

**Tax Expenditures and Government Purchases: The Case of U.S.  
Military Procurement Contracts after the Tax Reform Act of 1986**

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ABSTRACT

This paper considers the impact of the tax treatment of U.S. military contractors on government procurement contracts. Prior to passage of the Tax Reform Act of 1986, taxpayers were permitted to use the completed contract method of accounting to defer taxation of profits earned on long-term contracts. The Tax Reform Act and subsequent legislation passed in 1987 required that at least 70 percent of the profits earned on long-term contracts be taxed as accrued, thereby significantly reducing the tax benefits associated with long-term contracting. Comparing contracts that were ineligible for the tax benefits associated with long-term contracting with those that were eligible, it appears that between 1981 and 1989 the duration of U.S. Department of Defense contracts shortened by an average of between one and 3.5 months, or somewhere between 6 and 29 percent of average contract length. This pattern suggests that the tax benefits associated with long-term contracts promoted artificial contract lengthening prior to passage of the 1986 Act. The evidence is consistent with a behavioral model in which the Department of Defense ignores the federal income tax consequences of its procurement actions, thereby indirectly rewarding contractors who are able to benefit from tax expenditures of various types.

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## **1. Introduction.**

The United States government taxes the incomes earned by individuals and corporations, but the tax laws frequently provide for deviations from strict income taxation, these deviations being loosely grouped in the category of “tax expenditures.” In cases in which they apply, tax expenditure provisions commonly reduce tax obligations associated with producing goods and services, thereby ultimately reducing final prices paid by consumers.

U.S. federal and state governments are major consumers of goods and services, including, in many cases, goods and services whose prices are affected by applicable federal tax provisions. It frequently happens that one part of the federal government decides to offer tax subsidies to firms whose output is purchased by another part of the federal government. In this setting, it is not difficult to imagine outcomes in which the procurement arm of the government responds to lower prices by increasing its consumption of subsidized goods and services, unmindful of the fact that their price advantages stem from benefits for which another part of the government is paying. There remains the question of how important a phenomenon this tax-induced procurement substitution may be, and how it can be distinguished from other aspects of government purchasing decisions.

This paper considers the impact of tax changes in 1986 and 1987 that reduced the benefits associated with long-term contracting. These benefits arise when a low- or zero-tax entity (such as the government) purchases certain goods or services from high-tax providers using contracts that extend beyond a taxable year; under the “completed contract” method of accounting, the income earned on such contracts is not taxed until

the final year of the contract. The benefits of deferring taxation of income earned on such contracts was reduced in the mid-1980s, and as a result, it appears that the U.S. Department of Defense significantly reduced its procurement of goods and services eligible for deferral.

Specific U.S. tax provisions stipulate the allowable accounting methods in reporting contract derived income. These allowable accounting methods dictate the timing for reporting revenue and cost and, thus, for a given marginal tax rate determine the favorability of the overall tax treatment of the derived income. One issue concerning contracting behavior that has received little attention in the literature to date is how this tax treatment of income influences contracting behavior.<sup>1</sup>

There are two ways in which a legislated accounting method that varies across contracts may affect contracting behavior. First, for a contract with given terms, the overall tax treatment of income (i.e., the required timing for reporting income and costs and the marginal tax rate of the contract income) derived from the sale of these goods and services may alter the relative price the consumer faces through standard competitive market forces. Goods and services will be more or less attractive to an optimizing consumer depending on the tax treatment and its resultant effect on price. Second, for a given marginal tax rate, the effective tax rate and the overall cost of the good may be determined by the terms of the contract if the accounting method allows for delayed

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<sup>1</sup> Previous research as focused on the theory of optimal contracting from a principal-agent perspective (see Laffont and Tirole (1993) and Rogerson (1989)). The objective with this work is to determine proper incentive structures in contracting to maximize effort and/or minimize cost given that effort is unobservable and monitoring is costly and imperfect. Another line of research looks at incentives for cost manipulation under certain contract terms (see Rogerson (1992) and Thomas and Tung (1992)). The principle distinction between these studies and the one presented in this paper is that we focus on the determinants of contract terms (called contracting behavior). These other studies focus on behavioral incentives within various contract types.

reporting of income. More specifically, for a given marginal tax rate and dollar value of the contract, the overall cost of the good will decrease as the length of the contract is increased. This relationship creates an incentive for the official contract length to be manipulated where possible.

One of the accounting methods allowed by the U.S. tax code, the Completed Contract Method (CCM), is of special interest in light of the previous discussion.<sup>2</sup> The use of this method provides the firm with a potentially sizeable tax break with respect to the income derived from a contract, since income is reported only once the contract has been completed. Goods with longer production times will be relatively less expensive if the producer can report income using CCM. Therefore, one would expect to observe more contracts with a longer average length for any of two reasons:

1) optimizing consumers will be induced to purchase more of these relatively cheaper goods, and 2) in cases where the contract length is a choice variable in the contracting process, parties may extend the length of qualified contracts in an attempt to reap increased benefits from tax deferral.

To address this issue of the possible link between contracting behavior and the tax treatment of contract income, this paper examines the sensitivity of contract length to modifications in the allowable accounting method resulting from the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), the Tax Reform Act of 1986 (TRA), and the Revenue Act of 1987. All three of these tax acts decreased the benefits derived from extended contract lengths. The paper focuses on contracts entered into by the U.S. Department of Defense (DoD) in 1981 and 1989, and finds that contracts subject to the

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<sup>2</sup> The extent to which this method has been allowed has varied over time.

modifications had a one to 3.5 month decrease in mean length relative to contracts that were not subject to the modifications. This decrease in the mean is equivalent to a six to 29 percent decrease in the contract length.

While not representative of all contracts in the U.S., DoD contracts provide an interesting and useful study. The sensitivity of DoD contracts to the effective tax rate may illuminate the extent to which DoD internalizes the objectives of the rest of the government. For example, suppose the government's production function for providing national defense requires inputs in fixed proportions. When paper towels become relatively less expensive than aircraft carriers, the government cannot substitute paper towels for aircraft carriers and still provide "national defense." Therefore, many of DoD's purchasing decisions should be invariant to the method used to account for income. If the price of a required good falls, DoD should purchase the same bundle for fewer dollars. After all, the price decrease comes at the expense of less tax revenue. If DoD responds to the price decrease without an adjustment to total expenditure, it may indicate that DoD's objectives do not include tax revenue maximization, but cost minimization instead. From a normative perspective, this outcome is of particular interest if Congress and the Treasury fail to account for DoD's behavior when tax policies are determined.

The remainder of the paper is presented in the following manner: a description of the contracts that qualify for special tax treatment and the legislative history behind their tax treatment is discussed in the next section, followed by a model that outlines buyer and seller motivation and the predicted effect of tax treatment on length, a description of the data, the empirical results, and a brief conclusion.

## **Legislative History**

All contract derived income is not treated the same by the U.S. tax system. Taxpayers with income derived from "long-term" contracts have been granted the use of additional accounting methods for reporting income and expenses. These long-term contracts are defined as a building, installation, construction, or manufacturing contract that spans more than one taxable year. The types of manufacturing contracts that qualify for long-term status are further limited to those for the manufacture of a unique item (e.g. ones not normally carried in the firm's finished good inventories), or for items that require more than 12 months to complete.

Prior to 1983, taxpayers with income derived from long-term contracts could choose from the percentage of completion method (PC), the completed contract method (CC), or any of the other more general accounting methods available for reporting contract income. Under the PC method, costs derived from the contract are deducted in the period in which they are incurred, while revenues are allocated over the life of the contract in proportion to the percentage of completion of the good. The percentage of completion calculations could be based on either the percentage of cost incurred relative to total costs, or on the percent of physical completion of the good. In contrast, under the CC method, revenue and costs that are directly allocable to the contract are reported in the year the contract is completed, and costs that are not directly allocable to the contract are deducted in the period in which they are incurred.<sup>3</sup>

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<sup>3</sup> Costs that are not directly allocable to the contract are often referred to as period costs. They are most naturally thought of as overhead or common costs that cannot be specifically assigned to the activities of any one contract.

In 1982, the use of the CC method was modified under TEFRA in an effort to more clearly match contract costs to contract income.<sup>4</sup> In the case of extended-period long-term contracts (long-term contracts that last more than 24 months) some previously defined period costs were reclassified as contract costs, thus requiring them to be carried forward and accounted for at the time the contract is completed. These included, among others, research and development expenses attributable to a long-term contract in existence at the time they are incurred, or which are incurred under an agreement to perform the research and development. Contracts for construction with an expected duration of less than 36 months or with contractors who have a maximum average gross annual income of \$25,000 are exempt from the cost reclassification regulations. These modifications took effect December 31, 1982, with a phase-out of the deductibility of the newly classified contract costs over a three year period.

Four years later, the Tax Reform Act of 1986 made broad changes in the use of the PC and CC accounting methods for reporting income derived from long-term contracts. Changes to the PC method resulted because "the Congress recognized the use of the percentage of completion method may produce harsh results for taxpayers in some cases, for example, where an overall loss is experienced on the contract, or where actual profits are significantly less than projected."<sup>5</sup> Changes to the CC method resulted, on the other hand, from a perception in Congress that this method led to low or negative tax rates and an unjustified income deferral (especially among large defense contractors).<sup>6</sup>

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<sup>4</sup> The regulations on the use of the PC method were left entirely intact by TEFRA.

<sup>5</sup> U.S. Congress, Committee on Joint Taxation (1987).

<sup>6</sup> U.S. Congress, Committee on Joint Taxation (1987).



The revisions to the PC method enacted by TRA removed the option of calculating the percentage of completion based on physical completion. Furthermore, the percentage of completion calculation now must be based on all costs for which capitalization is required. A "look-back" adjustment to the tax liability of past years was also adopted. This procedure was designed to account for circumstances where uncertainty in completion and revenues might lead to unduly extreme tax outcomes over the life of the contract. Once the contract has been completed and income and costs are known with certainty, taxes over the course of the contract's life are recalculated. Any discrepancies between the actual payment and the ex-post calculations are then settled. This settlement allows the firm to receive a tax credit to compensate for excess tax payments that may have arisen from calculations based on expected income.

In name, the CC method is no longer an option for reporting long-term contract income. The CC method was replaced by the Percentage of Completion-Capitalized Cost method (PCCC). In reality, the PCCC method is a hybrid of the "old" CC method and the "new" PC method. Under the PCCC method, 40 percent of the contract income and costs are reported based on percentage of completion.<sup>7</sup> The remaining 60 percent of the contract income and costs are reported when the contract is completed.<sup>8</sup> Thus, only 60 percent of the taxable income from the contract could be deferred until the contract is completed. The Revenue Act of 1987 reduced the percentage eligible for deferral to 30

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<sup>7</sup> The "look-back" adjustment procedure is applied to this 40 percent of the contract income.

<sup>8</sup> The PCCC method is to be applied to all contracts that are not accounted for using the straight PC method. Taxpayers who had previously used the more traditional methods, such as the accrual shipment method, were also required to use the PCCC method for their long-term contracts.

percent, so after 1987 at least 70 percent of contract income was taxed based on percentage of completion.

The effect of the changes to the CC method on the incentive to manipulate the contract length can be seen from the following example. Consider a firm with \$250,000 in profits from a one year contract. For simplicity, assume the contract revenue and costs are all incurred on the first day of the contract. Under the "old" CC method, the contractor could increase his after tax profits by approximately \$5700 if he could artificially extend the contract length by one more year. (This assumes a marginal tax rate of 35 percent and a pretax interest rate of 10 percent.) Now, under the PCCC method, the contractor only gains 30 percent of the original amount, or roughly \$1700 from gaming the contract length under the new regime. Under the PC method, the contractor gains nothing.

Following the revisions to the tax code, shorter DoD contract lengths may be observed on average for either of two reasons. First, the gains to a contractor from gaming, coupled with a risk of detection will decrease the incentive to game. Second, goods from longer contracts are now more expensive than they were before the tax change. DoD may respond to normal competitive market forces and purchase more of the relatively cheaper items--those with a shorter contract length.

### **Theory**

We model the Department of Defense consumption decision over items  $1, \dots, N$ , using standard welfare maximization. The Department of Defense maximizes the welfare function:

$$W[x_1 \varphi(t_1), x_2 \varphi(t_2), \dots, x_N \varphi(t_N)] \quad (1)$$

subject to the budget constraint:

$$x_1 p_1(t_1, \alpha) + x_2 p_2(t_2, \alpha) + \dots + x_n p_n(t_n, \alpha) \leq M \quad (2)$$

where  $x_i$  is the quantity of item  $i$ ,  $t_i$  is the time to delivery of item  $i$ , and  $\varphi(\cdot)$  is a function that converts time to delivery into "effective" units of a good.  $\varphi(\cdot)$  captures the idea that time to delivery affects the level of welfare DoD achieves from consuming any given quantity of a good. According to this specification, time to delivery is a separate attribute that DoD can choose for each item. The price of  $x_i p_i(t_i, \alpha)$ , depends on time and the tax treatment,  $\alpha$ , of the derived income.

Maximizing welfare, subject to the budget constraint, with respect to the choice variables  $x_i$  and  $t_i$  yields the following first order conditions:

$$\frac{\partial W}{\partial x_i} \varphi(t_i) = \lambda p_i(t_i, \alpha) \quad \forall i \quad (3)$$

$$\frac{\partial W}{\partial \varphi} x_i \varphi'(t_i) = \lambda x_i \frac{\partial p_i(t_i, \alpha)}{\partial t_i} \quad \forall i \quad (4)$$

Combining (3) and (4) yields:

$$\frac{\varphi'(t_i)}{\varphi(t_i)} = \frac{\frac{\partial p_i(t_i, \alpha)}{\partial t_i}}{p_i(t_i, \alpha)} \quad \forall i \quad (5)$$

Equation five is simply an elasticity condition. It states that in equilibrium DoD will trade off delivery time of  $x_i$  to the point where the price elasticity of  $x_i$  equals DoD's elasticity of marginal welfare.

In order to see what effect the tax treatment,  $\alpha$ , has on time to delivery,  $t_i$  consider a standard discounting specification for  $\varphi(\cdot)$ :

$$\varphi = \delta\beta^{-\gamma t} \quad (6)$$

Taking the log of (6) and differentiating with respect to time, the left-hand-side of (5) then equals:

$$\frac{\varphi'}{\varphi} = -\gamma \ln(\delta\beta) \quad (7)$$

Also, consider the following specification for  $p_i(t_i, \alpha)$ :

$$p = \frac{\zeta(1 - \alpha t)}{\ln(t)} \quad t > 1 \quad (8)$$

The right-hand-side of equation (5) then becomes:

$$\frac{dp/dt}{p} = \frac{-\alpha}{1 - \alpha t} - \frac{1}{t(\ln(t))} \quad (9)$$

By (7), this expression is constant in equilibrium.

$$d(\underline{dp/dt})$$

Clearly,  $\frac{p}{d\alpha} < 0$ . Differentiating (9) with respect to  $t$  yields:

$$\frac{d(dp/dt)}{dt} = \frac{-\alpha^2}{(1-\alpha t)^2} + \frac{1+\ln(t)}{[t(\ln(t))]^2} \quad (10)$$

$$\frac{d(dp/dt)}{dt} \Big|_{\alpha=0} > 0, \text{ so } \frac{dt}{d\alpha} > 0 ;$$

time to delivery increases as the tax treatment of contract length becomes more favorable.

### The Data

The data for the empirical analysis originally come from the Department of Defense (DoD) *Defense Contract Action Data System (DCADS)*, fiscal years 1981 and 1989.<sup>9</sup> The data consist of all contracting actions within DoD in excess of \$10,000 in FY81 and \$25,000 in FY89. These actions are reported on the DD Form 350, the Individual Contract Action Report (ICAR). The report gives information on the contracting office, action date, type of contract action (cancellation, modification, etc), the type of contract, contractor, type of good or service, place of performance, weapon system that the contract belongs to (if relevant), the expected completion date, and the contract value. Nominal dollar contract values have been converted to 1987 constant dollars using the price index for government purchases of goods and services for national defense. In 1981 there were 374,804 contract actions totaling over \$119 billion (87\$); in 1989 there were 222,597 actions worth over \$122 billion (87\$).

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<sup>9</sup> The data for 1989 were obtained through the Federal Procurement Data Center of the General Services Administration (GSA). The GSA receives the data directly from DoD, but usually reports the data in a different format. Not all fields of the original DoD data are available from the GSA, and some fields may have been combined with other fields or even reclassified.

The actual sample used in the study is a subset of the full sample from each of those years. The sample was limited to new contract awards that were negotiated by and for the DoD in either 1981 or 1989. Because the data represent all contract *actions*, the selection criterion eliminates modifications to existing contracts that can take the form of terminations, cancellations, increases in the scope of work, funding actions, etc., as well as orders from contracts which may have been let by other Federal agencies or other contracting offices within DoD. Contracts for sales to foreign governments or international institutions were also dropped.<sup>10</sup> The sample in 1989 was further limited by the complication that the information on the expected completion date was voluntarily supplied by the contracting office. Roughly half of the original sample of records contain this information and the sample means for the observations with and without the estimated completion date are not systematically different with respect to the other information that was supplied. Eliminating records with identifiable reporting errors narrowed the final sample size to 165,160 observations which consist of 121,993 contracts from 1981, and 43,167 contracts from 1989.<sup>11</sup> Table 1 and table 2 present summary statistics for the final combined sample and for the two yearly sub-samples, respectively.

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<sup>10</sup> The data were narrowed to this subset for two reasons: to ensure that the types of contracts across the two years were as consistent as possible (given the different end-use sources of the data and small differences in the DD Form 350), and to ensure that the contracts were truly let under the tax regime they are identified with.

<sup>11</sup> Identifiable errors include contracts with a negative calculated length and those with a dollar value less than zero.

## Results

As indicated by the summary statistics found in Table 2 for the samples of defense contracts let in 1981 and 1989, the mean contract length in 1989 was roughly 1.2 months *longer* than the mean contract length in 1981. This is a rather crude measure of contract length since it does not control for many characteristics of the contracts which may explain the difference in the mean lengths over the two years. For instance, contracts with a larger dollar value most certainly are longer on average, assuming dollar value is an indication of the complexity of the purchased good. Since DoD let more contracts with a larger (constant) dollar value in 1989, we would expect to see a longer unconditional mean contract length. Therefore, we begin the empirical investigation by estimating contract length as a function of observable contract and contractor characteristics and a 1989 year dummy. Because not all contracts were affected by the modifications of the tax code, the analysis is extended to allow for a comparison of the difference in contract length over time between contracts that were potentially affected by the modifications and contracts that were not. This analysis is performed using three different classifications: subject matter of the contract, tax status of the firm, and the combination of subject matter and tax status.

The first column of Table 3 presents results based on the estimation of contract length (in years) as a function of a 1989 year dummy variable and various characteristics of the contract and contractor, as specified in Equation 11:

$$\begin{aligned} \text{Length} = & \alpha_0 + \gamma * \text{year}_{89} + \alpha'_1 * (\text{contract type dummy}) \\ & + \alpha'_2 * (\text{contract action dummy}) + \alpha'_3 * (\text{type of business dumm}) \\ & + \alpha'_4 * (\text{place of performance dummy}) + \alpha'_5 * (\text{subject matter} \end{aligned} \quad (11)$$

$$+ \alpha'_6 *(claimant\ group\ dummy) + \alpha_7 *dollar$$

The variables measuring contract and contractor characteristics are designed to control for that portion of the contract length that can be explained by different mixes of these characteristics over the two years. Such explanatory characteristics include the type of contract, classified by the remuneration and, where relevant, incentive terms of the contract; the kind of contract action, or the nature of the first binding document of the contract; the type of business or contractor; the geographic place of performance; the subject matter of the contract, or the good or service the contract covers; and the claimant group, or the broad procurement program the contract is identified with (determined by the end use of the purchased item).<sup>12,13</sup> The inclusion of contract value (*dollar*) as a

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<sup>12</sup> An example of the relationship of claimant groups to specific contracts is a contract for tires classified in the combat vehicles claimant group.

<sup>13</sup> Contracts are let as fixed price when costs are known with relative certainty at the outset of the contract. Firm fixed price contracts do not allow for any adjustment to the compensation terms. Fixed price contracts with economic price adjustments allow for adjustable terms based on contingencies. For instance, contracts for goods that require price volatile components will often allow economic price adjustments to compensate for the price uncertainty of these components. Fixed price redetermination means the price is fixed for an initial period, with possible redetermination at a later date (when future expected uncertainty is resolved). Contracts are let as cost reimbursement when costs are not known with enough certainty and fixed price contracts are therefore unsuitable. Under cost contracts, contractor cost is reimbursed and the contractor receives no fee. Under cost sharing contracts, the contractor is reimbursed for a portion of the cost only. Both classes of contracts (i.e. fixed price and cost reimbursement) also have incentive based versions. Award fees are designed to motivate excellence in quality, timeliness, cost effective management, etc. The award may be given at any time during the performance. Under incentive fee arrangements (associated with cost reimbursement contracts), contractors work within agreed upon target costs and a target fee. The actual fee will be higher (lower) than target if the actual cost is lower (higher) than target. Under incentive arrangements (associated with fixed price contracts) contractors work within target costs, target profits and a price ceiling. At the completion of a contract, the parties renegotiate final costs. If actual costs are lower (higher) than target costs, actual profit is higher (lower) than target profit. The final price is also reset. Under time and materials contracts, contractors are reimbursed for time and materials based on a predetermined agreement of an hourly wage rate, overhead, administration expenses profit, materials costs and handling costs. Labor hours contracts are similar to time and materials contracts except that materials are excluded.



regressor is intended to reflect any gaming effects that may be sensitive to the value of the contract. For instance, if there is a cost or a penalty when a contractor is suspected of gaming the completion date, contractors may be reluctant to increase the contract length for less valuable contracts, all else equal. The estimate of the constant term indicates that the base contract--a firm, fixed-price letter contract in 1981 with a large domestic firm for supplies produced in the U.S for use in the missiles and space systems program--has a mean length of one year.

The estimated coefficient on *year*<sub>89</sub> indicates that contracts let in 1989 were still one and a half months longer, on average, than those let in 1981, even with the inclusion of covariates to control for contract characteristics that might affect the length. As previously suspected, various contract and contractor characteristics do contribute to sizeable differences in the length of defense contracts. The coefficients on the claimant group dummy variables indicate that contracts from the airframes and aircraft engines claimant groups are 2.25 and 1.75 months longer respectively than contracts from the base case claimant group of missiles and space systems. Contracts from all other claimant groups are 0.25 months to 8.75 months shorter than those in the missiles and space systems claimant group, all else held equal. All other types of contracts are longer than firm fixed price, with fixed price incentive, cost plus-award fee, cost sharing, and cost plus-incentive fee contracts contributing from ten to 12 months more to the length. Contracts let to small, non-profit, and foreign contractors are less than one month shorter on average than contracts with large firms, all else equal. Service and research, development, test and evaluation (RDTE) contracts are .5 months and 2 months longer

than supply contracts, respectively, and each additional billion dollars in contract value contributes 6.7 years to the contract length.<sup>14</sup>

There are potentially many factors in addition to TEFRA and TRA that may have been influencing contract lengths over this period. For instance, the decline in the total constant dollar value of DoD obligations after 1987 and the thawing of the Cold War may have led to a change in acquisition policy that systematically changed contract lengths between 1981 and 1989.  $Year_{89}$  is only capable of capturing the unexplained time variation in all contracts, regardless of the cause. Therefore, the estimate of the  $year_{89}$  coefficient in the first column of Table 3 reflects the total combined influence from all of these factors, and not just the influence of the change in the tax code.

One way to better isolate the effect of the change in the tax code is to construct a group of contracts that are potentially affected by the new regulations via eligibility for the special tax treatment. The remaining contracts then comprise the ineligible group. These should be immune to changes in the tax code. Before and after comparisons in contract length can then be made between the eligible group and the ineligible group. This approach, in essence, controls for events that occurred between 1981 and 1989 and influenced the length of all contracts (like broad changes in acquisition policy, for example). This strategy amounts to estimating an equation of the form:

$$\text{length} = \alpha + \beta \text{eligible} + \gamma \text{year}_{89} + \delta \text{eligible} * \text{year}_{89} + p'Z \quad (12)$$

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<sup>14</sup> It is possible that *dollar* and *contract type* are endogenous to contract length. Estimation results are robust to the exclusion of both.

where *eligible* takes the value of 1 if the contract is eligible for special tax treatment, *year<sub>89</sub>* takes the value of 1 if the contract was let in 1989, *eligible\*year<sub>89</sub>* is the interaction of *eligible* and *year<sub>89</sub>*, *Z* is a vector of additional covariates of the form discussed in Equation 1, and  $\varepsilon$  is the disturbance term. This specification controls for time and group effects, and allows the time effect to vary for the two groups. Figure 1 illustrates how this specification is equivalent to a comparison of the two groups of contracts before and after the tax code change.

**Figure 1**

	1981	1989	Difference in length over time within group
Eligible Group	$\alpha + \beta$	$\alpha + \beta + \gamma + \delta$	$+\gamma + \delta$
Ineligible Group	$\alpha$	$\alpha + \gamma$	$\gamma$
Difference in length across groups within a period	$\beta$	$\beta + \delta$	$\delta$

The four panels in the upper left corner of the table indicate which coefficients from the estimating equation represent the appropriate time-group effect. The right-most column gives the measured *time* variation of length *within a group*, while the bottom row yields

the measured *group* variation of length *within a time period*. Finally, the bottom right corner of the table presents the desired "tax code" effect: the result of comparing differences in estimated contract length over time for the two groups. This effect is ultimately captured by the coefficient on the interaction term in the estimating equation.

The applicability of TEFRA and TRA provide several groups with which to test the effect of accounting methods on contracting behavior. Recall that the changes in the allowable accounting methods applied only to *long-term* contracts, which are defined as building, installation, construction and qualified manufacturing contracts that span more than one taxable year. All other contracts, regardless of the length, were unaffected by the change in allowable accounting methods. Given the applicability rules, it would not be appropriate to select the group of potentially eligible contracts based on contract length for three reasons. First, this type of selection would include service contracts that are not eligible, regardless of their length. Second, the tax code applies to contracts that span more than one *taxable* year. Since firms have different tax calendars, contracts as short as one month might qualify. Third, selecting on contract length would ultimately be equivalent to selecting on the residual of the relationship between contract length and its determinants. Because of regression to the mean, this selection mechanism will bias the results in favor of finding a tax treatment effect.

Information on the subject matter of the contracts was used to identify those contracts that are potentially eligible for long-term contract treatment. This group of potentially tax sensitive contracts include all supply, and RDTE contracts. A subset of service and construction contracts was also included. These include contracts for the installation of equipment; maintenance, repair and rebuilding of equipment; construction

of structures and facilities; maintenance, repair or alteration of real property; and modification of equipment.<sup>15</sup>

Estimation results for all coefficients are presented in the second column of Table

3. Figure 2 reproduces a subset of the coefficients in the manner of Figure 1.

**Figure 2**

	1981	1989	1989-1981
Eligible goods (110,592;39,648)	1.024 (0.018)	1.130 (0.018)	0.106 (0.003)
Ineligible goods (11,401;3519)	1.102 (0.019)	1.275 (0.020)	0.173 (0.010)
Eligible - Ineligible	-0.078 (0.007)	-0.145 (0.010)	<b>-0.067</b> <b>(0.010)</b>

Notes: Standard errors are in parentheses. The numbers under the group headings indicate sample size for each year.

Contracts in both groups were longer on average in 1989 than in 1981, 0.106 and 0.173 years for the contracts subject to the regulation change and those immune to the change, respectively. However, the contracts that were potentially subject to the regulations had a smaller increase in length than contracts that were not. The difference in the amount of intragroup change was 0.067 years (roughly 3.5 weeks) less for eligible contracts, or 6.1 percent, all else equal.

<sup>15</sup> A listing of service and construction contracts as they are broadly grouped by DoD is presented in the appendix.

Because the tax code does not specify exactly what defines a building, installation, construction or manufacturing contract, it is possible the findings in Table 3 and Figure 2 are an artifact of the proposed interpretation of which contracts were subject to the legislation. This may be especially true in the case of various service contracts. To address this issue, estimates were obtained by varying the definition of the eligible and ineligible groups. Based on the listing of broad service and construction contract groups in the appendix, RDTE contracts; maintenance, repair and rebuilding of equipment contracts (8); and repair or alteration of real property contracts (23) were alternatively included in the control. Also, contracts that deal with the construction-related work of architects and engineers (2) were included in the tax applicable group. The direction of the results are robust to these modifications in specification, with the difference in the amount of intragroup change varying from 0.027 to 0.126 years.

Exploiting information on the tax status of the contractor provides another way of isolating the effect of TEFRA and TRA on the length of contracts. An appealing aspect of this approach is its insensitivity to interpretations of the applicability of the law. Domestic firms with taxable earnings from work performed in the U.S. would be most sensitive to changes in the U.S. tax code and non-profit organizations, foreign firms, and domestic firms performing work outside the U.S. would be the least sensitive.<sup>16</sup> Hence, a second set of study groups can be defined by tax sensitive and tax insensitive firms.

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<sup>16</sup> Recall that all foreign firms regardless of place of performance and all domestic firms performing outside the U.S. are classified as "foreign" in the empirical work in this study. Hines (1993) finds that on average foreign firms performing in the U.S. are less tax sensitive than U.S. firms because some foreign firms are tax-exempt. Hines and Hubbard (1990) find that 84 percent of U.S. firms performing outside the U.S. do not repatriate dividends and therefore are not subject to U.S. taxes. This indicates that small changes in the U.S. tax code will not affect the behavior of these firms on average.

Column three of Table 3 reports coefficient estimates for all variables; Figure 3 reports the selected subset.

**Figure 3**

	1981	1989	1989-1981
Tax Sensitive Firms (111,773;38,081)	1.032 (0.018)	1.130 (0.018)	0.098 (0.003)
Tax Insensitive Firms (10,220;5086)	0.933 (0.022)	1.140 (0.023)	0.207 (0.009)
Sensitive - Insensitive	0.099 (0.013)	-0.010 (0.014)	<b>-0.109</b> <b>(0.009)</b>

Notes: Standard errors are in parentheses. The numbers under the group headings indicate sample size for each year.

Again, the results indicate that all contracts increased in length from 1981 to 1989, 0.098 and 0.207 years for contracts with tax sensitive and tax-insensitive firms, respectively. However, firms with tax sensitive income experienced a smaller increase in contract length of 0.109 years (roughly five weeks) or 11.7 percent.

The underlying idea behind the analysis thus far is that one group of contracts is affected by the tax change and one is not, either by virtue of the tax status of the firm or the type of good or service the contract covers. Neither of the specifications that rely on identification through subject matter or tax status separately are entirely correct for this setup because we know that only eligible contracts with tax sensitive firms should be affected. By grouping contracts according to only one of these dimensions, we

potentially misrepresent the impact of TEFRA and TRA on length. Some contracts that are not subject to the legislation by virtue of the contractor's tax status could have been incorrectly classified into the tax sensitive group by virtue of the subject matter of the contract. This misclassification will bias the estimate toward zero.

A better strategy for identifying the influence of TEFRA and TRA is to exploit both dimensions of applicability at the same time. This serves to reduce the bias created by knowingly incorrectly grouping eligible contracts into the group of ineligible ones. This strategy is accomplished by estimating an augmented form of Equation 12:

$$h = \alpha + \beta_1 \textit{eligible} + \beta_2 \textit{sensitive} + \gamma \textit{year}_{89} + \delta_1 \textit{eligible} * \gamma \textit{sensitive} + \delta_2 \textit{sensitive} * \textit{year}_{89} + \xi \textit{eligible} * \textit{sensitive} * \textit{year}_{89} + p'Z + \quad (13)$$

where *eligible* takes the value of 1 if the contract is in the group of potentially eligible contracts defined by subject matter, *sensitive* takes the value of 1 if the contract is in the tax sensitive group defined by the tax status of the contractor, *eligible\*sensitive* is the interaction of *eligible* and *sensitive*, and *eligible\*sensitive\*year<sub>89</sub>* is the interaction of the two treatment groups and *year<sub>89</sub>*. As with Equation 2, this specification controls for time, group, and time-varying group effects. In addition, it controls for group effects in two dimensions (firm tax status and subject matter), allows these to vary over time and also allows for group varying treatment effects.

Full estimation results for Equation 13 appear in Table 4. These results are very similar to those found in Table 3. Various contract and contractor characteristics still contribute to sizeable differences in the length of defense contracts. The coefficients on the claimant group dummy variables indicate that contracts from the airframes and aircraft engines claimant groups are 2.25 and 1.75 months longer respectively than



contracts from the base case claimant group of missiles and space systems. Contracts from all other claimant groups are 0.25 months to 8.75 months shorter than those in the missiles and space systems claimant group, all else held equal. All other types of contracts are longer than firm fixed price, with fixed price incentive, cost plus-award fee, cost sharing, and cost plus-incentive fee contracts contributing from 10.5 to 12.4 months more to the length. RDTE contracts are 2.5 months longer than supply contracts and each additional billion dollars in contract value contributes 6.7 years to the contract length.

Table 5 presents a subset of the results from estimation of Equation 13 in a manner similar to Figure 1. The top panel presents time-group effects, time variation within groups, group variation within a period, and the "tax treatment effect" for taxable firms. Within this subset of firms that are affected by TEFRA and TRA, all contracts increased in length between 1981 and 1989. Those contracts that were subject to the new regulation by virtue of subject matter experienced an increase of 11.2 percent (0.118 years or roughly 1.5 months) less than contracts that were not.

The middle panel of Table 5 presents analogous results for tax-exempt firms. This panel illustrates the effect of unexplained influences on length for both types of contracts. Because tax-exempt firms were not affected by TEFRA and TRA, the variation in contract lengths within groups over time and across groups within a time period must be reflecting other factors beside those having to do with the tax code. All contracts increased in length over the period, but contracts that broadly could be classified as sensitive to the change in the tax code had a *larger* increase in length.

The bottom panel of Table 5 gives the estimated "true" tax treatment effect when applicability in both the firm tax status and subject matter dimensions are taken into

account. Contracts for goods and services subject to the regulation and with firms with tax sensitive income experienced an increase in length of 28.7 percent (0.303 years) less between 1981 and 1989 than contracts with tax insensitive firms or for goods and services not affected by modification to the tax code produced by TEFRA and TRA.

Only contracts for manufactured goods must exceed 12 months to qualify for long-term status. All other eligible contracts will qualify if the contract spans more than one taxable year. Hence, it is possible that contracts as short as 2 months might qualify for long-term status and would be sensitive to modification in the allowable accounting methods. However, on average longer contracts are most likely more sensitive than shorter ones. First, longer contracts are more likely to span taxable years. Second, if longer contracts are correlated with a larger dollar value, the tax benefit derived from extending the contract length is larger, in an absolute sense, in the case of longer contracts. We explore the possibility that longer contracts are most sensitive to the modifications in the tax code by estimating quantile regressions for the 50th, 75th and 90th percentiles. Full results for quantile estimation of Equation 13 appear in Table 6. A comparison of the results across quantiles indicates that the relationship between contract length and the covariates is not constant for all points in the distribution of contract length. Furthermore, a comparison of the results in Table 6 and the results in Table 4 indicate that the estimated effect of the non-treatment related covariates on the mean are most similar to the estimated effect of these same covariates in the 50 to 75 percentile range of contract length.

Table 7 reproduces a subset of the results dealing with the "treatment" effects. Columns one and two present the difference in time variation between eligible and

ineligible groups for taxable and tax-exempt firms, respectively. Column three presents the overall difference between taxable and tax-exempt firms. The results found in column one indicate that for all quantiles, contract lengths for eligible contracts increased less than contract lengths for ineligible contracts. This finding supports the idea that contract lengths for eligible goods produced by taxable firms are sensitive to the tax treatment of the contract. The results found in column two indicate that contract lengths for eligible goods produced by tax-exempt firms actually increased over time relative to non-eligible goods produced by the same type of firms. These results are similar to the result from mean estimation presented in Table 5.

Finally, column three gives the estimated "true" tax treatment effect when applicability in both the firm tax status and the subject matter dimensions are taken into account. In both a relative and absolute sense, contracts in the 90th percentile were more sensitive than contracts in the 50th or 75th percentile. Contracts in the 90th percentile decreased in length by 0.28 years or 15 percent, while contracts in the 50th and 75th percentile decreased by 0.15 and 0.17 years or 20 and 13 percent, respectively.

The estimated conditional median is 0.732 years. Therefore, a median contract will only qualify for long-term status if the contract spans two taxable years. Contracts in the 75th percentile will automatically qualify with respect to length since the estimated conditional length for the 75th percentile is 1.3 year. All qualified contracts (i.e., those that span more than one tax year) should be affected by changes in the tax code, regardless of the absolute length. However, there is an additional element of gaming with shorter contracts that expire near the end of a taxable year. Firms that extend the length of these contracts to span two tax years will be able to take advantage of the tax deferral.

This may explain the increased sensitivity at the median, as a percent of the estimated conditional median, relative to the 75th percentile.

## **Conclusion**

This analysis of defense contracts in 1981 and 1989 offers evidence of the influence of allowable accounting methods for tax purposes on contract lengths for firms engaging in long-term contracts. Estimates of the decrease in mean length of all contracts that resulted from modifications to the completed contract and the percent of completion methods of accounting range from slightly less than one month to over 3.5 months, or six to 29 percent of the contract length. These estimates indicate that tax policy can have a substantial influence on firm contracting behavior.

To what extent was activity subsidized by the Treasury through CCM? Estimates of the additional revenue the Treasury was to receive as a result of TRA86 can shed some light on this question. The Joint Tax Committee estimated that the Treasury would receive an additional \$2.278 billion in receipts as a result of the changes in the tax code. Using the then-applicable corporate tax rate of 34 percents this implies that \$6.7 billion of income earned in 1989 would otherwise have gone unreported that year (i.e., in a pre-TRA86 world). Using DoD contracts as a guide, the mean value-weighted contract in 1989 was 1.98 years long. Assuming this \$2.278 billion was invested for 1.98 years at an interest rate of ten percent, \$470 million was earned in interest. This amount was 0.36 percent of the total value of all contracts DoD entered into in 1989.

The benefits derived from the use of the CCM are most likely widespread. With respect to DoD contracts, it seems reasonable to imagine that both DoD and its contractors shared the benefits. Contractors have higher profits, and DoD gains by

effectively expanding its budget. The benefits are shared because both parties have leverage in contracting. Contractors have extreme leverage in negotiating contracts once they have secured the contract for developing a major system and the work is well under way. At that point, DoD has substantial investments in the system. Unless DoD chooses to sacrifice the investment, to some extent it is held captive by the contractor. Of course, DoD has power in that it can always threaten to contract with the firm's competitors in the future instead.

## Appendix

### Department of Defense Listing of Other Services and Construction

1. Special Studies and Analyses - Not R&D
2. Architect and Engineering Services - Construction
3. Automatic Data Processing and Telecommunications
4. Purchase of Structures and Facilities
5. Natural Resource Management
6. Social Services
7. Quality Control, Testing and Inspection Services
8. Maintenance, Repair, and Rebuilding of Equipment
9. Modification of Equipment
10. Technical Representative Services
11. Operation of Government-Owned Facility
12. Installation of Equipment
13. Salvage Services
14. Medical Services
15. Professional, Administrative and Management Support Services
16. Utilities and Housekeeping Services
17. Photographic, Mapping, Printing, and Publication Services
18. Training Services
19. Transportation and Travel
20. Lease or Rental of Equipment
21. Lease or Rental of Facilities
22. Construction of Structures and Facilities
23. Maintenance, Repair or Alteration of Real Property

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**Table 1**

## Summary Statistics

Variable	Min	Max	Mean	Standard Deviation
<b>Length (Years)</b>	0	10.41	0.60	0.57
<b>Claimant Group Dummy</b>				
Airframes	0	1	0.034	0.180
Aircraft Engines	0	1	0.018	0.134
Other Aircraft Equipment	0	1	0.047	0.211
Missile & Space Systems	0	1	0.027	0.161
Ships	0	1	0.057	0.231
Combat Vehicles	0	1	0.017	0.127
Non-Combat Vehicles	0	1	0.018	0.133
Weapons	0	1	0.016	0.124
Ammunition	0	1	0.007	0.082
Electronics & Communications Equipment	0	1	0.125	0.331
Petroleum	0	1	0.023	0.148
Other Fuels & Lubricants	0	1	0.002	0.039
Containers & Handling Equipment	0	1	0.000	0.200
Textiles, Clothing & Equipage	0	1	0.015	0.122
Building Supplies	0	1	0.009	0.096
Subsistence	0	1	0.107	0.309
Transportation Equipment (Railway)	0	1	0.000	0.009
Production Equipment	0	1	0.006	0.076
Construction	0	1	0.154	0.361
Construction Equipment	0	1	0.003	0.053
Medical & Dental Supplies & Equipment	0	1	0.028	0.164
Photographic Equipment	0	1	0.005	0.070
Material Handling Equipment	0	1	0.004	0.062
Other Supplies & Equipment	0	1	0.181	0.385
Services	0	1	0.100	0.300

**Table 1 (continued)**

Variable	Min	Max	Mean	Standard Deviation
<b>Type of Contract Dummy</b>				
Fixed Price, Redetermination	0	1	0.001	0.025
Firm Fixed Price	0	1	0.892	0.310
Fixed Price, Economic Price Adjustment	0	1	0.049	0.216
Fixed Price, Incentive	0	1	0.002	0.040
Cost Plus, Award Fee	0	1	0.001	0.032
Cost Contract	0	1	0.010	0.100
Cost Sharing	0	1	0.001	0.038
Cost Plus, Fixed Fee	0	1	0.040	0.195
Cost Plus, Incentive Fee	0	1	0.001	0.034
Time & Materials	0	1	0.003	0.052
Labor Hours	0	1	0.001	0.027
<b>Type of Contracting Action Dummy</b>				
Letter	0	1	0.006	0.077
Definitive, Superseding Letter	0	1	0.003	0.054
Definitive	0	1	0.991	0.094
<b>Type of Business Dummy<sup>1</sup></b>				
Small	0	1	0.584	0.493
Large	0	1	0.323	0.468
Non-profit	0	1	0.017	0.131
Foreign	0	1	0.075	0.264
<b>Place of Performance Dummy<sup>1</sup></b>				
Domestic	0	1	0.925	0.264
US Territory	0	1	0.003	0.059
Foreign	0	1	0.072	0.258
<b>Subject Matter of Contract Dummy</b>				
Research, Development, Test & Evaluation (RDTE)	0	1	0.055	0.228
Service	0	1	0.252	0.434
Product	0	1	0.694	0.461
<b>Dollars (million 87\$)</b>	0.012	827.846	0.475	7.169
<b>N = 165,160</b>				

<sup>1</sup> Small, Large, and Non-profit refer to domestic firms performing the work in the U.S. Foreign refers to *any* type of firm performing the work outside the U.S. (in either a U.S. territory, possession or a foreign country) as well as foreign firms performing the work within the U.S.

**Table 2**Sample Means By Year<sup>1</sup>

Variable	1981	1989
<b>Length (Years)</b>	0.57	0.67
<b>Claimant Group Dummy</b>		
Airframes	3.55	2.80
Aircraft Engines	1.75	2.10
Other Aircraft Equipment	4.67	4.68
Missile & Space Systems	2.46	3.23
Ships	6.16	4.32
Combat Vehicles	1.76	1.35
Non-Combat Vehicles	1.72	2.05
Weapons	1.63	1.39
Ammunition	0.55	1.02
Electronics & Communications Equipment	13.27	10.49
Petroleum	2.35	2.00
Other Fuels & Lubricants	0.13	0.23
Containers & Handling Equipment	0.04	0.04
Textiles, Clothing & Equipage	1.55	1.41
Building Supplies	0.98	0.83
Subsistence	9.98	12.66
Transportation Equipment (Railway)	0.01	0.01
Production Equipment	0.60	0.51
Construction	14.21	18.79
Construction Equipment	0.33	0.12
Medical & Dental Supplies & Equipment	2.92	2.27
Photographic Equipment	0.54	0.33
Material Handling Equipment	0.42	0.30
Other Supplies & Equipment	18.66	16.54
Services	9.75	10.56

<sup>1</sup> Units are percent of sample unless otherwise indicated.

**Table 2 (continued)**

Variable	1981	1989
<b>Type of Contract Dummy</b>		
Fixed Price, Redetermination	0.03	0.15
Firm Fixed Price	88.51	91.26
Fixed Price, Economic Price Adjustment	5.71	2.71
Fixed Price, Incentive	0.15	0.17
Cost Plus, Award Fee	0.05	0.25
Cost Contract	0.93	1.07
Cost Sharing	0.16	0.11
Cost Plus, Fixed Fee	4.02	3.76
Cost Plus, Incentive Fee	0.12	0.09
Time & Materials	0.24	0.38
Labor Hours	0.08	0.05
<b>Type of Contracting Action Dummy</b>		
Letter	0.44	1.00
Definitive, Superseding Letter	0.30	0.30
Definitive	99.26	98.70
<b>Type of Business Dummy<sup>2</sup></b>		
Small	58.00	59.46
Large	33.62	28.76
Non-profit	1.7	1.85
Foreign	6.67	9.93
<b>Place of Performance Dummy<sup>2</sup></b>		
Domestic	93.33	90.09
US Territory	0.34	0.38
Foreign	6.33	9.53
<b>Subject Matter of Contract Dummy</b>		
Research, Development, Test & Evaluation (RDTE)	4.86	7.22
Service	23.90	28.68
Product	71.23	64.10
<b>Dollars (million 87\$)</b>	0.413	0.648
<b>N =</b>	121,993	43,167

<sup>2</sup> Small, Large and Non-profit refer to domestic firms performing the work in the U.S. Foreign refers to *any* firm performing the work outside the U.S. (in either a U.S. territory, possession, or foreign country) as well as domestic firms performing outside the U.S.

**Table 3**

## OLS Estimation Results of Contract Length Determinants

Variables	Specification		
	I	II	III
<b>Affected Group</b>		-0.078 (0.007)	0.099 (0.013)
<b>Year<sub>89</sub></b>	0.110 (0.003)	0.173 (0.010)	0.207 (0.009)
<b>Affected Group*Year<sub>89</sub></b>		-0.067 (0.010)	-0.109 (0.009)
<b>Claimant Groups</b>			
Airframes	0.187 (0.010)	0.190 (0.010)	0.186 (0.010)
Aircraft Engines	0.145 (0.012)	0.149 (0.012)	0.145 (0.012)
Other Aircraft Equipment	-0.024 (0.010)	-0.021 (0.010)	-0.024 (0.010)
Ships	-0.279 (0.009)	-0.272 (0.009)	-0.280 (0.009)
Combat Vehicles	-0.052 (0.012)	-0.049 (0.012)	-0.052 (0.012)
Non-Combat Vehicles	-0.236 (0.012)	-0.232 (0.012)	-0.237 (0.012)
Weapons	-0.102 (0.012)	-0.099 (0.012)	-0.103 (0.012)
Ammunition	-0.159 (0.017)	-0.156 (0.017)	-0.159 (0.017)
Electronics & Communications Equipment	-0.150 (0.008)	-0.147 (0.008)	-0.150 (0.008)
Petroleum	-0.247 (0.012)	-0.243 (0.012)	-0.248 (0.012)
Other Fuels & Lubricants	-0.366 (0.032)	-0.362 (0.032)	-0.365 (0.032)
Containers & Handling Equipment	-0.400 (0.062)	-0.396 (0.062)	-0.401 (0.062)
Textiles, Clothing & Equipage	-0.165 (0.013)	-0.161 (0.013)	-0.165 (0.013)

Notes: Total number of observations is 165,160. *Affected Group* is a dummy defined by detailed subject matter of the contract in column II and firm tax status in column III. See the text for a more explicit description of which contracts belong to each group.

**Table 3 (continued)**

Variables	Specification		
	I	II	III
Building Supplies	-0.671 (0.015)	-0.667 (0.015)	-0.672 (0.015)
Subsistence	-0.737 (0.009)	-0.733 (0.009)	-0.736 (0.009)
Transportation Equipment (Railway)	-0.264 (0.144)	-0.255 (0.144)	-0.273 (0.144)
Production Equipment	-0.233 (0.018)	-0.227 (0.018)	-0.233 (0.018)
Construction	-0.337 (0.010)	-0.288 (0.011)	-0.337 (0.010)
Construction Equipment	-0.344 (0.024)	-0.340 (0.024)	-0.346 (0.024)
Medical & Dental Supplies & Equipment	-0.461 (0.011)	-0.457 (0.011)	-0.461 (0.011)
Photographic Equipment	-0.372 (0.019)	-0.368 (0.019)	-0.374 (0.019)
Material Handling Equipment	-0.330 (0.021)	-0.326 (0.021)	-0.333 (0.021)
Other Supplies & Equipment	-0.375 (0.008)	-0.372 (0.008)	-0.376 (0.008)
Services	-0.257 (0.010)	-0.274 (0.010)	-0.259 (0.010)
<b>Contracts</b>			
Fixed Price, Redetermination	0.127 (0.048)	0.128 (0.048)	0.127 (0.048)
Fixed Price, Economic Price Adjustment	0.212 (0.007)	0.211 (0.007)	0.212 (0.007)
Fixed Price, Incentive	1.033 (0.032)	1.033 (0.032)	1.033 (0.032)
Cost Plus, Award Fee	0.975 (0.039)	0.959 (0.039)	0.978 (0.039)
Cost Contract	0.578 (0.017)	0.593 (0.017)	0.579 (0.017)
Cost Sharing	0.891 (0.034)	0.900 (0.034)	0.910 (0.034)

Notes: Total number of observations is 165,160. *Affected Group* is a dummy defined by detailed subject matter of the contract in column II and firm tax status in column III. See the text for a more explicit description of which contracts belong to each group.

**Table 3 (continued)**

Variables	Specification		
	I	II	III
Cost Plus, Fixed Fee	0.345 (0.008)	0.339 (0.008)	0.344 (0.008)
Cost Plus, Incentive Fee	0.889 (0.037)	0.882 (0.037)	0.887 (0.037)
Time & Materials	0.055 (0.024)	0.067 (0.024)	0.058 (0.024)
Labor Hours	0.005 (0.046)	0.003 (0.046)	0.004 (0.046)
<b>Type of Contracting Action</b>			
Definitive, Superseding Letter	-0.251 (0.028)	-0.248 (0.028)	-0.252 (0.028)
Definitive	-0.194 (0.016)	-0.194 (0.016)	-0.196 (0.016)
<b>Type of Business</b>			
Small	-0.054 (0.003)	-0.053 (0.003)	-0.053 (0.003)
Non-profit	0.068 (0.013)	-0.082 (0.013)	
Foreign	-0.051 (0.021)	-0.052 (0.021)	0.016 (0.024)
<b>Place of Performance</b>			
Foreign	0.032 (0.021)	0.034 (0.021)	0.027 (0.021)
<b>Subject Matter of Contract</b>			
Research, Development, Test & Evaluation (RDTE)	0.200 (0.008)	0.212 (0.008)	0.200 (0.008)
Service	0.051 (0.007)	-0.004 (0.008)	0.051 (0.007)
<b>Dollars (billion 87\$)</b>	6.679 (0.175)	6.699 (0.175)	6.691 (0.175)
<b>Constant</b>	1.028 (0.018)	1.102 (0.019)	0.933 (0.022)
<b>R<sup>2</sup></b>	0.25	0.25	0.25

Notes: Total number of observations is 165,160. For type of business, the covariates *small* and *non-profit* refer to domestic firms performing the work in the U.S. *Foreign* refers to *any* type of firm performing the work outside the U.S. (in either a U.S. territory, possession or a foreign country) as well as foreign firms performing the work within the U.S.

**Table 4**

OLS Estimation Results of Contract Length Determinants:  
 Controlling for Subject Matter of Contract  
 and Tax Status of Contractor

Variables	
<b>Eligible Good</b>	-0.152 (0.014)
<b>Tax Sensitive Firm</b>	0.041 (0.015)
<b>Eligible Good*Tax Sensitive Firm</b>	0.084 (0.014)
<b>Year<sub>89</sub></b>	0.060 (0.020)
<b>Eligible Good*Year<sub>89</sub></b>	0.185 (0.022)
<b>Tax Sensitive Firm*Year<sub>89</sub></b>	0.149 (0.023)
<b>Eligible*Sensitive*Year<sub>89</sub></b>	-0.303 (0.025)
<b>Claimant Groups</b>	
Airframes	0.190 (0.010)
Aircraft Engines	0.149 (0.012)
Other Aircraft Equipment	-0.020 (0.010)
Ships	-0.274 (0.009)
Combat Vehicles	-0.049 (0.012)
Non-Combat Vehicles	-0.233 (0.012)
Weapons	-0.100 (0.012)
Ammunition	-0.156 (0.017)

Notes: Total number of observations is 165,160. *Eligible Good* is a dummy defined by detailed subject matter of the contract. *Tax Sensitive Firm* is a dummy defined by the tax status of the contractor. See the text for a more explicit description of which contracts belong in each group.



**Table 4 (continued)**

Variables	
Electronics & Communications Equipment	-0.147 (0.008)
Petroleum	-0.245 (0.012)
Other Fuels & Lubricants	-0.361 (0.032)
Containers & Handling Equipment	-0.398 (0.062)
Textiles, Clothing & Equipage	-0.162 (0.013)
Building Supplies	-0.668 (0.015)
Subsistence	-0.732 (0.009)
Transportation Equipment (Railway)	-0.267 (0.144)
Production Equipment	-0.227 (0.018)
Construction	-0.288 (0.010)
Construction Equipment	-0.343 (0.024)
Medical & Dental Supplies & Equipment	-0.457 (0.011)
Photographic Equipment	-0.370 (0.019)
Material Handling Equipment	-0.330 (0.021)
Other Supplies & Equipment	-0.373 (0.008)
Services	-0.274 (0.010)
<b>Contracts</b>	
Fixed Price, Redetermination	0.127 (0.048)
Fixed Price, Economic Price Adjustment	0.212 (0.007)
Fixed Price, Incentive	1.030 (0.032)
Cost Plus, Award Fee	0.953 (0.039)

Notes: Total number of observations is 165,160.

**Table 4 (continued)**

Variables	
Cost Contract	0.589 (0.018)
Cost Sharing	0.924 (0.034)
Cost Plus, Fixed Fee	0.339 (0.008)
Cost Plus, Incentive Fee	0.880 (0.037)
Time & Materials	0.065 (0.024)
Labor Hours	0.001 (0.046)
<b>Type of Contracting Action</b>	
Definitive, Superseding Letter	-0.249 (0.028)
Definitive	-0.195 (0.016)
<b>Type of Business</b>	
Small	-0.052 (0.003)
Foreign	0.030 (0.025)
<b>Place of Performance</b>	
Foreign	0.026 (0.021)
<b>Subject Matter of Contract</b>	
Research, Development, Test & Evaluation (RDTE)	0.213 (0.008)
Service	-0.004 (0.008)
<b>Dollars (billion 87\$)</b>	6.715 (0.175)
<b>Constant</b>	1.056 (0.024)
<b>R<sup>2</sup></b>	0.25

Notes: Total number of observations is 165,160. For type of business, the covariate *small* refers to domestic firms performing the work in the U.S. *Foreign* refers to *any* type of firm performing the work outside the U.S. (in either a U.S. territory, possession or a foreign country) as well as foreign firms performing the work within the U.S.

**Table 5**

Tax Sensitive Firms

	1981	1989	1989-1981
Eligible Goods (102,352; 35,495)	1.029 (0.018)	1.120 (0.025)	0.091 (0.003)
Ineligible Goods (9,421; 2,586)	1.100 (0.019)	1.306 (0.021)	0.210 (0.011)
Eligible - Ineligible	-0.1528 (0.014)	-0.126 (0.023)	<b>-0.118</b> <b>(0.011)</b>

Tax Insensitive Firms

	1981	1989	1989-1981
Eligible Goods (8,240; 4,153)	0.904 (0.023)	1.149 (0.024)	0.245 (0.009)
Ineligible Goods (1,980; 933)	1.056 (0.024)	1.116 (0.027)	0.060 (0.020)
Eligible - Ineligible	-0.152 (0.014)	0.033 (0.019)	<b>0.185</b> <b>(0.022)</b>

Sensitive - Insensitive

<b>-0.303</b> <b>(0.025)</b>
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Notes: Standard errors are in parentheses. Numbers under group headings indicate sample sizes for each year.

**Table 6**

Quantile Estimation Results of Contract Length Determinants:  
Controlling for Subject Matter of Contract  
and Tax Status of Contractor

Variables	Quantile		
	50th	75th	90th
<b>Eligible Good</b>	-0.083 (0.0001)	-0.167 (0.0003)	-0.144 (0.001)
<b>Tax Sensitive Firm</b>	0.166 (0.0001)	0.013 (0.0004)	0.027 (0.002)
<b>Eligible Good*Tax Sensitive Firm</b>	-0.000 (0.0001)	0.091 (0.0003)	0.065 (0.001)
<b>Year<sub>89</sub></b>	0.096 (0.0002)	0.062 (0.0005)	0.096 (0.002)
<b>Eligible Good*Year<sub>89</sub></b>	0.068 (0.0002)	0.163 (0.0005)	0.148 (0.002)
<b>Tax Sensitive Firm*Year<sub>89</sub></b>	-0.017 (0.0002)	0.021 (0.0006)	0.172 (0.002)
<b>Eligible*Sensitive*Year<sub>89</sub></b>	-0.147 (0.0002)	-0.170 (0.0006)	-0.284 (0.002)
<b>Claimant Groups</b>			
Airframes	0.249 (0.0001)	0.199 (0.0003)	0.238 (0.001)
Aircraft Engines	0.249 (0.0001)	0.198 (0.0003)	0.158 (0.001)
Other Aircraft Equipment	0.081 (0.0001)	-0.050 (0.0002)	-0.126 (0.0009)
Ships	-0.167 (0.0001)	-0.307 (0.0002)	-0.462 (0.0009)
Combat Vehicles	0.083 (0.0001)	-0.141 (0.0003)	-0.433 (0.001)
Non-Combat Vehicles	-0.084 (0.0001)	-0.302 (0.0003)	-0.598 (0.001)
Weapons	-0.001 (0.0001)	-0.142 (0.0003)	-0.296 (0.001)
Ammunition	-0.084 (0.0002)	-0.145 (0.0004)	-0.335 (0.002)
Electronics & Communications Equipment	-0.084 (0.0001)	-0.216 (0.0002)	-0.291 (0.0008)

Notes: Total number of observations is 165,160. Standard errors are analytic standard errors. *Eligible Good* is a dummy defined by detailed subject matter of the contract. *Tax Sensitive Firm* is a dummy defined by the tax status of the contractor. See the text for a more explicit description of which contracts belong in each group.

**Table 6 (continued)**

Variables	Quantile		
	50th	75th	90th
Petroleum	-0.085 (0.0001)	-0.210 (0.0003)	-0.439 (0.001)
Other Fuels & Lubricants	-0.252 (0.0003)	-0.227 (0.0008)	-0.491 (0.003)
Containers & Handling Equipment	-0.334 (0.0006)	-0.466 (0.0015)	-0.462 (0.0056)
Textiles, Clothing & Equipage	-0.015 (0.0001)	-0.225 (0.0003)	-0.487 (0.0012)
Building Supplies	-0.584 (0.0001)	-0.876 (0.0004)	-1.120 (0.0015)
Subsistence	-0.584 (0.0001)	-0.967 (0.0002)	-1.374 (0.0008)
Transportation Equipmen (Railway)	-0.250 (0.0013)	-0.125 (0.0031)	-0.263 (0.0126)
Production Equipment	-0.167 (0.0002)	-0.300 (0.0004)	-0.473 (0.0017)
Construction	-0.250 (0.0001)	-0.490 (0.0003)	-0.596 (0.001)
Construction Equipment	-0.250 (0.0002)	-0.466 (0.0006)	-0.648 (0.0023)
Medical & Dental Supplies & Equipment	-0.334 (0.0001)	-0.552 (0.0003)	-0.759 (0.001)
Photographic Equipment	-0.333 (0.0002)	-0.459 (0.0005)	-0.541 (0.0018)
Material Handling Equipment	-0.250 (0.0002)	-0.470 (0.0005)	-0.635 (0.002)
Other Supplies & Equipment	-0.252 (0.0001)	-0.467 (0.0002)	-0.626 (0.0008)
Services	-0.083 (0.0001)	-0.297 (0.0002)	-0.573 (0.0009)
<b>Contracts</b>			
Fixed Price, Redetermination	0.082 (0.0004)	0.084 (0.0012)	0.171 (0.0044)
Fixed Price, Economic Price Adjustment	0.168 (0.0001)	0.160 (0.0002)	0.079 (0.0006)
Fixed Price, Incentive	0.882 (0.0003)	0.815 (0.0008)	0.787 (0.003)
Cost Plus, Award Fee	0.414 (0.0004)	1.481 (0.001)	2.845 (0.0036)

Notes: Total number of observations is 165,160. Standard errors are analytic standard errors.

**Table 6 (continued)**

Variables	Quantile		
	50th	75th	90th
Cost Contract	0.500 (0.0002)	0.848 (0.0004)	1.244 (0.0016)
Cost Sharing	0.664 (0.0003)	1.239 (0.0008)	1.574 (0.0032)
Cost Plus, Fixed Fee	0.248 (0.0001)	0.252 (0.0002)	0.635 (0.0008)
Cost Plus, Incentive Fee	1.082 (0.0003)	1.138 (0.0009)	1.079 (0.0034)
Time & Materials	0.082 (0.0002)	-0.000 (0.0006)	0.000 (0.0022)
Labor Hours	-0.004 (0.0004)	0.000 (0.0011)	0.047 (0.0042)
<b>Type of Contracting Action</b>			
Definitive, Superseding Letter	-0.23 (0.0003)	-0.193 (0.0007)	-0.243 (0.0026)
Definitive	-0.148 (0.0001)	-0.193 (0.0004)	-0.261 (0.0015)
<b>Type of Business</b>			
Small	-0.000 (0.0000)	-0.007 (0.0001)	-0.081 (0.0003)
Foreign	0.166 (0.0002)	0.036 (0.0006)	-0.026 (0.0023)
<b>Place of Performance</b>			
Foreign	-0.082 (0.0002)	-0.006 (0.0005)	0.036 (0.002)
<b>Subject Matter of Contract</b>			
Research, Development, Test & Evaluation (RDTE)	0.084 (0.0001)	0.324 (0.0002)	0.621 (0.0008)
Service	-0.001 (0.0001)	0.087 (0.0002)	0.033 (0.0007)
<b>Dollars (billion 87\$)</b>	10.139 (0.0016)	41.050 (0.0028)	92.640 (0.0071)
<b>Constant</b>	0.732 (0.0002)	1.313 (0.0006)	1.852 (0.0023)
<b>R<sup>2</sup></b>	0.19	0.21	0.25

Notes: Total number of observations is 165,160. Standard errors are analytic standard errors. For type of business, the covariate *small* refers to domestic firms performing the work in the U.S. *Foreign* refers to any type of firm performing the work outside the U.S. (in either a U.S. territory, possession or a foreign country) as well as foreign firms performing the work within the U.S.

**Table 7**

Estimated Differences in Response Between Eligible and Ineligible Goods Contracts  
Over Time  
Quantile Estimation Results

Percentile	Taxable Firms (I)	Tax-exempt Firms (II)	Taxable - Tax-exempt Firms (I-II)
.50	-0.080 (0.0001)	0.068 (0.0002)	-0.147 (0.0002)
.75	-0.007 (0.0003)	0.163 (0.0005)	-0.17 (0.0006)
.90	-0.136 (0.001)	0.148 (0.002)	-0.284 (0.002)

Notes: Standard errors are in parentheses