ratio).

As the following graph shows, when the share ratio approaches 50:50, risk is shifted from the government to the contractor. By this reasoning, when the share ratio is 50:50, then the contractor has the possibility of higher returns and higher losses. The following chart shows how the share ratio affects the adjusted payoff:

FIGURE 1



As shown in Figure 1, by following the government's incentive payment plan, eventually the profit turns negative. However, the contractor is not expected to pay the government when fee falls below zero. Table 3 (below) shows the adjusted profit values associated with each share ratio and final cost illustrated in Figure 1. The highlighted section shows where the adjusted profit becomes negative, and where the contractor's real adjusted profit value is $0.

TABLE 3

[redacted]

In order to determine the optimal share ratio, the contractor's adjusted profit follows the following payout function (as described in the Weitzman model for the optimal share ratio):

$$AP = K + (1-s)\,X \quad (2)$$

Where X is the accounting cost of the project, K is the base fee, and s is the share ratio. The share ratio is a percentage and it can be observed that if s= 0 then the contract is similar to a cost plus contract and where s=1 then it is a fixed price contract (Weitzman).

Weitzman Model for the Optimal Share Ratio

In the hopes of using incentive contracts to eliminate cost overruns, it is in the best interests of the government and the contractor to negotiate the share ratio so that it is Pareto efficient with respect to that particular program. Through the use of the Weitzman model for optimal share ratios, a Pareto efficient share ratio can be determined. This model uses the following variables:

Ψ = the government's risk measurement
Φ = the contractor's risk measurement
α =a measure of elasticity (or the responsiveness of the project's costs to changes in the share ratio)
σ/θ =a measurement of the effects of different states of the world on the project ("noise" measurement)
ρ =the probability that each different state of the world will occur[1]

In the model, Weitzman assumes that the government is risk-neutral and the contractor risk-seeking, so Weitzman sets ψ equal to 1, and uses various levels of Φ; all greater than 1. However, for analysis in this paper, the government is assumed to be risk-averse and the contractor is assumed to be risk-seeking. In other words, the following conditions must be met:

$$\Phi > 1 \quad (3)$$
$$\Psi < 1 \quad (4)$$

[1] In his model, Weitzman assumes that there are two states of the world. One state has the probability ρ, and the other with probability $1-\rho$.

The government is assumed to be risk averse (Ψ< 1), because of the particular risks that the government faces in the contracting process. Two of the main risks faced by the government are:

1) A loss of public confidence from the appearance of mismanagement of government resources and
2) Not acquiring a system necessary for national defense.

Both of these risks have negative consequences for DOD acquisition executives and program managers For example, on October 5, 2007 Dr. Etter (the Navy's senior acquisition official) resigned from her post as a result of turmoil and embarrassment over cost growth in one of the Navy's most prominent shipbuilding programs, the Littoral Combat Ship (LCS) (Cavas). A third, more serious risk faced by the government, is that the final product could be low quality (or even not work at all), which could result in the death of soldiers or sailors. All of this indicate that the government is adverse to risk taking in the contracting process.

In contrast, the contractor's goal to maximize their profit (AP or adjusted profit), would result in risk-seeking behavior. As seen in Table 3, the more risk that the contractor takes on the, the higher their potential profit. In order to maximize their profit, contractors would want to maximize both the base profit and the profit realized from the share ratio, all subject to the contractor's expected utility. The main problem facing the contractor results from finding the optimal share ratio, since once this is found the adjusted profit can then be determined (Society for Cost Estimating and Analysis (SCEA)).

Weitzman finds the optimal share ratio to be (where s = the share ratio):

$$s = \frac{\alpha}{\alpha - 1 + \mu} \quad (5)$$

And

$$\mu = 1 + \frac{\sqrt{\rho(1-\rho)}\,(\phi - 1)}{1 + \rho(\phi - 1)}\frac{\sigma}{\theta} + 1 + \frac{\sqrt{\rho(1-\rho)}\,(\psi - 1)}{1 + \rho(\psi - 1)}\frac{\sigma}{\theta} \quad (6)$$

By running various drills on the share ratio, it appears that both risk measurements (Ψ and Φ) have a very large effect on the share ratio. Increases in both Ψ and Φ cause the share ratio to increase (while still maintaining conditions 3 and 4). The noise measurement (σ/θ), has an inverse relationship with the share ratio while α has a direct relationship to the share ratio. However, the effect of elasticity and the noise measurement is much smaller than the risk measurements.

In his analysis, Weitzman sets the elasticity equal to 0.1 and varies the values of the noise factor and contractor risk measurement to find multiple values for the share ratio (Weitzman) (recall that the government's risk measurement is assumed to be equal to 1 in the Weitzman model). Weitzman then takes the average of the share ratios realized and finds an average share ratio of 0.86 as the optimal share ratio (or 86%). In the following case studies, Monte Carlo simulation (with 10,000 iterations and a triangular distribution) was used in order to determine a confidence level for the measures of elasticity (α) and noise measurement (σ/θ) used in the model.

Program X: A CPIF Case [2]

Program X was a shipboard electronic system. It had a multiple phase contract with contract line (CLIN) 0001 for SDD. Additional CLINs in the contract included a data package (technical drawings, manuals, etc.) as well as follow-on production of six Low Rate Initial Production (LRIP) units once SDD was complete. SDD consisted of all costs to design and test the program and culminated in the delivery of 2 Engineering Development Models (EDMs). The contract began in July 1995 and SDD was completed in May 1999; for a 47 month total duration.

The contract was negotiated as a CPIF contract with a base fee of approximately 8% and a share ratio for CLIN 0001 of 50:50. The target cost (without fee) for the SDD portion of the contract was $16.8M. SDD had a total final cost (without fee) of $34.1M, for a total overrun of 203%. For the total contract, the final cost (without fee) was approximately $48M, for a total overrun of 200%. Since the other CLINs had a fixed fee, the total fee that was collected on the contract was $1.1M ($13.9M x 8%). So, even though the contractor did not receive any fee for the SDD portion, they still realized a profit on part of the contract.

We will use the Weitzman model to try to find what the optimal share ratio would be for this program. First, Monte Carlo simulation was used to determine an appropriate factor for σ/θ and α. For σ/θ, a most likely value of 0.15 was used. This was the average value stated in Weitzman's paper, and since the time period that Program X was in SDD, (1995-1999), was a strong period economically for the US, a narrow range was used. A low of 0.05 and high of 0.75 was used for the simulations. This yielded a value of 0.4605 for σ/θ at the 80% Confidence Level.

For α, a most likely value of 0.1 was used; since there has been no formal study of α and Weitzman uses it for his value of α (Weitzman). In the case of Program X, a wider range was used for α since it is a large hardware system, and it has been observed that large hardware systems have higher values for α (Weitzman). The value 0.05 was used as the low value and 1.0 was used as the high value. This yielded a value of 0.5866 for α (at the 80% Confidence Level).

The following table shows the different optimal share ratios found using constant values for σ/θ and α, while varying the values of ρ (probability), Φ (contractor risk aversion), and Ψ (government risk aversion) (while ensuring that conditions 3 and 4 are maintained):

TABLE 4

[redacted]

Note: the highlighted squares represent μ

Taking the average of the share ratios generates an optimal share ratio of 81.2%. Since the actual share ratio used for this program was 50%, the government assumed that the contractor was much more risk-

[2] The name of this program/company is not disclosed in order to protect contractor proprietary information. All information was gathered from a Navy Cost Estimating electronic database.

seeking than this model implies. Keeping the other variables constant, setting $\psi = 0.5$ and Φ=11.0 yields an average share ratio of 50.8%.

Since the optimal share ratio seems to be greater than the share ratio used in the contract, this might be one reason why the program overran; the incentive for the contractor to prevent cost growth on the program was not rational. However, this could also be a situation where the contractor used the SDD phase to advance the amount of research and development that they did and the government paid for the cost of this research. The contractor would then anticipate earning fees/profits in the follow-on production part of the contract.

Program Y: A CPFF Case[3]

Program Y was an Unmanned Aerial System (UAS). Program Y was a multiple phase contract with CLINs 0001 and 0003 for SDD. Additional follow-on CLINs negotiated for the contract included a CLIN for an indefinite number of production systems that could be purchased one year after contract negotiation and further CLINs with options for indefinite amounts of both full systems and individual air vehicles. SDD consisted of all the costs associated with the design of and tests for the UAS. The contract culminated in the delivery of 1 First Article Test (FAT) unit. The contract commenced in March 2006 and SDD is 95% complete (as of October 31, 2007); for a total SDD duration of approximately 21 months.

The contract was a CPFF contract with a fixed fee of 8.5%. The target cost (without fee) was $6.3M for the SDD CLINs. SDD currently has a total estimated final cost (without fee) of $9.5M for a total expected overrun of 151%.

In this case the contractor agreed to renegotiate the SDD CLINs contract into a Fixed Price contract with $6.8M as the ceiling (the original cost (without fee) of $6.3M plus the $0.5M in negotiated fixed fee). In this case, the contractor stands to lose $2.6M. Perhaps the contractor's incentive to undertake a switch from Cost-Plus contract to a Fixed Price contract was the follow-on production CLINs; they wanted to ensure that the government would purchase as many options in future years as possible to ensure their future revenues.

Using the Weitzman model and Monte Carlo simulation to find the optimal share ratio (the same process used for Program X), first appropriate values for σ/θ and α were determined. For σ/θ, a most likely value of 0.25 was used, since the time period for Program Y (2006-present), has a higher level of "noise" present, due to the weaker buying power of the dollar and continually rising material costs. A low value of 0.1 and a high value of 0.5 were used for the range of the Monet Carlo simulation. This yields a value of 0.3595 for σ/θ at the 80% Confidence Level.

For α, a most likely value of 0.1 was used; since there has been no formal study of α and Weitzman uses it for his value of α (Weitzman). In the case of Program Y, a narrow range was used to determine α since it is a small system (wing span of approximately six feet). The value 0.01 was used as the low value and 0.5 was used as the high value. This yielded a value of 0.302 for α (at the 80% Confidence Level).

The following table shows the different optimal share ratios found using constant values for σ/θ and α, while varying the values of ρ (probability), Φ (contractor risk aversion), and Ψ (government risk aversion) (while ensuring that conditions 3 and 4 are maintained):

[3] The name of this program/company is not disclosed in order to protect contractor proprietary information. All background information was taken from a Navy Cost Estimating electronic database.

TABLE 5

[redacted]

Note: the highlighted squares represent μ

Taking the average of the share ratios yields an optimal share ratio of 74.8%. Since originally there was no share ratio for this program, the government assumed that the contractor was much more risk-averse than these calculations imply. The contractor's risk-seeking ability is illustrated through the fact that the contract has since renegotiated from a Cost-Plus to Fixed-Price contract for SDD. Perhaps an incentive based contract could have prevented the cost overruns by placing more incentivize for SDD than on the contractor's future revenue in production.

Fixed vs. Incentive Fee Contracts

Both Program X (a CPIF contract) and Program Y (a CPFF contract) had cost overruns. This could be because the government misinterpreted each contractor's risk valuation (too much risk-seeking for Program X and too little risk-seeking for Program Y). Or, these overruns could imply that the fee structure (CPIF or CPFF) has little to no incentive for contractors to control their costs; in fact the CPIF contract had a greater percentage overrun than the CPFF contract did. This asks the question: Does the share ratio have a measurable effect on the share ratio?

The following table shows some specific programs in the SDD phase (both CPFF and CPIF) taken from a General Accounting Office (GAO) study (Edwards) (Department of Defense Press Office):

TABLE 6[4]

[redacted]

This chart shows that both CPFF and CPIF contracts have extensive cost overruns (with an average overrun of 210%)[5].

However convincing this data may be, it does not prove that there are persistent cost overruns throughout defense contracting. A study performed on 64 defense contracts (for the time period 1977-2000) shows that there are persistent cost overruns across services, phases of development, and contract vehicle exist (Christensen). The following table provides a top-level summary of this study:

TABLE 7

[redacted]

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[4] The Global Hawk Surveillance Plan, V-22 Osprey are all helicopter programs. More specifically, Global Hawk is an Unmanned Air Vehicle (UAV), the V-22 Osprey is a tilt-rotor vertical take-off system, and the RAH-66 Comanche is a cargo helicopter. SBIRS stands for Space Based Infrared System and its primary mission is to provide early warning of a ballistic missile attack on the US, its deployed forces, or allies. The Patriot Advanced Missile is a mobile missile program using guided missiles to simultaneously engage and destroy multiple target types at varying ranges. The data for these programs was taken from the Cato Institute Study. The Littoral Combat Ship (LCS) is a new class of small, stealthy ships designed to support troops ashore and to conduct anti-mine, intelligence, and reconnaissance operations. The data for this program was taken from the Department of Defense Press Office.

[5] The data for these programs was normalized to Fiscal Year (FY) 2003 dollars, except for the LCS; which in FY2007 dollars.

According to the study, once a program is 15% overrun, it is unlikely to recover (in other words it is unlikely to achieve its original target cost). In fact, the study shows (statistically significant to a 95% Confidence Level) that cost overruns are likely to increase as the program continues (Christensen). Perhaps this is caused by the fact that the contractor's risk measurement was not accurately identified in the optimal share ratio formula, or perhaps there are deeper problems with the DOD contracting process.

Implications

The data in Tables 6 and 7 shows that incentive contracts for SDD efforts are not an effective way to limit cost growth in defense contracting. This could be because, as shown in the case studies, the optimal share ratio is not used when determining a contract's fee structure. Or these persistent overruns could be due to a break-down elsewhere in the contracting process. Some potential problems are:

- Unstable requirements in the contract (Baker)
- Other more powerful incentives for the contract (Business Intelligence Program Performance Team)
- Unwillingness of the government to cancel a program (Christensen)

The first problem, setting firm requirements, is a recurring problem in defense contracting. Looking at all the programs discussed in Table 6, all had one thing in common (even though they span a wide range of technologies); each program had one or more technical aspect that was difficult to define by the government. If the government can't define their desired requirements, then it would be difficult, or even impossible, for the contractor to complete the development of that program since they are unsure of the end product.

Another problem with determining the requirements is the constantly changing environment that the government and contractor operate in. Since DOD faces a wide variety of threats in constantly changing environments and situations, the requirements for the programs can change rapidly in response to these changing needs; in other words, programs are prone to rapid obsolescence (Cummins). Another contributing factor to the requirements creep is the fast pace of technology; as can be seen in the commercial industry for computers. Since the government contracting process takes a long time, the DOD must sometimes wait years for a program to be fully developed; by that time the technology could be out of date.

Another reason why the incentive fee contracting is not effective in preventing cost overruns could be because the gains from ensuring that the program does not overrun are insignificant compared to other gains the contractor receives. These other gains have a larger affect on what motivates a contractor's upper level management; and thus the contractor's business philosophy.

The following table shows the six main elements of compensation (in 2006) for six of the main defense contractors CEOs and what their total salaries were:

TABLE 8[6]

[redacted]

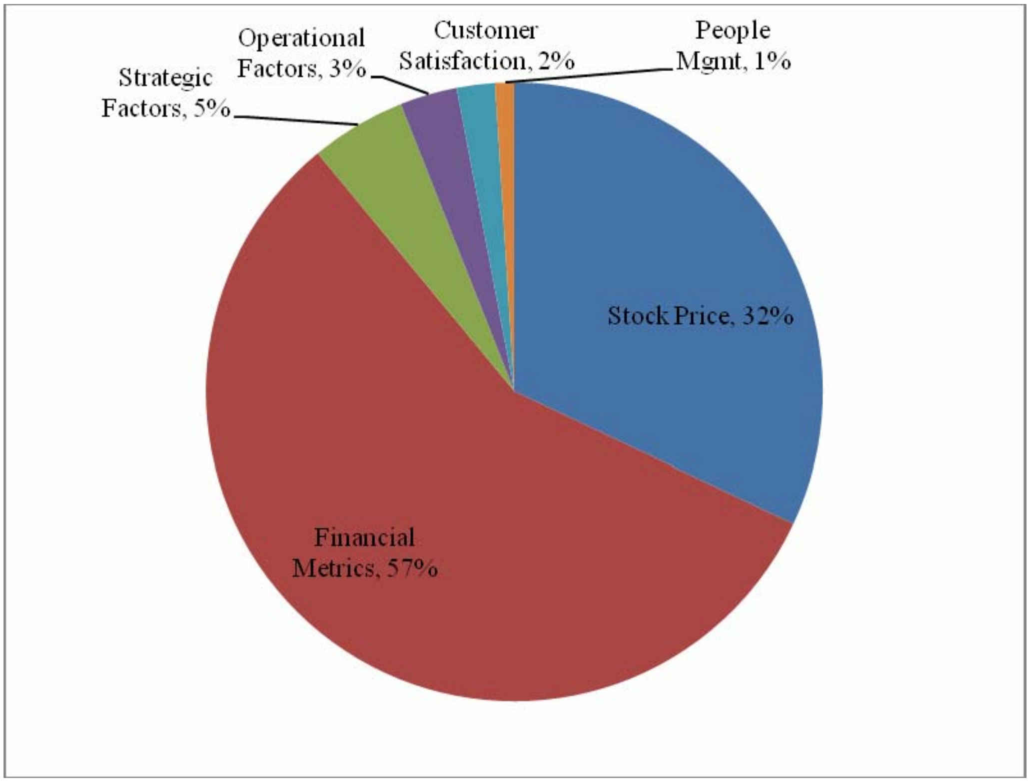
Assume that CEOs want to maximize their yearly salary; there are six factors that have a major influence on the typical CEO's total compensation. These are (Business Intelligence Program Performance Team):

1. Stock Price
   - Total shareholder return; both stockholder appreciation plus reinvested dividends
2. Financial
   - Operating margin/profit, sales revenue, cash flow etc.
3. Strategic
   - Meeting business goals, new bookings/orders, new contracts, protecting funding for existing programs, enhancing corporate reputation
4. Operational
   - Cost control/productivity, leadership initiatives, quality management, ethics, environmental compliance, labor relations
5. Customer Satisfaction
   - Improve execution of critical programs, realize available award fees
6. People
   - Attract and retain talent, leadership development

Table 8 shows that CEO salary is composed of two main categories: long term incentives (purple) and annual payments (blue). Both of these forms of compensation are affected by the six influences listed above. Although customer satisfaction does influence CEO salary, its effect is not nearly as large as the effect of the stock price. Of total CEO compensation, stock price is, on average, 36% of total executive compensation. With options, this increases to 47% of executive compensation; almost half of their total salary. After looking at all of the different elements of the CEO salary and how each of these factors influence executive compensation, each one can be attributed a percentage of total compensation. This is displayed in the following graph (Figure 2):

[6] In order to protect proprietary information, the names of these six Defense Contractors have been withheld.

FIGURE 2



The analysis shows that customer satisfaction is a low priority when determining an executive's salary; executive compensation aligns with stockholder interest, or keeping stock prices high.

Since stock price is mostly determined by consumer confidence and expected earnings, the company would want to maximize these factors (Business Intelligence Program Performance Team). This would provide contractors with just enough incentive not to have negative publicity (which could lower consumer confidence and then lower their stock price).

The desire to increase the stock price could also create incentives to bid unrealistically in order to win the contract. This would then increase their stock price, regardless of whether the contract is successfully executed or not. If the company has a significant amount of business from the private sector for the fully developed products that are already in production, like commercial aircraft, then they have little incentive to complete the contract after they've won it. It would be enough to win the contract, which would increase expected future revenue and thus increase the stock price. Then, the contractor could use the reimbursable contract to further research and development while earning profits from programs/systems already in production.

Finally, the government's unwillingness to cancel a program is a major cause for cost overrun (Christensen). The contractor, knowing of this, would be likely to allow overruns in a development program, especially if there was a follow on production program or if they intended to use the development period to fund their own research and use it for future commercial contracts.

For example, the V-22 Osprey program (mentioned above) was in development for over 20 years and had several very public cost breaches; it even crashed in developmental testing killing all 7 crew members on board. But the Osprey is still currently receiving funding and birds are still being produced. Even though the users of this program have limited interest in it, it has strong Congressional support and has not been cancelled despite all of its "black-eyes". This is a case where lobbying and "pork projects"[7] are negatively affecting the acquisition process.

Contractors are ensured that they will receive at least reimbursement for their costs because the government has no incentive to cause a company to go bankrupt. Job losses from the closure of a plant have a negative impact on the elected government officials. As a result, sometimes- especially in an election year- the government would be unwilling to cancel a contract (Christensen). As long as the contractor is aware of this fact, it is impossible for the government to make a credible threat that they will cancel a contract. This is especially true when that particular contractor is the only source for a particular program (as is the case for sole source contracts).

Contracting Reform

Incentive contracts could be looked at as a method of positive reinforcement that the government uses with contractors in order to maximize national defense. If positive reinforcement doesn't work, then an alternate solution is to use negative reinforcement. One negative reinforcement concept that the federal government has already put into place is the Contractor Performance Assessment Reporting System (CPARS). This is a way to track contractors' performance and observe which contractors continually overrun their contract. However, in order for this to work, there has to be a credible threat made by the government stating that contractors who continually overrun their contracts will face negative consequences.

Currently, the contractor does not face a credible threat that cost overruns will result in the cancellation of a program; or even that their bids for future programs will be affected. While CPARS is part of the source selection process for Navy programs, it does not necessarily make a large impact. For example, if all of the contractors bidding on a certain contract have had significant cost overruns in the past, then any potential effect of the CPARS system will be cancelled out.

The threat of program cancellation is one that is hard for the government to tackle. The government has a long history of not cancelling programs, even if they have serious cost overruns (Christensen). The only way that this can be changed is if the government makes a commitment to cut programs that have serious cost problems and stick to that decision.

In 1982, the Nunn-McCurdy Amendment (made permanent in 1983) sought to fix this problem. According to the Amendment, any program with 15% cost growth over their current baseline must notify Congress and any program that is 25% over, will be terminated. However, there are many ways that a program can avoid being terminated. For example, the Secretary of Defense can submit a detailed explanation to Congress, addressing four key points (Defense Technical Information Center):

- Why the program is essential to national security
- There is no alternative that will lead to the same capability at a lower cost
- The new unit cost estimates are reasonable
- Current management structure is adequate to control the new unit costs

Most programs are not cancelled due to a Nunn-McCurdy breach. The only real threat that the Nunn-McCurdy Amendment poses, is Congressional involvement. For some programs, this is not a credible

[7] "Pork programs" refer to cases where Congressmen push for contracts to be awarded to contractors that are located in their specific district. Congressmen do this in order to increase the amount of jobs for their constituents, and thus increase their own popularity and better their chance for reelection.

threat since they have strong support in Congress (for example, the V-22 Osprey program). Additionally, programs could be re-baselined in order to avoid a breach and subsequent investigations. There are also many of mitigating factors (such as changing requirements) that programs can use to avoid termination. For example, the SIBRS program had two Nunn-McCurdy breaches; one in 2001 and one in 2005 and the Osprey V-22 was reviewed by Congress several times; neither program has been cancelled.

Recently, one high profile program has been cancelled. Both contractors working on the LCS program received a stop order in 2007 due to cost overruns and inefficient management practices. This CPIF program is experiencing extremely high overruns (currently at 182%). Also, Program Y- the CPFF program previously discussed- is in danger of being cancelled due to constant cost overruns on that program and other programs that the contractor has with the government. However, it will still take a while for the government to receive any benefits from cancelling a contract. In order for the government to realize any benefits, they must commit to this policy. This is a very difficult goal to accomplish due to lobbying and Congressional "pork" programs.

Another potential solution to the cost overrun problem is to firmly set contract requirements. Requirements creep- the continual change of what the government wants from the contractor- make it impossible for the contractor to stay on target; as the target is continually changing. In fact, the only way to be able to determine a relationship between the contract and the incentive is to firmly set the contract requirements (Baker). Once the requirements are set, it is imperative that there is extensive government oversight in order to ensure that the requirements are met. This is currently done through Earned Value Management (EVM) reporting systems (Society for Cost Estimating and Analysis (SCEA)). Through this process, the government requests reports from the contractor based on the scope and dollar value of the contract. The contractor then reports back to the government what their progress is on that program.

Perhaps, expanding government oversight into more levels in a program's development stage would be one way to help prevent cost overruns from requirements creep. In other words, use government labs and engineers alongside of contractor engineers when developing systems. Since incentive fees are designed to share the risk between the government and contractor, both stakeholders would be more thoroughly represented in design and development of programs. With more government oversight and participation this could help keep the contractor on track. Government involvement could prevent the contractor from using a development contract as a way to research for later programs that could possibly be coming down the road.

All of these potential solutions would take time to implement. But by reducing costs, the government would be able to maximize the amount of military defense for the nation and provide for troops in the field. However, until the government is able to make a credible threat to cancel a program or firmly define the requirements of a contract, no matter what the contract vehicle, cost overruns will be a necessary cost of business.

Conclusions

While there have been several attempts made by the federal government to control constantly overrunning costs on defense contracts (CPARS, the Nunn-McCurdy Amendment), these attempts have been- for the most part- unsuccessful. Incentive fees, originally believed to be the ultimate solution for the cost overrun problem, are not effectively implemented due to constantly changing requirements, weak incentives, and lack of negative consequences. Only when the federal government can credibly commit to cancelling poorly managed programs and set contract incentives to match contractor's upper management goals, then will the government be able to decrease the prevalence of cost overruns in a program's development process.

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