Do Expiring Budgets Lead to Wasteful Year-End Spending? Evidence from Federal Procurement*

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Abstract

Many organizations fund their spending out of a fixed budget that expires at year's end. Faced with uncertainty over future spending demands, these organizations have an incentive to build a buffer stock of funds over the front end of the budget cycle. When demand does not materialize, they then rush to spend these funds on lower quality projects at the end of the year. We test these predictions using data on procurement spending by the U.S. federal government. Using data on all federal contracts from 2004 through 2009, we document that spending spikes in all major federal agencies during the 52nd week of the year as the agencies rush to exhaust expiring budget authority. Spending in the last week of the year is 4.9 times higher than the rest-of-the-year weekly average. We examine the relative quality of year-end spending using a newly available dataset that tracks the quality of $130 billion in information technology (I.T.) projects made by federal agencies. Consistent with the model, average project quality falls at the end of the year. Quality scores in the last week of the year are 2.2 to 5.6 times more likely to be below the central value. To explore the impact of allowing agencies to roll unused spending over into subsequent fiscal years, we study the I.T. contracts of an agency with special authority to roll over unused funding. We show that there is only a small end-of-year I.T. spending spike in this agency and that the one major I.T. contract this agency issued in the 52nd week of the year has a quality rating that is well above average.

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1 Introduction

Many organizations have budgets that expire at year's end. In the U.S., most budget authority provided to federal government agencies for discretionary spending requires the agencies to obligate funds by the end of the fiscal year or return them to the Treasury general fund, and state and municipal agencies typically face similar constraints (McPherson, 2007; Jones, 2005; GAO, 2004).[1]

For these organizations, unspent funding may not only represent a lost opportunity but can also signal a lack of need to budget-setters, decreasing funding in future budget cycles (Lee and Johnson, 1998; Jones, 2005). When current spending is explicitly used as the baseline in setting budgets for the following year, this signaling effect is magnified.

This "use it or lose it" feature of time-limited budget authority has the potential to result in low value spending—since the opportunity cost to organizations of spending about-to-expire funds is effectively zero. Exacerbating this problem is the incentive to build up a rainy day fund over the front end of the budget cycle. Most organizations are de facto liquidity constrained, facing at the very least a high cost to acquiring mid-cycle budget authority. When future spending demands are uncertain, organizations have an incentive to hoard. Thus, at the end of the budget cycle, organizations often have a buffer-stock of funding which they must rush to spend through.

To illustrate the key mechanisms which create the potential for wasteful year-end spending, we build a simple model of spending with fixed budgets and expiring funds. Annual budget cycles are divided into two six-month periods. Spending exhibits decreasing returns within each period and is scaled by a productivity parameter that is unknown in advance. In the face of this uncertainty, organizations engage in precautionary savings in the first period. In the second period, the prospect of expiring funds leads to a rush to spend. As a result, average spending is higher and average quality is lower at the end of the year.

There is some suggestive evidence consistent with these predictions for the U.S. federal government. A Department of Defense employee interviewed by McPherson (2007) describes "merchants and contractors camped outside contracting offices on September 30th (the close of the fiscal year) just in case money came through to fund their contracts." A 1980 report by the Senate

[1] At the end of the federal fiscal year, unobligated balances cease to be available for the purpose of incurring new obligations. They sit in an expired account for 5 years in case adjustments are needed in order to accurately account for the cost of obligations incurred during the fiscal year for which the funds were appropriated. At the end of the 5 years, the funds revert to the Treasury general fund.

Subcommittee on Oversight of Government Management on "Hurry-Up Spending" found that the rush to spend led to poorly defined contracts, limited competition and inflated prices, and the procurement of goods and services for which there was no current need (Subcommittee on Oversight of Government Management, 1980). At a congressional hearing in 2006, agency representatives admitted to a "use-it-or-lose-it" mentality and a "rush to obligate" at year's end (McPherson, 2007). The 2007 Federal Acquisition Advisory Panel concluded that "the large volume of procurement execution being effected late in the year is having a negative effect on the contracting process and is a significant motivator for many of the issues we have noted with respect to, among another things, lack of competition and poor management of interagency contracts" (Acquisition Advisory Panel, 2007).

Yet despite these accounts, there is no hard evidence on whether year-end spending surges are currently occurring in the U.S. federal government or whether year-end spending is lower-value than spending during the rest of the year. Government Accountability Office (GAO) reports in 1980 and 1985 documented that fourth quarter spending was somewhat higher than spending during the rest of year using aggregate agency spending data. In a follow-up report, GAO (1998) stated that because "substantial reforms in procurement planning and competition requirements have changed the environment . . . year-end spending is unlikely to present the same magnitude of problems and issues as before." However, this later report was unable to examine quarterly agency spending patterns for 1997 because agency compliance with quarterly reporting requirements was incomplete. Other government professionals cite similar constraints to empirical analysis. In summarizing the response of Department of Defense contracting officers to the interview question, "How would you measure the quality of year-end spending?" McPherson (2007) writes, "Absent flagrant abuse that no one could miss, there is no practical way of weighing year-end spending."

This paper address the empirical shortfall. It begins by documenting the within-year pattern of federal spending on government contracts, the main category of spending where significant discretion about timing exists. The analysis demonstrates that there is a large surge in the 52nd week of the year that is concentrated in procurements for construction-related goods and services, furnishings and office equipment, and I.T. services and equipment. It also shows that the date of completion of annual appropriations legislation has a noticeable effect on the timing of federal

contracting, consistent with anecdotal claims that part of the difficulties agencies face in effective management of acquisitions comes from tardy enactment of appropriations legislation. The estimates show that a delay of ten weeks, roughly the average over this time period, raises raises the share of spending in the last month by 1 percentage point, from a base of about 15 percent.

We then analyze the impact of the end-of-year spending surge on spending quality using a newly available dataset on the status of the federal government's 686 major information technology projects—a total of $130 billion in spending. Consistent with the model, spending on these I.T. projects spikes in the last week of the fiscal year, increasing to 7.2 times the rest-of-year weekly average. Moreover, the spike is not isolated to a small set of agencies or a subset of years, but rather a persistent feature both across agencies and over time. In tandem with the spending increase, there is a sharp drop-off in investment quality. Based on a categorical index of overall investment performance, which combines assessments from agency information officers with data on cost and timeliness, we find that projects that originate in the last week of the fiscal year have 2.2 to 5.6 times higher odds of having a lower quality score. Ordered logit and OLS regressions show that this effect is robust to agency and year specific factors as well as to a rich set of project characteristic controls.

Our findings suggest that the various safeguard measures put into place in response to the 1980 Senate Subcommittee report (GAO, 1998) and to broader concerns about acquisition planning have not been fully successful in eliminating the end-of-year rush-to-spend inefficiency. An alternative solution is to give agencies the ability to roll over some of their unused funding for an additional year. Provisions of this nature have been applied with apparent success in the states of Oklahoma and Washington, as well as in the UK (McPherson, 2007; Lienert and Ljungman, 2009). Within the U.S. federal government, the Department of Justice (DOJ) has obtained special authority to roll over unused budget authority into a fund that can be used in the following year.

We extend the model to allow for rollover and show that, in the context of the model, the efficiency gains from this ability are unequivocally positive. To test this prediction, we study I.T. contracts at the Department of Justice which has special rollover authority. We show that there is only a small end-of-year I.T. spending spike at DOJ and that the one major I.T. contract DOJ issued in the 52nd week of the year has a quality rating that is well above average.

The rest of the paper proceeds as follows. Section 2 presents a model of wasteful year-end

spending and discusses the mechanisms that could potentially lead to end-of-year spending being of lower quality than spending during the rest of the year. Section 3 examines the surge in year-end spending using a comprehensive dataset on federal procurement. Section 4 tests for a year-end drop-off in quality using data on I.T. investments. Section 5 analyzes the Department of Justice experience with rollover authority. Section 6 concludes.

2 A Model of Wasteful Year-End Spending

In this section, we present a simple model to illustrate how expiring budgets can give rise to wasteful year-end spending. The model has three key features. First, there are decreasing returns to spending within each sub-year period. Decreasing returns could be motivated by a priority-based budgeting rule, where during a given period organizations allocate resources to projects according to the surplus they provide. Alternatively, decreasing returns could be motivated by short-run rigidities in the production function. For example, federal agencies with a fixed staff of contracting specialists might have less time to devote to each contract in a period with abnormally high spending.

Second, there is uncertainty over the value of future budget resources. One can think of uncertainty arising from either demand or supply factors. Shifts in military strategy or an influenza outbreak, for example, could generate an unanticipated change in demand for budget resources. On the supply side, uncertainty could be driven by variation in the price or quality of desired goods and services.[2]

Third, resources that are not spent by the end of the year cannot be rolled over to produce value in subsequent periods. At the end of this section, we also analyze what happens when this constraint is relaxed.

2.1 The Baseline Model

Consider an annual model of budgeting where an organization chooses how to apportion budget authority, B, normalized to 1, over two six-month periods, denoted by $t = \{1, 2\}$, to maximize a

[2] As an example of supply side uncertainty, during the recent recession many agencies have experienced construction costs for Recovery Act projects that were below projections.

Cobb-Douglas objective. Denote spending in each period by x_t, and normalize its price to 1. To model decreasing returns and uncertainty, assume that the Cobb-Douglas elasticity parameters α_t are stochastic i.i.d. draws from the same distribution with support on the open unit interval.[3] The organization makes its spending decision, x_t, after observing its draw of α_t for that period. Conditional on observing the period 1 elasticity parameter, the log objective for the organization is:

$$\max_{x_1,x_2} \ \alpha_1 \ln(x_1) + \mathbb{E}_{\alpha_2}\big[\alpha_2 \ln(x_2)\big] \quad \text{s.t. } x_1 + x_2 \leq 1. \tag{1}$$

Substituting in the constraint $x_2 = 1 - x_1$, optimal spending in the first period is

$$x_1^*(\alpha_1) = \frac{\alpha_1}{\alpha_1 + \mathbb{E}_{\alpha_2}[\alpha_2]}. \tag{2}$$

Spending in the second period is the remainder $x_2^* = 1 - x_1^*$.

Because of the uncertainty over the second period elasticity parameter, α_2, the organization puts aside some money on average during the first part of the year.

Proposition 1 (Rainy Day Fund Effect)**.** *The expected level of spending is strictly greater in period 2 than in period 1 (i.e., $\mathbb{E}[x_2^*] > \mathbb{E}[x_1^*]$).*

The proof is a straightforward application of Jensen's inequality. Because $x_1^*(\alpha_1)$ is a convex function of α_2, $x_1^*(\alpha_1) = \frac{\alpha_1}{\alpha_1 + \mathbb{E}_{\alpha_2}[\alpha_2]} < \mathbb{E}_{\alpha_2}\left[\frac{\alpha_1}{\alpha_1+\alpha_2}\right]$. Integrating over α_1, this implies that $\mathbb{E}_{\alpha_1}[x_1^*] < \mathbb{E}_{\alpha_1,\alpha_2}\left[\frac{\alpha_1}{\alpha_1+\alpha_2}\right]$. Because α_1 and α_2 are drawn from the same distribution, $\mathbb{E}_{\alpha_1,\alpha_2}\left[\frac{\alpha_1}{\alpha_1+\alpha_2}\right] = 1/2$. Therefore, $\mathbb{E}[x_1^*] < 1/2 < \mathbb{E}[x_2^*]$.

The next result concerns the value of spending in each period. Define the average quality of spending in a period as that period's output normalized by the level of spending: $q(x_t) = \alpha_t \ln(x_t)/x_t$.

Proposition 2 (Wasteful Year-End Spending)**.** *The expected average quality of spending is strictly lower in period 2 than in period 1 (i.e., $\mathbb{E}[q(x_2^*)] < \mathbb{E}[q(x_1^*)]$).*

The proof is simple. By Proposition 1, we know that $\mathbb{E}[x_2] > \mathbb{E}[x_1]$. Because $q(x_t)$ is strictly

[3]Uncertainty could alternatively be conceptualized in a model with constant elasticities but uncertain prices. The main results below would be qualitatively unchanged.

decreasing, this implies that $\mathbb{E}[q(x_2)] < \mathbb{E}[q(x_1)]$.

To summarize, decreasing returns and uncertainty create an incentive for organizations to build up a rainy day fund in the first period, spending less than half of their budget on average. At the end of the year, spending increases and average quality is lower than in the earlier part of the year.

It is worth emphasizing that this model illustrates two different channels through which end-of-year spending can be of lower quality. The first channel comes from the uncertainty about future needs and will lead organizations to engage in only high value projects early in the year and wait to undertake lower value projects once the full-year demands on resources are clearer. The second channel comes from the production-function rigidities motivated by the anecdotal evidence that contracting officers become over-extended in the end-of-year rush to get money out the door. Either channel by itself would be enough to produce an empirical relationship in which end-of-year spending is of lower value.

2.2 Rollover Budget Authority

The inefficiency from wasteful year-end spending raises the question of whether anything can be done to reduce it. Reducing uncertainty would be helpful, but is infeasible in practice for many organizations due to the inherently unpredictable nature of some types of shocks. Another way to potentially increase efficiency would be to allow organizations to roll over budget authority across fiscal years. Under such a system, budgeting would still occur on an annual basis, but rather than expiring at year's end, unused funds would be added to the newly granted budget authority in the next year.

The idea that budget authority should last for longer than one year is not new. As McPherson (2007) has pointed out, granting Congress the power to collect taxes, Article 1, Section 8 of the U.S. Constitution gave Congress the power of taxation, "To raise and support armies, but no appropriation of money to that use shall be for longer term than two years." Not only does this suggest that the Founding Fathers though that two-year limits were reasonable in some instances, but by failing to attach this clause to other forms of federal expenditure, they implied by omission that periods longer than two years were potentially desirable in a broad range of circumstances.

More recently, Jones (2005) has argued for extending U.S. federal government's obligation period from 12 to 24 months, and McPherson (2007) has recommended that agencies be allowed to carry over unused budget authority for one-time or emergency use for an additional year. The federal government of Canada has, in fact, adopted a version of rollover, allowing agencies to carry over up to 5 percent of their budget authority across years. In response to concerns over wasteful year-end spending, the states of Oklahoma and Washington also allow state agencies to roll over their budget authority to some extent.[4] Finally, within the U.S. federal government, the Department of Justice (DOJ) has obtained special authority to transfer unused budget authority to an account which can be used for capital and other similar expenditure in future years.[5]

2.3 Extending the Model To Allow For Rollover

To show how rollover would increase the average quality of spending, extend the model from one to two years so that it now covers four consecutive six-month periods. After observing its period 1 elasticity parameter, the organization's objective is

$$\max_{\{x_t\}} \ \alpha_1 \ln(x_1) + \mathbb{E}_{\alpha_2}\left[\alpha_2 \ln(x_2) + \mathbb{E}_{\alpha_3}\left[\alpha_3 \ln(x_3) + \mathbb{E}_{\alpha_4}\left[\alpha_4 \ln(x_4)\right]\right]\right] \tag{3}$$

s.t

(c1) $\quad x_1 + x_2 \leq 1$

(c2) $\quad x_3 + x_4 \leq 1$

(c3) $\quad x_1 + x_2 + x_3 + x_4 \leq 2$

The baseline model and the model with rollover are defined by different subsets of the constraints. An organization that must spend its entire budget by year's end faces constraints (c1) and (c2). An organization that can roll over funding from the first to the second year faces constraints (c1) and (c3). In other words, with rollover an organization can spend more than one unit in the second year so long as its two-year spending is less than two units in total.

For intuition as to how rollover improves quality, notice that the constraints from the rollover

[4] See McPherson (2007) for an in-depth discussion.

[5] See Public Law 102-140: 28 U.S.C. 527. The special authority is also discussed in a May 18, 2006 Senate hearing entitled, "Unobligated Balanced: Freeing Up Funds, Setting Priorities and Untying Agency Hands."

problem are nested by the baseline constraints. That is, constraints (c1) and (c2) imply constraint (c3) but (c1) and (c3) do not imply (c2). It follows, then, with the rollover provision the organization faces the same objective problem with one less constraint.

Proposition 3. *The rollover provision strictly increases average quality,*

The proof is an application of the General Envelope Theorem. Note that the Lagranian of the nested baseline and rollover objective can be written as

$$\begin{aligned} v(x^*, \theta) = \max_{\{x_t\}} \; & \alpha_1 \ln(x_1) + \mathbb{E}_{\alpha_2,\alpha_3,\alpha_4}\left[\alpha_2 \ln(x_2) + \mathbb{E}_{\alpha_3,\alpha_4}\left[\alpha_3 \ln(x_3) + \mathbb{E}_{\alpha_4}\left[\alpha_4 \ln(x_4)\right]\right]\right] \\ & - \lambda_1(x_1 + x_2 - 1) \\ & - \theta\lambda_2(x_3 + x_4 - 1) \\ & - \lambda_3(x_1 + x_2 + x_3 + x_4 - 2) \end{aligned}$$

where the baseline model is given by the case ($\theta = 1$) and the rollover problem is given by the case ($\theta = 0$). Because the objective is strictly decreasing in θ when evaluated at $(x^*, \theta = 1)$ due to the binding budget constraint, it follows from the General Envelope Theorem that the maximal value of the objective is strictly greater—and thus average quality is strictly greater—with the rollover provision.

3 Does Spending Spike at the End of the Year?

The predictions of the model are straightforward. Spending should spike at the end of the year. Year end spending should be of lower quality than spending during the rest of the year. Allowing agencies to roll over unneeded money into the following fiscal year should lead to higher spending quality. Using newly available data, we test each of these three predictions, beginning in this section with the first prediction.

For many types of government spending, there is little potential for a spike in spending at the end of the year. The 65 percent of spending that is made up of mandatory programs and interest on the debt is not subject to the timing limitations associated with annual appropriations. The 13 percent of spending that pays for compensation for federal employees is unlikely to exhibit

an end-of-year surge since new hires bring ongoing costs. This leaves procurement of goods and services from the private sector as the main category of government spending where an end-of-year spending surge could potentially occur. We therefore focus our empirical work on the procurement of goods and services that accounted for $538 billion or 15.3 percent of government spending in 2009 (up from $165 billion dollars and 9.2 percent in 2000).

It is worth noting that even within procurement spending, there are some categories of spending for which it would be unlikely to observe an end-of-year spike. Some types of appropriated spending, such as military construction, come with longer spending horizons to provide greater flexibility to agencies. Moreover, there are limits to what kinds of purchases can be made at year end.

In particular, Federal law provides that appropriations are available only to "meet the bona fide needs of the fiscal year for which they are appropriated." Balances remaining at the end of the year cannot generally be used to prepay for the next year's needs. A classic example of an improper obligation was an order for gasoline placed 3 days before the end of the fiscal year to be delivered in monthly installments throughout the following fiscal year (GAO, 2004). That said, when there is an ongoing need and it is impossible to separate the purchase into components performed in different fiscal years, it can be appropriate to enter into a contract in one fiscal year even though a significant portion of the performance is in the subsequent fiscal year. In contrast, contracts that are readily severable generally may not cross fiscal years (unless specifically authorized by statute).[6]

3.1 The Federal Procurement Data System

Falling technology costs and the government transparency movement have combined to produce an extraordinary increase in the amount of government data available on the web (Fung, Graham and Weil, 2007; The Economist, February 25, 2010). As of October 2010, Data.gov had 2,936 U.S. federal executive branch datasets available. The Federal Funding Accountability and Transparency Act of 2006, sponsored by Senators Coburn, Obama, Carper, and McCain, required OMB to create a public website, showing every federal award, including the name of the entity receiv-

[6]Over the past two decades, Congress has significantly expanded multi-year contracting authorities. For example, the General Services Administration can enter into leases for periods of up to 20 years, and agencies can contract for services from utilities for periods of up to 10 years.

ing the award and the amount of the award, among other information. USAspending.gov was launched in December 2007 and now contains data on federal contracts, grants, direct payments, and loans.

The data currently available on USAspending.gov include the full Federal Procurement Data System (FPDS) from 2000 through 2009. FPDS is the data system that tracks all federal contracts. Every new contract awarded as well as every follow-on contracting action such as a contract renewal or modification results in an observation in FPDS. Up to 176 pieces of information are available for each contract including dollar value, a four digit code describing the product or service being purchased, the component of the agency making the purchase, the identity of the provider, the type of contract being used (fixed price, cost-type, time and materials, etc.), and the type of bidding mechanism used. While FPDS was originally created in 1978, agency reporting was incomplete for many years, and we are told that it would be difficult to assemble comprehensive data for years before 2000. Moreover, while FPDS is thought to contain all government contracts from 2000 on, data quality for many fields was uneven before the 2003 FPDS modernization. Therefore, for most of the FPDS-based analyses in this paper, we limit ourselves to data from fiscal years 2004 through 2009.[7]

Table 1 shows selected characteristics of the FPDS 2004 to 2009 sample. There were 14.6 million contracts during this period or an average of 2.4 million a year. The distribution of contract size is highly skewed. Ninety-five percent of contracts were for dollar amounts below $100,000, while 78 percent of contract spending is accounted for by contracts of more than $1 million. Seventy percent of contract spending is by the Department of Defense. The Department of Energy and NASA, which rely on contractors to run large labs and production facilities, and the General Services Administration, which enters into government-wide contracts and contracts on behalf of other agencies, are the next largest agencies in terms of spending on contracts. Twenty-nine percent of contracts were non-competitive, 20 percent were competitive but received only a single bid, and 51 percent received more than 1 bid. Sixty-five percent were fixed price, 30 percent were cost-reimbursement, and 6 percent were on a time and materials or labor hours basis.

[7] FPDS excludes classified contracts. Data are made available in FPDS soon after an award, except during wartime the Department of Defense is permitted a 90 day delay to minimize the potential for disclosure of mission critical information.

3.2 The Within-Year Pattern of Government Procurement Spending

Figure 1 shows contract spending by week, pooling data from 2004 through 2009. There is a clear spike in spending at the end of the year with 16.5 percent of all spending occurring in the last month of the year and 8.7 percent occurring in the last week. The bottom panel shows that when measured by the number of contracts rather than the dollar value, there is also clear evidence of an end-of-the-year spike, with 12.0 percent occurring in the last month and 5.6 percent occurring in the last week.

Table 2 shows that the end of the year spending surge occurs in all major government agencies. If spending were distributed uniformly throughout the year, we would expect to see 1.9 percent in the final week of the year. The lowest agency percentage is 3.6 percent.

Table 3 shows the percent of spending on different types of goods and services that occurs at the end of the year. The table shows some of the largest spending categories along with some selected smaller categories that are very similar to the large categories. Construction-related goods and services, furnishings and office equipment, and I.T. services and equipment all have end-of-year spending rates that are significantly higher than the average. These categories of spending often represent areas where there is significant flexibility about timing for performing maintenance or upgrading facilities and equipment, and which, because they represent on-going needs, have a reasonable chance of satisfying the bona fide needs requirement even if spending happens at the end of the year.

The categories of spending under the "Services" heading have end-of-year spending rates that are near the average. For these kinds of services it will often be difficult to meet the bona fide needs requirements unless the services are inseparable from larger purchases, the services are necessary to provide continuity into the beginning of the next fiscal year, or the services are covered by special multiyear contracting authorities. Thus it is not surprising that their rate of end of year spending is lower than that for construction, for example. There are two categories of spending where there is very little year-end surge. The first is ongoing expenses such as fuels where attempts to spend at the end of the year would represent a blatant violation of prohibitions against paying for the following year's expenses with current year appropriations. The second is military weapons systems where because of long planning horizons and the flexibility provided

by special appropriations authorities, one would not expect to see a concentration of spending at the end of the year.

Figure 1 also shows a spike in spending in the first week of the year, along with smaller spikes at the beginning of each quarter. The spending patterns for these beginning of period contracts are very different from those at the end of the year. Appendix Table A1 shows that leases and service contracts are responsible for most of the beginning-of-period spikes.

3.3 The Impact of Appropriations Timing on the Within-Year Pattern of Government Procurement Spending

It is the exception rather than the rule for Congress to pass annual appropriations bills before the beginning of the fiscal year. Over the 10 years from 2000 to 2009, the full annual appropriations process was never completed on time. Although defense appropriations bills were enacted before the start of the fiscal year 4 times, in 8 of the ten years, appropriations for all or nearly all of the civilian agencies were enacted in a single consolidated appropriations act well after the start of the fiscal year.

Analysts have attributed some of the challenges facing federal acquisition to the tardiness of the appropriations process, since the delays introduce uncertainty and compress the time available to plan and implement a successful acquisition strategy (Acquisition Advisory Panel, 2007). In this subsection we analyze the relationship between the timing of the annual appropriations acts and the within-year pattern of government contract spending. For this analysis, we use the full 2000 to 2009 FPDS data, even though the data prior to 2004 are of lower quality. In particular, in these earlier years it appears that for some agencies, contracts are all assigned dates in the middle of the month and the within-month weekly pattern is therefore not fully available.

Figure 2 shows results from regressing measures of end-of-year spending on the timing of annual appropriations. This analysis has two data points for each year, one representing defense spending and the other representing non-defense spending. For each observation we measure the share of annual contract spending occurring in the last quarter, month, and week of the year and the "weeks late" of the enactment of annual appropriations legislation (enactment is defined by the date the President signs the legislation). "Weeks late" measures time relative to October

1 and takes on negative values when appropriations were enacted prior to the start of the fiscal year. For defense spending, "weeks late" measures the date that the defense appropriations bill was enacted. For non-defense spending the date is assigned from the date of the consolidated appropriations act, or, in the case of the two years in which there was not a consolidated act, a date that is the midpoint of the individual non-defense appropriations acts.[8]

There is a clear pattern in the data in which later appropriation dates result in a greater fraction of end-of-year spending. In the plots, we show the separate slopes of the defense and non-defense observations. Defense spending tends to be appropriated earlier and to have less end of year spending, but the slopes for the two types of spending are similar. The labels show the regression coefficients, including the coefficients from a pooled regression in which defense and non-defense spending have different intercepts but are constrained to have the same slope. The estimates show that a delay of ten weeks, roughly the average over this time period, raises the share of spending in the last quarter by 2 percentage points from a base of about 27 percent. A ten-week delay raises the share of spending in the last month by 1 percentage point, from a base of about 15 percent. Both coefficients are statistically significant at the 1 percent level. As we mentioned above, we do not have reliable within-month data on timing for the years before 2004, so we exclude years before 2004 for the analysis of spending during the last week of the year. The estimates indicate that a 10 week delay raises the share of spending by 1 percentage point on a base of 9 percent. Due to the smaller sample, the estimate is less precise, with a p-value of .07.

Overall, the analysis in this section shows that the end-of-year spending surge is alive and well, thirty years after Congress and GAO focused significant attention on the problem and despite reforms designed to limit it. Moreover, claims that late appropriations increase the end-of-year volume of contracting activity are accurate, suggesting that late appropriations may be exacerbating the already adverse effects of having an acquisition workforce operating beyond capacity at the end of the year.

A surge in end-of-year spending does not necessarily imply bad outcomes. Agency acquisition staff can plan ahead for the possibility that extra funds will be available. Indeed, for large contracts weeks and even months of lead time are generally necessary. The next section of the

[8]We aggregate all non-defense spending because it facilitates communication of the pattern of results while capturing nearly all of the available variation. We have also run analysis in which we assign each non-defense agency the date of its individual appropriations act and obtain very similar results.

paper therefore analyzes the relative quality of end-of-year contract spending to explore whether there are any adverse effects of the end-of-year spending surge.

4 Is End of Year Spending of Lower Quality?

Our model predicts that end-of-year spending will be of lower quality both because agencies will spend money at the end of the year on low value projects and because the increased volume of contracting at the end of the year will lead to less effective management of those acquisitions. As the discussion in the introduction indicated, it has been challenging historically to study contract quality because of the limited availability of data. In this section of the paper, we use a new dataset that includes quality information on 686 of the most important federal I.T. procurements to study whether end-of-the year procurements are of lower quality.

4.1 I.T. Dashboard

Our data come from the federal I.T. Dashboard (www.itdashboard.gov) which tracks the performance of the most important federal I.T. projects. The I.T. Dashboard came online in beta form in June, 2009 and provides the public with measures of the overall performance of major I.T. projects. Like the USAspending.gov data discussed earlier, the I.T. Dashboard is part of the trend toward "open government" and part of a shift in federal management philosophy toward monitoring performance trends rather than taking static snapshots of performance and of making the trends public both for the sake of transparency and to motivate agencies to achieve high performance (Metzenbaum, 2009).[9]

Along with providing credible performance data for a portion of contract spending, studying federal I.T. projects has two other advantages. The first is the ubiquity of I.T. spending. Major information technology projects are carried out by nearly all components of the U.S. federal government. Compared to an analysis of, say, the purchase of military or medical equipment, an analysis of I.T. spending shines a much broader light on the workings of government, allowing us

[9]The legislative foundation for the I.T. Dashboard was laid by the Clinger-Cohen Act of 1996, which established Chief Information Officers at 27 major federal agencies and called on them to "monitor the performance of the information technology programs of the agency, [and] evaluate the performance of those programs on the basis of applicable performance measurements." The E-Government Act of 2002 built upon this by requiring the public display of these data.

to test our hypotheses across agencies with a wide range of missions and organizational cultures.

The second advantage is that federal I.T. spending is an important and growing federal activity. Federal I.T. expenditure was $81.9 billion in 2010, and has been growing at an inflation-adjusted rate of 3.8 percent over the past 5 years.[10]. Moreover, these expenditure levels do not account for the social surplus from these projects. It is reasonable to think that information systems used to monitor terrorist activities, administer Social Security payments, and coordinate the health care of military veterans could have welfare impacts that far exceed their dollar costs.

Finally, it should be noted that while we are duly cautious about external validly, the widespread nature of I.T. investment across all types of organizations, including private sector ones, makes a study of I.T. purchases more broadly relevant than would be certain other categories of spending where the federal government may be the only purchaser. Not only do non-federal organizations buy similar products under similar budget structures, but they often purchase these products from the same firms that sell to U.S. federal agencies. These firms know the end-of-year budgeting game, and if they play it at the U.S. federal level, there may be reason to believe that they operate similarly elsewhere.[11]

4.2 Data and Summary Statistics

The I.T. Dashboard displays information on major, ongoing projects made by 27 of the largest agencies of the federal government. The information is gleaned from the Exhibit 53 and Exhibit 300 forms that agencies are required to submit to the Office of Management and Budget and is constantly updated on the Dashboard website, allowing users to view and conduct simple analysis of the data. The data we use was downloaded in March, 2010 at which time there were 761 projects being tracked.

For the analysis, we drop the 73 observations that are missing the quality measures, date of award, or cost variables. We also drop two enormous projects because their size would cause them to dominate all of the weighted regression results and because they are too high-profile to be indicative of normal budgeting practices.[12] This leaves us with a baseline sample of 686 projects

[10] Analytical Perspectives: Budget of the U.S. Government, 2010

[11] See Rogerson (1994) for a discussion of the incentives facing government contractors.

[12] These projects are a $45.5 billion project at the Department of Defense and a $19.5 billion project at the Department of Homeland Security; the next largest project is $3.9 billion and the average of the remaining observations is $219

and $130 million in planned total spending.

Table 4 shows the year of origination of these projects and the agencies at which they occurred. Almost two-thirds of these projects (64.6 percent) and half of the spending (50.3 percent) originated in 2005 or later, although there are some ongoing projects that originated more than 20 years ago.[13] The projects are distributed fairly broadly across agencies. Although the Department of Defense, Department of Transportation, and Department of Veteran's Affairs have higher levels of spending, the vast majority of the agencies have at least 10 projects (21 of 27) and at least $1 billion in aggregate spending (20 of 27).

The main performance measure tracked on the I.T. dashboard is the overall rating for the project. The canonical approach to tracking acquisitions is to measure cost, schedule, and performance. The overall rating therefore combines three subindexes. The cost rating subindex is based on the *absolute* percent deviation between the planned and actual cost of the project. Projects that are on average within 5 percent of the scheduled cost receive a score of 10, projects that are within 5 percent to 10 percent on average receive a score of 9, and so on down to zero. Because the symmetric treatment of under and over-cost projects is somewhat unnatural, in our analysis we also construct an alternative index, "cost overrun" which gives under-cost projects the highest scores and over-cost projects the lowest. In this index, projects that are at least 45 percent under-cost receive a score of 10, projects that are 35 percent to 45 percent under-cost receive a score of 9, and so on.

The schedule rating subindex is based on the average tardiness of the project across milestones. Projects that are no more than 30 days overdue on average receive a score of 10, projects that are no more than 90 days overdue on average receive a score of 5, and projects that are more than 90 days overdue on average receive a score of 0.

The third subindex is a subjective CIO evaluation score, designed to incorporate an assessment of contract performance. The rating is intended to reflect the CIO's "assessment of the risk of the investment's ability to accomplish its goals," with the CIO instructed to "consult appropriate stakeholders in making their evaluation, such as Chief Acquisition Officers, program managers,

million. Because the dropped observations have above average overall ratings and are not from the last week of the year, omitting the observations works against us finding the effect predicted my our model.

[13] We address sample selection issues in the sensitivity section below.

etc."[14] Importantly, the CIO evaluation is not mutually exclusive of the cost and schedule ratings, with the CIO explicitly instructed to consider deviations from planned cost and schedule. A reason for this is that the cost and schedule indices assess progress against current milestones, but these milestones may have been reset after being missed in the past. The CIO rating would be able to account for risks associated with a project that has repeatedly missed milestones in the past even if it is on track with current milestones.

The CIO rating is based on a 1-to-5 scale with 5 being the best.[15]. In constructing the overall rating this 1-to-5 scale is converted to a 0-to-10 scale by subtracting 1 and multiplying by 2.5.

The overall rating is constructed by taking an average of the three subindexes. However, if the CIO evaluation is below the calculated average, the CIO evaluation replaces the average.[16] The overall rating falls on a 0-to-10 scale with 10 being the best, and, through the averaging of the subindices, takes on non-integer values. Additional information on the indices can be found in the FAQ of the I.T. Dashboard website.

Table 5 shows summary statistics for the I.T. dashboard sample. The average project has a planned cost of $189 million and receives an average overall rating of 7.1 out of 10. The I.T. dashboard includes information on the investment phase (e.g., planning, operations and maintenance), service group (e.g., management of government resources, services for citizens), and line of business (e.g., communication, revenue collection) of the project. The bottom panel of the table shows the distribution of the sample across these project characteristics. These variables, along with agency and year fixed effects, are used as controls in the regression specifications.

To classify year-end projects, we use the date the first contract of the projects was signed, creating an indicator variable for projects that originated in the last seven days of September, the end of the fiscal year. Most I.T. projects are comprised of a series of contracts that are renewed and altered as milestones are met and the nature of the project evolves. We think that using the date the first contract was signed to classify the start date of the project is the best approach as the

[14] In particular, CIOs are instructed to assess the risk management (e.g., mitigation plans are in place to address risks), requirements management (e.g., investment objectives are clear and scope is controlled), contractor oversight (e.g., agency receives key reports), historical performance (e.g., no significant deviations form planned costs and schedule), human capital (e.g., qualified management and execution team), and any other factors deemed imported.

[15] A rating of 5 corresponds to "low risk," 4 corresponds to "moderately low risk," 3 corresponds to "medium risk," 2 corresponds to "moderately high risk," and 1 corresponds to "high risk."

[16] The exact formula is $overall\_rating = \min\left\{(2.5/3)(CIO\_evaluation - 1) + (1/3)cost\_rating + (1/3)schedule\_rating, (2.5/3)(CIO\_evaluation - 1)\right\}$

key structure of the project is most likely determined at its onset. While future contract awards may affect the quality of the project, we only observe outcomes at the project level. We view any potential measurement error from our approach as introducing downward bias in our coefficient of interest as contracts initially awarded before the last week of the year may be contaminated by modifications made in the last week of a later year and contracts initially awarded at the rush of year's end may be rectified at a later point.

Figure 3 shows the weekly pattern of spending in the I.T. Dashboard sample. As in the broader FPDS sample, there is a spike in spending in the 52nd week of the year. Spending and the number of projects in the last week increase to 7.2 and 8.3 times their rest-of-year weekly averages respectively. Alternatively put, while only accounting for 1.9 percent of the days of the year, the last week accounts for 12.3 percent of spending and 14.0 percent of the number of projects. Activity is tilted even more strongly towards the last week if the sample of projects is restricted to the 65.1 percent of contracts that are for less than $100 million. Given the longer planning horizon for larger acquisitions, it is not surprising that we see more of a year-end spike for the smaller contracts.[17]

4.3 The Relative Quality of Year-End I.T. Contracts

Figure 4 shows the distributions of the overall rating index for last-week-of-the-year projects and projects from the rest of the year. In these histograms, the ratings on the 0 to 10 scale are binned into 5 categories with the lowest category representing overall ratings less than 2, the second lowest representing overall ratings between 2 and 4, and so on. The top figure shows the distribution weighted by planned spending, meaning that the effects should be interpreted in terms of dollars of spending. These effects are closest to the theory which makes predictions about the average value of spending in the last period. To show that the effects are not being driven entirely by a small number of high cost projects, Panel B shows the unweighted distribution of projects for the last week and the rest of the year.

Consistent with the model, overall ratings are substantially lower at year's end. Spending in the last week of the year (Panel A) is 5.7 times more likely to have an overall rating in the bottom

[17] As in the broader FPDS sample, the end of year spike in the I.T. data is a broad phenomenon, not limited to a few agencies.

two categories (48.7 percent versus 8.6 percent). Without weighting by spending, projects (Panel B) are almost twice as likely to be below the central value (10.6 percent versus 5.7 percent).

To control for potentially confounding factors, we examine the effects of the last week within an ordered logit regression framework. The ordered logit model is a latent index model where higher values of the latex index are associated with higher values of the categorical variable. An advantage of the ordered logit model is that by allowing the cut points of the latent index to be endogenously determined, the model does not place any cardinal assumptions on the dependent variable.[18] In other worlds, the model allows for the range of latent index values that corresponds to an increase in the overall rating from 1 to 2 to be of different size than the range that corresponds to an increase from 2 to 3. In particular, letting i denote observations and j denote the values of the categorical variable, the predicted probabilities from the ordered logit model are given by

$$\mathrm{P}(Overall\_Score_i > j) = \frac{\exp(\beta_L Last\_Week_i + \beta_{0j} + X_i'\beta_X)}{1 + \exp(\beta_L Last\_Week_i + \beta_{0j} + X_i'\beta_X)},$$

where *Last_Week* is an indicator for the last week of the fiscal year and X_i is a vector of control variables. See Greene and Hensher (2010) for a recent treatment of ordered choice models.

Table 6 presents results from maximum likelihood estimates of the ordered logit model on the I.T. dashboard sample. The estimates in the table are odds ratios. Recall that odds ratios capture the proportional change in the odds of a higher categorical value associated with a unit increase in the dependent variable, so that an odds ratio of $1/2$ indicates that the odds of a higher categorical value are 50 percent lower, or reciprocally that the odds of a lower categorical variable are 2 times as great. The results in this table are weighted by inflation-adjusted spending.

The first column of the table shows the impact of a last week contract on the rating in a regression with no covariates. Columns 2 through 4 sequentially add in fixed effects for year, agency, and project characteristics. In all of the specifications, the odds ratios are well below one—ranging from 0.18 to 0.46—implying that last week spending is of significantly lower quality than spending in the rest of the year (the p-values are less than 0.01 in all specifications). The estimates imply that spending that originates in the last week of the fiscal year has 2.2 to 5.6 times higher odds of

[18]The standard ordered logit model does restrict the variables to have a proportional effect on the odds of a categorical outcome. We fail to reject this assumption using standard Brant tests that compares the standard ordered logit model with a version that allows the effects to vary.

having a lower quality score.

4.4 Sensitivity Analysis

This subsection explores the robustness of the basic estimates. It shows how the results vary with different treatment of large contracts, with different functional form assumptions, and when selection into the sample is modeled.

Figure 4 showed that the finding that year end projects are of lower quality was more pronounced in the dollar weighted analysis than in the unweighted analysis, suggesting that a few large poor performing contracts may be heavily affecting the results. The first four columns of Table 7 analyze this issue. The first two columns split the sample at the median contract size of $62 million. In the sample of smaller contracts, the coefficient of 0.60 is substantially below one but is less precisely estimated (p-value of 0.17). The point estimate in column (3) from an unweighted regression is quite similar to the estimate in column (1) for the smaller contracts, but with added precision from doubling the sample size by including the full sample (p-value of .02). Results in which we Winsorize the weights, assigning a weight of $1 billion to the 4 percent of projects that are larger than $1 billion, are about half way between the full sample weighted and unweighted results (p-value less than 0.01). Overall, it is clear that the pattern of lower rating for end of year contracts is a broad phenomenon. It is also clear that the sample contains several very large low rated projects that were originated in the last week of the year—possibly providing evidence that it is particularly risky to rush very large contracts out the door as the fiscal year deadline approaches.

Column (5) of Table 4 shows results from an ordinary least squares (OLS) model in which the raw overall rating is regressed on an indicator for the contract originating in the last week of the year and on controls. The regression coefficient of -1.00 shows that I.T. spending contracted in the last week of the year receives ratings that are on average a full point lower on the 0 to 10 rating scale. This estimate also confirms that the finding of lower quality year end spending is not limited to the ordered logit functional form.

An important feature of our sample is that it reflects only active I.T. projects. Projects that have already been completed or projects that were terminated without reaching completion are not in

our sample. Unfortunately, because the I.T. dashboard and the CIO ratings are brand new, it is not possible to acquire rating information on the major I.T. projects that are no longer ongoing.

Ideally, one would want a sample of all major I.T. projects that originated in a particular period in time. The bias introduced by the way in which our sample was constructed most likely leads us to underestimate the end-of-year-effect. In particular, very bad contracts begun in the last week of the year are likely to be canceled and would not appear in our data set. Similarly, very well executed contracts from earlier in the year are likely to be completed ahead of schedule and also not appear in our data set. Thus, our estimates likely understate the gap in quality that we would find if we could compare all contracts from the last week of the year with all contracts from the rest of the year.

To explore the extent of bias that a selection mechanism like the one just described might introduce into our estimates, we assembled a data set of all 3,859 major I.T. projects that originated between 2002 and 2010. We were able to assemble this data set using the annual Exhibit 53 reports that allow the Office of Management and Budget to track I.T. projects across the major federal agencies. These data show that more recently originated projects are significantly more likely to be in our sample. Our sample contains 85 percent of the total spending on projects that originated in 2007 or later and only 28 percent of the spending on projects that originated before this date.

A simple way to assess whether there is selection is to estimate the model on samples split into earlier and later years. A difference in the coefficient of interest across samples, given the assumption that there is no time trend in the effect, would be indicative of selection bias. Given this assumption, however, we can estimate the parameter of interest exactly by using the date of project origination to identify a selection correction term. Column (6) implements this strategy, showing estimates from a standard Heckman selection model where the year or origination is excluded from the second stage. The results show a larger effect than the corresponding OLS estimate, but the lack of precession means that we cannot rule out that the effects are the same.[19] The negative coefficient on the selection term, although statistically indistinguishable from zero, suggests that lower quality projects are on net more likely to remain in the sample over time.

[19] Consistent with this finding, OLS estimates on a sample split in 2007 show a larger point estimate in the later years, but we cannot reject the hypothesis that the coefficients are the same.

4.5 Why Are Year End Contracts of Lower Quality?

The results from the I.T. dashboard show that, consistent with the predictions of our model, year end spending is of lower quality than spending obligated earlier in the year.[20] Our model posited two channels: agencies may save low priority projects for the end of the year and undertake them only if they have no better uses for the funds, and the high volume of contracting activity at the end of the year might allow for less management attention per project.

There is also a third possible mechanism.[21] Some program managers or contracting officers may be inclined toward procrastination and these same employees may be ones who do a worse job of planning for, writing, or managing contracts. Thus, we may see a surge of low quality contracts at the end of the year because that is when the least effective acquisition professionals get their contracts out the door. This third mechanism could have different policy implications from the first two because allowing agencies to roll over funds would not necessarily improve outcomes—the least effective acquisition professionals would simply issue their contracts at a different time of year. One way to evaluate this procrastination hypothesis would be to examine the within-year calendar distribution of other contracts issued by the contracting officers who issued last week contracts in our I.T. Dashboard sample to see if they appear to be procrastinators who consistently complete their contracts late in the year. While we can identify the contracting officers responsible for a contract in both the dashboard sample and the FPDS sample, we cannot currently link the two samples, though we believe we ultimately will be able to do so.

Another way to explore the possible mechanisms behind the poor outcomes for end-of-year contracts is to examine the subcomponents of the overall rating to see which subindices are responsible for the result. Appendix Table A2 repeats our main ordered logit analysis with each subindex as the dependent variable. The results show clearly that it is the evaluation by the agency CIO that is responsible for the main finding. Neither the cost rating nor the schedule rating has an odds ratio that is significantly different from 1. The CIO evaluation shows that the odds of having a higher rating are one-sixth as high for last-week-of-the-year contracts. The coefficient in the CIO

[20] In addition to the last week of the year results described above, we have also examined last month of the year spending and find that spending in the balance of the last month of the year is of moderately lower quality than that in the first 11 months of the year. We have also examined the quality of first week of the year spending (which also spikes). The point estimate for the first week of the year suggests somewhat higher spending quality, but the odds ratio difference from 1.0 is not statistically significant.

[21] We thank Steve Kelman for suggesting this third mechanism.

regression is insensitive to adding the cost rating and scheduling rating into the regression, suggesting that it is information in the CIO rating that is not incorporated in the other rating that is responsible for the result. This finding is not all that surprising. As we mentioned above, the I.T. dashboard explicitly places more faith in the CIO's assessment than in the other components by allowing the CIO assessment to override the other components if it is lower than the other components. Moreover, the ability to reset milestone targets makes it difficult to assess the cost and schedule ratings. But while not surprising, the fact that it is the CIO evaluation that is driving the result means that we cannot learn much about the mechanism from the subindices, since the CIO evaluation in a comprehensive measure of the I.T. project's performance.

Another way to explore possible mechanisms is to examine whether other observable features of end-of-year contracts are different from those earlier in the year. Specifically, we examine whether features that policymakers often define as high risk—such as lack of competitive bidding or use of cost-reimbursement rather than fixed cost pricing—are more prevalent in end of year contracts. For this analysis we return to the FPDS sample of all contracts from 2004 to 2009. To facilitate the analysis, we aggregate the 14.6 million observations up to the level of the covariates. We then estimate linear probability models with indicators for contract characteristics (e.g., a non-competitively sourced indicator) as the dependent variable on an indicator for last week of the fiscal year and controls. The regressions are weighted by total spending in each cell.

The first three columns of Appendix Table A3 examine shifts in the degree of competitive sourcing at the end of the year. The use of non-competitive contracts shows little change. However, contracts that are competitively sourced are significantly more likely to receive only one bid perhaps because the end of year rush leaves less time to allow bidding to take place. The estimates indicate that there is almost a 10 percent increase in the percent of contracts receiving only a single bid—a 1.7 percentage point increase one a base of 20 percent. On net, then, there is a modest increase in "risky" non-competitive and one bid contracts at the end of the year. Column (3) shows that spending on contracts that are either non-competitive or one bid contract increases by 1 percentage points on a base of 49 percent in the last week of the year.

The second three columns investigate the type of contract used. Contracts that provide for cost reimbursement rather than specifying a fixed price are often seen as high risk because they have significant potential for cost overruns. Time and material or labor hours (T&M/LH) contracts

raise similar concerns because they involve open ended commitments to pay for whatever quantity of labor and materials are used to accomplish the task specified in the contract. Column (4) shows that end-of-year contracts are less likely to include these sorts of high risk contract terms possibly because agencies are attempting to use up defined sums of excess funds and therefore limit contracts to the available amounts. The use of T&M/LH contracts increases by 0.4 percentage points, which is substantial compared to a base of 5.5 percent. Because T&M/LH contracts are infrequent, column (6) shows a net decrease in the combined use of risky cost-reimbursement and T&M/LH contract spending of about 3 percentage points on a base of 36 percent.

Overall, the analysis in this section does not offer any clear insights into what might be causing lower performance among end-of-year contracts. There is no reason to expect it to be a single mechanism. All three mechanisms could be reinforcing each other in contributing to the phenomenon.

5 Do Rollover Provisions Raise Spending Quality?

The third prediction of the model is that allowing for the rollover of unused funding unambiguously improves quality, both overall and at year's end. Intuitively, organizations are less likely to engage in wasteful year-end spending when the funding could be used for higher value projects in the next budget period.

As we noted in the introduction, since 1992 the Department of Justice (DOJ) has had special authority to roll over unused funds to pay for future I.T. needs. In this section of the paper, we examine whether the quality of DOJ's end-of-year I.T. spending is higher than that of federal agencies who lack rollover authority.

5.1 The DOJ's Rollover Authority

The DOJ authority provides that "unobligated balances of appropriations available to the Department of Justice during such fiscal year may be transferred into the capital account of the Working Capital Fund to be available for the department-wide acquisition of capital equipment, development and implementation of law enforcement or litigation related automated data processing systems, and for the improvement and implementation of the Department's financial management

and payroll/personnel systems."[22] While other agencies have ongoing working capital funds, appropriated funds contributed to those funds retain their fiscal year restrictions.

Between 1992 and 2006, approximately $1.8 billion in annual appropriations were transferred to the DOJ working capital fund from unused appropriations balances (Lofthus, 2006). Nonetheless, Table 2 shows that DOJ has an end-of-year spending surge comparable to that of other agencies when all spending is taken into account, with 9.4 percent of its spending occurring in the last week of the year.

Even with rollover authority, there remain incentives for agencies to use up their full allocation of funding. Large balances carried over from one period to another are likely to be interpreted by OMB and Congressional appropriators as a signal that budget resources are excessive and lead to reduced budgets in subsequent periods. For example, Senator Coburn issued a report in 2008 entitled "Justice Denied: Waste and Management at the Department of Justice" in which he stated: "Every year Congress appropriates more than $20 billion for the Department of Justice to carry out its mission, and every year the Department ends the year with billions of unspent dollars. But instead of returning this unneeded and unspent money to the taxpayers, DOJ rolls it over year to year, essentially maintaining a billion dollar bank account that it can dip into for projects for which the money was not originally intended" (Coburn, 2008).[23]

It is not just external pressure that may lead an organization to spend all of its resources even in the presence of rollover authority. Components of an agency may not be willing to return resources to the center if they are not ensured of being able to spend those resources after they are rolled over. Indeed, in 2006 testimony before Congress, Deputy Assistant Attorney General Lee Lofthus may have been suggesting a connection between those components of DOJ that contribute expiring funds to the working capital fund and those that benefit from it when he noted that the FBI was both the biggest contributor to the fund and the biggest beneficiary (Lofthus, 2006).

Given that rollover funds at DOJ are used for I.T. purposes, one might expect to see little

[22] Public Law 102-104: 28 USC 527 note.

[23] Coburn goes on to add ". . . perhaps without the pressure to rush to spend funds before they are canceled, DOJ may, in fact, make more prudent spending decisions with unobligated funds. This has not been studied and warrants examination for potential cost savings across the federal government. As long as DOJ is banking billions of dollars from year to year that the Department has some discretion to spend on its priorities as they arise, however, Congress should more carefully review how much it is appropriating for DOJ programs. If a particular initiative or office does not need or spend as much as Congress has appropriated, then Congress should consider appropriating less for that particular office and the Department overall."

or no end-of-year spike in I.T. spending, because I.T. components of the agency will know that they will directly benefit from funds contributed to the working capital fund. This is indeed the case. In the comprehensive FPDS data, only 3.4 percent of DOJ's I.T. spending occurs in the last week—the 19th lowest of the 21 major agencies. In the I.T. dashboard data, DOJ has 16 ongoing major I.T. investments, with planned total spending of just over $5.1 billion. Only 1 investment occurred in the last week of year. The $99 million cost of this investment implies that 1.9 percent of DOJ spending occurred in the last week compared to an average of 11.0 percent across the other agencies.

Although the sample size of investments is very small, the quality of DOJ's year-end spending is high. The one last week investment has the highest quality score of all major I.T. investments at the agency. Difference-in-differences estimates presented in Table 8, which allow us to control for investment characteristics, suggest that the DOJ pattern is sufficiently unusual to be statistically significant—even though it is identified off of a single end-of-year observation. Specifically, difference-in-differences point estimates indicate that year-end quality increases by 2.0 to 3.5 categorical levels at DOJ relative to other agencies. The p-values on the interaction variable are less than 0.01 in all specifications.

Despite the statistical and economic significance of the estimates, we are hesitant to draw strong conclusions from the estimated effect. In addition to the small number of projects, the fact that the effect is identified off of a single agency raises the potential for bias from unobserved organizational characteristics. Nevertheless, the evidence that exists appears consistent with the prediction that rollover increases year-end quality.

6 Conclusion

Our model of an organization facing a fixed period in which it must spend its budget resources made three predictions. We have confirmed all three of them using data on U.S. federal contracting. First, there is a surge of spending at the end of the year. Second, end of year spending is of lower quality. Third, permitting the rollover of spending into subsequent periods leads to higher quality.

Because we cannot identify the exact mechanism producing the decline in spending quality at

the end of the year, it is difficult to draw firm policy conclusions from the result. If the low spending quality comes from agencies squandering end of year resources on low priority projects, possibly compounded by insufficient management attention during the end of year spending rush, then allowing for rollover of unused balances or switching to two-year budgeting might improve spending quality. But as long as future agency budgets are based in part on whether agencies exhausted their resources in the current period, there will still be an incentive for year-end spending surges. And unless the rollover balances stay with the same part of the organization that managed to save them, agency subcomponents will still have an incentive to use up their allocations. An alternative approach would be to apply greater scrutiny to end-of-the-year spending with the presumption that any spending above levels occurring earlier in the year was unwarranted. This latter approach could also be the proper management prescription if low quality end-of-year spending results from a correlation between acquisition officer skill and a tendency to procrastinate—agencies would want to give greater attention to end of year contracts because the acquisition officials responsible for them need more oversight.

In evaluating possible policy reforms one should not lose sight of the potential benefits of one-year budget periods. The annual appropriations cycle may provide benefits from greater Congressional control over executive branch operations. Moreover, the use-it-or-lose it feature of appropriated funds may push projects out the door that would otherwise languish due to bureaucratic delays.

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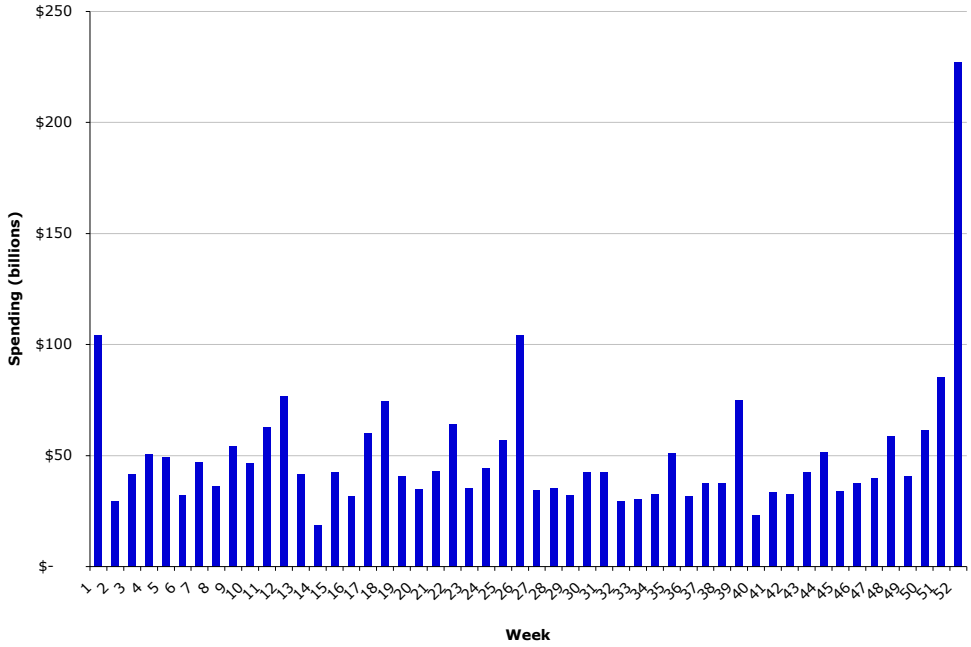
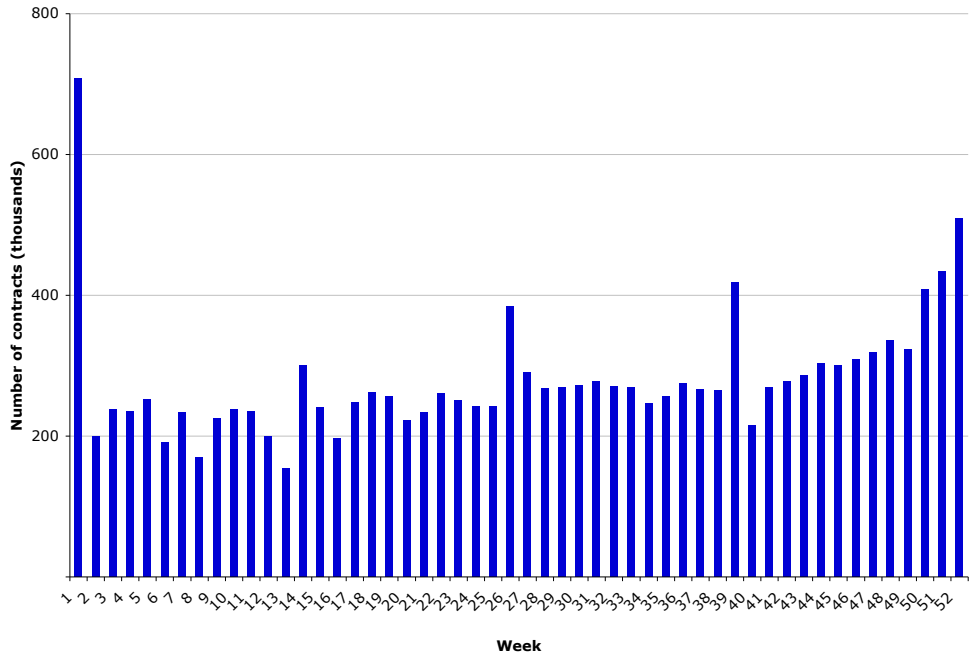
Figure 1: Federal Contracting by Week, Pooled 2004 to 2009 FPDS



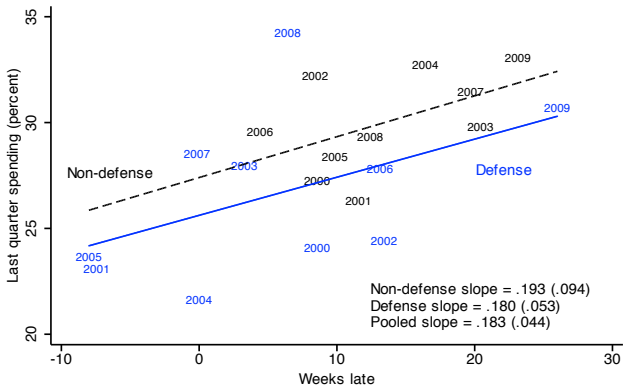
(a) Spending



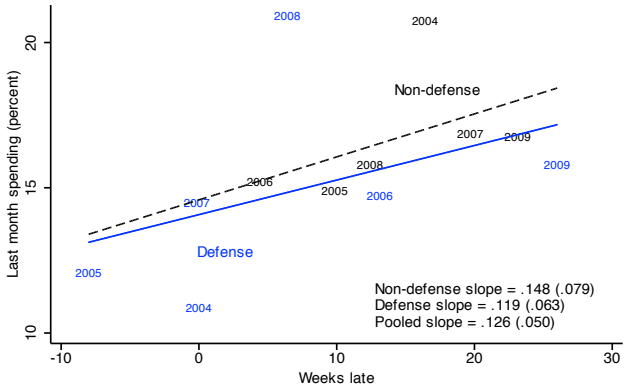
(b) Number of Contracts

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov.
Note: Total spending and number of contracts by week of the fiscal year. Spending values inflation-adjusted to 2009 dollars using the CPI-U.

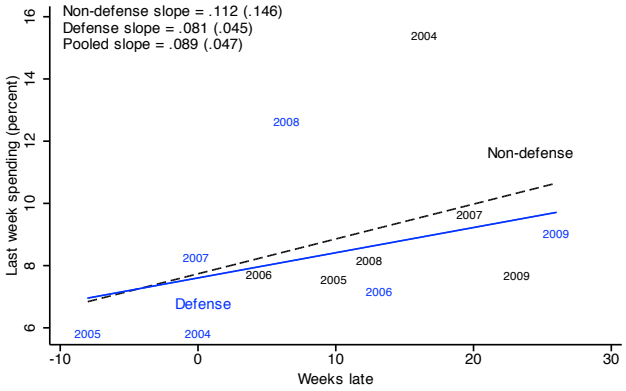
Figure 2: Year-End Spending by Appropriations Date



(a) Last Quarter Spending



(b) Last Month Spending

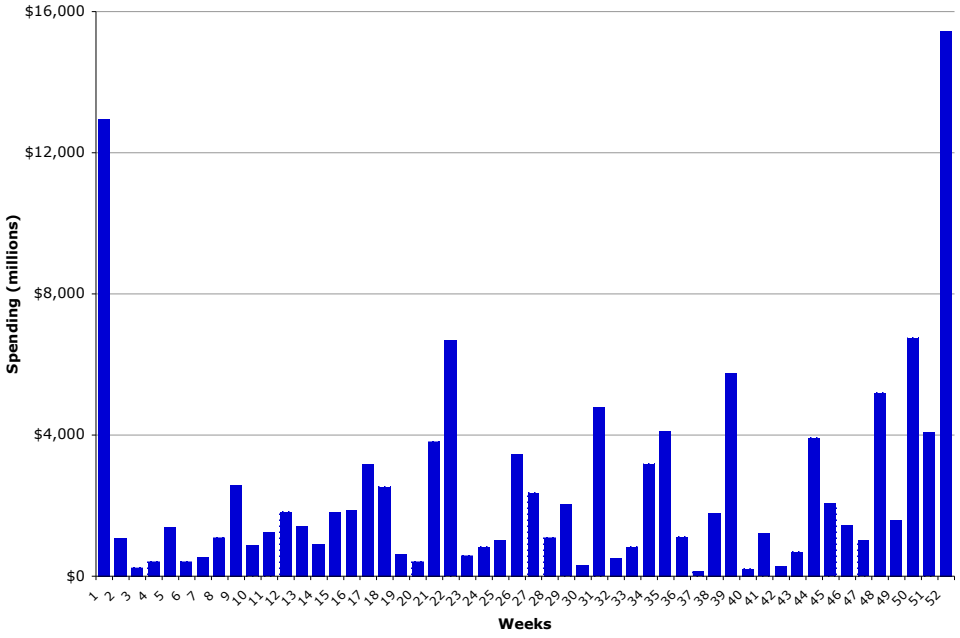


(c) Last Week Spending

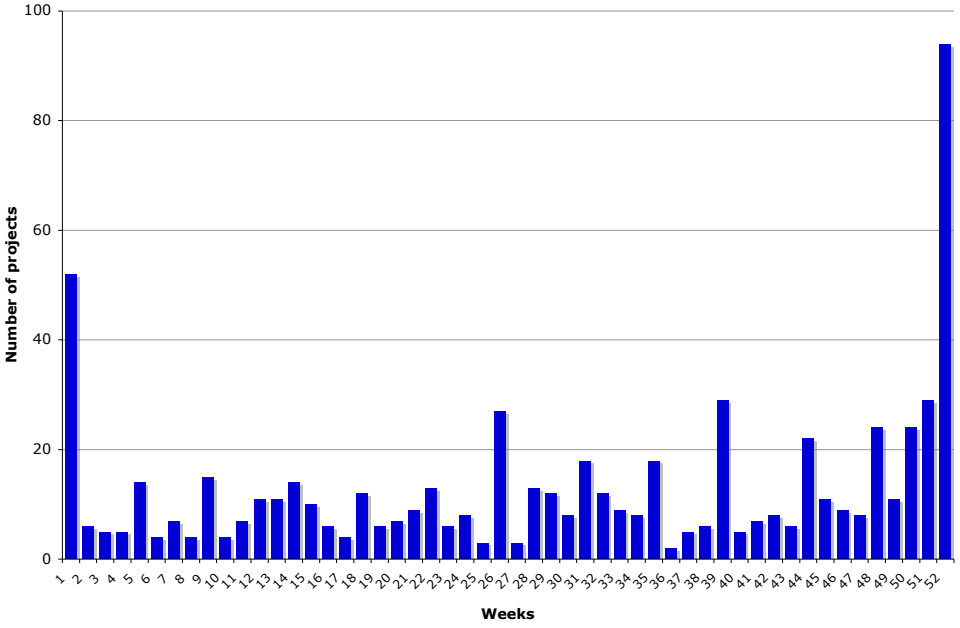
Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov and Library of Congress.

Note: Vertical axes show the percent of annual spending occuring in the last quarter, month, and week of the fiscal year. Horizontal axes shows the passage dates for the non-defense and defense appropriation bills, relative to the first day of the fiscal year in weeks. For defense spending, weeks late measures the date that the defense appropriations bill was enacted. For non-defense spending the date is assigned from the date of the consolidated appropriations act, or, in the case of the two years in which there was not a consolidated act, a date that is the midpoint of the individual non-defense appropriations acts. Plots show fitted lines and slope coefficients from bivariate regressions on defense and non-defense spending. Pooled coefficients from a regression where defense and non-defense spending have different intercepts but are constrained to have the same slope. Robust standard errors in parentheses.

Figure 3: I.T. Contracting by Week



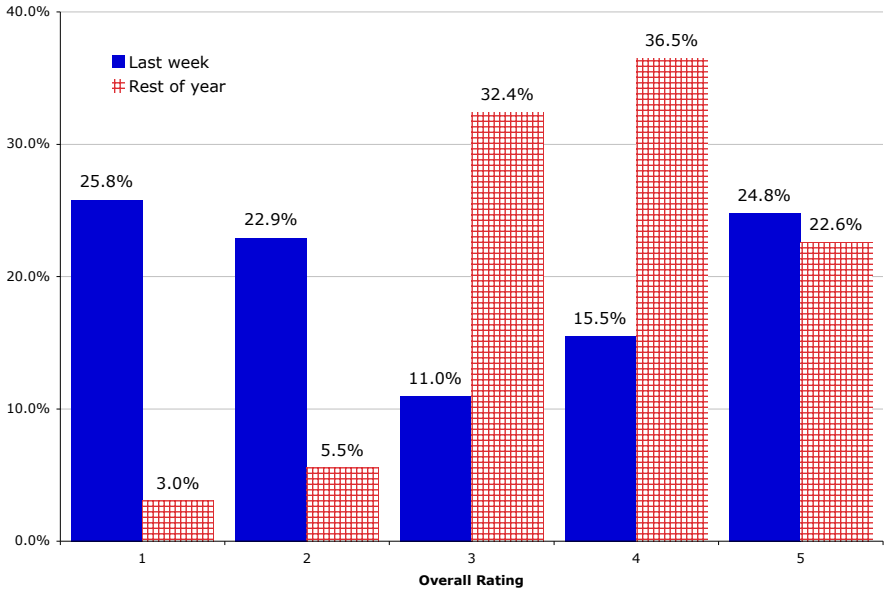
(a) Spending



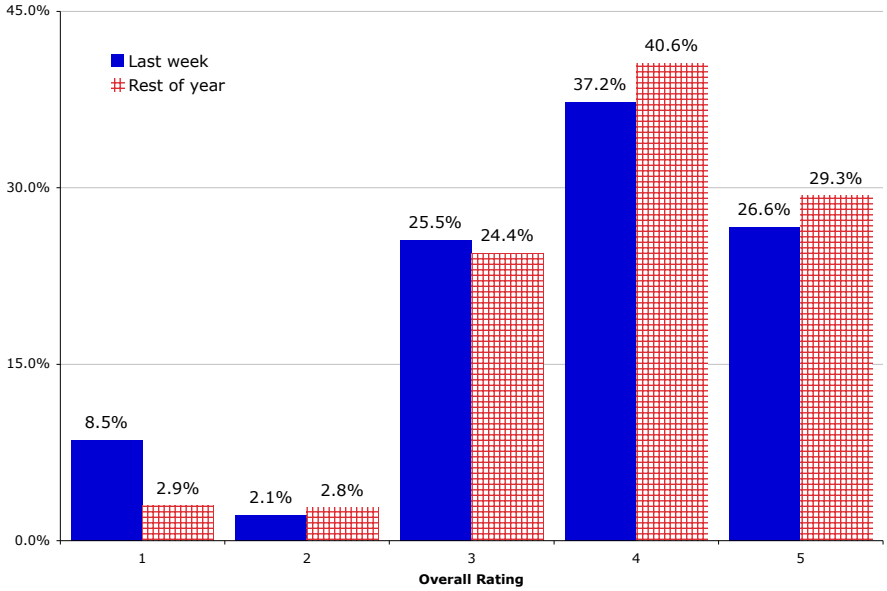
(b) Number of Projects

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov.
Note: Total spending and number of I.T projects by week of the fiscal year. Spending values inflation-adjusted to 2009 dollars using the CPI-U.

Figure 4: Year-End and Rest-of-Year Overall Ratings



(a) Spending



(b) Number of projects

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov.
Note: Overall rating histograms for I.T. projects originating in the last week and rest of the year. To construct this figure, ratings are binned into 5 categories with the lowest category representing overall ratings less than 2, the second lowest representing overall ratings between 2 and 4, and so on. See text for details on the overall rating index. Panel A weights projects by inflation-adjusted spending. Panel B shows unweighted values.

Table 1: Summary Statistics: Federal Contracting, Pooled 2004 to 2009 FPDS

	Spending		Contracts	
	Billions	Percent	Count	Percent
Totals	$2,597	100.0%	14,600,000	100.0%
Year				
2004	$304	11.7%	1,413,316	9.7%
2005	$355	13.7%	1,857,960	12.7%
2006	$405	15.6%	2,719,479	18.6%
2007	$452	17.4%	2,977,426	20.4%
2008	$542	20.9%	3,292,063	22.5%
2009	$538	20.7%	2,307,904	15.8%
Contract size				
Less than $100K	$166	6.4%	13,800,000	94.5%
$100K to $1M	$398	15.3%	626,134	4.3%
At least $1M	$2,033	78.3%	98,001	0.7%
Agency				
Agriculture	$25	1.0%	241,626	1.7%
Commerce	$13	0.5%	112,756	0.8%
Defense	$1,824	70.2%	3,536,530	24.2%
Education	$8	0.3%	12,806	0.1%
Energy	$142	5.5%	37,756	0.3%
Environmental Protection Agency	$8	0.3%	62,713	0.4%
General Services Administration	$82	3.2%	4,830,748	33.1%
Health and Human Services	$76	2.9%	249,907	1.7%
Homeland Security	$74	2.8%	255,461	1.7%
Housing and Urban Development	$6	0.2%	15,666	0.1%
Interior	$25	1.0%	377,743	2.6%
Justice	$33	1.3%	420,379	2.9%
Labor	$13	0.5%	41,229	0.3%
National Aeronautics and Space Administration	$83	3.2%	81,211	0.6%
National Science Foundation	$2	0.1%	4,201	0.0%
Other	$37	1.4%	179,283	1.2%
Small Business Administration	$0	0.0%	3,361	0.0%
State	$34	1.3%	239,019	1.6%
Transportation	$21	0.8%	57,235	0.4%
Treasury	$25	1.0%	177,662	1.2%
Veterans Affairs	$67	2.6%	3,630,856	24.9%
Competition type				
Non-competitive	$745	28.7%	3,553,453	24.3%
Competitive with one bid	$521	20.0%	3,883,273	26.6%
Competitive with more than one bid	$1,332	51.3%	7,131,422	48.8%
Contract type				
Fixed price	$1,675	64.5%	14,200,000	97.3%
Cost-reimbursement	$780	30.0%	151,362	1.0%
Time and materials/labor hours	$142	5.5%	249,705	1.7%

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov
Note: Contract spending inflation adjusted to 2009 dollars using the CPI-U.

Table 2: Year-End Contract Spending by Agency, Pooled 2004 to 2009 FPDS

	Spending (billions)	Percent of spending	
		Last month	Last week
Agriculture	$24.8	17.0%	6.2%
Commerce	$13.4	21.4%	5.6%
Defense	$1,820.0	16.0%	8.6%
Education	$8.2	18.6%	11.2%
Energy	$142.0	6.6%	4.0%
Environmental Protection Agency	$8.1	22.3%	10.4%
General Services Administration	$82.0	12.9%	7.0%
Health and Human Services	$76.4	25.5%	12.2%
Homeland Security	$73.6	22.7%	9.4%
Housing and Urban Development	$5.7	18.5%	11.7%
Interior	$25.3	23.2%	7.6%
Justice	$32.6	17.9%	9.4%
Labor	$12.7	12.9%	5.9%
National Aeronautics and Space Administration	$82.7	16.9%	11.0%
National Science Foundation	$2.0	27.7%	11.5%
Small Business Administration	$0.4	31.9%	16.3%
State	$33.5	34.9%	20.4%
Transportation	$20.5	17.6%	3.6%
Treasury	$24.9	15.3%	9.6%
Veterans Affairs	$66.9	18.2%	9.5%
Other	$37.4	28.6%	18.9%
Total	$2,600.0	16.5%	8.7%

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov.
Note: Contract spending inflation adjusted to 2009 dollars using the CPI-U.

Table 3: Year-End Contract Spending By Selected Product or Service Code, Pooled 2004 to 2009 FPDS

	Spending (billions)	Percent of spending	
		Last month	Last week
Construction-related			
Construction of structures and facilities	$136.0	40.9%	28.6%
Maintenance, repair, or alteration of real property	$72.5	34.8%	20.1%
Architect and engineering services	$32.8	26.1%	13.8%
Installation of equipment	$4.0	33.9%	20.4%
Prefabricated structures and scaffolding	$3.7	34.9%	18.4%
Furnishings and office equipment			
Furniture	$8.0	37.3%	18.4%
Office supplies and devices	$4.0	24.9%	16.6%
Household and commercial furnishings and appliances	$1.2	37.8%	20.7%
Office machines, text processing systems and equipment	$1.1	33.5%	17.0%
I.T. services and equipment			
Automatic data processing and telecom. services	$145.0	21.0%	12.3%
Automatic data processing equipment	$53.7	29.2%	14.9%
Services			
Professional, admin, and management support services	$336.0	19.1%	9.9%
Research and development	$309.0	11.3%	5.3%
Utilities and housekeeping services	$73.7	15.6%	9.1%
Ongoing			
Fuels, lubricants, oils and waxes	$72.7	13.2%	0.7%
Medical services	$68.8	4.9%	1.7%
Chemicals and chemical products	$6.2	3.3%	1.3%
Tires and tubes	$1.0	8.7%	2.7%
Toiletries	$0.3	12.2%	3.0%
Military weapons systems			
Aircraft and airframe structural components	$141.0	5.7%	2.9%
Ships, small craft, pontoons, and floating docks	$48.5	7.5%	2.1%
Guided missiles	$38.0	8.1%	3.5%
Other	$1,111.6	13.6%	6.8%
Total	$2,600.0	16.5%	8.7%

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov.
Note: Contract spending in the last month and week of the fiscal year by selected 2-digit product or service code, inflation adjusted to 2009 dollars using the CPI-U. Categories jointly account for 57.2 percent of total spending.

Table 4: Summary Statistics: Major I.T. Projects as of March, 2010

	IT spending		IT projects	
	Millions	Percent	Count	Percent
Total	$129,729	100.0%	686	100.0%
Agency				
Agency for International Development	$265	0.2%	3	0.4%
Agriculture	$1,864	1.4%	33	4.8%
Commerce	$11,042	8.5%	46	6.7%
Corps of Engineers	$4,012	3.1%	11	1.6%
Defense	$14,889	11.5%	46	6.7%
Education	$1,407	1.1%	25	3.6%
Energy	$4,914	3.8%	26	3.8%
Environmental Protection Agency	$3,166	2.4%	20	2.9%
General Services Administration	$2,162	1.7%	25	3.6%
Health and Human Services	$8,990	6.9%	64	9.3%
Homeland Security	$13,068	10.1%	70	10.2%
Housing and Urban Development	$1,605	1.2%	10	1.5%
Interior	$4,557	3.5%	39	5.7%
Justice	$4,376	3.4%	15	2.2%
Labor	$2,434	1.9%	34	5.0%
National Aeronautics and Space Administration	$9,722	7.5%	22	3.2%
National Archives and Records Administration	$649	0.5%	8	1.2%
National Science Foundation	$374	0.3%	6	0.9%
Nuclear Regulatory Commission	$515	0.4%	16	2.3%
Office of Personnel Management	$497	0.4%	7	1.0%
Small Business Administration	$269	0.2%	9	1.3%
Smithsonian Institution	$58	0.0%	9	1.3%
Social Security Administration	$1,236	1.0%	13	1.9%
State	$3,705	2.9%	13	1.9%
Transportation	$12,514	9.6%	42	6.1%
Treasury	$4,921	3.8%	41	6.0%
Veterans Affairs	$16,521	12.7%	33	4.8%
Year of origination				
1981	$2,706	2.1%	1	0.1%
1991	$61	0.0%	1	0.1%
1992	$322	0.2%	1	0.1%
1993	$409	0.3%	2	0.3%
1994	$155	0.1%	2	0.3%
1996	$3,050	2.4%	7	1.0%
1997	$1,430	1.1%	3	0.4%
1998	$2,891	2.2%	5	0.7%
1999	$2,814	2.2%	10	1.5%
2000	$2,855	2.2%	15	2.2%
2001	$8,463	6.5%	17	2.5%
2002	$12,577	9.7%	32	4.7%
2003	$13,860	10.7%	60	8.7%
2004	$12,818	9.9%	87	12.7%
2005	$13,529	10.4%	95	13.8%
2006	$16,169	12.5%	126	18.4%
2007	$17,935	13.8%	121	17.6%
2008	$14,176	10.9%	75	10.9%
2009	$3,508	2.7%	26	3.8%

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov
Notes: Major I.T. investments by federal agency and year of origination, inflation adjusted to 2009 dollars using the CPI-U.

Table 5: Summary Statistics: Quality Indexes and Project Characteristics for Major I.T. Projects

	Mean	Std. Dev.	Min	Max
Planned cost (millions)	189.11	447.06	0.10	4770.89
Overall rating	7.07	2.30	0.00	10.00
Rating subindexes				
CIO evaluation	3.95	0.94	1.00	5.00
Cost rating	8.72	2.52	0.00	10.00
Cost overrun	5.25	1.49	0.00	10.00
Schedule rating	8.43	3.09	0.00	10.00

	Count	Percent
Investment phase		
Full-Acquisition	59	8.6%
Mixed Life Cycle	304	44.3%
Multi-Agency Collaboration	29	4.2%
Operations and Maintenance	278	40.5%
Planning	16	2.3%
Service group		
Management of Government Resources	124	18.1%
Missing	2	0.3%
Service Types and Components	125	18.2%
Services for Citizens	344	50.2%
Support Delivery of Services to Citizen	91	13.3%
Line of business		
Administrative Management	15	2.2%
Controls and Oversight	12	1.8%
Defense and National Security	30	4.4%
Disaster Management	20	2.9%
Economic Development	9	1.3%
Education	16	2.3%
Energy	5	0.7%
Environmental Management	32	4.7%
Financial Management	81	11.8%
General Government [CA]	45	6.6%
General Science and Innovation	22	3.2%
Health	55	8.0%
Homeland Security	40	5.8%
Human Resource Management	24	3.5%
Income Security	17	2.5%
Information and Technology Management	85	12.4%
International Affairs and Commerce	7	1.0%
Law Enforcement	12	1.8%
Natural Resources	16	2.3%
Planning and Budgeting	8	1.2%
Public Affairs	13	1.9%
Revenue Collection	8	1.2%
Supply Chain Management	25	3.6%
Transportation	45	6.6%
Workforce Management	5	0.7%
Other	39	5.7%
Total	686	100.0%

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov
Notes: Planned total cost is inflation-adjusted to 2009 dollars using the CPI-U. Overall rating is a quality index that combines that CIO evaluation, cost rating, and scheduling rating subindexes (see text for details). It takes values from 0 to 10, with 10 being the best score. The CIO evaluation is the agency CIO's assessment of project quality. It takes values from 1 to 5, with 5 being the best. The cost rating is based on the absolute percent deviation between the planned and actual cost of the project. The cost overrun is a non-absolute measure that assigns over-cost projects the lowest scores. The schedule rating is based on the average tardiness of the project. The cost and schedule indexes takes values from 0 to 10, with 10 being the best. The line of business other category combines all categories with 4 or fewer projects.

Table 6: Ordered Logit Regressions of Overall Rating on Last Week and Controls

	Odds ratio of higher overall rating			
	(1)	(2)	(3)	(4)
Last week	0.26	0.46	0.30	0.18
	(0.07)	(0.14)	(0.10)	(0.07)
Year FE		X	X	X
Agency FE			X	X
Project characteristics FE				X
N	671	671	671	671

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov
Notes: Odds ratios from ordered logit regressions. Overall rating is a quality index that combines that CIO evaluation, cost rating, and scheduling rating subindexes (see text for details). It takes values from 0 to 10, with 10 being the best score. Project characteristics are fixed effects for investment phase, service group, and line of business (see Table 5). Observations weighted by inflation-adjusted spending. Standard errors in parentheses.

Table 7: Alternative Overall Ratings Specifications

	Odds ratio of higher overall rating from ordered logit				Coefficients from linear model	
	Contracts < $62M	Contracts ≥ $62M	Unweighted	Winsorized weights	OLS	Heckman selection model
	(1)	(2)	(3)	(4)	(5)	(6)
Last week	0.60	0.18	0.56	0.37	-1.00	-1.57
	(0.23)	(0.11)	(0.14)	(0.12)	(0.39)	(0.64)
Year FE	X	X	X	X	X	
Agency FE	X	X	X	X	X	X
Project characteristics	X	X	X	X	X	X
Weighted by spending	X	X		X	X	X
λ						-0.87
						(0.85)
R-squared					0.69	
N	335	336	671	671	671	3,803

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov and 2003 to 2010 Exhibit 53 reports, available at http://www.whitehouse.gov/omb/e-gov/docs/.
Notes: Columns (1) to (4) show odds ratios from ordered logit regressions. Columns (1) and (2) split the sample at the median value. Column (3) shows odds ratios from an unweighted regression. Column (4) Winsorizes the spending weight at $1 billion (96th percentile).Columns (5) and (6) show regression coefficients from linear regressions. Column (5) reports coefficients from a simple OLS regression. Column (6) reports coefficient from a Heckman selection model with a linear second stage. In this regression the sample is all major I.T. projects recorded in the Exhibit 53 reports. The excluded variable in this selection model is the year of project origination. The coefficient λ is the implied coefficient on the inverse Mill's ratio selection term. Overall rating is a quality index that combines that CIO evaluation, cost rating, and scheduling rating subindexes (see text for details). It takes values from 0 to 10, with 10 being the best score. Project characteristics are fixed effects for investment phase, service group, and line of business (see Table 5). Observations weighted by inflation-adjusted spending unless otherwise mentioned. Robust standard errors in parentheses.

Table 8: Difference-in-Differences Estimates of Overall Rating on Justice and Last Week

	OLS Estimates					
	(1)	(2)	(3)	(4)	(5)	(6)
Justice X last week	3.54	2.29	2.85	2.36	2.251	2.49
	(1.19)	(1.16)	(0.75)	(0.65)	0.593	0.898
Last week	-1.91	-1.06	-0.93	-0.99	-0.814	-0.468
	(1.10)	(0.82)	(0.48)	(0.39)	0.391	0.238
Justice	0.06	-0.59	-3.33	-3.88	-4.022	-2.028
	(0.51)	(0.49)	(0.47)	(0.59)	0.578	1.01
Year FE		X	X	X	X	X
Agency FE			X	X	X	X
Project characteristics				X	X	X
Weighted by spending	X	X	X	X	Winsorized*	
R-squared	0.06	0.22	0.58	0.68	0.60	0.48
N	686	686	686	686	686	686

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov
Notes: Coefficients from OLS regressions of overall rating on fully interacted Justice and last week indicators and controls. Overall rating is a quality index that combines that CIO evaluation, cost rating, and scheduling rating subindexes (see text for details). It takes values from 0 to 10, with 10 being the best score. Project characteristics are fixed effects for investment phase, service group, and line of business (see Table 5). Robust standard errors in parentheses.
*Spending weight Winsorized at $1 billion (96th percentile).

Table A1: First Week Contract Spending for Selected Product or Service Codes, Pooled 2004 to 2009 FPDS

	Spending (billions)	First week (percent)
Leases		
Lease or rental of facilities	$29.2	26.2%
Lease or rental of equipment	$5.4	13.1%
Service contracts		
Utilities and housekeeping services	$73.7	11.1%
Medical services	$68.8	11.3%
Transportation, travel and relocation services	$39.3	15.5%
Social services	$5.5	9.3%
Other	$2,378.1	3.1%
Total	$2,600.0	4.0%

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov
Note: Percent of contract spending in the last month and week of the fiscal year by selected 2-digit product or service code, inflation adjusted to 2009 dollars using the CPI-U. Categories account for about 8.5% of spending but 29.7% of first week spending.

Table A2: Ordered Logit Regressions of Subindexes on Last Week and Controls

	Odds ratio from ordered logit				
	Evalutation by Agency CIO		Cost rating	Cost overrun	Schedule rating
	(1)	(2)	(3)	(4)	(5)
Last week of September	0.14	0.16	0.80	0.74	1.15
	(0.06)	(0.07)	(0.36)	(0.30)	(0.66)
Cost and schedule rating		X			
Agency FE	X	X	X	X	X
Year FE	X	X	X	X	X
Project characteristics	X	X	X	X	X
Weighted by spending	X	X	X	X	X
N	671	671	671	671	671

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov
Notes: Odds ratios from ordered logit regressions. The CIO evaluation is the agency CIO's assessment of project quality. It takes values from 1 to 5, with 5 being the best. The cost rating is based on the absolute percent deviation between the planned and actual cost of the project. The cost overrun is a non-absolute measure that assigns over-cost projects the lowest scores. The schedule rating is based on the average tardiness of the project. The cost and schedule indexes takes values from 0 to 10, with 10 being the best. Project characteristics are fixed effects for investment phase, service group, and line of business (see Table 5). Standard errors in parentheses.

Table A3: Year-End Contract Characteristics Regressions

	Dependent Variable:					
	Non-competitive	One bid	Non-competitive or one bid	Cost-reimbursement	T&M/LH	Cost-reimbursement or T&M/LH
	(1)	(2)	(3)	(4)	(5)	(6)
Last week	-0.002	0.017	0.010	-0.032	0.004	-0.028
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Year FE	X	X	X	X	X	X
Agency FE	X	X	X	X	X	X
Product or service code FE	X	X	X	X	X	X
R-squared	0.41	0.31	0.30	0.52	0.21	0.51
N	402,400	402,400	402,400	402,400	402,400	402,400
Mean of dependent variable	28.7%	20.0%	48.7%	30.0%	5.5%	35.5%

Source: Federal Procurement Data System, accessed October, 2010 via www.usaspending.gov
Note: Table shows coefficients from linear probability model regressions of contract type and competition type indicators on last week and controls. To facility the analysis, the data is aggregated to the level of the covariates and the regressions are weighted by inflation-adjusted spending in each cell.

Table A4: Percent of Projects in I.T. Dashboard Data

	Spending			Projects		
	All	I.T Dashboard	% in I.T. Dashboard	All	I.T Dashboard	% in I.T. Dashboard
Year of origin						
≤ 2001	$68,460	$14,538	21.2%	813	48	5.9%
2002	$114,668	$12,848	11.2%	1,018	61	6.0%
2003	$115,286	$51,004	44.2%	653	113	17.3%
2004	$53,151	$10,309	19.4%	467	71	15.2%
2005	$35,027	$16,456	47.0%	250	56	22.4%
2006	$13,023	$5,172	39.7%	191	77	40.3%
2007	$61,953	$55,665	89.8%	248	183	73.8%
2008	$19,864	$19,752	99.4%	135	127	94.1%
2009	$498	$491	98.7%	16	13	81.3%
2010	$285	$273	95.5%	13	10	76.9%
Total	$482,215	$186,509	38.7%	3,803	759	20.0%

Source: I.T. Dashboard data, accessed March, 2010 via http://it.usaspending.gov and 2003 to 2010 Exhibit 53 reports, available at http://www.whitehouse.gov/omb/e-gov/docs/.
Notes: All spending and projects are totals from agency Exhibit 53 reports. I.T. Dashboard spending and projects are totals in the I.T. Dashboard dataset (including projects dropped from the baseline sample due to missing values). Spending values inflation-adjusted using the CPI-U.