Investor Reaction to Inter-Corporate Business Contracting: Evidence and Explanation

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Abstract

We examine the stock market reaction to 1227 inter-corporate ordinary business contract announcements reported by Dow Jones between January 1, 1990 and December 31, 2001. Around contract announcement dates, we find statistically significant positive average abnormal returns and abnormal trading volume for contractors, but insignificant positive abnormal returns and negative abnormal volume for contractees. Cross-sectionally, contract announcement period returns are higher for contractors who are small relative to the contract size, have higher return volatility, larger market-to-book ratios, and higher profitability. The announcement period returns of contract awarding firms are not significant and are only marginally related to cross-sectional explanatory factors. The results are consistent with two explanatory stories: contractor quasi rents induced by the winner's curse and information signaling about contractor production costs. The results are not consistent with perfect competition, with contracts having positive net present values for both parties, and with a behavioral version of incomplete contracting theory.

I. Introduction

A contract is an agreement which is legally enforceable or legally recognized as creating a duty; however, economists have adopted a broader definition to include agreements enforced also by non-legal means. Contracts are an essential part of the market system designed to insure efficiency by stipulating the distribution of gains from trade, protecting against opportunism, ensuring that the contracting partners fulfill their obligations, and providing a framework for dealing with uncertainties [Lyons (1996); Williamson (1991,1996, 2002)].

A great deal of effort has been devoted to find the optimal transaction structure[1] that will maximize efficiency. Because the costs of writing, organizing, and coordination increase as one moves from a simple transaction with no integration (contract) to full integration (merger), the choice of the most efficient transaction structure is a critical challenge. Whether a specific structure is economically efficient remains subject to a considerable debate.[2]

A contract has unique characteristics that differ from full and intermediate integration transactions (mergers and joint ventures). It is simple, less costly than mergers and joint

[1] The hierarchy of the transaction structure with regard to the level of integration between trading parties can range from no integration (a one-time, discrete, arm's length market transaction governed by simple contract) to intermediate integration such as a joint venture or strategic alliance, to complete integration where two partners lose their identities within a new firm (i.e., a merger) (Williamson (1979)).

[2] On the side of *full integration*, Alchian and Woodward (1987) suggest that more integrated transactions avoid the opportunity for expropriation, while Williamson (1979) suggests that full integration would resolve the hold-up problem, as compared to an arm's length contract. The empirical evidence from merger transactions, however, provides a different story, and at best does not support the argument that full integration is consistent with economic efficiency. Moeller, Schlingemann, and Stulz (2004) conclude that investors believe a strategy of growing through acquisitions is not sustainable and does not create much value. Concerning *intermediate integration*, Johnson and Houston (2000) argue that vertical joint ventures reduce the governance problem and are hence more efficient than simple contracts. Gulati (1995), Kogut (1988), and Murray and Siehl (1989) argue that joint ventures make each firm's payoffs contingent on the venture's performance instead of on fulfillment of contractual obligation and thus align incentives and alleviate moral hazard. On the empirical side, there are mixed results about the performance of this type of transaction; McConnell and Nantell (1985) find positive gains for joint venture partners, while Johnson and Houston (2000) find that only one party enjoys such gains.

ventures, discrete, an arm's length transaction, and seems less likely to be motivated by synergies, replacement of inefficient management, gaining market power, and other motives underlying more integrated transitions. Thus, contract transactions might constitute a more suitable laboratory for examining economic efficiency while avoiding the confounding motives of integrated transactions. Compared to mergers and joint ventures, little empirical study has been devoted to simple contract transactions. This paper tries to fill that gap, which is its main contribution.

We study the stock market's reaction to the announcement of ordinary business contracts. Both parties to a contract surely must anticipate benefits since they enter voluntarily into the contract and agree to be bound by its stipulations. Under the presumption that managers strive to increase stock market value in making their corporate investment decisions (Fama and Miller (1972); Fama and Jensen (1983)), the announcement of a contract award and winning a contract should engender a positive valuation effect for contractee and contractor alike since both anticipate a positive net present value. Hence one might be tempted to predict that both contracting parties' stock prices rise upon a contract's announcement.

However, there are reasons that the stock market's reaction may not be so obvious. A simple reason is that contracts are often anticipated, so the actual announcement is no surprise. But there are more subtle issues at work too, for both the contractee and the contractor.

The theory of incomplete contracts as developed by Williamson (1975, 1985, 1996, and 2002) suggests that when a transaction is not governed by a spot contract with immediate

exchange, the passage of time introduces both an environmental risk[3] and a behavioral risk. Behavioral risk arises because one or both parties might put less effort or investment than promised, which creates a *moral hazard,* or a threat of opportunism, problem. Transaction cost theory avers that moral hazard is due to difficulties in enforcing contracts, especially if the transaction is complex or subject to change and trade is infrequent. Such difficulties become serious if the transaction requires specific investments that are not easily transferable or re-deployable in alternative uses (Williamson (1996)). Given that contracts are incomplete, one party, the contractor, may act opportunistically, once the other (contractee) has invested. This is known as the hold-up problem [Klein, Crawford, and Alchian (1978); Williamson (1989)].[4] Coleman (1990) and Stump and Heidi (1996) argue that a contractee faced with the potential of opportunistic behavior has a strong incentive to employ protective mechanisms to govern a contract.

This incomplete contracting argument raises the question of whether contractee firms, faced with contractors potentially infected by moral hazard, would agree to contractual terms that reduce contractee firm values. One behavioral explanation is simply that they are overconfident about their effectiveness in monitoring contractor behavior and are slow to learn. In contrast, more rational and experienced contractees would bargain contract terms to the point that their stock price does NOT systematically decline around contract announcements.

[3] Environmental risk is a problem if one or both parties to the transaction are risk averse, and prefer more stable income stream, even if this reduces their expected profits. This risk is exogenous and beyond the control of both partners, but it can be reduced by using third party securities or by risk sharing between the parties to the transaction (Cheung, 1969.)

[4] Another explanation of the moral hazard problem is related to effort monitoring (Lyons (1996)), which suggests that if the success of the transaction depends on the amount of effort, there is a danger that people will shirk. Since effort is not easily observed and difficult to monitor, there is an asymmetry of information between the contractee (principal) and the contractor (agent) (Stiglitz (1974), Grossman and Hart (1983), and Milgrom and Roberts (1982)).

Rational contractee stock prices should not systematically decrease around contract announcements, but competitive forces suggest that stock prices should not increase either. Unless contractees have monopsony power, they pay a competitive price for the good or service provided under the contract. Hence, there is no marginal value created for the contractee.

From the contractor's perspective, the benefit of a winning a contract depends also on the extent of competition (among potential contractors.) If contractors are perfectly competitive, they are forced by competition to supply the good or service at marginal cost. Consequently, there should be no observable stock market response of contractor firms upon the announcement of the contract award.

These competitive arguments suggest that neither the contractor nor the contractee should experience any stock price change upon contract announcement. This is the polar opposite implication from maximization of net present value, under which a contract creates value for both parties.

Even more subtle issues must be considered. For example, when there are multiple contract bidders and considerable uncertainty about costs, each bidding firm should be wary of the "winner's curse" (i.e., the winning bidder might underestimate its own costs of production.) To counter the winner's curse, a firm should bid well above its estimated cost so as to assure that the contract will be at least marginally profitable. To the extent that all bidders attempt to mitigate the winner's curse, the winning bidder will obtain a quasi-rent, the difference between the actual biased-high bid and a break-even bid.

Bazerman and Samuelson (1983), and Hong and Shum (2002) identify two factors that affect the incidence and the magnitude of the winner's curse, the degree of uncertainty concerning the value of the asset (in this case the contract) and the number of competing bidders. They conclude that an increase of either factor will increase the range of value estimates and bids, which will increase the probability that the winning bidder will overestimate the true value of the asset and thus overbid. Krishna and Morgan (1997), and Bordley and Harstad (1996) note that the winner's curse provides a prominent example where asymmetric information can overturn the common economic wisdom that more competition is always desirable (i.e., the winning bidder might underestimate its own cost of production.)

There is also a possibility that private information could be revealed by a contract announcement. If a contract is significant enough to warrant a press release, it presumably conveys information previously known to management. Given a basic assumption that some contractors are more efficient than others and really can produce the good or service at lower cost, winning a contract could be a signal of efficiency. Contracts are often granted to the lowest bidders, who are able to bid lower because of their ability to produce at lower costs. To the extent that contractor cost structures are revealed by contract announcements, contract winners might experience a positive market reaction.

In addition, contract announcements could reveal the assessment of the contracting parties about each other. A contractee reveals a positive assessment of a contractor's ability to deliver goods and services and further reveals a willingness to depend on a contractor for some integral part of its business. On the other hand, a contractor reveals a positive assessment that a contractee will be able to discharge its obligations; e.g., to remain in business for the duration of the contract and to provide prompts payment.

In summary, there is wide variety of possible stock market reactions to contract announcements, ranging from no reaction at all (lack of surprise and/or perfect competition on both sides) to strong positive reactions particularly for contract winners. This variety of possibilities represents a compelling justification for empirical study. What does happen to stock prices when a contract is announced?

In a related paper, Houston and Johnson (2000) and Johnson and Houston (2000) study the difference between horizontal and vertical joint venture and find correspondingly different valuation effects. They employ simple contracts as a base case to compare with joint venture. They find that contractors earn a significantly positive mean abnormal return of about 1.5% whereas we find that they earn 1.8%. Both their and our papers find that contractees earn a statistically insignificant mean abnormal return. However, they do not have any hypotheses to explain the differences of abnormal announcement returns of both contractors and contractees cross-sectionally. In addition, our sample is comprehensive consisting of the1029 contractor and 645 contractee announcements during 1990-2001.

Our paper contributes to the literature in several ways. First, we empirically examine the impact of simple contracts on the share prices of the contracting partners. Second, we provide and empirically examine alternative explanations for the behavior of the contracting parties with regard to contract transactions. Third, we examine the determinants of gains to contracting parties around the contract announcements.

II. Development of Testable Hypothesis

II.1 Incomplete Contracting

The incomplete contracting literature emphasizes the difficulty of monitoring and enforcing contracts. Difficulties in monitoring the behavior of contractors are related to performance ambiguity, implying that complex technologies, the use of intangible assets versus tangible assets, and dynamic environments increase the difficulty of defining, specifying, and accurately assessing contractor performance [Caves and Murphy (1976); Heide and John (1990); Lal (1990); Stump and Heide (1996)]. As the level of performance ambiguity increases, firms' abilities to write complete contracts deteriorate (Jensen and Meckling (1976)). This moral hazard problem becomes serious if the contracting party makes a specific investment that is not easily re-deployable to service other trading parties [Klein, Crawford, and Alchian (1978); Williamson (1989)]. Therefore, as the difficulty of monitoring and enforcing contracts increases, a contractor has an incentive to behave opportunistically. This ***behavioral*** argument suggest that one party to the contract (contractors) can benefit at the expense of the contractee; hence, our first hypotheses is

H1a: For contractor (contractee) firms, announcement period abnormal returns are positive (negative) and statistically significant.

However, under the assumption of rational behavior, and when faced with potential moral hazard, a contractee would refuse to grant a contract at a price close to expected cost;[5] the price should be bargained down to the point that a contractee's stock price is not expected to

[5] There are other non-legal mechanisms that may inhibit opportunistic behavior. Reputation, for example, can have a significant impact on the moral hazard problem; contractors have an incentive to signal honesty to the capital market, and to behave honestly if the costs of being revealed as opportunistic are significant [Akerlof (1970); Fombrun and Shanley (1990)].

decline upon the contract's announcement. Contractors, on the other hand, will not accept such a contract unless they are able to cover their costs and earn a normal rate of return on their investment. The overall implication of this ***rational*** contracting hypothesis is that neither firm experiences systematic stock price declines around contract announcements; therefore, the second sub-hypothesis is

H1b: For contracting partners, announcement period abnormal returns are non-negative.

To test this hypothesis against others, we utilize the following proxies as explanatory variables and the announcement period excess return as the dependent variable.

II.1.1. Research and Development: A firm's investment in research and developments (R&D) reflects efforts to develop specialized assets.[6] Firms would be expected to make marginal R&D investments only if the investments provide them with a unique, and to some extent monopolistic position in the market, from which to capture rents [Caves et al. (1982); Teece (1988); Johnson and Houston (2000); Houston and Johnson (2000)]. We use the ratio of research and development expense to total sales as a positive indicator of firm's specific technology and knowledge based assets. Greater asset specificity should be associated with a higher potential for opportunistic behavior by the contractor and a larger positive announcement period excess return. This suggests a positive relation between the announcement period excess returns and the ratio of R&D to total sales for contractors; the following hypothesis is implied:

[6] We assume that contractors would not make an investment pertain to specific contract until they won such a contract.

H1c: The relation between contractor's R&D to sales ratio (a proxy for asset specificity) and the announcement period excess returns is positive (negative) and statistically significant for the contractor (contractee) firms.

II.1.2. Employee Intensity: As firms invest in specific assets, the intensity of employee efforts dedicated to the transaction increases. Empirical evidence suggests that asset specificity and employee intensity are positively correlated [Caves and Bradburd (1988); Walker and Poppo (1991)]. The ratio of employees to sales is a positive indicator of employee intensity (Houston and Johnson (2000)). Thus, we anticipate a positive relation between the ratio of employees to sales and the announcement period excess return for contractor firms. Hence, the second hypothesis with regard to asset specifity can be stated as:

H1d: The relation between the contractor's employee to sales ratio (a proxy for employee intensity) and the announcement period excess returns is positive (negative) and statistically significant for the contractor (contractee) firms.

II.2. Perfect Competition Hypothesis

Competition suggests that stock price increases might not occur for either contracting party. If the contractee has no monopsony power and the contractor has no monopoly power, neither side should experience a significant increase in value at the margin. This suggests that neither a contractor nor a contractee should experience a stock price change upon contract announcement. Therefore, a testable hypothesis is:

H2: The announcement period average abnormal stock market returns are not statistically significant for the either contracting partner.

II.3. Winner's Curse Hypothesis

From bidding theory, the winner's curse effect is the tendency of a bidder to bias bids to offset the possibility of winning an asset only when the bid is too high. The winner's curse effect is more pronounced with a larger number of bidders and it can inhibit trade (Bajari and Hortacsu (2003)). Studies such as Bazerman and Samuelson (1983) identify two factors that affect the incidence and magnitude of the winner's curse: (1) the degree of uncertainty concerning the value of the asset and (2) the number of competing bidders. An increase in either factor will increase the range of value estimates and bids, making it more likely that the winning bidder will overestimate the true value of the asset and thus overbid. On the other hand, Hong and Shum (2002) argue that when there are multiple bidders and considerable uncertainty about costs, each bidding firm should be wary of the "winner's curse," an adverse-selection problem which arises because the winner tends to be the bidder with the most overly optimistic information (or "signal") concerning the asset's value. Bidding naively based simply on one's information would lead to negative expected profits so that in equilibrium, a rational bidder internalizes the winner's curse by bidding less aggressively.

When competing bidders are differentially (but incompletely) informed about the value of the asset, an increase in the number of bidders has two counteracting effects. First, the increased competition generally leads to more aggressive bidding (the competitive effect). Second, the winner's curse becomes more severe as the number of potential bidders increases, and rational bidders will bid less aggressively in response (winner's curse effect). If the winner's

curse effect is large enough, prices could actually fall as the number of competitors increases. Recently, Bulow and Klemperer (1999), Krishna and Morgan (1997), and Bordley and Harstad (1996) have pointed out this possibility; as these authors note, the winner's curse provides a prominent example where asymmetric information can overturn the common economic wisdom that more competition is always desirable (i.e., the winning bidder might underestimate its own costs of production.)

To counter the winner's curse, a contractor firm should bid higher than its estimated cost to make *ex post* profitability more likely. To the extent that all bidders attempt to mitigate the winner's curse, the winning bidder will obtain a quasi-rent, the difference between the actual biased-high bid and a break-even bid. Consequently, there should be a positive stock price reaction for the winning bidder equal to the quasi-rent. Hence, the following hypothesis is implied:

H3a. Because bidding firms bias their bids in an effort to counteract the winner's curse, the winning bidder receives a quasi-rent, which implies a significant abnormal stock price increase upon contract announcement.

We utilize two variables to study the winner's curse hypothesis

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II.3.1. Volatility: Contracts involving greater uncertainty about profitability should receive more biased high bids relative to the expected cost of production. Hence, the winning bidder should earn a higher quasi-rent and contractor's stock returns should be positively associated with more uncertain profitability. We measure this uncertainty by the volatility of

contractor's return using 200 daily returns from trading day t=-290 through trading day t=-91 relative to the announcement date, t=0.

II.3.2. Number of Bidders: Bajari and Hortacsu (2003) and Bazerman and Samuelson (1983) indicate that one factor that affects the incidence and magnitude of the winner's curse is the number of competing bidders. An increase in the number of competing bidders will increase the range of value estimates and bids, making it more likely that the winning bidder will overestimate the true value of the asset and thus overbid. This implies a positive relation between the number of competing bidders and the announcement period abnormal returns for contractor firms.

H3b: For contractor firms, the relations between announcement period abnormal returns and both return volatility and the number of competing bidders are positive and statistically significant.

Unfortunately, we do not know the number of bidders in most corporate contracts, hence, we employ, as a proxy, the number of firms with the same four-digit SIC code as the contracting firm. This seems a reasonable proxy since the number of firms in the same industry should be related to the number of potential bidders. However, it is also related to the extent of competition within the industry. More competition (among contractors) should drive down bid prices and reduce rather than increase the announcement period returns of contractors. Consequently, any lack of empirical support for hypothesis H3b might very well be attributable to an imperfect proxy for the number of bidders rather than a defect in the logic emanating from the winner's curse.

II.4. Information Signaling Hypothesis

Potential contractors are not all alike. Some are more efficient than others and can produce the good or service at lower cost. Winning a contract could therefore be a signal of efficiency since contracts are often granted to the lowest bidders, who are able to bid lower because they can produce at lower costs. To the extent that cost structures are revealed by contract announcement, contract winners should enjoy a positive market reaction.

H4a: For contractor firms, the announcement period abnormal returns are positive and statistically significant.

Signals have a more pronounced impact in the presence of information asymmetry. The market-to-book ratio (MTB) reflects asset intangibility and presumably is associated with more information asymmetry. Consequently, the stock prices of companies with higher MTB should respond with greater magnitude to whatever signal is emitted by winning a contract. This leads to the following hypothesis:

H4b: For contractor firms, the relation between the announcement period abnormal return and market-to-book ratio is positive and statistically significant.

II.5. Value Maximization Hypothesis

Under the presumption that market forces compelled managers to follow the market value maximization in making their corporate investment decisions (Fama and Miller (1972); Fama and Jensen (1983)), traditional valuation theory posits that the market value of the firm is equal to the discounted value of future earnings expected to be generated by assets in place, plus the discounted net present value of investments opportunities that are expected to be

available to the firm in the future (Miller and Modigliani (1961)). McConnell and Muscarella (1985) examine the market reaction of firms announcing capital expenditures and find that announcements of increases (decreases) in planned capital expenditures are associated with significant positive (negative) excess stock returns. They interpret their results as being consistent with the hypothesis that managers seek to maximize the market value of their firms in making their corporate investment decisions.

If contracting partners follow the market value maximization rule, then contract announcement should engender a positive valuation effect for contracting parties whose managements would not grant or bid for a contract unless they expect that it would generate a positive net present value.

H5: The announcement period excess returns for both contracting parties are positive and statistically significant.

A contract that creates a lot of value seems likely to be highly beneficial to both contracting parties; hence, there should be a positive cross-sectional relation between the abnormal announcement period returns of contractors and contractees under H5.

II.6. Contract Characteristics

II.6.1. Contract Duration: Axelrod (1984) and Parkhe (1993) argue that contract with longer duration should reduce opportunism because of each partner's ability to serially reward and punish actions taken previously within the contract period. The contract reveals both parties' expectations of being in business for at least the duration of the contract. Longer-term contracts may also save on transaction costs relative to a succession of shorter-

term contracts. Thus the relation between contract duration, measured in number of years to the end of the contract, and the announcement period abnormal returns for contracting parties is expected to be positive and statistically significant.

II.6.2. Relative Contract Size: It is defined as the stated dollar amount of the contract divided by the firm's total assets measured one year before the contract announcement. A large relative contract size should be more of a surprise to the market and perhaps be associated with larger announcement period abnormal returns. Large contractees granting contracts to large contractors would, intuitively, be normal; but large contracts granted by small contractees or large contracts granted to small contractor would be unusual. Thus, the relation between relative contract size and the announcement period abnormal returns for contracting parties is expected to be positive and statistically significant.

II.6.3. National versus International Contracting: International transactions might be riskier than purely domestic transactions for both parties. Contract enforcement and monitoring could be more difficult and costly. On the other hand, winning an international contract might be a positive surprise for a domestic contractor, while granting a contract internationally might be good news in terms of procurement diversification for a contractee. In any case, controlling for the international nature of the contract could provide a refinement in understanding the stock market's reaction to a contract announcement. To differentiate between domestic and international contracts for the contractee (contractor) firms, we create a dummy variable that is one if the contractor (contractee) is a US firm and zero if it is foreign firm. The relation between the announcement period abnormal return and whether the contract is domestic or international could be positive or negative.

II.7. Firm Characteristics

II.7.1. Firm Size*:* Prior research indicates that large firms, relative to small firms, make more public disclosures between releases of financial reports, are followed by larger number of analysts, and have less information asymmetry, thus providing the market with sounder basis for making valuation adjustments. Hence any announcement, including a contract announcement, is more likely to be more of surprise and more significant for smaller contracting partners, suggesting a negative relation between firm's size measured as the log of total assets and the announcement period abnormal returns.

II.7.2. Historical Profitability: Capital markets anticipate that contracting parties with higher profitability are more likely to fulfill their contractual obligations. However, a low-profitability firm winning a contract may represent a surprise to the market. Hence contract announcements may be associated with higher abnormal returns for less profitable firms. This suggests a negative relation between historical profitability and announcement period abnormal returns.

II.7.3. Leverage: Leverage represents risk to the counter-party in a contract and, as a consequence, highly-levered firms are less likely to be sought out as contracting partners. Hence, winning a contract by a highly-levered firm is more likely to be associated with bigger surprise, and thus higher announcement period abnormal returns. Highly-levered awarding firms are essentially undertaking additional payment obligations, so higher leverage might be associated with lower announcement returns. However, highly-levered contractees can be thought as signaling that they are financially sound, which suggests a direct relation between leverage and the announcement period abnormal returns

II.7.4. Industry: Industries vary in terms of barriers to entry, switching costs, opportunities to differentiate products, and quality of public information. Boddewyn, Halbrich, and Perry (1986) discuss the nature of ownership, internationalization and location advantages of service firms. Dunning and Norman (1983), Dunning and McQueen (1982), and Casson (1982) have identified some intangible advantages associated with service firms and compare them with tangible advantages of non-service firms. Based on these studies, we hypothesize that the stock prices of service firms and of non-service firms might react differently to contract announcements.

Table I summarizes the prediction of each hypothesis with regard to contract announcements, and the proxies utilized to distinguish these explanations.

*** Insert Table I about here ***

III. Data and Sampling Procedures

The initial sample of contracting data is obtained from Factiva, the Dow Jones Interactive database by using a keyword search for the term contract. The search covers all the publications available in the Dow Jones Interactive database, which covers most of the major daily publications such as *Wall Street Journal*, *New York Times*, and *Daily News* among others. This search produces 7137 contract announcements reported from January 1, 1990 to December 31, 2001.[7] Next, this initial sample of 7137 contract announcements is subjected to the following criteria:

[7] The initial sample 7137 includes contracts between domestic corporations-sovereign governments, domestic corporations-foreign government agencies, domestic corporations-domestic corporations, domestic corporations-foreign corporations, foreign corporations-foreign corporations, domestic corporations-government agencies, including the army, navy, NASA, air force, etc.

1. Excluded from the sample are legal contracts involving contract disputes, jury awards, non-compete agreements, patents, union contracts, and financial contracts involving mergers and acquisitions, joint ventures, restructuring, leasing, debt/equity offerings, and credit arrangements

2. Contracts between US corporations and other sovereign government, government agencies, or any non-private corporation (domestic or foreign), such as the military, army, navy, NASA, air force, the department of health and services, etc. and contracts between two foreign corporations or between foreign corporation and other government agencies are excluded. Thus, we include only contracts between US corporations and between US corporations and foreign corporations.

3. A company is excluded if it does not have returns available on the CRSP database over the period from 290 days before the announcement date to 90 days afterward, or if it has missing returns over the two-day announcement window day t-1 through day t0 (t0 is the announcement date.)

4. A company is excluded if it has a material confounding events (earning announcements, merger or acquisition announcement, dividend announcement, capital structure change, etc.) within a five-day window, from two days before to two days after the contract announcement.

As a result of these restrictions, the initial sample of 7137 contract is reduced to 1227 inter-corporate contract announcements. Out of the 1227 contracts we create three sub-samples. First, the contractor firm sub-sample consists of 1029 contract announcements where the contractor is a US firm while the contractee is a US or a foreign public corporation. Second, the contractee firm sub-sample, which includes 645 contract announcements where the

contractee is a US firm while the contractor is a US firm or foreign public corporation. Third, the matching sub-sample consists of 500 contract announcements where both the contractee and the contractor are US corporations. We create this matching sub-sample in order to estimate the average abnormal return for both contractee and contractor from the same contract, and to examine the distribution of gains between contracting partners. Table II Panel A provides a frequency distribution by announcement year, while Panel B shows the frequency distribution by industry group identified on the basis of the first digit of the SIC code.

*** Insert Table II about here ***

Financial data for each company, such as market-to-book value, research and development to sales, employees to sales, returns on assets, leverage, and firm size is obtained from the COMPUSTAT database for the year before the announcement year. Information about contract characteristics, such as the dollar amount of the contract, duration, and whether the contract is national or international is obtained from reading the articles that report the contract announcements. Volatility is calculated as the variance of returns from day t=-290 to trading day t=-91 relative to the announcement date, t=0. As a proxy for the number of bidders, we obtain the number of firms that have the same 4-digit SIC code as the contractors.

Table III provides summary statistics about firms and contract characteristics; there are 817 (out of 1029) contractor announcements and 498 (out of 645) contractee announcements with financial data available on the COMPUSTAT database. Information with regard to duration and the dollar amount of the contract was obtained from the articles that report the

announcements, and in many cases such information was not available. In addition, there are 395 firms (out of 500 matching announcements) in which contracting partners have financial data on the COMPUSTAT database.

Contractor mean (median) cumulative abnormal return over a two-day announcement window, t=-1 to 1=0 is 1.6% (0.5%) whereas contractee mean (median) CAAR over the same period is -0.09% (-0.01%). The number of companies (NCOMP) with the same four-digit SIC code, the variance of stock returns (RVAR), R&D expense, contract size, contract duration, and profitability are about the same for contractees and contractors. Contractor assets and income are much smaller than those of contractees suggesting that contractees are larger firms. The median contractor market value of equity is much smaller than that of contractee but the mean market values of equity are about the same. Contractor market-to-book ratios are higher. Contractors have smaller size compared to contract size, higher R&D expense, and higher employee intensity.

*** Insert Table III about here ***

IV. Method of Analysis

IV.1. Abnormal Rate of Return: Abnormal returns are computed using the Fama-French (1993) three-factor model as the (normal) return-generating process as follows:

$$R_{jt} = \alpha + \beta_j R_{mt} + s_j SMB_t + h_j HML_t + \varepsilon_{jt} \quad (1)$$

where R_{jt} is the rate of return of the common stock of the firm on day *t;* R_{mt} is the rate of return of a market value-weighted index on day *t*; SMB_t is the average return of a small market-capitalization portfolio minus the average return of a large market-capitalization portfolios; HML_t is the average return of high book-to-market equity portfolio minus the average return of low book-to-market equity portfolio; ϵ_{jt} is a random variable that, by construction, must have an expected value of zero, and is assumed to be uncorrelated with $R_{mt,}$ uncorrelated with R_{kt} for k≠ j, not autocorrelated, and homoscedastic. See Fama and French (1993) for a detailed description of SMB_t and HML_t. β_j is a parameter that measures the sensitivity of R_{jt} to the excess return on the market index; s_j measures the sensitivity of R_{jt} to the difference between small and large capitalization stock returns; and h_j measures the sensitivity of R_{jt} to the difference between value and growth stock returns.

The abnormal return for common stock *j* on day *t* is:

$$AR_{jt} = R_{jt} - [\hat{\alpha} + \hat{\beta}_j R_{mt} + \hat{s}_j SMB_t + \hat{h}_j HML_t] \quad (2)$$

where the coefficients $\hat{\alpha}_{j,}$ $\hat{\beta}_{j,}$ $\hat{s}_{j,}$ and $\hat{h}_j$ are OLS estimates of $\alpha_{j,}$ $\beta_{j,}$ $s_{j,\ and}$ h_j. These estimates are from an OLS regression using 200 daily returns from trading day t = -290 through trading day t = -91 relative to the announcement date, t=0. Ninety trading days immediately preceding the announcement are excluded because they might be contaminated by information leakage, and the two days (t = -1 to t = 0) represent our event window.

The average abnormal return for event date t is calculated as a simple cross-sectional average over N firms in the sample,

$$\mathrm{AAR}_t = \frac{1}{N}\sum_{j=1}^{N} \mathrm{AR}_{j,t}\,, \quad (3)$$

where $AR_{j,t}$ is the abnormal return of firm j on day t (the residual from Model (1).) A t-statistic can be calculated for the average abnormal return by assuming cross-sectional independence. A cumulative average abnormal return ($CAAR_{T_1,T_2}$) is computed as a sum over several event days; i.e., accumulating from days T_1 to T_2 inclusive, we have

$$CAAR_{T_1,T_2} = \frac{1}{N}\sum_{t=T_1}^{T_2}\sum_{j=1}^{N} AR_{j,t} \; . \tag{4}$$

To test for the level of significance of the CAAR we utilize both the rank test as developed by Corrado (1989) and Jackknife test developed by Giaccotto and Sfiridis (1996).

IV.2. Abnormal Trading Volume: To conduct trading volume analysis, we measure trading volume as the percentage of outstanding shares on a given day:

$$V_{it} = \ln\left(\frac{n_{it} \times 100}{S_{it}}\right) \tag{5}$$

where n_{it} is the number of shares traded for firm *i* on day *t*, and S_{it} is the firm *i* outstanding shares on day *t*. Following Ajinkya and Jain (1989) and Cready and Ramanan (1991), we use the natural log of the percentage of outstanding shares above. To generate abnormal trading volume we utilize an ordinary least squares market model approach, where the market model abnormal trading volume is:

$$v_{it} = V_{it} - (\hat{\alpha}_i + \hat{\beta}_i V_{mt}) \tag{6}$$

and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are obtained via ordinary least squares estimation over the period from day t=-290 through trading day t=-91. The market volume measure for a given day t is measures as:

$$V_{mt} = \frac{1}{N}\sum_{i=1}^{N} V_{it} \tag{7}$$

where *N* is the number of securities in the market volume index. To test for the significance of the abnormal volume, we utilize the standardized cross-sectional test statistics. The standardized cross-sectional method is utilized to develop statistics testing for the significance of the abnormal and cumulative average abnormal returns. This test is introduced by Boehmer, Musumeci, and Poulsen (1991) and it accounts for serial dependence of the abnormal returns accumulated over different intervals.

IV.3. Cross-Sectional Regression Analysis: The following cross-sectional regression model is employed to examine the hypotheses developed previously. In this regression the dependent variable is the two-day (t=-1 to t=0) CAAR derived from Fama and French model.

$$CAAR = \beta_0 + \beta_1 (RDE) + \beta_2 (EINT) + \beta_3 (MTB) + \beta_4 (RVAR) + \beta_5 (NOCOMP) + \beta_6 (CSIZE) + \beta_7 (DUR) + \beta_8 (NATL) + \beta_9 (SIZE) + \beta_{10} (LEV) + \beta_{11} (ROA) + \beta_{12} (INDUST) + \beta_{13} (CAARP) + \varepsilon. \quad (8)$$

where,

CAAR = the dependent variable, defined as the two-day announcement period cumulative average abnormal return

RDE = research and development expense divided by sales

EINT = employee intensity, defined as total number of employees divided by sales

MTB = market-to-book value, defined as the (book value of total asset minus the book value of equity + market value of equity) divided by the book value of total assets

RVAR = volatility of returns measured over the period t = -290 to t = -91 relative to the announcement day t = 0

NOCOMP = number of competitors defined as the number of companies with the same four-digit SIC code as the contracting firm

CSIZE = relative contract size defined as the dollar amount of the contract divided by total assets

DUR = number of years to contract expiration

NATL = nationality of the contracting partners defined as dummy variable equal one if the other party to the contract is a US firm (national) and zero otherwise

SIZE = size of the firm measured as log of total assets

LEV = degree of financial leverage, defined as long-term debt divided by total assets

ROA = return on assets, defined as net income divided by total assets

INDUST = dummy variable equal one for non-service firms and zero for service firms

CAARP = announcement period CAAR for the other partner in the contract, applicable only to the matched sample

V. Empirical Results

V.1. Average Abnormal Returns and Abnormal Volume

Table IV reports average abnormal returns (AAR) and the cumulative average abnormal returns (CAAR) for contract announcements from five days before to five days after the announcement day (day zero) for 1029 contractor and 645 contractee announcements. The two-day announcement window CAAR for contractors is 1.81% and statistically significant at the 0.10 percent level (Z=8.755) and the number of positive AARs is 605 (out of 1029). The ratio positive to negative is significant at the 0.10 level (rank test 6.841) thereby indicating that a few large outliers do not dominate the results. For contract-granting firms, the two-day CAAR is 0.21 and is not statistically significant.

*** Insert Table IV about here ***

Table V shows that the results for 500 announcements of matching firms are stronger. The announcement period CAAR for contractors is 2.66% with a Z-statistic of 8.183, which is statistically significant, and the CAAR for contractees is positive 0.33, which is marginally significant at the 10 percent level.

*** Insert Table V about here ***

Table VI reports the abnormal volume around contract announcements for contractors, contractees, and matched sample. The average abnormal volume of contractors is 12.89%, which is highly significant at 0.1 percent. The average abnormal volume of contractees is insignificant and negative 2.14%. Results for the matched sample show that contractors also have abnormal volume 17.53%, which is significant at the 0.1 percent whereas contractees have insignificant negative abnormal volume.

*** Insert Table VI about here ***

Figure I plots average abnormal returns and volume of contractors and contractees from 90 days before until 90 days after the announcement date. The figures show that the abnormal returns and the abnormal volume of contractors during the announcement period are obviously higher than those before and after the window. In contrast, the abnormal returns and volume of contractees appear to be random from 90 days before to 90 days after the announcement date.

*** Insert Figure I about here ***

Overall, these event studies reveal that contractors earn positive and significant abnormal returns and abnormal trading volume while contract-granting firms (contractees) earn insignificant positive returns and negative abnormal volume. The CAAR pattern is not consistent with the predictions of the behavioral version of contract theory that contractors should earn positive significant abnormal returns at the expense of contractees due to moral hazard. In addition, the correlation between the contractors and contractee CAARs for the matched sample is not negative (as one might expect if there is a wealth transfer), rather it is positive (0.135) though it is not statistically significant.[8]

Moreover, the results are inconsistent with the rational hypothesis predicting that the abnormal returns for both contractors and contractees should be insignificantly positive and with the value maximization hypothesis predicting a significant gain to contracting parties. The results show that most of the gains accrue to the contractors and, that, at best, contract-awarding firms neither gain nor lose, but rather earn a normal rate of returns.[9] These results also are in conflict with McConnell and Mozzarella (1985)'s finding that announcements of increased capital expenditures are associated with significant positive excess returns (if contract grants entail increased capital expenditure), and it does not lend support to the perfect competition hypothesis where contracting parties earn insignificant abnormal returns.

These results are, however, consistent with two other hypotheses; first, the information signaling hypothesis which suggests that winning a contract can be a signal of efficiency

[8] This result is not reported but can be requested from the authors.

[9] One explanation for the lack of significant of positive abnormal returns to contractees is that the information related to granting a contract is anticipated, which should be reflected in the pre-announcement period abnormal returns. However, the results show that the pre-announcement period abnormal return, day -90 through day -2 is -0.88 and is not statistically significant. If the event had been anticipated, there might have been positive pre-announcement abnormal returns.

since contracts are often granted to the highest bidders, who are able to bid higher than the other bidders because they can produce at a lower cost. The second explanation is the winner's curse hypothesis, which suggests that bidders (contractors) in their attempts to mitigate the winner's curse obtain a quasi-rent, which is translated into higher announcement period abnormal returns.

In summary, the market reaction to contract announcement is positive and statistically significant for contract-wining firms while it is positive but not significant for contract-granting firms. These results are consistent with the information signaling and the winner's curse hypothesis. The results do not support the incomplete contracting, perfect competition, or contractee's value maximization hypotheses. To distinguish further among these competing theories, we turn now to a cross-sectional explanation of announcement period returns.

V.2. Cross-sectional determinants of abnormal returns

Tables VII (Table VIII) reports the results of the cross-sectional analysis for contractors (contractees) for the total sample (panel A) and the matched sample (Panel B). In Table VII, the total sample of contractors in Panel A represents US contractor firms that won a contract either from US or foreign firms. The CAAR for the contractor is available and serves as dependent variable. The other party to the same contract (a contractee in this case) is either a US firm or a foreign corporation. For unlisted US contractees and for all foreign contractees, no returns are available on the CRSP to estimate CAAR. The matched sub-sample is comprised of US contractors who won contracts from US firms, both parties are listed, and returns for both are available to estimate the CAAR. Table VIII presents the corresponding results for the total sample of US contractees.

Tables VII and VIII include two specifications of the cross-sectional regression. Model 2 in the total sample does not include contract duration (DUR) because this variable has the largest number of missing values; many contract announcements do not report DUR. Model 2 in Table VIII does not include DUR and CSIZE for the same reasons. Comparing regressions with and without DUR also sheds light on the sensitivity of the results to sample size. NATL stands for the nationality of the party in the contract and is not applicable to the matched sample, since both parties in the contract are US firms.

In the matched sample (Table VII, Panel B), the dependent variable is the two-day (t=-1 and t=0) announcement period CAAR for contractors, while CAARP is an independent variable, which denotes the two-day (t=1 and t=0) announcement period CAAR of contractee in the same contract for the same announcement period. In Table VIII, Panel B, the dependent variable is the CAAR of contractees while CAARP is the CAAR for counter-party contractors. The CAAR of the contracting counter-party (CAARP) is not used in the total sample, Panels A of either Table, because many firms do not have any matched parties. CAARP is included as an independent variable to examine the possibility that one party's gain is another party's loss. A negative and significant coefficient of CAARP would suggest that one party benefits at the expense of another, while a positive and significant coefficient indicates that the contract is value enhancing for both parties.

Two variables are used to test the behavioral incomplete contracting hypothesis. First, ***RDE*** is the ratio of research and development expense to total sales; it is a positive indicator of asset specificity. A higher level of asset specificity implies a higher likelihood of opportunistic behavior by the contractors and the higher announcement period abnormal

returns. In Models 1 and 2 of the total sample, RDE is positive as predicted, while it is negative in Models 1 and 2 of the matched sample. However, in both cases (the full and the matched sample), RDE is not statistically significant. Employee intensity, ***EINT***, is another indicator of asset specificity. Model 1 of the total sample indicates that EINT is negative, contrary to its predicted sign, while it is positive in Models 1 and 2 of the matched sample. However, in all cases it is not statistically significant.

For contractee firms, (Table VIII, matched sample), neither *RDETOR* (research and development expense for sales for contractors) nor *EINTTOR* (employee intensity for contractors) is significant. These findings, coupled with the documented market reaction to contract announcement for contractors and contractees, do not lend support to the argument advanced by the behavior version of the incomplete contracting hypothesis.

To test the winner's curse hypothesis, we utilize two proxies; the first variable is the returns volatility ***RVAR***. According to the winner's curse argument, in the presence of multiple bidders and considerable uncertainty about costs, contractors bid higher in an attempt to mitigate the winner's curse. Therefore, contracts involving greater uncertainty (*RVAR*) about profitability would receive higher bids relative to the expected cost of production, and thus winners would receive quasi-rents and higher announcement period abnormal returns. Table VII shows that RVAR is positive (as anticipated) in all specifications and is significant at the 0.10 percent level.[10]

[10] We also utilize the standard deviation of the abnormal returns as a proxy for winners curse and obtain the same results. The correlation between RVAR and standard deviation of the error term is 0.95.

NOCOMP is the second proxy for the winner's curse representing the number of competitors bidding for the contract. The number of bidders is one of the determinants of the magnitude and the incidence of the winner's curses. As the number of bidders' increases, in an effort to counteract the winner's curse, all bidders bias upward their bids even more. Hence, a positive relation is expected between NOCOMP and contractor's the announcement period CAAR. Table VII shows that NOCOMP is negative though not significant in the total sample regression, while it is positive and marginally significant in Model 2 of the matched sample. With regard to contractees, Table VIII shows that NOCOMP is positive and marginally significant at 10 percent in Model 1 and 2 of the matched sample, though it is not significant in total sample's specification. Unfortunately, our proxy for the number of bidders is actually the number of existing firms with the same four-digit SIC (industry) code as the winning bidder. Consequently, NOCOMP is also a rough measure of the extent of potential competition, so this could attenuate its relevance as a measure of the winner's curse.

MTB is a proxy for the information signaling hypothesis. The value of the signal, as it reveals private information about contractors cost efficiency, will be more valuable, represents a bigger surprise, and engenders higher market reaction for contractors with higher degree of information asymmetry (high MTB). The relation between MTB and CAAR is positive as predicted and it is statistically significant at 0.05 levels. MTB is statistically significant at 1 percent level in Model 1 for the matched sample. Coupled with the pattern of the announcement period abnormal returns (positive and significant CAAR for contractors and positive but not significant for contractees), these results generally support the information signaling hypothesis that contract announcement reveal private information about contractor's efficiency.

V.2.1 Firm Characteristics

1. Firm size (***SIZE***): Having more public disclosure and lower degree of information asymmetry, and followed by larger number of analysts, large firms (relative to small firms) may instigate less market reaction from contract announcements than small firms. As a result, a negative relation is implied between firm size and the announcement period abnormal returns. The results in Table VII show that SIZE is positive across all model specifications for both the total and matched samples, though it is not significant. For contractees, Table VIII shows that SIZE is positive but not significant

2. Financial leverage (***LEV***): It is more of a surprise to the market that highly-levered firms win a contract compared to low-levered firm; hence, a positive relation is implied between CAAR and financial leverage. The results in Table VII show that LEV is positive across all models, as anticipated, and it is significant at 5 percent in Model 1 of the total sample and sub-sample. With regard to contractees, Table VIII shows that LEV is positive and marginally significant at 10 percent in Model 2 of the total sample, but it is not significant in other model's specification.

3. Historical profitability (***ROA***): Contracting partners with higher profitability are more likely to fulfill their contractual obligations; therefore, it is a surprise for unprofitable firms, or firms with lower profitability relative to the average, to win a contract, suggesting a negative relation between historical profitability and CAAR. Table VII shows that historical profitability is positive, contrary to our expectation, and statistically significant in all regression models. Specifically, it is significant at 0.10 percent in Model 1 in both the total and sub-sample matching firms. For contractee firms, Table VIII shows that ROA is not significant

4. Industry group (***INDUST***): It is a dummy variable equal one if the firm is in non-service and zero otherwise. INDUST is negative but insignificant through all models and for both contractors and contractee firms. Overall, these results do not support a differential market reaction between two types of industry.

V.2.2 Contract Characteristics

1. Relative contract size (***CSIZE***): Winning a large contract relative to firm size may represent a surprise and hence should be associated with more positive market reaction. Table VII indicates that CSIZE is positive and highly significant at 0.10 percent in all models for both total and matched samples. These results are consistent with the notion that a small firm that wins a large contract receives more positive reaction from the market than vice versa. For contractee firms, CSIZE is not significant.

2. Duration of the contract (***DUR***): Duration may reveal both parties' expectations of the length of time they will be in business together, thus a positive relation is anticipated between abnormal returns and duration of the contract. The results indicate that duration is positive for the total sample but negative for the matched contractor firms. However, neither is statistically significant.

3. Nationality (***NATL***): International contracts might be riskier than purely domestic contracts for both parties. In addition, contract enforcement and monitoring for international contracts could be more difficult and costly. Hence a negative relation between NATL and the announcement period excess return is expected. On the other hand, winning an international contract might be a positive surprise for a domestic contractor, while granting a contract internationally might be good news in terms of procurement diversification for a

contractee. Nevertheless, Table VII indicates NATL is not statistically significant for either party suggesting that cross-border enforcement of contracts is not considered significant by the market.

4. Expropriation (***CAARP***): It is the announcement period returns of contractees (contractors) in the regression for CAARs of contractors (contractees). According to incomplete contracting hypothesis (behavioral version), a gain of one contracting party comes at the expense of its contracting partner. On the other hand, both parties should gain under value maximization hypothesis. CAARP could be used to test these two hypotheses. A negative and significant coefficient may suggest a wealth transfer from the contractee to contractor or vise versa whereas a significant positive efficient implies wealth enhancement for both contracting parties. Results in Table VII shows that CAARP coefficient is positive and significant at 10 percent level in Model l of contractor, while it is positive but not significant for contractee firms, suggesting that the contractor's gain is not at the contractee's expense or vice versa. This result does not lend support to the behavior version of the incomplete contracting hypothesis.

The regression models for the contractor's total sample are highly significant at 0.10 percent level with F-values of 10.86 and 23.25 for Model 1 and 2 respectively. In addition, the adjusted R-squares are 0.409 and 0.349 for Model 1 and 2 respectively, which are reasonable given that we are using daily data. For the matched sub-sample, the F-values are 12.46 and 17.48, which are significant at the 0.10 level and the adjusted R-squares are 0.647 and 0.525 for Models 1 and 2 respectively. For contractees, none of the regression models is significant.

*** Insert Table VII and VIII about here ***

VI. Summary and Conclusion

Although simple business contracts are perhaps the most common forms of inter-corporate agreements, they have not been widely studied. This is in sharp contrast with the sizeable literature about integrating agreements such as mergers and joint ventures. Our paper's goal is to begin filling this gap.

One might at first think that the valuation effects of corporate contracts are obvious because both parties, the contractee who grants the contract and the contractor who provides the good or service, freely enter into the contractual agreement and bind themselves to its terms. Since both sides must anticipate benefits, one might be tempted to predict that both firms would enjoy stock price increases around the contract announcement.

Yet things are not as simple as they might appear. If both contracting parties are perfectly competitive, so the contractee has no monopsony power and the contractor has no monopoly power, the contract should provide no monopoly profits to either side and there should be little if any stock market reaction.

The theory of incomplete contracting, however, suggests that moral hazard and other problems could create a situation that benefits one side at the expense of the other. Unless both parties are rational and take full account of incomplete contracting problems, the stock price gain of one party might correspond to a stock price loss of the other party.

Another consideration is that contractors are generally bidders with competitors. The winner's curse phenomenon implies that they should bias up their bids relative to expected costs. This suggests that the winning bidder will receive a quasi-rent and that the stock market will respond favorably. Similarly, if the winning bidder, usually the lowest bidder, reveals by winning that it is a low-cost producer, the stock market might interpret this as a positive signal about the winning contractor.

We study announcement period abnormal returns of contractors and contractees in a short window around contract announcements. We find that winning contractors experience material and significant abnormal stock price increases and abnormally high volume. In contrast, there is no perceptible stock price reaction for contractees. These results rule out monopsony power for contractees and they are also inconsistent with behavioral insufficiency in taking account of moral hazard and other problems associated with incomplete contracting. Moreover, since winning contractors do experience stock price increases, the results are inconsistent with a simple form of perfect competition.

A behavioral version of incomplete contracting theory suggests that moral hazard is more probable when the contractor has specific assets, yet empirical proxies turn out to be insignificant. Also, using a matched sample, we find no evidence that one party's stock market gain corresponds to a loss by its counter party.

This leaves as viable the winner's curse hypothesis (quasi-rents for winning contractors) and the low production cost signaling hypothesis. There is some additional evidence in favor of both hypotheses; for example, the announcement period abnormal return of contractors

increases with return volatility, a proxy for uncertainty in contract costs, which should in turn be associated with a greater danger of the winner's curse.

Similarly, the contractor's market to book ratio, an indicator of intangible assets, is also associated with higher announcement period returns. This is indirectly consistent with the cost signaling hypothesis because signals have a more pronounced impact on stock prices when there is information asymmetry, and such asymmetry should be larger when assets are intangible.

We also find that contractor returns increase with the size of the contract relative to the size of the contractor firm. This might be an indication that the market is more surprised when a large contract is won by a smaller firm.

These results are obtained while controlling for a number of other possible determinants of announcement period returns, including proxies for previous firm profitability, firm size, leverage, industry, contract duration, and nationality (contracts across borders.) For contractors, previous profitability is associated with higher contract announcement returns, but nothing else is significant.

In conclusion, contracting firms on average seem to properly account for the vagaries of the inevitable incompleteness of contracts. Neither party gains at the expense of the other. There is no stock market response for contractees, but perhaps this can be attributed to a lack of surprise. Winning contractors experience abnormal stock price increases. This contradicts the view that they are perfectly competitive. The source of their gains could emanate from (1) winning a bid signals the market that the contractor is a low-cost producer, or (2) the

winning contractor receives a quasi-rent created by the efforts of all bidders to counteract the winner's curse by biasing their bids high. These two explanations are not mutually exclusive.

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Table I
Summary of the Direction and Significance of the Stock Market Reaction as Predicted by each Hypothesis

Panel A summarizes the direction of the two-day, t=-1 to t=0, (where t=0 is the announcement date) announcement period cumulative abnormal return (CAAR) under each hypothesis for contractor and contractee firms. Panel B lists control variables and independent variables used to distinguish among the hypotheses. For both Panels, S stands for statistically significant, NS stands for statistically insignificant, and NP stands for no prediction.

Panel A: Predicted Sign of the CAAR

Hypothesis/Variable	**Contractor**	**Contractee**
1. Incomplete Contracting		
a. Behavioral	Positive (S)	Negative (S)
b. Rational	Non-Negative	Non-Negative
2. Perfect Competition	NS	NS
3. Winner's Curse	Positive (S)	NP
4. Information Signaling	Positive (S)	NP
5. Value Maximization	Positive (S)	Positive (S)

Panel B: Predicted Sign of the Variable in a Cross-Sectional Model of the CAAR

Distinguishing Variables		
A. Incomplete Contracting (behavioral version)		
1. R & D to Sales	Positive (S)	Negative (S)
2. Employee Intensity	Positive (S)	Negative (S)
3. CAAR of other party	Negative (S)	Negative (S)
B. Winner's Curse		
1. Volatility	Positive (S)	NP
2. Number of Bidders	Positive (S)	NP
C. Information Signaling		
1. Market-to-Book ratio	Positive (S)	NP
D. Value Maximization		
1. CAAR of other party	Positive (S)	Positive (S)
Control Variables		
Contract Characteristics		
1. Relative Contract Size	Positive (S)	Positive (S)
2. Contract Duration	Positive (S)	Positive (S)
3. Nationality	NP	NP
Firm Characteristics		
1. Firm Size	Negative (S)	Negative (S)
2. Leverage	Positive (S)	Positive (S)
3. Profitability	Negative (S)	Negative (S)
4. Industry	NP	NP

Table II
Frequency Distribution by the Announcement Year and Industry Group

The classification is based on the first digit of the SIC code, where 1 is for mining, metals, oil, gas, buildings and heavy constructions, and related contractors; 2 is for food, tobacco, textile, apparel products, lumber, furniture, paper products, printing, publishing, chemicals, petroleum retailing, and related industries; 3 is for rubber, plastic, and leather products, stone clay and concrete products, metal and fabricated metal industries, industrial and commercial machinery, electronics, electrical and transportation equipment and instruments, photo, and other manufacturing industries; 4 is for rail, water and air transportation, communication, postal, and transportation services; 5 is for wholesale trade, building materials, general merchandise and food stores, appeal and furniture stores, and eating and drinking places; 6 is for financial institutions, insurance, brokers and real estate agents, and investment companies; 7 is for hotels and lodging places, personal and business services, repair services, motion pictures, and related services; 8 is for health, legal, educational and social services, membership organizations, and professional services; 9 is for executive, legislative & general government; justice, public order & safety, public finance, taxation, administration of human resource programs, administration of environmental quality and housing programs, administration of economic programs, national security and international affairs.

Panel A: Frequency Distribution by Year

	Contractors		Contractees	
Year	**Frequency**	**Percent**	**Frequency**	**Percent**
1990	91	8.84	66	10.23
1991	59	5.73	33	5.12
1992	89	8.65	53	8.22
1993	61	5.93	35	5.43
1994	97	9.43	81	12.56
1995	86	8.36	49	7.60
1996	95	9.23	52	8.06
1997	100	9.72	41	6.36
1998	112	10.88	76	11.78
1999	92	8.94	61	9.46
2000	78	7.58	60	9.30
2001	69	6.71	38	5.89
Total	**1029**	**100.00**	**645**	**100.00**

Panel B: Frequency Distribution by Industry Code

	Contractors		Contractees	
SIC	**Frequency**	**Percent**	**Frequency**	**Percent**
1	138	13.41	30	4.65
2	28	2.72	71	11.01
3	510	49.56	233	36.12
4	180	17.49	167	25.89
5	33	3.21	35	5.43
6	20	1.94	52	8.06
7	83	8.07	41	6.36
8	35	3.40	16	2.48
9	2	0.02	0	0
Total	**1029**	**100.00**	**645**	**100.00**

Table III
Summary Statistics of Firms and Contract Characteristics for Contractee and Contractor Firms

CAAR is the cumulative average abnormal returns over a two-day announcement window, t=-1, t=0; NCOMP is the number of competitors measured as the number of firms that have the same four-digit SIC code as the company; RVAR is the variance of stock returns measured over the period from 290 days to 90 days before the announcement; ASSETS is total assets one year before the announcement year; RDEXP is research and development expense; MVEQ is market value of equity; INCOME is net income; AMOUNT is dollar amount of the contract; DURATION is duration of the contract in years; ROA is prior return on assets; LEV is degree of financial leverage measured as long-term debt divided by total assets; MTB is market to book value ratio; CSIZE is relative contract size measured as the dollar amount of the contract divided by total assets; RDE is ratio of research and development expenditures divided by sales; EINT is employee intensity measured as number of employees divided by sales. All financial variables are from the COMPUSTAT one year before the announcement year. STD is standard deviation and N is the number of observations.

	Contractors				Contractees		
Variable	**N**	**Mean**	**Median**	**STD**	**N**	**Mean**	**Median**	**STD**
CAAR	817	0.016	0.005	0.07	498	-0.0009	-0.001	0.035
NCOMP	817	98.799	73.00	118.91	498	123.21	75.00	162.66
RVAR	817	0.001	0.001	0.001	498	0.001	0.00	0.001
ASSETS ($)	817	20535.24	5196.22	42292.22	498	35856.81	14591.00	63255.97
RDEXP ($)	534	1420.13	432.80	1780.15	297	1383.18	540.00	1822.16
MVEQ	805	25386.32	4552.88	46451.56	492	28537.88	10146.74	58015.83
INCOME ($)	814	758.98	147.94	1838.42	498	1120.92	401.53	2892.13
AMOUNT ($)	698	454.81	107.45	1195.23	416	520.56	100.00	1915.52
DURATION	296	5.66	5.00	3.39	207	5.36	5.00	3.20
ROA	814	0.03	0.05	0.12	498	0.04	0.04	0.11
LEV	817	0.15	0.13	0.14	497	0.21	0.20	0.15
MTB	805	2.28	1.74	2.29	492	2.07	1.48	2.48
CSIZE	698	0.22	0.03	0.65	416	0.19	0.01	1.20
RDE	534	0.12	0.05	0.49	297	0.07	0.04	0.24
EINT	796	0.007	0.005	0.01	485	0.006	0.005	0.009

Table IV
Abnormal Returns around Contract Announcements for Contractors and Contractees

Average abnormal returns are from Fama and French three-factor model for 1029 contractors and 645 contractees; AAR is the average abnormal return; MAAR is the median average abnormal return; POS: NEG is the number of positive and the number of negative abnormal returns and the asterisks indicates that the ratio of positive to negative is significant; Rank Test Z is the test for the percentage of positive to negative average abnormal returns; Jackknife Z is the test for the significance of average abnormal returns.

	Contractors					Contractees				
Day	**AAR**	**MAAR**	**POS:NEG**	**Rank Test Z**	**Jackknife Z**	**AAR**	**MAAR**	**POS:NEG**	**Rank Test Z**	**Jackknife Z**
-5	0.10	-0.04	501:528	1.110	1.389	0.00	0.02	330:315	0.600	0.412
-4	0.06	-0.01	510:519	0.070	0.045	-0.10	-0.19	292:353	-1.620	-1.096
-3	0.30	0.02	521:508	1.250	2.288*	-0.14	-0.16	295:350	-2.050*	-1.992*
-2	0.03	-0.12	490:539	-0.610	-0.296	0.00	-0.08	311:334	-0.100	0.286
-1	1.37	0.36	596:433***	6.800***	8.298***	0.26	0.00	323:322	1.460	2.064*
0	0.44	0.08	530:499*	2.880**	3.650***	-0.06	-0.12	303:342	-0.470	-0.371
1	-0.02	-0.12	478:551	-0.670	0.206	0.01	0.00	321:324	0.350	0.375
2	-0.08	-0.17	472:557	-1.040	-0.435	-0.14	-0.13	305:340	-1.090	-0.769
3	-0.11	-0.18	466:563	-1.570	-1.663	0.02	-0.12	296:348	-0.870	-0.269
4	0.09	-0.05	499:530	0.430	0.979	-0.12	-0.20	289:355	-1.720	-1.477
5	0.11	-0.03	507:527	0.560	1.562	-0.19	-0.08	306:338	-0.880	-1.123
-1,0	1.81	0.59	605:424***	6.841***	8.755***	0.21	-0.01	321:324	0.699	1.201
-90,-2	1.79	1.27	535:494**	-1.248	2.287*	-0.88	-1.03	305:340	-3.349***	-1.365
2,90	-2.36	-0.56	496:533	-5.015***	-2.602***	-1.66	-0.59	316:329	-2.927**	-1.385

O Significant at 10 percent level
* Significant at 5 percent level
** Significant at 1 percent level
*** Significant at 0.1 percent level

Table V
Abnormal Returns around Contract Announcements for a Matched Sample of Contractors and Contractees

Average abnormal returns are from Fama and French three-factors model for 500 contractors and contractees matched announcements; AAR is the average abnormal return; MAAR is the median average abnormal return; POS: NEG is the number of positive and the number of negative abnormal returns; Rank Test Z is the test for the percentage of positive to negative average abnormal returns; Jackknife Z is the test for the significance of average abnormal returns.

	Contractors					Contractees				
Day	AAR	MAAR	POS:NEG	Rank Test Z	Jackknife Z	AAR	MAAR	POS:NEG	Rank Test Z	Jackknife Z
-5	0.00	-0.09	240:260	0.300	0.250	0.07	0.07	264:236	1.120	1.036
-4	0.16	0.09	260:240	0.560	0.800	-0.16	-0.21	225:275	-1.800O	-1.524
-3	0.45	0.12	259:241	1.540	2.423*	-0.15	-0.18	227:273	-1.888O	-0.50
-2	0.07	-0.04	244:256	-0.430	0.120	-0.06	-0.10	237:263	-0.390	-0.003
-1	1.93	0.46	303:197***	6.280***	7.022***	0.35	0.03	257:243	1.700O	2.448*
0	0.73	0.18	273:227**	3.350***	3.891***	-0.01	-0.11	238:262	-0.280	0.133
1	-0.14	-0.18	227:273	-0.920	-0.256	-0.01	-0.01	248:252	0.270	0.183
2	0.02	-0.16	225:275	-0.810	0.172	-0.16	-0.06	244:256	-0.510	-0.509
3	-0.21	-0.17	227:273	-1.210	-1.506	0.02	-0.11	231:268	-0.670	-0.228
4	0.04	-0.04	246:254	0.400	0.593	-0.07	-0.19	227:272	-1.490	-1.354
5	0.24	0.07	260:240	1.230	1.479	-0.24	-0.07	240:259	-0.640	-1.162
-1,0	2.66	0.90	319:181***	6.807***	8.183***	0.33	0.04	255:245	1.001	1.874
-90,-2	0.76	0.41	256:244	-1.194	1.298	-0.56	-0.80	240:260	-2.653*	-1.130
2,90	-2.89	-0.32	244:256	-3.648***	-2.179*	-2.05	-0.77	241:259	-2.829**	-1.613

O Significant at 10 percent level
* Significant at 5 percent level
** Significant at 1 percent level
*** Significant at 0.1 percent level

Table VI
Abnormal Volume around Contract Announcements for Contractors, Contractees, and Matched Samples

Average abnormal volume is from the market model for 1029 contractors, 645 contractees, and 500 matched pairs of contractors and contractee announcements. MARV is the mean abnormal relative volume and STDCS-Z is the standardized cross-sectional Z statistic for the mean abnormal relative volume.

Day	Contractors		Contractees		Matched Sample			
					Contractors		Contractees	
	MARV	STDCS-Z	MARV	STDCS-Z	MARV	STDCS-Z	MARV	STDCS-Z
-5	0.76	1.038	-1.90	-0.917	0.48	0.798	-1.72	-1.434
-4	0.53	0.340	-1.06	-0.587	0.33	0.044	-0.54	-0.500
-3	0.84	1.055	-3.27	-3.098**	0.93	1.234	-2.51	-1.841O
-2	2.01	2.529*	-3.72	-3.621***	2.57	1.745O	-3.42	-2.673*
-1	8.09	7.098***	-1.20	-1.377	10.93	6.117***	-0.55	-0.578
0	4.81	5.211***	-0.94	-0.371	6.59	4.358***	-0.95	-0.399
1	3.00	3.096**	-1.99	-1.340	3.79	2.643**	-2.39	-1.356
2	1.37	2.093*	-2.67	-2.409*	1.52	1.509	-2.66	-1.873O
3	1.01	0.390	-2.22	-1.842	0.97	1.101	-2.25	-1.592
4	0.73	0.491	-2.93	-0.127	1.74	1.331	-2.23	-0.147
5	1.97	2.880**	-2.78	-0.390	1.92	1.922	-2.57	-0.110
-1,0	12.89	7.012***	-2.14	-0.957	17.53	5.825***	-1.50	-0.547
-90,-2	27.10	2.259*	-182.51	-2.087*	17.94	1.514	-171.03	-1.556
2,90	28.62	2.415*	-215.39	-1.948*	4.76	1.210	-249.71	-2.696**

O Significant at 10 percent level
* Significant at 5 percent level
** Significant at 1 percent level
*** Significant at 0.1 percent level

Table VII
Contractor Firm Cross-sectional Regression for the Total and the Matched Sub-Samples

This table reports cross-sectional regressions that attempt to explain the cumulative average abnormal return (CAAR) in the two-day announcement window t=-1 and t=0 for the total sample of contractors and the CAAR of a matched sub-sample of contractors that have contractee partners with simultaneous returns available in CRSP. The matched sub-sample is for contractors and contractees in the same contract. RDE is the ratio of research and development expense to total sales. EINT is employee intensity measured by the ratio of employee to sales. RVAR is the volatility of stock returns defined as the variance of stock returns over the period day -290 to day -90 relative to the announcement day zero. MTB is market-to-book value, defined as the (book value of total asset minus the book value of equity + market value of equity) divided by the book value of total assets. NOCOMP is the number of contractors' competitors. Size is firm size measured as the log of total assets. LEV is financial leverage defined as long-term debt divided by total assets. ROA is return on assets defined as net income divided by total assets. INDUST is industry group, which is a dummy variable equal one if the firm is in non-service and zero otherwise. CSIZE is the dollar amount of the contract divided by total assets. DUR is duration of the contract, which is number of years until the end of the contract. NATL is the nationality of the other party in the contract, which is a dummy variable equal one if the party is national and zero otherwise. CAARP is the announcement period CAAR of the other partner in the contract, applicable only to the matched sample. O Significant at 10 percent level. * Significant at 5 percent level. ** Significant at 1 percent level. *** Significant at 0.1 percent level.

	Total Sample				**Matched Sub-Sample**			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
Variable	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**
Intercept	-0.054	-1.44	-0.037	-2.04*	-0.143	-2.06*	-0.061	-1.71
RDE	0.035	1.49	0.004	0.49	-0.042	-0.69	-0.011	-0.49
EINT	-0.131	-0.08	1.077	1.37	5.833	1.23	2.919	1.64
RVAR	34.093	5.71***	20.978	8.74***	65.907	5.92***	32.561	6.74***
MTB	0.006	2.50*	0.003	2.24*	0.009	2.77**	0.005	2.28*
NOCOMP	-0.001	-1.43	-0.000	-0.03	0.000	0.94	0.000	1.82*
SIZE	0.004	1.22	0.002	1.36	0.005	0.91	0.002	0.57
LEV	0.069	1.86*	0.010	0.47	0.166	2.09*	0.041	0.84
ROA	0.168	3.04***	0.070	2.01*	0.379	3.14***	0.169	2.25*
INDUST	-0.013	-0.67	-0.007	-0.63	-0.018	-0.60	-0.003	-0.14
CSIZE	0.052	6.10***	0.052	9.09***	0.062	4.14***	0.073	7.46***
DUR	0.000	0.06	-	-	-0.001	-0.27	-	-
NATL	-0.001	-0.06	0.008	1.51	-	-	-	-
CAARP	-	-	-	-	0.474	1.75O	0.065	0.42
Number of observations	296		534		165		252	
F-Value	10.86***		23.25***		12.46***		17.48***	
R Square	0.4504		0.3644		0.7035		0.5569	
Adjusted R Square	0.4089		0.3487		0.6471		0.5250	

Table VIII
Contractee Firm Cross-sectional Regression for the Total and the Matched Sub-Samples

This table reports cross-sectional regressions that attempt to explain the cumulative average abnormal return (CAAR) in the two-day announcement window t=-1 and t=0 for the total sample of contractees and the CAAR for a matched sample of contractees that have contractor partners with simultaneous returns available in CRSP. Total sample is for US contractee firms where the contractor is a US or foreign company. The matched sub-sample is for contractors and contractees that are parties to the same contract. NOCOMP is the number of the contractors' competitors. Size is firm size measured as the log of total assets. LEV is financial leverage defined as long-term debt divided by total assets. ROA is return on assets defined as net income divided by total assets. INDUST is industry group, which is a dummy variable equal one if the firm is in non-service and zero otherwise. CSIZE is the dollar amount of the contract divided by total assets. DUR is duration of the contract, which is number of years until the end of the contract. NATL is the nationality of the other party in the contract, which is a dummy variable equal one if the party is national and zero otherwise. CAARP is the announcement period CAAR of the other partner in the contract, applicable only to the matched sample. In the matched sample, RDETOR is the research and development expense divided by sales for the contractor counterparties and EINTTOR is employee intensity, the number of employee divided by sales, for contractor counterparties. O Significant at 10 percent level.* Significant at 5 percent level. ** Significant at 1 percent level. *** Significant at 0.1 percent level.

	Total Sample				**Matched Sample**			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
Variable	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**	**Coeff.**	**T-Stat.**
Intercept	-0.008	-0.40	-0.015	-1.53	-0.038	-1.52	-0.017	-0.53
SIZE	0.001	0.56	0.001	1.36	0.002	1.10	0.000	0.01
LEV	-0.009	-0.54	0.019	1.72O	0.011	0.50	0.039	1.22
ROA	-0.014	0.70	0.003	0.23	0.016	0.62	-0.005	-0.15
INDUST	-0.005	-0.83	-0.003	-0.69	0.002	0.19	-0.001	-0.05
CSIZE	0.000	0.25	-	-	0.001	0.23	0.004	0.64
DUR	0.001	0.55	-	-	0.001	0.59	0.000	0.36
NATL	-0.000	-0.01	0.000	0.06	-	-	-	-
NOCOMP	-	-	-	-	0.000	1.78O	0.000	1.59
CAARP	-	-	-	-	0.019	0.63	0.026	0.71
RDETOR	-	-	-	-	-	-	-0.001	-0.21
EINTTOR	-	-	-	-	0.218	0.57	-	-
Number of observations	179		497		165		165	
F-Value	0.37		1.09		0.58		0.53	
R Square	0.015		0.011		0.048		0.067	
Adjusted R Square	-0.025		0.001		-0.035		-0.059	

Figure I
Average Abnormal Return and Volume for Contractors and Contractee Firms around Contract Announcements