

NBER WORKING PAPER SERIES

U.S. DEFENSE CONTRACTS DURING THE TAX EXPENDITURE BATTLES OF
THE 1980S

Susan Guthrie
James R. Hines, Jr.

Working Paper 14146
<http://www.nber.org/papers/w14146>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
June 2008

We thank Thomas A. Barthold, Christopher Heady and participants in the NBER Tax Expenditures Conference for helpful comments on an earlier draft. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2008 by Susan Guthrie and James R. Hines, Jr.. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

U.S. Defense Contracts During the Tax Expenditure Battles of the 1980s
Susan Guthrie and James R. Hines, Jr.
NBER Working Paper No. 14146
June 2008
JEL No. H25,H57

ABSTRACT

This paper considers the impact of the tax treatment of U.S. military contractors. Prior to the early 1980s, taxpayers were permitted to use the completed contract method of accounting to defer taxation of profits earned on long term contracts. Legislation passed in 1982, 1986 and 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.

Susan Guthrie
353 North Bowman Avenue
Merion, PA 19066
sguthrie@comcast.net

James R. Hines, Jr.
Department of Economics
University of Michigan
343 Lorch Hall
611 Tappan Street
Ann Arbor, MI 48109-1220
and NBER
jrhines@umich.edu

1. Introduction.

The United States government taxes the incomes earned by individuals and corporations, but the tax laws occasionally provide for favorable deviations from strict income taxation, these deviations being loosely grouped in the category of “tax expenditures.” Tax expenditure provisions commonly reduce tax obligations associated with the production and sale of goods and services, the benefits of which are ultimately shared between producers, who enjoy greater after-tax profits, and consumers, who benefit from lower prices.

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 offers 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 low prices are due to benefits for which another part of the government pays. 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 1982, 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 availability of this method of accounting was reduced starting in 1982, and as a result, it

appears that the U.S. Department of Defense significantly reduced its procurement of goods and services eligible for income tax deferral.

Firms providing goods and services under long term contracts often find that their ultimate revenue stream is uncertain, as production encounters unforeseen costs or obstacles, and mismatches with buyer expectations require that final product be modified subsequent to delivery. Hence, a firm might appear profitable in the early years of a long-term contract, as the buyer pays for partial completion, but upon concluding the contract the firm might find that it has taken a significant loss. Given these uncertainties, Congress prior to 1982 was unwilling to require taxpayers to include contracting profits in income prior to contract completion and acceptance. Taxpayers electing to account for profits under the completed contract method of accounting did not include contract income, and buyers did not deduct contract payments, until contracts were complete. Since contracts are generally profitable, the tax deferral available from use of the completed contract method of accounting effectively subsidized long-term contracts whenever those performing the contracts were subject to tax rates lower than or equal to the tax rates of buyers. This included most importantly cases in which taxable entities performed contract work for nonprofit organizations or the government, but was not limited to these situations.¹

The completed contract method of accounting was modified and its benefits significantly curtailed in a series of legislative reforms in 1982, 1986, and 1987. These reforms were motivated by a perception on the part of Congress that use of the completed contract method of accounting excessively subsidized certain contractors, particularly those doing work for the U.S.

¹ Tax rates may differ between buyers and contractors if they are subject to differing tax rates (for example, if one is a corporation and the other a partnership, or if one of the parties has tax loss carryforwards), or if the tax treatment of contract income and expenses differs between the parties. Contractors providing goods that buyers would have to capitalize and depreciate for tax purposes are examples of the latter.

Department of Defense (U.S. Congress, Joint Committee on Taxation, 1987). In the wake of the generous tax provisions of the Economic Recovery Tax Act of 1981, subsequent legislative developments in the 1980s sought to reduce many of the tax expenditures in the Internal Revenue Code, of which the completed contract method of accounting was thought to be one.

One of the notable features of the completed contract method of accounting is that the primary beneficiaries of this accounting method were believed to be taxpayers working on contracts for the U.S. Department of Defense. Since the U.S. federal government both subsidized these contracts with favorable tax accounting and financed the contracts with direct defense outlays, it is not entirely clear why the accounting method *per se* was considered to be a subsidy. If all parties are rational, and if those issuing the contracts on behalf of the U.S. government incorporate tax revenue losses due to favorable contract accounting, then the subsidy available from using the completed contract method of accounting would be entirely recouped in other contract terms, presumably in the form of lower prices paid on these contracts. If these conditions hold, then there would be no reason to expect that reducing the favorable treatment of long term contracts would be accompanied by changes other than higher prices for goods and services provided under these contracts.

The contracts used for Department of Defense procurement reflect problems of hidden and incomplete information that influence many contracting situations. The government seeks to obtain the best value for its money in settings in which it cannot be certain just how costly it is for private firms to provide it with goods and services, while the providers, who may have better information on their own costs, nevertheless face considerable uncertainty over what their ultimate contract costs will be. In such settings even the most efficient contracts do not resolve all of the associated problems of moral hazard and adverse selection (Cummins, 1997; Laffont

and Tirole, 1993; Rogerson, 1989, 1990, 1995), and in particular, there remains ample scope for strategic manipulation of reported contract costs (Rogerson, 1992; Thomas and Tung, 1992, Naegelen and Mougeot, 1998). In practice, there appears to be little evidence of strategic cost shifting in defense contracts (McGowan and Vandrzyk, 2002), and the incompleteness of the contracts that the Department of Defense signs with private contractors appears to reflect efficient accommodation to the underlying design and performance uncertainties of modern weapon systems (Crocker and Reynolds, 1993).

The scaling back of tax benefits associated with long term contracting is likely to influence Department of Defense contracts in two ways. The first is that, for given contract terms, providing goods and services under long term contracts becomes less attractive to contractors, who will demand – and, in the course of the competitive process, get – higher pretax prices. In response to these higher prices, the Department of Defense will reduce its demand for goods with lengthy production processes.² The second effect is that the loss of tax benefits from long term contracts reduces the previous incentives to lengthen production processes in order to take advantage of the completed contract accounting rules. Together, these two effects imply that the Department of Defense faces higher procurement prices for goods and services produced under long term contracts, and that average contract duration should shorten. These predictions rely on the assumption that military contractors benefit from the completed contract method of accounting; contractors that are tax exempt or otherwise face low tax rates should be largely unaffected.

While it is difficult to compare prices of military contracts in separate years, given the changing nature of goods and services demanded by the government, it is not difficult to

² Lichtenberg (1989) estimates that the average price elasticity of demand for Department of Defense weapon systems in the 1980s was 0.55.

compare contract lengths. This paper focuses on contracts entered into by the Department of Defense in 1981 and 1989, finding that, after controlling for observable contract attributes, contracts that were likely to be affected by the accounting changes in 1982, 1986 and 1987 shortened by 1.0-3.5 months compared to contracts that were not likely to be affected. Evaluated at the mean, this corresponds to a 6-29 percent reduction in the contract length. This sensitivity of contract provisions to the federal income tax treatment of contractors suggests that the Department of Defense did not fully internalize its impact on federal tax revenues in making contracting decisions.

2. Legislative History: The Tax Expenditure Battles of the 1980s

Taxpayers with income earned from long term contracts are permitted choices among alternative methods of accounting for their contract income and expenses. Long term contracts consist of building, installation, construction, and manufacturing contracts that span more than a single tax year. The types of manufacturing contracts that qualify for long-term status are further limited to those for the manufacture of unique items (e.g. those not normally carried in the contractor'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, the completed contract method, or any of the other more general accounting methods available for reporting contract income. Under the percentage of completion 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. In calculating the intertemporal allocation of contract

revenues, 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 completed contract 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.³ Given the tax significance of contract completion, there were conspicuous disputes and inconsistent rulings between courts over the point at which expenses could be taken and contract income reported (*Yale Law Journal*, 1955), as a result of which there was pressure on Congress to enact rules clarifying and possibly limiting application of the completed contract method.

Congress's first significant opportunity came in 1982, when reaction to the generous provisions of the 1981 tax cut prompted new legislation designed to raise revenue and reduce some of the perceived inequities in the tax system. The Tax Equity and Fiscal Responsibility Act of 1982 modified the completed contract method to align its measurement of income more closely with economic income attributable to long term contracts.⁴ 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 costs 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 were exempt

³ 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.

⁴ Regulations on the use of the percent of completion method were left entirely intact by the 1982 tax legislation.

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 sweeping changes to the U.S. federal income tax, generally in the direction of drastically reducing tax expenditures (U.S. Government Accountability Office, 2005), broadening the tax base, and lowering marginal tax rates. Favorable accounting methods were swept up in these reforms, which included broad changes in the use of the percentage of completion and completed contract accounting methods for reporting income derived from long-term contracts. One year prior to passage of the Tax Reform Act of 1986, the U.S. Congress, Joint Committee on Taxation (1985) estimated that the annual tax expenditure (foregone revenue) from use of the completed contract method of accounting would be \$4.9 billion in 1986, rising to \$7.0 billion by 1990. These are sizable tax expenditures, exceeding in magnitude the contemporaneous tax expenditures for the favorable tax treatment of capital gains held by individuals until death. Changes to the percentage of completion method reflected that “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.” Changes to the completed contract method resulted, on the other hand, came from a perception in Congress that use of this method led to low or negative tax rates and an unjustified income deferral (especially among large defense contractors).⁵

The revisions to the percentage of completion method enacted in 1986 removed the option of calculating the percentage of completion based on physical completion. Furthermore,

⁵ U.S. Congress, Committee on Joint Taxation (1987).

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 completed contract method is no longer an option for reporting long term contract income. The completed contract method was replaced by the Percentage of Completion-Capitalized Cost method (PCCC). In reality, the PCCC method is a hybrid of the “old” completed contract method and the “new” percent of completion method. Under the PCCC method, 40 percent of the contract income and costs were reported based on percentage of completion.⁶ The remaining 60 percent of the contract income and costs were reported when the contract is completed.⁷ Thus, only 60 percent of the taxable income from the contract could be deferred until the contract is completed. The U.S. Congress, Joint Committee on Taxation (1987) estimated that this accounting change alone would augment federal tax revenues by \$2.9 billion in 1987, \$3.3 billion in 1988, \$2.3 billion in 1989, and less than \$1 billion per year thereafter. The Revenue Act of 1987 reduced the percentage eligible for deferral to 30 percent,

⁶ The “look-back” adjustment procedure is applied to this 40 percent of the contract income.

⁷ The PCCC method is to be applied to all contracts that are not accounted for using the straight percent of completion 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.

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

The effect of the changes to the completed contract 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 that contract revenue is received and all costs are incurred on the first day of the contract. Under the “old” completed contract method, the contractor could increase the present discounted value of his after tax profits by approximately \$5700 if he could artificially extend the contract length by one 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 extending the contract length under the new regime. With the percentage of completion method, the contractor gains nothing from extending the contract.⁸

3. A Model of Contract Timing

In evaluating the impact of contracting regimes on contract characteristics and performance it is helpful to start with a simple framework that identifies the effects of contracting rules on contract timing. This section offers one such framework.

Consider a Department of Defense procurement process that seeks to maximize the present discounted value of national defense subject to a budget constraint. This problem is characterized by the standard tradeoff (Peck and Scherer, 1962; Scherer, 1964; Hartley, 2007) between procuring defense items sooner, when they are more valuable, or later, when they are

⁸ This example takes the nominal pretax interest rate to be 10 percent, but it is noteworthy that nominal interest rates fell over the 1980s, further reducing the benefits of extending contract length for tax purposes. Annualized three-month Treasury bill rates in mid-1981 exceeded 16 percent, and in early 1982 exceeded 12 percent, whereas by 1989 were well under nine percent.

less expensive. One way to express the contours of this tradeoff is to write the Department of Defense objective function as:

$$(1) \quad W[x_1\phi(t_1), \dots, x_n\phi(t_n)],$$

for goods $1, \dots, n$, in which x_i is the quantity of good i procured, and t_i is the time to delivery of good i . In expression (1), the $\phi(t_i)$ function converts units of x_i to effective consumption based on time to delivery, with $\phi'(t_i) < 0$, reflecting that the military prefers to have its contracts fulfilled sooner rather than later. In expression (1), the $\phi(t_i)$ function is taken to be same for all goods i and quantity levels x_i , though generalizing this to permit idiosyncratic differences changes the results very little.

The Department of Defense maximizes (1) subject to the budget constraint:

$$(2) \quad \sum_{i=1}^n x_i p(t_i, \alpha) \leq R,$$

in which quantities are normalized so that the price of good i for immediate delivery, and in the absence of special tax treatment, is unity. The term $p(t_i, \alpha)$ is the actual price of good i in the marketplace, reflecting both time of delivery t_i and the tax treatment of contract income, which is summarized by the term α ; higher values of α are associated with greater tax benefits from long term contract treatment. Hence the left side of (2) is the out of pocket cost of procurement by the Department of Defense: it is the sum of the products of quantities and prices. The term R on the right side of (2) is the Department's available resources. It is noteworthy that, in this formulation, the Department of Defense is assumed not to let the impact of α on federal government tax revenues influence its procurement decisions. The impact of this assumption is considered shortly.

Assuming that the Department of Defense can freely choose quantities and delivery times for all n procurement items, interior conditions for the maximization of (1) subject to (2) are:

$$(3) \quad W_i \phi(t_i) = \lambda p(t_i, \alpha)$$

$$(4) \quad W_{i,x_i} \phi'(t_i) = \lambda x_i \frac{\partial p(t_i, \alpha)}{\partial t_i},$$

in which W_i is the derivative of the $W[\cdot]$ function with respect to its i^{th} argument. Taking the ratio of (4) to (3) produces:

$$(5) \quad \frac{\phi'(t_i)}{\phi(t_i)} = \frac{\frac{\partial p(t_i, \alpha)}{\partial t_i}}{p(t_i, \alpha)}.$$

Equation (5) is an elasticity condition. Welfare maximization entails the Department of Defense trading delivery times against prices, to the point at which the price elasticity of good i with respect to the timing of delivery equals the Department of Defense's elasticity of valuation with respect to timing.

In order to illustrate the effect of the tax treatment, α , on time to delivery, t_i , consider a standard discounting specification for $\phi(t_i)$:

$$(6) \quad \phi(t_i) = \delta \beta^{-\gamma t_i}.$$

Differentiating (6) with respect to t_i , it follows that (6) implies:

$$(7) \quad \frac{\phi'(t_i)}{\phi(t_i)} = -\gamma \ln \beta.$$

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

$$(8) \quad p(t_i, \alpha) = \frac{\zeta(1 - \alpha t_i)}{\ln t_i}.$$

The $p(t_i, \alpha)$ function in (8) has the property that the price falls as t_i lengthens, and higher values of α are also associated with reduced prices, the effect of α on contract prices being greatest for the longest term contracts. The function in (8) is sensible if contract time is measured in years, so $t_i > 1$, and α is chosen so that $\alpha t_i < 1$ for all feasible values of t_i . Equation (8) implies:

$$(9) \quad \frac{\frac{\partial p(t_i, \alpha)}{\partial t_i}}{p(t_i, \alpha)} = -\frac{\alpha}{1 - \alpha t_i} - \frac{1}{t_i \ln t_i}.$$

Equation (5) implies that defense contracts will be chosen so that the right side of equation (7) equals the right side of equation (9). Since the right side of equation (7) is a function of unchanging parameters, it follows that the value of the right side of equation (9) cannot be affected as α changes. Differentiating the right side of (9) with respect to α , and setting the result equal to zero, produces:

$$(10) \quad \frac{-(1 - \alpha t_i) - \alpha t_i}{(1 - \alpha t_i)^2} + \frac{dt_i}{d\alpha} \left[\frac{-\alpha^2}{(1 - \alpha t_i)^2} + \frac{1 + \ln t_i}{t_i \ln t_i} \right] = 0.$$

Equation (10) in turn implies that:

$$(11) \quad \frac{dt_i}{d\alpha} = \frac{(t_i \ln t_i)^2}{[(1 - 2\alpha t_i)(1 + \ln t_i) + \alpha^2 t_i^2 \ln t_i (1 - \ln t_i)]}.$$

The numerator of the right side of equation (11) is positive, and the denominator will also be positive either if α is very small or if $t_i < e$ and $1 \geq 2\alpha t_i$. Hence there is a wide range of cases for which contracts should be expected to lengthen as the tax treatment of contract length becomes more favorable.

As noted earlier, these calculations presume that the Department of Defense ignores the impact of its actions on federal income tax collections. If Congress in determining its budgetary allocation to the Department of Defense treats the tax savings available to defense contractors as equivalent to budgetary outlays, reducing resources available to the Department of Defense accordingly, then price reductions for long term contracts due to higher values of α will not entice greater purchases, as they come at the cost of reduced total resources. Hence contract length sensitivity to the tax treatment of long term contracts suggests that the Department of Defense does not incorporate tax considerations in its procurement decisions, presumably because relevant decision makers do not have incentives to do so.

4. Department of Defense Contracts

The data for the empirical analysis come from the Department of Defense *Defense Contract Action Data System*, fiscal years 1981 and 1989. The data consist of all contracting actions within the Department of Defense in excess of \$10,000 in fiscal year 1981 and \$25,000 in fiscal year 1989. These actions are reported on the DD Form 350, the Individual Contract Action Report. The report gives information on the contracting office, action date, type of contract action (e.g., cancellation or modification), 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 were converted to 1987 constant dollars using the aggregate price index for government purchases of goods and services for national defense. In 1981 there were 374,804 contract actions totaling over \$119 billion as measured in 1987 dollars; in 1989 there were 222,597 actions worth over \$122 billion, again in 1987 dollars.

The study uses a subset of the full sample from 1981 and 1989. The sample is limited to new contract awards that were negotiated by and for the Department of Defense 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, and funding actions, as well as orders from contracts let by other Federal agencies or other contracting offices within the Department of Defense. Contracts for sales to foreign governments or international institutions were also dropped.⁹ 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 have similar values for other variables. Eliminating records with identifiable reporting errors narrowed the final sample size to 165,160 observations, consisting of 121,993 contracts from 1981, and 43,167 contracts from 1989.¹⁰ Table 1 and table 2 present summary statistics for the final combined sample and for the two yearly sub-samples, respectively.

5. Determinants of Contract Length

The sample means reported in Table 2 indicate that the mean length of a Department of Defense contract in 1989 was roughly 1.2 months greater than the mean contract length in 1981. This is a rather crude measure of contract length, however, since it does not control for characteristics of the contracts that explain differences in mean lengths over the two years. For

⁹ The data are restricted to this subset for two reasons: to ensure that the types of contracts across the two years are as consistent as possible (given the different end-use sources of the data and small differences in the DD Form 350), and to improve the accuracy of matches between contracts and applicable tax regimes.

¹⁰ Identifiable errors include contracts with a negative calculated length and those with a dollar value less than zero.

example, contracts with larger dollar values tend to have longer duration, and since the (constant) mean dollar value of defense contracts in 1989 exceeds that in 1981, it is sensible that contracts might have lengthened. Consequently, the empirical investigation starts 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 tax changes, 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 accounting changes and contracts that were not. This analysis uses three different classification schemes to identify changes to contracts: 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. 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). Since contract characteristics and contract length are jointly determined by the contracting parties, a regression that estimates the effect of tax provisions on contract length while taking other contract terms to

be independent effectively estimates the extent to which parties are willing to exchange one characteristic for another.¹¹

The estimated constant term in column one of Table 3 indicates that the base contract – a firm, fixed-price letter contract in 1981 with a large domestic firm for supplies produced in the United States for use in the missiles and space systems program – has a mean length of one year. The estimated coefficient on *year*₈₉ indicates that contracts let in 1989 were still 1.3 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 noted, contract and contractor characteristics contribute to sizeable differences defense contract lengths. The estimated coefficients on the claimant group dummy variables indicate that contracts from the airframes and aircraft engines claimant groups are 2.24 and 1.74 months longer respectively than contracts from the base case claimant group of missiles and space systems. Contracts from all other claimant groups are between 0.25 months and 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 contracts, with fixed price incentive, cost plus-award fee, cost sharing, and cost plus-incentive fee contracts contributing from ten to 12 months to average 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 contracts are 0.6 months and 2.4 months longer than supply contracts, respectively, and each additional billion dollars in contract value contributes 6.7 years to the contract length.

¹¹ Estimated tax effects remain significant when contract dollar values and contract type variables are omitted from the regressions.

Numerous factors other than tax changes influenced the duration of defense contracts over this period. For instance, the decline in the total constant dollar value of Department of Defense obligations after 1987 and the thawing of the cold war may have altered acquisition policy in a way that systematically changed contract lengths between 1981 and 1989. *Year*₈₉ captures the unexplained time variation in all contracts, regardless of the cause. Therefore, the estimated *year*₈₉ coefficient in the first column of Table 3 reflects the combined influence of all of these factors, and not just the influence of the change in the tax treatment of defense contracts.

A more effective way to isolate the effect of the change in the taxation of long term contracts is to identify a group of contracts that are potentially affected by the new regulations via eligibility for the special tax treatment. The remaining contracts then represent a control group that should not be influenced by the tax changes. It is then possible to estimate the effect of the tax change on the affected group, adjusting for time and group effects, permitting the time effect to vary between the control and treatment groups.

The tax changes of the 1980s present different possible groups with which to test the effect of accounting methods on contracting behavior. Changes in 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 (since firms have different tax calendars, contracts as short as one month can qualify). Consequently, information on the subject matter of the contracts can be used to identify those contracts that are potentially eligible for long-term contract treatment. This group of potentially tax sensitive contracts includes contracts for: supply; research, development, test and evaluation; and a subset of service and construction contracts concerning 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. The Appendix lists the Department of Defense classification of service and construction contracts.

Column two of Table 3 presents coefficients from a regression estimating the treatment effect of the tax change on the affected contracts. Figure 1 reproduces a subset of these coefficients.

Figure 1

	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; 3,519)	1.102 (0.019)	1.275 (0.020)	0.173 (0.010)
Eligible - Ineligible	-0.078 (0.007)	-0.145 (0.010)	-0.067 (0.010)

Notes: Standard errors are in parentheses. The numbers under the group headings indicate sample sizes 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 affected by the tax change and those unaffected, respectively. Contracts potentially affected by the tax change showed a smaller increase, however: the difference is 0.067 years (roughly 3.5 weeks), or 6.1 percent of mean contract length.

There is potential imprecision in the classification of the treatment group in this regression, particularly in the case of service contracts. To address this issue, the regressions were re-run using differing definitions of the treatment and control groups. Based on the listing of broad service and construction contract groups in the appendix, the control group was changed to include: research, development, test and evaluation contracts; maintenance, repair and rebuilding of equipment contracts (8); and repair or alteration of real property contracts (23). Also, contracts that deal with the construction-related work of architects and engineers (2) were included in the treatment group. The sign of the estimated tax effect remained the same in all of these regressions, with the estimated effect on contract duration varying from 0.027 to 0.126 years.

Information on the tax status of the contractor provides another way of identifying the effect of tax changes on contract length. Domestic firms with taxable earnings from work performed in the United States should be most sensitive to U.S. tax changes, whereas nonprofit organizations, foreign firms, and domestic firms performing work outside the United States should be the least sensitive.¹² Hence, a second set of treatment and control groups can be defined by tax sensitive and tax insensitive firms. Column three of Table 3 reports coefficient estimates from a regression using this classification, and Figure 2 reports the selected subset.

¹² Some foreign firms doing business in the United States are subject to taxation by their home countries, which permit them to claim tax credits for income taxes paid to the United States. For these firms U.S. taxes are not entirely costs, since they create offsetting credits, which explains patterns of investment in the United States identified by Hines (1996). American firms doing business abroad are permitted to defer U.S. taxation of their foreign income until it is repatriated to the United States, which reduces effective U.S. taxation of this income (Hines, 1994; Desai, Foley and Hines, 2003).

Figure 2

	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; 5,086)	0.933 (0.022)	1.140 (0.023)	0.207 (0.009)
Sensitive - Insensitive	0.099 (0.013)	-0.010 (0.014)	-0.109 (0.009)

Notes: Standard errors are in parentheses. The numbers under the group headings indicate sample sizes 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. This change in contract length was, however, smaller by 0.109 years (roughly five weeks) for the treatment group, representing a difference of 11.7 percent of mean contract length.

The underlying idea behind the estimates reported in Table 3 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. It is also possible to estimate interaction effects to exploit both dimensions of applicability at the same time, which is what is done by the equation presented in Table 4. These results are very similar to those reported 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 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. Research, development, test and evaluation 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 results from this estimation in a manner similar to that of 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 the tax changes, all contracts increased in length between 1981 and 1989. This contract lengthening was more pronounced for contracts unaffected by the tax change: the difference between the change in treatment and control groups was 0.118 years, or roughly 1.4 months, 11.2 percent of mean contract length.

The middle panel of Table 5 presents analogous results for tax insensitive firms. This panel illustrates the effect of unexplained influences on length for both types of contracts. Because these firms were generally not affected by changes to contract accounting methods, the variation in contract lengths within groups over time and across groups within a time period presumably reflect factors other than those having to do with the taxation. All contracts increased in length over the period, but more so for contracts that broadly could be classified as sensitive to tax changes.

The bottom panel of Table 5 gives the estimated tax treatment effect when both the firm tax status and contract subject matter dimensions are taken into account. Contracts for goods and services subject to the accounting change, provided by firms with tax sensitive income, shortened by 0.303 years between 1981 and 1989 compared to contracts unaffected by the tax change with tax insensitive contractors. This difference of 0.303 years corresponds to 28.7 percent of mean contract length.

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 the change in allowable accounting methods. Longer contracts are, however, more likely than others to span taxable years, and longer contracts, with their greater average dollar values, offer greater benefits from extensions into subsequent tax years. A final set of regressions, presented in Table 6, explores the possibility that longer contracts are most sensitive to the tax changes by estimating quantile regressions for the 50th, 75th and 90th percentiles. 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 indicates 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 the estimated treatment effects from Table 6. Columns one and two of Table 7 present differences in time variation between eligible and ineligible groups of contracts for taxable and tax-exempt firms, respectively. Column three presents the overall difference between taxable and tax-exempt firms. The results reported in column one indicate

that, for all quantiles, contract lengths for eligible contracts increased less than contract lengths for ineligible contracts. This finding suggests 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 insensitive 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 tax treatment effect when both the firm tax status and the contract 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 contract length is 0.732 years. Therefore, a median contract will qualify for long term status only 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 accounting rules, regardless of 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.

6. Conclusion

The experience of the 1980s strongly suggests that Department of Defense contract provisions are sensitive to their federal income tax treatment. In response to reductions in the favorable tax treatment of long term contracts, average contract length fell by between slightly less than one month to over 3.5 months, or 6-29 percent of mean contract length. From this evidence it appears that the Department of Defense does not fully incorporate the effect of its procurement decisions on federal income tax revenue, and as a result, consciously or unconsciously encourages provision modes that benefit from favorable tax treatment.

The sizable tax expenditure associated with long term contracting prior to the 1980s represented a significant subsidy to military procurement that was not captured in standard budget entries for federal outlays. Whether it is better for the federal government to finance programs through tax subsidies or direct budgetary outlays is an ages-old question, given new life in recent decades by the work of Stanley Surrey (e.g., Surry, 1973) in promoting the tax expenditure budget. More recent scholarship (e.g., Dharmapala, 1999; Weisbach and Nussim, 2004) offers mixed assessments of tax expenditures and outlay alternatives, noting the advantages and disadvantages of each in different settings. There could be circumstances in which outcomes are unaffected by whether the government uses tax expenditures or direct outlays to finance its programs, and if ever there were to be such a case, it is likely to be one in which the government itself is the ultimate consumer. Yet the evidence is that military procurement is affected by the form that tax benefits take, very likely reflecting the decentralized behavior of military agencies pursuing objectives without fully incorporating their effect on other parts of the government. Hence as a practical matter tax expenditures and direct outlays are not equivalent even from the standpoint of government procurement, and the failure of this

equivalence implies that there are real consequences to alternative methods of financing government programs.

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

References

- Crocker, Keith J. and Kenneth J. Reynolds, The efficiency of incomplete contracts: An empirical analysis of Air Force engine procurement, *RAND Journal of Economics*, Spring 1993, 24 (1), 126-146.
- Cummins, Michael J., Incentive contracting for national defense: A problem of optimal risk, *Bell Journal of Economics*, Spring 1977, 8 (1), 168-85.
- Deferral of income under the completed contract method of tax accounting, note, *Yale Law Journal*, January 1955, 64 (3), 448-457.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr., Chains of ownership, tax competition, and the location decisions of multinational firms, in Heinz Herrmann and Robert Lipsey, eds. *Foreign Direct Investment in the Real and Financial Sector of Industrial Countries* (Berlin: Springer-Verlag, 2003), 61-98.
- Dharmapala, Dhammika, Comparing tax expenditures and direct subsidies: The role of legislative and committee structure, *Journal of Public Economics*, June 1999, 72 (3), 421-454.
- Feinschreiber, Robert, Using the completed contract method after TEFRA, *Taxes*, September 1983, 61 (9), 576-82.
- Hartley, Keith, The arms industry, procurement and industrial policies, in Todd Sandler and Keith Harley eds., *Handbook of Defense Economics*, vol. 2 (Amsterdam: North-Holland, 2007), 1139-1176.
- Hines, James R., Jr., Credit and deferral as international investment incentives, *Journal of Public Economics*, October 1994, 55 (2), 323-347.
- Laffont, Jean-Jacques, and Jean Tirole, *A Theory of Incentives in Procurement and Regulation* (Cambridge, MA: MIT Press, 1993).
- Lichtenberg, Frank R., How elastic is the government's demand for weapons? *Journal of Public Economics*, October 1989, 40 (1), 57-78.
- McGowan, Annie S. and Valaria P. Vandrzyk, The relation between cost shifting and segment profitability in the defense-contracting industry, *Accounting Review*, October 2002, 77 (4), 949-969.
- Naegelen, Florence and Michael Mougeot, Discriminatory public procurement policy and cost reduction incentives, *Journal of Public Economics*, March 1998, 67 (3), 349-367.

- Peck, Merton J. and Frederic M. Scherer, Frederic M., *The Weapons Acquisition Process: An Economic Analysis* (Boston: Harvard Business School, 1962).
- Rogerson, William P., Profit regulation of defense contractors and prizes for innovation, *Journal of Political Economy*, December 1989, 97 (6), 1284-1305.
- Rogerson, William P., Quality v. quantity in military procurement, *American Economic Review*, March 1990, 80 (1), 83-92.
- Rogerson, William P., Overhead allocation and incentives for cost minimization in defense procurement, *Accounting Review*, October 1992, 67 (4), 671-690.
- Rogerson, William P., Incentive models of the defense procurement process, in Keith Hartley and Todd Sandler eds., *Handbook of Defense Economics*, vol. 1 (Amsterdam: North-Holland, 1995), 309-346.
- Scherer, Frederic M., *The Weapons Acquisition Process: Economic Incentives* (Boston: Harvard Business School, 1964).
- Surrey, Stanley S., *Pathways to Tax Reform: The Concept of Tax Expenditures* (Cambridge, MA: Harvard University Press, 1973).
- Thomas, Jacob K. and Samuel Tung, Cost manipulation incentives under cost reimbursement: Pension costs for defense contracts, *Accounting Review*, October 1992, 67 (4), 691-711.
- U.S. Congress, Joint Committee on Taxation, *General Explanation of the Revenue Provisions of the Tax Equity and Fiscal Responsibility Act of 1982* (Washington, D.C.: U.S. Government Printing Office, 1983).
- U.S. Congress, Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 1986-1990* (Washington, D.C.: U.S. Government Printing Office, 1985).
- U.S. Congress, Joint Committee on Taxation, *General Explanation of the Tax Reform Act of 1986* (Washington, D.C.: U.S. Government Printing Office, 1987).
- U.S. Government Accountability Office, *Tax Expenditures Represent a Substantial Federal Commitment and Need to Be Reexamined*, GAO-05-690 (Washington, DC: GAO, 2005).
- Weisbach, David A. and Jacob Nussim, The integration of tax and spending programs, *Yale Law Journal*, March 2004, 113 (5), 955-1028.

Table 1

Summary Statistics

Variable	Min	Max	Mean	Standard Deviation
Length (Years)	0	10.41	0.60	0.57
Claimant Group Dummy				
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
Type of Contract Dummy				
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
Type of Contracting Action Dummy				
Letter	0	1	0.006	0.077
Definitive, Superseding Letter	0	1	0.003	0.054
Definitive	0	1	0.991	0.094
Type of Business Dummy¹				
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
Place of Performance Dummy¹				
Domestic	0	1	0.925	0.264
US Territory	0	1	0.003	0.059
Foreign	0	1	0.072	0.258
Subject Matter of Contract Dummy				
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
Dollars (million 87\$)	0.012	827.846	0.475	7.169
N = 165,160				

¹ 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 2Sample Means By Year¹

Variable	1981	1989
Length (Years)	0.57	0.67
Claimant Group Dummy		
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

¹ Units are percent of sample unless otherwise indicated.

Table 2 (continued)

Variable	1981	1989
Type of Contract Dummy		
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
Type of Contracting Action Dummy		
Letter	0.44	1.00
Definitive, Superseding Letter	0.30	0.30
Definitive	99.26	98.70
Type of Business Dummy²		
Small	58.00	59.46
Large	33.62	28.76
Non-profit	1.7	1.85
Foreign	6.67	9.93
Place of Performance Dummy²		
Domestic	93.33	90.09
US Territory	0.34	0.38
Foreign	6.33	9.53
Subject Matter of Contract Dummy		
Research, Development, Test & Evaluation (RDTE)	4.86	7.22
Service	23.90	28.68
Product	71.23	64.10
Dollars (million 87\$)	0.413	0.648
N =	121,993	43,167

² 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
Affected Group		-0.078 (0.007)	0.099 (0.013)
Year₈₉	0.110 (0.003)	0.173 (0.010)	0.207 (0.009)
Affected Group*Year₈₉		-0.067 (0.010)	-0.109 (0.009)
Claimant Groups			
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)
Contracts			
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)
Type of Contracting Action			
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)
Type of Business			
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)
Place of Performance			
Foreign	0.032 (0.021)	0.034 (0.021)	0.027 (0.021)
Subject Matter of Contract			
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)
Dollars (billion 87\$)	6.679 (0.175)	6.699 (0.175)	6.691 (0.175)
Constant	1.028 (0.018)	1.102 (0.019)	0.933 (0.022)
R²	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	
Eligible Good	-0.152 (0.014)
Tax Sensitive Firm	0.041 (0.015)
Eligible Good*Tax Sensitive Firm	0.084 (0.014)
Year₈₉	0.060 (0.020)
Eligible Good*Year₈₉	0.185 (0.022)
Tax Sensitive Firm*Year₈₉	0.149 (0.023)
Eligible*Sensitive*Year₈₉	-0.303 (0.025)
Claimant Groups	
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)
Contracts	
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)
Type of Contracting Action	
Definitive, Superseding Letter	-0.249 (0.028)
Definitive	-0.195 (0.016)
Type of Business	
Small	-0.052 (0.003)
Foreign	0.030 (0.025)
Place of Performance	
Foreign	0.026 (0.021)
Subject Matter of Contract	
Research, Development, Test & Evaluation (RDTE)	0.213 (0.008)
Service	-0.004 (0.008)
Dollars (billion 87\$)	6.715 (0.175)
Constant	1.056 (0.024)
R²	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)	-0.118 (0.011)

	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)	0.185 (0.022)

Sensitive - Insensitive

-0.303 (0.025)

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
Eligible Good	-0.083 (0.0001)	-0.167 (0.0003)	-0.144 (0.001)
Tax Sensitive Firm	0.166 (0.0001)	0.013 (0.0004)	0.027 (0.002)
Eligible Good*Tax Sensitive Firm	-0.000 (0.0001)	0.091 (0.0003)	0.065 (0.001)
Year₈₉	0.096 (0.0002)	0.062 (0.0005)	0.096 (0.002)
Eligible Good*Year₈₉	0.068 (0.0002)	0.163 (0.0005)	0.148 (0.002)
Tax Sensitive Firm*Year₈₉	-0.017 (0.0002)	0.021 (0.0006)	0.172 (0.002)
Eligible*Sensitive*Year₈₉	-0.147 (0.0002)	-0.170 (0.0006)	-0.284 (0.002)
Claimant Groups			
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)
Contracts			
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)
Type of Contracting Action			
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)
Type of Business			
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)
Place of Performance			
Foreign	-0.082 (0.0002)	-0.006 (0.0005)	0.036 (0.002)
Subject Matter of Contract			
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)
Dollars (billion 87\$)	10.139 (0.0016)	41.050 (0.0028)	92.640 (0.0071)
Constant	0.732 (0.0002)	1.313 (0.0006)	1.852 (0.0023)
R²	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	Tax Sensitive Firms (I)	Tax Insensitive Firms (II)	Tax Sensitive - Insensitive 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)

Note: Standard errors are in parentheses.