Valuation Effects of Government Contract Awards

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Abstract

This paper explores the effects of announcements of large government procurement contract awards on the common stock returns of award-winning firms using data obtained from the U.S. Department of Defense. Hypotheses are developed and tested using an event study methodology. Different outcomes were expected, depending on whether investors view certain types of contract awards as potential signals of the firm's health. The results suggest that the positive valuation effects observed for fixed price contract awards may be motivated by investor interpretation of the award as a positive signal regarding the firm's future prospects.

Introduction

It is well established in the literature that security markets respond quickly to new information about a firm's prospects (see Ball and Brown [1] and Fama *et al.* [3]). It seems, however, that many different types of new information should be examined, as useful empirical findings may result that would help to explain the process by which investor reaction is translated into security prices. One event that may have interesting price dynamics is the announcement of a large government procurement contract award to a firm. Accordingly, this paper analyzes the effects of government contract awards on security returns.

On the surface, intuition may suggest that a government contract award represents good news for a firm's prospects, and a nonnegative stock price reaction should follow. From an empirical standpoint, the strength of the observed reaction should be a function of how quickly the news of a contract award is capitalized into the firm's stock price (i.e., rapid capitalization would imply little or no observed price reaction).

A more interesting hypothesis regarding the valuation effects of contract awards emerges if one considers two assumptions regarding the procurement process. First, several different types of contract arrangements may be offered by the granting agency. These arrangements place varying degrees of technical and

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contract formats by the contracting agency may be perceived by stockholders as riskier than cost-plus formats, because cost overruns generally must be absorbed by the firm under the former. Second, the potential existence of significant informational asymmetries may cause investors to attempt to infer signals regarding inside manager assessments of the firm's prospects through the bidding process. Recent work by Heinkel [4], Leland and Pyle [5], and others may imply that a low bid on a contract proposal signals good news in the context of greater sales, lower than average overhead costs, and efficient management. This effect should be much stronger for contracts in which cost overruns must be borne by the firm.

The existence of significant informational asymmetries combined with the differences in risk-return characteristics among the various contract formats suggests that:

- Abnormal returns surrounding the announcements of fixed price contract awards should be significantly positive and larger than the abnormal returns associated with cost-plus contract awards, and

- Abnormal returns surrounding the announcements of cost-plus contract awards will be either insignificant or significantly positive, depending on the speed with which news of the contract award is capitalized into stock prices.

In the next section, a description of the government procurement process is offered. Hypotheses are developed regarding the potential valuation effects of announcements of contract awards. Particular attention is paid to the effects of informational asymmetries on shareholder behavior. The empirical work is described and summarized in the next two sections. The paper concludes with implications of the work.

Procurement Procedures and Contracts[1]

The procurement process may follow one of two general formats, known respectively as *formal advertising* and *negotiation*. Because approximately 90 percent of the total dollar value of defense contracts are placed through negotiation, this section describes negotiated procurements.

[1] Additional material for this section was obtained from the Office of the Secretary of Defense [8]. Readers interested in more detail are directed to the *Federal Acquisition Regulations* [10].

The procurement process begins when an individual at a government facility recognizes the need for a product, service, or process. This individual writes a report to a central decision-making body (e.g., the Office of the Secretary of Defense). This report consists of a statement of the problem, the need for a solution, an outline of a proposed solution, and a projection of (discounted) cash flows. After revisions are made, the report is distributed as a preliminary specification for the proposal.

Upon completion of the preliminary specification, a program manager, source evaluation board (SEB), and contracting officer are appointed. The program manager is charged with overseeing the project from this point. The SEB is composed of technical specialists in various fields who review the preliminary specification and oversee the technical aspects of the project. The contracting officer is responsible for the specifics of the procurement contract; he or she is also a member of the SEB.

The preliminary specification is published and sent to interested firms who comment on the proposal. After consideration of firms' comments, the SEB publishes and distributes the final specification and a request for proposals. The SEB reviews proposals submitted by interested firms, and the two or three top-rated proposals are retained for final consideration. Normally (perhaps ninety percent of the time), the procurement is awarded to the lowest bidder. If the lowest bidder is not selected, justification usually is required of the SEB.

Procurement contracts come in as many as 20 or more formats. For determining the risks associated with cost overruns, they may be grouped into one of two general categories: fixed price and cost reimbursement. By far the most common among the fixed price formats is the firm fixed price contract. The price (award) is fixed for the duration of the contract, and it is not subject to any adjustment. These contracts are used in situations in which costs are reasonably predictable and specifications are well defined.

The most common type of cost reimbursement contract is the cost-plus-fixed-fee contract. With this contract, the bidding firm and the purchasing agency negotiate an estimated cost of performing the contract plus a fixed fee that the firm is to receive for the work. The fee is invariant with respect to the actual costs incurred for the work performed. Other variations in the cost reimbursement category include contracts that provide incentives to keep costs in line with initial projections and contracts that provide for a fee that varies according to the contracting officer's evaluation of the firm's performance. Cost-plus contracts usually are granted for procurements in which the product is ill-defined, such as a radar system for which the technology currently does not exist to produce the system. The choice of contract type is usually at the discretion of the contracting officer.

The primary significance of this discussion for the current study is the fact that the risks of cost overruns are absorbed by the firm in a fixed price contract, whereas these risks are borne by the government in a cost-plus contract. This distinction may have particularly important empirical consequences in an environment characterized by informational asymmetries.

Potential Valuation Effects of a Contract Award

A large body of current research in financial economics studies the effect of asymmetric information between the firm's managers and outside investors on financial decision making (see Heinkel [4], Leland and Pyle [5], Myers and Majluf [6], Narayanan [7], and Ross [9]). One response a firm may make to minimize the adverse consequences of asymmetric information is to attempt to signal good news to investors through management decisions. This section combines the motives of managers to attempt to signal firm quality and the differential risks associated with different types of government contracts to generate testable hypotheses concerning the valuation consequences of announcements of government contract awards.

Under the assumption that bidding firms' managers and stockholders condition their decisions on the same information set, there is no informational advantage for managers to attempt to exploit. Assuming that managers are risk averse and their compensation package is designed to minimize conflicts of interest with stockholders, bids on procurement contracts should balance management assessment of the expected cost of a lost contract against the expected cost of a winning bid that may not allow the firm to recover 100 percent of its costs. Because bids tendered on procurement contracts are public information, however, the actual award announcement reveals little if any new information about the firm's prospects. Consequently, the only possible motivation for a stock price response to an award announcement is the capitalization of expected net positive cash flows accruing from the project.

More important for this study, capitalization of a project's cash flows, by itself, would not lead to a differential price impact between announcements of fixed price and cost-plus contract awards. Furthermore, the only way a differential could be hypothesized from this scenario would be for the market to capitalize the risk differential that exists between the two contract formats. That is, because of the certainty of cost recovery associated with cost-plus contracts, larger abnormal returns may be associated with their announcements. To summarize, it is hypothesized that in the absence of significant informational asymmetries between managers and investors, stock price reaction to announcements of large government contract awards will be weak at best. If

some differential reaction occurs between contract formats, it would favor the cost-plus contract.

Alternatively, if the management of a bidding firm is presumed to have inside information about the firm's future prospects, investors may view the announcement of a contract award as having information content. More significantly, the value of the information revealed may be a function of the type of contract awarded. The following simple model illustrates the point.

Consider the situation in which j firms are eligible to bid on either a fixed price (FP) contract or cost-plus (CP) contract that are otherwise identical.[2] Different bidding firms have different distributions of random project costs:

- Firm j has random costs that are uniformly distributed: c_j is uniform [0,J],
- Firms in the economy have different maximum costs, J, that likewise are distributed uniformly: J is uniform $[0,J_{max}]$, and
- J_{max} is increasing monotonically in j.

The manager of firm j chooses to bid either the fixed price or the cost-plus contract to maximize a weighted average of today's valuation of the project by the uninformed market, $V(c_j)$, and the expected profit from the project, $E(P_j)$:

$$(1)\quad \underset{c_j}{\text{Max}}\ M = aV(c_j) + (1-a)E(P_j)$$

where:

$c_j = \{FP,CP\}$ and

$$(2)\quad E(P_j) = \begin{cases} p - J/2 \text{ if } c_j = FP \\ f \text{ if } c_j = CP \end{cases}$$

where:

p = the fixed price in the FP contract; and
f = the fee in the cost-plus-fixed-fee contract (CP).

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[2]The model presented in this section is intended to suggest a possible rationale why investors may view awards of different types of contracts as having different information content. It is not intended to suggest that a firm bids on contracts of a certain format solely on the basis of its cost structure.

Investors hypothesize that:

Firms j: $J < J^C$ => bid the FP contract, and
$J > J^C$ => bid the CP contract,

where:

J^C = maximum costs for the indifferent firm; and
j^C = index of the indifferent firm (i.e., a smaller j and corresponding maximum cost J represent a better firm).

Under this hypothesis, investors value the projects by the type of contract bid:

$$(3)\quad V(FP) = \left[\int_0^{J^C} (P - J/2)dJ \right] / \int_0^{J^C} dJ = p - J^C/4, \text{ and}$$

$$(4)\quad V(CP) = f$$

Using equations (2), (3), and (4) in equation (1):

$$(5)\quad \begin{cases} \text{if } c_j = FP: & M = a(p - J^C/4) + (1-a)(p - J/2) \\ \text{if } cj = CP: & M = f \end{cases}$$

It is known that firm j^C is indifferent between these two contracts:

$$p - aJ^C/4 - (1-a)J^C/2 = f.$$

Solving for J^C:

$$(6)\quad J^C = 4(p-f) / (2-a)$$

It is easy to show that substituting equation (6) into equation (5) and solving for the indifferent firm yields the firm shown in equation (6). Thus, investors conjecture (correctly) that better firms ($J<J^C$) bid the FP contract and that the remainder ($J>J^C$) bid the CP contract. This is optimal for firms.

From equations (3) and (4), investors value projects by the type of contract offered. This notion suggests that the true (higher) value of the firm winning a fixed price award is revealed at the time of announcement. This new information, combined with the assumption of value additivity, implies that a

positive stock price reaction will follow. In contrast, announcements of cost-plus awards have little information content and, therefore, should have a significantly smaller price impact upon announcement.

Summarizing the two sets of hypotheses, in an environment characterized by symmetric information, announcements of contract awards reveal no new information about the quality of the winning firm and thus are hypothesized to have little, if any, systematic effect on stock returns. Furthermore, if price differentials are observed between fixed price and cost-plus awards, they are hypothesized to favor the cost-plus awards. Alternatively, in an environment characterized by significant informational asymmetries, announcements of fixed price contract awards are hypothesized to produce significantly positive valuation effects. Announcements of cost-plus contract awards are hypothesized to have significantly smaller, perhaps insignificant, valuation consequences.

Empirical Methodology and Data

The hypotheses described in the previous section are examined using an event time methodology similar to that documented by Dodd and Warner [2]. The event day (t = 0) is the day after the contract award was announced by the government--announcements are made each day after the close of the New York and American Stock Exchanges. For each security associated with an award-winning firm, the market model is used to calculate a prediction error, or abnormal return, for the event days t = -15 through t = +15. The market model is estimated for the period t = -136 through t = -16 using data from the CRSP daily returns file and the CRSP equally weighted index returns. For a sample of N contract awards, an average abnormal return for each day t is defined as:

$$(7)\quad AAR_t = \sum_{j=1}^{N} AR_{jt} / N$$

The cumulative average abnormal return from event day T_1 through T_2 is:

$$(8)\quad CAAR = \sum_{t=T_1}^{T_2} AAR_t$$

The expected values of AAR and CAAR are zero in absence of abnormal performance. Assuming cross sectional independence, the significance of these two random variables may be tested, respectively, using the following statistics:

$$(9)\quad Z_t = \left(1/\sqrt{N}\right) \cdot \sum_{j=1}^{N} AR_{jt} / S_{jt}$$

and

$$(10) \qquad Z = \left(\sqrt{N} / \sqrt{T_2 - T_1 + 1} \right) \cdot \sum_{t=T_1}^{T_2} [(1/N) \cdot \sum_{j=1}^{N} AR_{jt}/S_{jt}]$$

where:

S_{jt} = estimated standard deviation of the prediction error.[3]

Data for this study consist of a sample of announcements of defense contract awards for contracts of $20 million or more awarded between January 1, 1981 and December 31, 1985 to firms included on the CRSP daily returns file.[4] Contract award announcement data are published in several sources, including the *Wall Street Journal Index*, *Commerce Business Daily*, and *DMS Contract Awards*. Unfortunately, none of these sources documents the contract type (i.e., fixed price, cost-plus, etc.). In order to obtain this information, copies of a random sample of the actual press releases (known as *blue tops*) of contract awards were obtained from the defense department. These press releases are issued daily at 4:00 p.m. eastern time.

The final sample consists of announcements for 41 fixed price awards and 13 cost-plus awards for 38 different firms. The sample was obtained as the result of two separate telephone requests and one follow-up phone call, and it represents every contract award of at least $20 million in value available from the blue tops supplied by the defense department.[5]

The dollar value of the fixed price awards ranged from $21.1 million to $310.5 million, with an average value of $53.9 million. The cost-plus awards ranged in value from $21.0 million to $289.6 million, with an average value of $73.6 million. A listing of the 38 firms involved in the study is given in Appendix A.

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[3]See Dodd and Warner [2] for derivation of the test statistics and an expression for S_{jt}.

[4]Most procurements, both defense and nondefense, are governed by common federal acquisition regulations, and both are subject to the scrutiny of the General Accounting Office and the Office of Management and Budget.

[5]Announcements were screened for the presence of contemporaneous earnings and dividend announcements.

Results

Values for abnormal returns, cumulative abnormal returns, and associated test statistics surrounding the event date are reported in Table 1. Results show a statistically significant positive abnormal return of 0.42 percent the day following the announcement of a fixed price contract award.[6] A significantly positive cumulative abnormal return of 0.70 percent is documented for the two days following the announcement of the award. In contrast, there appears to be no abnormal return associated with the announcement of a cost-plus contract. Furthermore, when all contracts are combined, the results are insignificant.[7] This final result suggests that information, once revealed to the market, is capitalized rapidly into the firm's stock price.

Although limited because of the small sample, these results are generally consistent with the notion that an award of a fixed price contract conveys good news about the firm's future prospects. Combined with the weaker result associated with the cost-plus contract award announcements, the results suggest that there exist valuation consequences associated with fixed price contract awards that are caused by something other than the potentially positive NPV project of such an award.

Conclusions

This research was designed to explore the effects of large government procurement contract awards on the common stock returns of award winning firms. Depending on whether investors view certain types of contract awards as potential signals of the firm's health, one of two potential outcomes was expected. Data on contract awards by type of contract were gathered in order to facilitate a statistical test for these possibilities.

Results of the event study suggest that fixed price contract awards are viewed favorably by investors. Furthermore, when combined with the results for cost-plus awards, the event study results suggest that the valuation effects observed for the fixed price awards are due to some factor other than the fact that a contract award represents a potentially positive NPV project for the firm. The analytical discussion documented in this paper suggests that positive investor reaction to the fixed price contract awards is due to investor interpretation of the award as a positive signal regarding the firm's future prospects. This finding suggests that

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[6]Statistically significant at the five percent level for a one-tail test.

[7]Difference of means test statistics between the two types of contracts are generally insignificant, probably owing to the small sample size.

investors may seek to interpret events other than financial decisions as signals regarding a firm's future prospects.

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Table 1
Average Abnormal Returns and Cumulative Average Abnormal Returns Around the Event Day

AAR(T) / CAAR(T_1,T_2)	All Contracts (N=54)	Fixed Price Contracts (N=41)	Cost-Plus Contracts (N=13)
AAR(-1)	0.0007 (0.12)	0.0003 (0.12)	0.0018 (0.47)
AAR(0)	0.0031 (1.49)	0.0042 (1.80)*	-0.0006 (-0.16)
AAR(+1)	0.0025 (0.75)	0.0028 (0.77)	0.0016 (0.15)
CAAR(-1,0)	0.0038 (1.14)	0.0045 (1.19)	0.0012 (0.22)
CAAR(0,+1)	0.0056 (1.58)	0.0070 (1.82)*	0.0010 (0.00)
CAAR(0,+2)	0.0058 (1.27)	0.0069 (1.34)	0.0024 (0.21)
CAAR(0,+3)	0.0045 (0.98)	0.0070 (1.32)	-0.0032 (-0.36)
CAAR(-1,+1)	0.0063 (1.36)	0.0073 (1.41)	0.0013 (0.27)
CAAR(-2,+2)	0.0043 (0.74)	0.0046 (0.66)	0.0016 (0.34)
CAAR(-3,+3)	0.0010 (0.11)	0.0047 (0.59)	-0.0124 (-0.84)

Numbers in parentheses are calculated using equation (3) in the case of AAR and equation (4) in the case of CAAR. These test statistics are distributed approximately unit normally

*Statistically significant at the five percent level, one-tail test

Appendix A
Contract Award-Winning Firms

Avco Lycoming
Bell-Textron
Boeing
Cummins Engine
Flying Tiger
FMC Corp.
Ford Aerospace
General Dynamics
General Electric
Goodyear Aerospace
Great Lakes Dredge and Dock
Grumman Aerospace
Harsco Corp.
Honeywell
Hughes Aircraft
IBM
ITT
Litton
Martin Marietta
McDonnell Douglas
Mobil Oil
Morrison-Knudsen
Morton-Thiokol
Northrop Corp.
Northwest Airlines
Ogden Bulk Transport
Planning Research Corp.
Raytheon
Rockwell International
Sanders Associates
Sperry Corp.
Teledyne
Texas Instruments
Thiokol
Union Carbide
United Technologies
Westinghouse Electric
World Airways