The prefix of each variable indicator describes the structure of the data and the transformations performed on it: “c” means centered and rescaled; “l” means logarithmically transformed, adding 1 if zeroes are present in the data; “b” means binary data; “n” means general numerical data; “r” means a ratio where one indicator was divided by another; “p” means percentage, similar to ratio but typically capped at 100 percent and is always calculated from variables using a common measure. Categorical variables and their individual levels are not given a prefix.

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| Table B‑1: Dependent Variables | | | |
| Name | Variable Indicator | Type | Description |
| Some Option Exercised | b\_SomeOpt | Binary | Whether the contract had at least one option exercised via a modification that did not increase scope. The sample for this for this model is restricted to those contracts with an initial base less than their initial ceiling. |
| All Options Exercised | b\_AllOpt | Binary | Whether the vast majority, over 95 percent by value, of a contract’s options were exercised. The sample for the model using this variable is limited to contracts that exercised some options in order to more clearly illustrate the relationship between independent variables and all options being exercised. |
| Any Ceiling Breach | b\_CBre | Binary | Whether a contract had its cost ceiling increased via a change order. |
| Ceiling Breach Size | ln\_CBre | Continuous | The increased contract ceiling due to change orders, logged, in 2018 constant dollars based on contract start fiscal year. The dataset for these models is limited to contracts with any ceiling breaches, in order to avoid clustering at zero-based problems. |
| Any Termination | b\_Term | Binary | Whether contracts experienced a partial or complete termination |

Note: See section 4.2.1 Dependent Variables for additional detail and descriptive statistics.

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| Table B‑2: Study Variables | | | | | |
| Name | Variable Indicator | Type | | Description | |
| **Service Contract Complexity** | | | | | |
| Detailed Industry Salary | cln\_US6sal | Continuous | | Average U.S. wage in the contract’s detailed industry in the calendar year prior to contract start. Deflated to 2018 constant dollars based on the prior calendar year, logged, and rescaled. | |
| Service Code Invoice Rate | cln\_PSCrate | Continuous | | Average annual invoice rate for the contract’s product or service code in the fiscal year prior to contract start. In 2018 constant dollars based on the start fiscal year, logged and rescaled. | |
| **Contract Management Capacity** | | | | | |
| Office Performance-Based | cp\_OffPerf7 | Continuous | | Percentage share of office 2018 constant obligations that were for Performance-Based Service Contracts in the prior 7 fiscal years, rescaled. | |
| Office Service Code Experience | cp\_OffPSC7 | Continuous | | Percentage of office 2018 constant obligations that went to contracts with the same product or service code as the product in question over the last 7 fiscal years, rescaled. | |
| **Extent of Prior Relationship** | | | | | |
| Paired Years | cn\_PairHist7 | Continuous | How many of the past 7 fiscal years involved obligations being made from the office to the vendor, recalled. | |
| Paired Actions | cln\_PairCA | Continuous | How many contracting actions the contract’s vendor performed for the office in question in the prior fiscal year, logged and rescaled. 1 action was added to all office-vendor pairings to allow for logarithmic transformation even when there was no previous acts. | |

Note: See section 4.2.2 Study Independent Variables for additional detail and descriptive statistics.

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| Table B‑3: Level 2, 3, and 4 and Variables Included in the Model | | | | | |
| Name | Variable Indicator | | Level | Type | Description | |
| **Sector** | |  | |  |  | |
| Subsector | NAICS3 | | 4 | Categorical | NAICS Subsector Code (3-digit code) with 82 subsectors within the defense services sample. | |
| Detailed Industry | NAICS6 | | 3 | Categorical | NAICS Detailed Industry Code (6-digit code) in a given Subsector with 878 detailed industries within the defense services sample. | |
| Service Area | ServArea | | 2 | Categorical | Service Area is based on Product or service codes groupings (Construction; Equipment Related; Information Communications Technology, Facility-Related; Professional, Administrative, and Management) with each service area in a given NAICS Detailed Industry treated as a different group. | |
| **Acquirer** | | |  |  |  | |
| Agency | Agency | | 3 | Categorical | Contracting Agency Code with 26 agencies within the defense services sample. | |
| Office | Office | | 2 | Categorical | Contracting Office Code within a given Agency with 1,092 offices within the defense services sample. | |
| **Place** | Place | | 2 | Categorical | Country in which the contract was performed with 186 countries within the defense services sample. | |
| **Start Fiscal Year** | StartFY | | 2 | Categorical | Fiscal Year the contract was signed in with 9 groups from 2008 to 2015. | |

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| Table B‑4: Number of Total Observations and Groups in Each Higher-Level Variables by Sample | | | | | |
| Name | Population | Overall Sample | Options Samples | | Breached Size Sample |
| Some | All |
| Contracts/Task Orders | 1,241,449 | 1,000,000 | 74,274 | 51,357 | 61,184 |
| Sector: Subsector | 108 | 82 | 78 | 73 | 75 |
| Sector: Detailed Industry | 1,059 | 878 | 624 | 573 | 557 |
| Sector: Service Area | 3,825 | 3,242 | 1,508 | 1,327 | 1,292 |
| Acquirer: Agency | 28 | 26 | 25 | 25 | 24 |
| Acquirer: Office | 1,228 | 1,092 | 758 | 676 | 656 |
| Place | 197 | 186 | 121 | 103 | 123 |
| Start Fiscal Year | 9 | 9 | 9 | 9 | 9 |

Note: Some of the gap between the population and overall sample results from an uneven distribution of missing data, e.g. most NAICS codes that changed between 2007 and 2012 were set as missing.

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| Table B‑5: Office and Vendor-Office Pair Level 1 Control Variables | | | |
| Name | Variable Indicator | Type | Description | |
| Office Obligations | cln\_OffObl7 | Continuous | Total office constant 2018 obligations in the prior 7 fiscal years, logged and rescaled. 1 dollar is added to all values to allow for logarithmic transformation of offices with no prior spending. | |
| Paired Share | cp\_PairObl7 | Continuous | Percentage of an office’s constant 2018 obligations that are accounted for by this vendor, rescaled. | |
| Office Focus | cln\_OffFocus | Continuous | Determines the distribution of office attention, as measured in contract counts processed through the Herfindahl-Hirschman Index, across different detailed industries, logged and then rescaled. | |

Note: The study variables Office Performance-Based and Office Service Code Experience vary based on office and year like the office focus variable in this table. The study variables Paired Years and Paired Actions vary with each combination of office, vendor, and year like the paired share variable in this table.

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| Table B‑6: Subsector and Detailed Industry Level-1 Control Variables | | | |
| Name | Variable Indicator | Type | Description | |
| Subsector HHI | cln\_Def3HHI | Continuous | A measure of industrial concentration (Herfindahl-Hirschman Index) of subsector industries, logged and rescaled. | |
| Detailed Industry HHI | cln\_Def6HHI | Continuous | A measure of industrial concentration (Herfindahl-Hirschman Index) of detailed industries, logged and rescaled. | |
| Subsector DoD:US | clr\_Def3toUS | Continuous | Ratio of defense obligations to U.S. wide revenues in same NAICS subsector, logged and rescaled. Draws from economic census in calendar ‘07 (signed year ‘08-‘12) and ‘12 (signed year ‘13-‘15). Capped at 1. | |
| Detailed Industry DoD:US | clr\_Def6toUS | Continuous | Ratio of defense obligations to U.S. wide revenues in same NAICS detailed industry, logged and rescaled. Draws from economic census in calendar ‘07 (signed year ‘08-‘12) and ‘12 (signed year ‘13-‘15). Capped at 1. | |

Note: The Detailed Industry Salary study variable varies based on detailed industry and five year block, like the detailed industry DoD:US variable in this table.

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| Table B‑4: Initial Contract Scope Level-1 Control Vehicles | | | |
| Name | Variable Indicator | Type | Description |
| Initial Base | cln\_Base | Continuous | The initial contract base which excludes options that have not been exercised at contract start. Deflated in 2018 dollars based on contract start fiscal year, cost ceiling, logged and rescaled. |
| Initial Ceiling: Base | clr\_Ceil2Base | Continuous | The initial ratio of the ceiling to the base, logged and then rescaled |
| Planned Duration | cln\_Days | Continuous | The initial maximum duration of the contract in days, logged and rescaled |

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| Table B‑4: Description Independent Contract Level 1 Categorical Variables | | | |
| Name | Variable Indicator | Type | Description |
| Competition | Comp | Categorical | The level of competition for any given contract. |
| No Competition | (Baseline) | Binary | Whether the contract did not use competitive procedures. |
| 1 Offer | 1Offr | Binary | Whether contracts received 1 offer |
| 2-4 Offers | 2-4Offr | Binary | Whether contracts received 2, 3 or 4 offers. |
| 5+ Offers | 5plusOffr | Binary | Whether contracts received 5 or more offers. |

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| Table B‑4: Description Independent Contract Level 1 Categorical Variables | | | |
| Name | Variable Indicator | Type | Description |
| Vehicle | Veh | Categorical | Contract Vehicle: The omitted baseline is definitive awards and purchase orders. |
| Definitive / Purchase Order | (Baseline) | Categorical | Does the contract have no parent vehicle (I.e. definitive award or purchase Order) |
| Single-Award | SIDV | Binary | Is the contract vehicle is a single-award indefinite delivery contract. |
| Multi-Award | MIDV | Binary | Is the contract vehicle is a multiple-award indefinite delivery contract. |
| FSS-GWAC | FSS-GWAC | Binary | Is the contract vehicle is a Federal Supply Schedule or Government-Wide Acquisition Contract. |
| BPA-BOA | BPA-BOA | Binary | Whether the contract vehicle is a Blank Purchase Agreement or Basic Ordering Agreement. |

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| Table B‑4: Description Independent Contract Level 1 Categorical Variables | | | |
| Name | Variable Indicator | Type | Description |
| Pricing | Pricing | Categorical | The means of calculating vendor payments. The omitted baseline is firm fixed price contracts. |
| Firm Fixed-Price | (Baseline) | Binary | Firm-Fixed Price Contract |
| Other Fixed-Price | Other\_FP | Binary | Fixed-price redetermination, fixed-price award fee, and fixed-price economic price adjustment |
| Incentive Free | Incentive | Binary | Including fixed-fee incentive fee, cost plus incentive fee, and cost sharing |
| Combination or Other | Comb-Other | Binary | Covers contracts using multiple pricing mechanisms or unusual and unclassified types |
| Other Cost-Based | Other\_CB | Binary | All types of cost-based contracts, excluding incentive fee |
| Time & Materials / Labor Hours/ FFP:LoE | TM-LH-FPLOE | Binary | Time and materials, labor hours, and fixed-price level of effort contracts respectively |

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| Table B‑4: Description Independent Contract Level 1 Categorical Variables | | | |
| Name | Variable Indicator | Type | Description |
| Crisis Funding | Crisis | Categorical | Whether the funding came from emergency accounts |
| Not Crisis | (Baseline) | Binary | Whether CSIS classified the contract as crisis-funded. |
| Recovery Act | ARRA | Binary | Whether the funds come from the American Recovery and Reinvestment Act |
| Disaster | Disaster | Binary | Whether the funds come from discretionary spending |
| OCO | OCO | Binary | Whether the funds come from the Overseas Contingency Operations fund |