# INCOME CHANGES AND CONSUMPTION: EVIDENCE FROM THE 2013 FEDERAL GOVERNMENT SHUTDOWN *

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**Abstract**

We use the 2013 federal government shutdown and a rich data set from an online personal finance website to study the effects of changes in income on changes in consumption. The 2013 shutdown represented a significant and unanticipated income shock for federal government workers, with no direct effect on permanent income. We exploit both the differences between unaffected state government employees and affected federal employees as well as between federal employees required to remain at work and those required to stay at home to generate variation in income and leisure time. We find strong evidence for excess sensitivity of consumption patterns, violating the permanent income hypothesis. We demonstrate that this decline in spending can be largely explained by increased home production, changes in spending allocations, and credit constraints. We discern detailed categories of household spending with widely varying elasticities. The results demonstrate the importance of household liquidity, leisure, and home production when constructing stimulus or social insurance policy.

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# 1 Introduction

There is a substantial body of work documenting the excess sensitivity of changes in consumption to changes in income. However, observed changes in consumption can be due either to changes in beliefs about permanent income, liquidity issues, or to factors related to changes in time allocation such as the non-separability of leisure and consumption in the utility function, or home production. Drops in consumption due to changes in time allocation have very different welfare implications than drops in consumption due to shifts in permanent income or credit constraints, impacting the optimal construction of government insurance programs such as unemployment insurance and social security.

This paper uses the 2013 federal government shutdown as a natural experiment to examine the effect of changes in income and time allocation on consumption. We make two main contributions. First, we provide evidence of excess sensitivity of consumption to temporary changes in income *with no change in permanent income or wealth*. The fact that nominal permanent income would not change was known from the early days of the shutdown. Second, we exploit institutional specifics of the shutdown to show that changes in the time allocation of workers lead to large effects on consumption patterns. Up to half of the decline in spending is due to changes in time allocation and work-related expenses.

The link between income and consumption is one of the most researched relationships in economics. However, when attempting to apply some of the workhorse consumption models to the data, difficulties often arise. Speaking about violations of the permanent income model in their survey paper, Jappelli and Pistaferri (2010) note that:

> ...One encounters two types of problems when trying to provide a clean test of the [permanent income] theory: one empirical and one theoretical. On the empirical side, it is difficult to identify situations in which income changes in a predictable way. But even if the empirical problems can be surmounted, there are many plausible explanations why the implications of the theoretical models may be rejected, ranging from binding liquidity constraints to non-separabilities between consumption and leisure, home-production considerations, habit persistence, aggregation bias, and durability of goods.

This paper leverages highly-detailed household level data to more comprehensively explore the relationship between temporary income shocks and consumption. In the context of the US federal government shutdown of 2013, we are able to isolate a purely temporary income shock,

wherein the sole effect is that income is reallocated from one paycheck to the next, two weeks later. Importantly, this paper is the first, to our knowledge, to be able to jointly examine the role that home production, credit and liquidity constraints, and substitution between categories of spending play in driving consumption responses to a temporary income shock.

Looking narrowly, this paper can help to understand how, conditional on permanent income being unaffected, both the level and composition of household spending change significantly during non-employment spells.[1] More broadly, this paper contributes to a growing literature about heterogeneous household consumption behavior and the importance of considering liquidity and credit in structural models.

Overall, this paper demonstrates three primary facts. The first is that, relative to the canonical permanent income model, we find striking evidence of excess sensitivity of household spending due to a purely temporary income shock. Second, we demonstrate that households are quick to reallocate spending across both time and categories of consumption. For most households seeing spending declines, much of the foregone spending is 'made up' following the repayment of their lost wages. Moreover, home production is an important channel through which households adjust the composition of their spending during the shutdown. Finally, this paper contributes to recent work suggesting that even relatively high-income households are impacted by temporary income declines due to hand-to-mouth spending, and we present evidence that a large driver of the observed excess sensitivity is liquidity and credit constraints.

This paper is organized as follows. The remainder of this section discusses the 2013 US federal government shutdown, which is used to identify the excess sensitivity of consumption to changes in income and decompose the effect into time allocation and income related components. Section 2 discusses the data derived from a large personal online finance platform. Section 3 discusses our empirical strategy and potential drivers of the observed effects. Section 4 details our results, while section 5 concludes.

[1] This includes changes in the composition during periods of unemployment as well as following retirement or periods outside the labor force.

## 1.1 The 2013 US Government Shutdown

At the beginning of the 2013 fiscal year, and following the inability of politicians to agree on a spending plan that included funding for the Patient Protection and Affordable Care Act, the US federal government ceased most non-essential operations. This shutdown lasted between October 1st and 16th, representing the second longest shutdown since 1980 and the largest measured by employee furlough days. Table 1 provides an overview of the events leading up to and during the shutdown, and Burwell (2013) provides an official overview of the impact of the shutdown. During the shutdown, the majority of civilian federal government employees were not paid.[2] Following the conclusion of the shutdown, employees received all of their foregone pay, totaling approximately $2 billion. Most federal government workers received their back-pay either in the second pay period at the end of October, between October 22 and November 1 or during the final months of 2013. Thus, the operational effect for most affected employees was a cut in pay of approximately 40% during the first pay period in October and then an increase in pay of approximately 40% during the second pay period in October.[3] There was no change in permanent income, only a temporary income reallocation during the month of October in 2013 for affected federal employees.

Workers who were affected by the shutdown (in terms of cuts in pay) were divided into two groups. 'Exempted' employees were required to work without pay during the shutdown, as the nature of their work was deemed essential to national security, public health or safety. Other workers deemed non-essential were furloughed and were kept off the job while the shutdown was in effect. Both groups experienced only a temporary income shock as they were given all of their foregone earnings following the conclusion of the shutdown. There was significant between-agency variation in the fraction of employees who were furloughed. For example, employees at the Departments of Veteran Affairs, Justice and Homeland Security were deemed essential to national security, and more than three quarters were exempted. During the same time period, approximately

[2]Some agencies such as the US Postal Service, Federal Courts, the State Department, and uniformed military personnel are primarily self-funded or funded through special appropriations bills that are not part of the normal budgetary process. Employees of these agencies were unaffected by the shutdown and were paid during the shutdown.

[3]The first payday in October was October 11th for most federal employees, covering the dates of September 22nd to October 5th. Affected employees received checks on October 11th that paid them for work done in September but not for any work done on or after October 1st. For full time employees, this would represent pay for 6 days of work rather than the usual 10 days.

95% of employees at the Department of Education, Department of Housing and Urban Development, the Environmental Protection Agency, and the Securities and Exchange Commission were deemed non-essential and furloughed. For a list of agencies affected by the shutdown see Table 2.

Thus, we observe 'unaffected' workers, who worked at an unaffected federal agency (eg. active duty military) or a state government agency and are used as controls in this paper. We also observe 'exempted' workers, who were unpaid during the shutdown but had to continue working every day. Finally, we observe 'furloughed' workers, who were both unpaid during the shutdown and were required to stay at home. Both 'exempted' and 'furloughed' workers were repaid all of their foregone wages soon after the shutdown's conclusion.

The between-agency variation in furloughs is one reason for a wedge in household spending responses to the temporary income declines. While exempted workers were required to continue working, furloughed workers were able to forgo work-related expenses like commuting and could increase home production activities like cooking or performing their own housework. Much work has focused on this area, finding significant declines in actual expenditures among the unemployed and retirees but smaller declines in proxies for consumption or utility.[4]

The 2013 government shutdown, combined with detailed household financial data, provides a number of key advantages for studying the effects of changes in income on consumption.[5] First, the shutdown had no effect on permanent income, meaning that the canonical permanent income hypothesis predicts a precise null hypothesis of zero effect on household consumption. Second, differences in exempted and furloughed workers allow us to separately examine the home production and leisure margins. Finally, data regarding the possession and opening of financial accounts gives us some ability to measure to what degree credit and liquidity constraints drove the observed consumption effects.

[4] A number of authors investigate this point. See Haider and Stephens (2007), Blundell and Tanner (1998), Hurd and Rohwedder (2006), and Aguiar and Hurst (2007) for a discussion of retirement and home production. Gruber (1997) and Guler and Taskin (2013) study home production and unemployment spells.

[5] A subset of results from this paper were discussed in a policy brief Baker and Yannelis (2014). In a paper written concurrently with this one, Gelman, Kariv, Shapiro, Silverman, and Tadelis (2015) study the effect of the shutdown on consumption and credit. Their paper focuses on the consumption and credit response to a temporary income drop, while ours highlights the consumption response to both a temporary income drop and incorporates changes in time allocation and home production.

## 1.2 Mechanics of Delayed Pay

Federal employees were affected to varying degrees by the government shutdown due to different pay period calendars at government agencies. For instance, many employees received pay at monthly increments, meaning their pay generally came at the start or end of each month. This pay would be unaffected by the government shutdown because by the time their payday for October arrived (either on the 31st of October or the 1st of November), the shutdown had ended and they were able to receive their full pay. In this paper, we count these employees as being unaffected by the shutdown.

Many other federal employees are on pay period calendars that had them receive bi-weekly checks on October 11th and 25th. These pay periods covered September 22nd-October 5th and October 6th-October 19th. The first of these paychecks would see an approximate decline in pay of about 40% (they received pay only for the 6 days worked in September and none of the days worked in October). For the paycheck on the 25th, with the shutdown ended, employees would receive their normal paycheck as well as back pay for the workdays missing from their previous paycheck. The end result in this example would be 40% lower pay for their first paycheck of October and 40% higher pay on their second October paycheck. Other variations of this pattern occurred for employees across differing pay period calendars, but few employees missed an entire paycheck due to how pay periods lined up with the shutdown.

# 2 Data

The data used in this paper comes from a large online personal finance website. The site provides a service that connects users' financial accounts so that the user can see all of their accounts in a single location. The site allows for users to easily see summaries of their income, spending, debt, and investments across all of their accounts and has other features such as budgeting or financial goal-setting. The site has grown rapidly, from under 300,000 users in 2007 to more than 3 million active users by 2013. This large userbase has yielded a database of more than 5 billion transactions across over 10 million individual accounts. These accounts span all manner of household financial products including checking accounts, savings accounts, credit cards, loans, property and mortgage

accounts, equity portfolios, and retirement accounts.[6]

The data are automatically linked from financial accounts to the website, allowing for less measurement error and potential recollection biases relative to other survey-based household financial data. In this paper, we focus primarily on two aspects of the data. The first is on paycheck income derived from government employers. To identify users with relevant employers, we take a similar approach as in Baker (2014), but focus on state and federal government agencies rather than publicly-traded companies. We match users to their employers using textual descriptions from users' direct deposit transactions. Direct deposit transfers into checking accounts are generally observed with little error, allowing us to focus on these paycheck deposits and exclude other sources of income. Direct deposit transaction descriptions are generally characterized by indicators that the transaction is a direct deposit, a string representing an employer or agency, and anonymized identifiers.[7] Our strategy for matching allows us to ignore punctuation and limited misspellings and is mainly drawn from the inspection and testing of several million paycheck transaction descriptions.

Our paycheck matching strategy yields a set of 152,810 households. 91,650 of these are employed by 52 unaffected federal agencies and state governments to be used as the control group during and surrounding the shutdown period. 61,160 users are able to be matched to 19 different federal agencies including NASA, the Securities and Exchange Commission, the Senate and House of Representatives, and a range of federal departments such as Labor, the Interior, Transportation, and State. We restrict to a balanced panel of users present in the data from January 2013 to December 2013. Given the strategy we employ, there is unlikely to be measurement error in agency-employee matching at the individual user level. This is due to the fact that a given government agency or department has a near uniform description attached to its direct deposit transactions. Thus, an error in matching would likely miss an entire class of employees or be unable to match any employee from a given agency rather than having only some employees matched while others are unmatched. One important caveat is that the paycheck transactions that we observe are net of any taxes or benefits withheld from employee paychecks. Thus, we cannot directly observe 401k contributions, federal and state taxes, or healthcare premiums paid out of gross pay.

[6]For the purposes of this paper, account balances are unable to be observed at a household level. Our analysis examines flows, such as income and spending, and the presence and change in number and types of financial accounts.

[7]Some examples of such descriptions are: "DEPT JUSTICE DIRECT DEP XLWK", "PAYROLL DEPOSIT HHS", and "TRANSIDRRRR81 STATE TENNESSDIR"

In addition, using data from the OMB's list of federal agency contingency plans, we note the fraction of the employees at each agency or department that were affected by the government shutdown.[8] The fractions of employees affected ranged from 26% or less at the Department of Veterans Affairs, Customs and Border Patrol, the Department of Justice, and Department of Transportation to more than 85% at the IRS, NASA, EPA, Department of Education, and Department of Commerce. In addition, a number of agencies, including the federal court system and Supreme Court, active duty military members, the US Post Office, and the FDA were unaffected by the shutdown due to exemption or other sources of funding.

Our second focus is on transactional spending data derived from bank, debit, and credit card transactions. These data offer a rich view of spending by users and comprise the vast majority of total household spending among users. Each transaction is time-stamped, has a full description and is generally also matched to information about the merchant. From this merchant and descriptive data, the site automatically categorizes each transaction into one of over 100 categories (such as 'Groceries', 'Gasoline', 'Student Loans', 'Fast Food', or 'Mortgage Payment') in order to provide easily readable spending and income breakdowns to the user. From these data, we can derive measures of total household spending across all categories as well as subsets of spending based on the categorization of the transactions. One potential omission is that of cash transactions. Cash transactions can only be fully observed when a user manually enters them, though strong assumptions about cash spending can also be made by observing ATM and bank withdrawals. An estimated 8-9% of total spending is done with cash in the United States, compared to approximately 3-4% of spending done with cash in the sample data.[9]

These data are described in more detail in Baker (2014), along with a number of ancillary tests and descriptive statistics. Steps are taken to test whether the user base of the website can yield relevant insights into the financial behavior and characteristics of a nation as a whole. Baker (2014) lays of a number of tests and re-weighting procedures, comparing data from the website to other measures of household financial behavior such as Census Retail Sales, the Survey of Consumer Finance, Zillow house price data, and the CPS, finding very strong relationships after conditioning on differences in demographics between website users and the nation as a whole.

In conjunction with the financial data, users provide demographic information such as age, sex,

[8] Found at the Office of Management and Budget Agency Contingency Plans.

[9] Cash spending estimates based on Boston Federal Reserve Survey of Consumer Payment Choice data.

marital status, and the size of the household. Users also list whether they are a homeowner, their profession, their level of education, their income level, and their location. Due to the nature of the website, usage patterns suggest that it covers the entirety of financial transactions for groups who make joint financial decisions. Thus, we equate a user of this financial website with a head-of-household in the Current Population Survey (CPS) or a 'consumption unit' in the Consumer Expenditure Survey (CES). For example, a 'user' represents the entirety of household spending for married couples but only represents an individual's spending for an unmarried individual living with roommates.

It is important to note that our identification strategy is local to government employees. It is possible that consumption patterns differ for government employees and other groups. Our sample is arguably representative of state and federal government employees in 2013. Being a software start-up, in early years the demographics of the website were very different than those of the nation as a whole. Key user characteristics like gender and age were starkly different than the national distribution in 2007 (being younger and more male). While the demographics of the user-base were initially very different, they have become much closer to a representative national distribution by 2013 as the user-base grew dramatically. Moreover, conditional on observable household demographic and locational characteristics, financial behavior among the users seems to track closely to national averages. Moreover, the existing user-base differs from the population of federal and state employees by less than it does from the total US population (eg. both have fewer unbanked households or extremely high-income households). Summary statistics of the sample population can be found in Table 3. Baker (2014) discusses using household weights derived from CPS weightings and self-reported demographic and locational information in order to obtain more externally valid estimates. Our results are robust to using equivalent household weights.

# 3 The Sensitivity of Consumption to Changes in Income

Our empirical strategy exploits the temporary drop in pay during the shutdown, and uses a difference in difference approach comparing affected federal government workers to unaffected state government workers. Graphical evidence indicates that the two groups behave very similarly when the shutdown was not in effect. The analysis sample used includes about 150,000 state and federal

government employees in 2013. In our main specification, we estimate the following equations:

$$y_{it} = \alpha_t + \alpha_i + \sum_{j=1}^{T} \gamma_j \mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i + \beta X_{it} + \varepsilon_{it} \tag{1}$$

$$c_{it} = \eta_t + \eta_i + \sum_{j=1}^{T} \tau_j \mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i + \zeta X_{it} + \xi_{it} \tag{2}$$

where $y_{it}$ is income or log income, $c_{it}$ is spending or log spending and $X_{it}$ are demographic and other controls for individual $i$ in time period $t$. Our coefficients of interest are the interactions between $\mathbb{1}\{Gov\}_i$, and an indicator of whether not an individual works for a federal government agency that was affected by the shutdown and $\mathbb{1}\{j = t\}_t$, a time period dummy. Let the subscript $s$ denote time periods when the government shutdown was in effect. We also include weekly time period fixed effects $\alpha_t$ to capture factors such as seasonality and time varying economic conditions, as well as agency week fixed effects $\alpha_i$ to capture unobserved time invariant differences between workers and agencies.

The terms $\varepsilon_{it}$ and $\xi_{it}$ represent mean zero error terms which are uncorrelated with the interaction terms of interest conditional on observables. The identifying assumption is a parallel trends assumption, that in the absence of the shutdown federal and state government workers income and consumption patterns would have trended similarly. Graphical evidence from 2013 when the shutdown was not in effect, as well as placebo tests in 2012 strongly support the validity of this assumption as it is observed that federal and state government workers trend similarly.

The ratio of the coefficients $\frac{\tau_s}{\gamma_s}$ provides us with an estimate of the sensitivity of consumption to changes in income, where $s$ denotes a period in which the shutdown is in effect. Estimated in levels, the ratio can be interpreted as a marginal propensity to consume (MPC). We will estimate analogous specifications of 1 and 2, replacing the dependent variable with logarithms of income and spending to estimate the elasticity of consumption with respect to income. In a world in which the permanent income hypothesis is valid, and agents are able to borrow and save freely, the MPC resulting from a transitory negative income shock should be close to zero. If individuals are credit constrained, the MPC can be as large as one.

A large literature has found that there is excess sensitivity of consumption to changes in income, which violates the canonical permanent income hypothesis. See Jappelli and Pistaferri (2010) for

a review of the literature. Many periods involving income changes, such as unemployment or retirement, are associated with changes in time allocation. Changes in time allocation can also affect consumption through multiple channels. The nature of the 2013 US government shutdown allows us to go beyond testing for excess sensitivity, and use between-agency variation to separate the effects of credit constraints and home production or leisure.

We add an interaction term for furloughed workers, $\mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i \times \mathbb{P}\{Furlough\}_i$, to equations 1 and 2. $\mathbb{P}\{Furlough\}_i$ is the probability that a given worked was furloughed, which is measured as the fraction of workers that were furloughed at the agency level. Table 2 shows the fraction of workers furloughed at each agency. At some agencies like the Department of Education and the Environmental Protection Agency, almost all workers were furloughed. At other agencies such as the Department of Veteran Affairs and and Department of Agriculture almost no workers were furloughed. The coefficient on the interaction terms gives the additional drop in consumption for furloughed workers, who were subject to both a transitory loss of income as well as increased leisure time and home production. Individual fixed effects are included to capture time invariant factors specific to a particular worker.

One primary benefit of our data and identification strategy is that it is possible to separately examine various types of household spending rather than only considering spending as a whole. This allows for a greater understanding of household smoothing behavior and also lets us highlight differences between households that were affected by the federal furloughs and loss of pay from those solely affected by the loss of pay. We can also use the richness of the data and fine categorical data to look for direct evidence of home production or leisure spending. We can re-estimate our main specification separately for each category, including the triple difference furlough interaction. If furloughed workers are engaging in home production, this would be evident through decreased spending on items such as restaurants, child-related expenses or home and garden related expenses. Evidence of increased leisure time could be present in categories such as entertainment, office supplies and spending in venues related to leisure activities such as coffee shops or bars.

## 3.1 Was the Shutdown Anticipated?

One important consideration is the extent to which the government shutdown was anticipated by households. Theory predicts that unanticipated and anticipated changes in income will have very

different impacts on consumption. The permanent income hypothesis predicts that anticipated income shocks should not have an effect on consumption, as individuals will save or dis-save smoothly. The institutional framework of the 2013 government shutdown does not provide a clear answer to the question of whether or not the shutdown was anticipated. While it was known that the federal government would shut down if a continuing resolution was not passed, it is possible that many workers predicted that a last minute deal would be reached as occurred several times in debt ceiling negotiations.

We claim that the shutdown was largely unanticipated; despite high levels of polarization and political uncertainty, there was no clear indication that the shutdown would actually occur. Several similar standoffs led to last minute continuing resolutions that kept the government running. In addition, other research often shows a lack of attention or understanding of economic news. Eggers and Fouirnaies (2014) find that households strongly respond to the media announcing that the economy is in a recession, leading to the conclusion that these households pay little attention to economic fundamentals and only respond to the additional media attention. Figure 1 provides suggestive evidence that the shutdown was not anticipated. The left panel displays the daily number of newspaper articles written that mention the phrase "government shutdown" as a fraction of all newspaper articles from June 1st, 2013 to February 28th, 2014. Articles are queried using the Access World News Newsbank database which is composed of almost 2000 newspapers in 2014.[10] This graph indicates the dramatic surge in media attention paid to the government shutdown that did not significantly precede the shutdown itself.

The right panel of Figure 1 focuses on the 3 weeks immediately preceding the government shutdown. In blue is again the fraction of newspaper articles written that mention the shutdown. In red is the probability of the shutdown occurring as calculated by the betting market website *Inkling Markets*. The two series are highly correlated, with both series only seeing significant increases in the 7 days leading up to the shutdown. This suggests that there was not a great deal of anticipation by either the media or prediction market participants, who have been shown to be fairly accurate predictors of political outcomes.[11] Thus, it is unlikely that affected federal employees were able to significantly alter their consumption and savings behavior in the short period before the shutdown

[10] News query was run on June 15, 2014.

[11] See Berg, Reitz, and Nelson (2008) and Wolfers and Zitzewitz (2006) for discussions of prediction market accuracy and interpretations.

began and their income was disrupted.

We empirically test for any change in observable savings behavior using the following specification:

$$s_{it} = \delta_t + \delta_i + \sum_{j=1}^{T} \rho_j \mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i + \kappa X_{it} + e_{it} \tag{3}$$

where $s_{it}$ is the amount individual $i$ saved in period $t$. A test for whether or not the shutdown was anticipated is $\rho_i = 0$ for all $i = p$ where $p$ denotes the three months before the shutdown. The intuition behind this test is that if federal government workers could have anticipated the shutdown, they would have saved to smooth consumption. We find no significant change in behavior leading up to the shutdown. We find that, if anything, federal government workers save less than state government workers in the months preceding the shutdown although the difference is not significantly different from zero. This provides additional evidence that the shutdown was not anticipated.

# 4 Results

We begin the analysis by documenting both a large income and corresponding spending response to the shutdown. We then discuss various channels through which the shutdown impacted spending. The observed pattern of the spending response is consistent with liquidity constraints, but not with changes in expectations regarding permanent income. Changes in the time allocation of workers also explain almost half of the decline in spending during the shutdown. Evidence from spending categories indicates that both home production and increases in leisure could explain how changes in time allocation impacted spending.

## 4.1 Income and Spending

Figure 2 displays variants of equations 1 and 2. The top row shows the coefficients for fixed effects for each week for federal and state government workers, which are respectively the blue squares and red triangles. Dashed lines show 95% confidence intervals for each point estimate. In the left panel the dependent variable is income, while in the right hand panel the dependent variable is spending during the final six months of 2013. The first three weeks of October, during which

the shutdown affected incomes, is shaded. The left hand panel shows that the shutdown did affect incomes significantly. In the second and third weeks of October 2013, there was an approximate 20-25% drop in incomes for federal government workers. The first week saw no impact due to the fact that paychecks in the first week of October were for a full September pay period which still was paid in full. The drop is followed by a rebound in the weeks following the shutdown. There is a large spike in incomes in the final week of October, but we see smaller increases in November and December which is consistent with a minority of workers not being repaid until later in the year. There is no noticeable change in income for the control group, state and unaffected federal government workers, which is expected as this group was not affected by the shutdown.

The right panel shows that the shutdown impacted spending. For federal government workers, there is a small drop in the second period week of the shutdown, and a larger drop in the third week of the shutdown. This pattern is consistent with credit constraints and federal government workers exhausting their savings. The largest drop is seen in the third week of the shutdown, after the end of the shutdown was announced. This pattern is not consistent with alternative explanations such as the drop in spending being driven by revised beliefs about permanent income. Following the shutdown, there is a rebound in spending. This rebound is driven primarily by durable purchases and will be discussed further in section 4.2. Again we see no noticeable change in spending for the control group, state government workers, which provides supporting evidence that the observed patterns are not driven by seasonality.

The second row of Figure 2 shows the difference in difference specification in equations 1 and 2. Each point estimate shows the difference in the outcome for federal and state government workers in the last six months of 2013. Dashed lines show 95% confidence intervals for each point estimate. Both the income and spending differences for federal and state government workers are statistically significant at the 0.05 level. The final row of Figure 2 repeats the analysis in the first row for 2012, where the federal government did not shut down. In this placebo specification, there is not a significant difference between federal and state government workers, providing supporting evidence for our identifying assumptions and that the observed patterns are driven by the shutdown. Note that we do observe some systematic statistically insignificant differences in spending patterns between the federal government and state government workers. This is largely governed by the fact that state and federal workers have somewhat different paycheck frequency such that there are

some small within-month differences in spending between the two. However, as seen in the final row of Figure 2, these differences are minor in general and especially so relative to the differences seen during the shutdown.

Table 4 makes the graphical evidence presented in Figure 2 explicit. The first row shows an interaction between the shutdown being in effect and an individual working for the federal government. Column (1) indicates that the shutdown was associated with a 23.4 percent weekly drop in income for federal government workers relative to state government workers. The drop is significant at the 0.01 level. Column (2) shows the partial rebound in the week immediately following the shutdown. The rebound is not full, since some federal government workers did not receive backpay until November or December. Column (3) indicates that during the shutdown there was an approximate 10.7 percent decrease in spending for federal government workers relative to state government workers. The effect is significant at the 0.01 level. Column (5) shows that there is a rebound in spending following the shutdown, however the rebound in spending is not as large as the prior drop.

Column (4) adds a a triple interaction between the shutdown being in effect, an individual working for the federal government and the probability that the individual was furloughed, $\mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it}$ where the subscript $i$ denotes the individual and the subscript $t$ denotes the time period. The results indicate that the drop for furloughed workers is roughly twice as large as that for workers who were not furloughed. This could be consistent with either time allocation or home production affecting consumption, and this will be discussed further in section 4.2.3. The results indicate a spending elasticity of consumption to income of 0.302 and a marginal propensity to consume of approximately 0.31. Column (1) shows that there is no significant difference in the income decline for furloughed workers, suggesting that the results are indeed driven by workers being sent home without pay during the shutdown. These results are also depicted graphically, by fraction of workers furloughed at various agencies, in Figure 3.

Columns (6)-(8) collapse the results to the daily level by agency, providing an additional specification and robustness check. The results are quite similar to the main results and significant at conventional significance levels. The results confirm that there is a large drop in spending for federal government workers during the shutdown, relative to state government workers. Moreover this drop in spending is much greater for workers who were furloughed during the shutdown. The

results also confirm the rebound in spending following the shutdown.

## 4.2 Drivers of Spending Response

### 4.2.1 Differential Categorical Spending Declines

Table 5 breaks down the spending decline between various categories during the shutdown, along with the differential decline for furloughed workers. The category is written above each column and panel. The first row shows food related expenditures. For federal employees overall, there is a significant decline in restaurant spending and no decline in fast food and grocery spending, which may be more inelastic. There is a larger decline in fast food and grocery related spending for furloughed workers. This could be due to home production, for example furloughed workers could cook at home rather than eating fast food and spend more time preparing less costly meals.

The second row shows transportation related spending. For non-furloughed workers, there is no decline in spending on public or auto transportation, or gasoline. Furloughed workers, who stayed home during the shutdown see declines of between 1 and 8 percent in all transportation related spending. The drops are significant at the 0.05 level or higher. This is evidence that the shutdown did indeed impact the time use of workers. Exempted workers were required to work during the shutdown, so we would expect to see no decline in transportation spending. Furloughed workers were not allowed to attend work during the shutdown thereby cutting transportation and commuting costs.

The third row of Table 5 shows spending results for shopping, clothing and check spending. There is an approximate 6 percent drop in spending on clothing, and a 12 percent drop in check spending for all government workers. The drops are significant at the 0.05 level or higher. Additionally there is a larger and marginally significant 7 percent drop in check spending for furloughed workers, which could be consistent with reducing spending on services due to either home production or changes in time allocation. There is no drop in shopping for exempted workers, however furloughed workers see an approximate 7 percent drop in shopping.

The fourth row of Table 5 shows spending results for entertainment and home categories. There is a 4 percent drop in cafe spending and a 1 percent drop in amusement spending for all federal government workers. The drops are significant at the 0.05 level. There are increases in spending

on cafes and amusement for furloughed workers, and the latter effect is significant at the 0.01 level. This is consistent with changes in time allocation, as furloughed workers could spend money on leisure activities rather than work and consumption. There is also evidence of home production, as there is a marginally significant 1 percent decline in spending on home services. Furloughed workers may have engaged in tasks such as raking leaves or childcare themselves as opposed to hiring outside assistance.

The fifth and sixth rows of Table 5 provide placebo tests. At the 5 percent level, there is no significant spending response in inelastic categories such as health insurance, auto and medical payments, or education. We also see no significant spending response for exempted or furloughed workers in interest income which should not be affected by the shutdown. The results in rows 5 and 6 provide further evidence that the observed effects are driven by a response to changes in income and time allocation during the shutdown, and not other factors.

Figures 4 and 5 show graphical evidence of categorical spending declines. Figure 4 indicates that, as in the main results, the timing of the observed drops and rebounds in spending is consistent with the timing of the shutdown. The figure also provides support for the common trends assumption. Figure 5 shows point estimates and 95% confidence intervals for shutdown and furlough effects. The shutdown spending decline is largest in categories such as check spending, restaurants and cash. Large declines in spending for furloughed workers are observed in categories such as gas, fast food and check spending, and increases are observed in categories such as amusement and personal care. This evidence is consistent with changes in time allocation and increases in leisure impacting consumption.

Changes in time allocation can impact consumption through two non-mutually exclusive channels. First, if consumption and leisure are substitutes and non-separable, an increase in time available for leisure will reduce consumption. Second, individuals may engage in home production, for example cleaning themselves rather than hiring outside help. Section 4.2.3 discusses the implications of consumption responses due to home production or increased leisure. The categorical spending declines provide evidence of both channels, however our design does not allow us to quantify the impact of each channel on the time-allocation related decline in consumption.

### 4.2.2 Permanent Income

One important driver of the household consumption decision is the arrival of new information about the future path of household income. Theory, and the well-established standard Euler equation for consumption, tell us that households will react to unanticipated news about changes in their permanent income path with a swift revision to their consumption with an elasticity near one. Moreover, empirical work has consistently found strong impacts of unexpected permanent income shifts.[12]

The government shutdown in 2013 may have changed households beliefs about the likelihood that they would maintain steady increases in pay and about the security of their positions in both the short- and long-run. The political crisis that precipitated the shutdown could have driven federal employees to believe they may be more likely to be subject to furloughs, pay freezes, or more intense political debates about public-sector compensation.

The standard Euler equation, along with the bulk of empirical research, would predict that a downward shift in beliefs about permanent income would be accompanied by an immediate and permanent decline in consumption equal to the size of the permanent income shock. That is, affected households would decrease spending when their beliefs shifted and would not increase spending to previous levels even after their temporary income disruption was relieved.

Examining figure 2 indicates that the timing of the consumption drop is inconsistent with revised beliefs about permanent income. If federal government workers beliefs changed due to the shutdown, we would expect to see an immediate drop in spending that was not followed by a rebound once the shutdown ended. This pattern is not what is observed. Instead, spending declines over the month, consistent with home production or liquidity constraints and federal workers depleting savings. In fact, the largest drop is during the third week of October, during which the end of the shutdown was announced but workers had not received backpay. It is difficult to reconcile this spending pattern with a model of the shutdown impacting beliefs about future income, while

[12]Theory dating back to Friedman (1957) has posited diverging responses to transitory and permanent income shocks. Flavin (1981), Campbell (1987), Carroll (2009) and Kaplan and Violante (2010) provide further theoretical justification for strong consumption responses to permanent income shocks in a wide range of settings. Work including Gruber (1997), Wolpin (1982), Pistaferri (2001), Stephens (2001), Coulibaly and Li (2006) and Jappelli and Pistaferri (2007) demonstrate these strong responses empirically. Stephens (2003) also examines the response to known regular payments using the timing of Social Security benefits. This work, alongside many other papers, provides much evidence for large household consumption responses to permanent income shocks, although sometimes finding responsiveness somewhat less than one, as theory would predict.

the spending patterns are consistent with binding liquidity constraints.

We test this hypothesis formally by looking at income 3 months prior to the shutdown and 3 months afterward, when all foregone pay had been repaid to the households, and comparing federal to state employees who were unaffected by the shutdown.[13] We find no significant difference in spending, at very high precision, allowing us to reject any long-lasting decline in household spending. Moreover, we find significant declines in spending during the shutdown, followed by a rapid recovery in spending upon the ending of the shutdown, suggesting that the decline in household spending was only temporary and likely not caused by shifts in permanent income expectations.

### 4.2.3 Consumption Types and Home Production

Changes in time allocation due to the shutdown could also affect consumption though multiple channels. Theory predicts that if utility is non-separable in consumption and leisure, individuals smooth the marginal utility of consumption, $\mathbb{E}_{t-1}[u(c_{i,t-1}, l_{i,t-1})] = u(c_{i,t}, l_{i,t})$, and an adjustment in leisure can lead to a consumption change. Home production can also cause a decline in observable spending if more time is available. Both of these explanations have been noted, respectively by Haider and Stephens (2007) and Aguiar and Hurst (2007) and Aguiar, Hurst, and Karabarbounis (2013), as potential explanations for the sharp drop in consumption seen at retirement, counter to the consumption smoothing predicted by the permanent income hypothesis. As well as being of theoretical interest, the underlying reasons behind a time allocation response have important welfare consequences in terms of designing social insurance programs. If the consumption drop following unemployment is due to increased leisure rather than liquidity constraints, this has implications in the design of optimal unemployment programs in the tradition of Baily (1978) and Chetty (2006).

Other work by Guler and Taskin (2013) suggests similar effects hold for unemployment spells. Burda and Hamermesh (2010), demonstrate cyclical variation in unemployment leads to variation in home production but little impact on long-term unemployment. The framework of the 2013 government shutdown allows us to separate the effects of leisure and home production from other

[13] One concern is that we find no significant differences here when looking at differential spending patterns between affected federal workers and state government employees because of a strong correlation in the changes in income expectations among these two groups. We also construct a control group composed of a random sample of private sector workers at publicly traded firms. Using this as an alternate control, we find no evidence supporting a persistent decline in income among the affected federal government employees.

channels, since some workers were sent home while others were required to work without pay.

During the 2013 US government shutdown, some agencies furloughed nearly all of their workers. Other agencies deemed services essential, and required the majority of employees to continue working without pay. This latter group would have been unaffected by increased home production or leisure, and hence any decline in consumption is more likely due to a credit constraint effect. To identify the effects of credit constraints and home production or leisure, we estimate equations 1 and 2, adding an interaction term for the fraction of workers in an agency that were furloughed, $\mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i \times \mathbb{P}\{Furlough\}_i$. The coefficient on the interaction term provides an estimate of the difference in consumption that is driven from home production or leisure rather than a temporary drop in income and credit constraints. A large negative coefficient is consistent with changes in time allocation leading to a drop in consumption, which could be due either to leisure or increased home production.

Column 4 of Table 4 is consistent with this pattern. The results indicate that while non-furloughed federal workers saw a 7% decline in spending during the shutdown, those households that had a furloughed worker saw spending decline by approximately twice as much. Column (2) of Table 4 demonstrates that this larger decline in spending was in spite of any difference in how household income was affected between these two groups. Observing particular types of spending allows us to pin down the types of spending that led to this divergence.

To further examine whether the observed drop is due to home production or increased leisure time, we can examine categorized spending data. Tables 5 and 6 show equation 2 broken down by individual categories. There are large drops in categories such as eating out, shopping and office supplies which are consistent with a number of interpretations. However, we see larger drops for furloughed workers relative to exempted workers in categories such as dining out, groceries, baby supplies, office supplies, entertainment and kid's activities, which is consistent both with increased leisure activity and home production in areas such as food preparation and child services.

Tables 5 and 6 also provide valuable placebo tests, which serve as a check regarding both our empirical strategy and the validity of our category data. We do not see drops in consumption in categories that are unlikely to be cut due to a transitory income shock. We see no differential change in health spending, which is likely to be inelastic and driven by adverse health shocks. We also see no effect on auto payments, which could adversely affect credit scores and have large implications

if missed. No effect is observed on interest income, which should be entirely unaffected by the shutdown.

Table 5 displays results showing impacts on federal employees affected by the disruption in pay during the shutdown as well as those affected by both the disruption in pay and the furlough. At the top of column (1), for example, we see a decline in spending at restaurants across all affected employees of approximately 8% as well as an additional negative and insignificant decline in restaurant spending among furloughed employees of approximately 4%. In a number of the categories in Table 5, we see differential household spending responses across affected employees in general and furloughed employees in particular.

Consistent with an expected decline in commuting among the furloughed workers, we see significantly less spending on automobiles, public transport, and gasoline compared to other affected federal employees. We also see a larger decline in fast food and groceries expenditures. This may be consistent with previous work suggesting that out-of-work individuals generally cut back on consumption of food outside the home and also are able to shop for groceries more judiciously, thus cutting expenditures while maintaining similar 'consumption.'

In the third row, we find that furloughed households also did not experience the same decline in spending on some categories of entertainment (eg. 'Amusement' as well as in the 'Movies' category which is not enumerated in this table). This is evidence that households with additional time away from work substituted into additional forms of entertainment outside the home. In contrast, furloughed households saw declines in spending on home services like maids and babysitters. This corresponds well with the increased ability of furloughed households to perform such household labor themselves during the shutdown period. The fourth and fifth rows contain spending from categories that may be more fixed in the short term. Households, either furloughed or exempted, who were affected by the shutdown had little reaction to the shutdown in terms of their spending on healthcare, car payments, or education payments.

### 4.2.4 Credit Constraints

The role of credit constraints in impacting household consumption behavior is often highlighted when examining unexpected declines in income. In the classic permanent income hypothesis framework, unexpected temporary declines in income only manifest themselves as declines in

consumption if households are credit or liquidity constrained.[14]

Given most affected federal employees knew that they would be repaid all foregone income following the conclusion of the government shutdown, they would experience no expected change in lifetime income. Because they would only be subject to a temporary decline in income, this framework would predict a decline in consumption only among those households who were unable to borrow or draw on liquid savings to smooth their consumption during the shutdown until their regular income resumed. Unable to borrow or draw on savings to finance current consumption, constrained households would be predicted to cut and defer spending during the government shutdown. Thus, any decline in spending would be only seen among households without sufficient savings or borrowing capability.

Suggestive evidence of credit constraints playing a role in the consumption drop is presented in Table 7. The table provides additional categorical specifications, broken down at the daily level for each agency. We aggregate across individuals in each agency in this specification due to the fact that there are large numbers of observations with zero spending at a day-category level. The first three columns (where columns 1 and 2 are in logs and column 3 in levels) show aggregate spending before and after the shutdown and confirm the patterns seen earlier– there is a drop in spending for federal government workers during the shutdown, and a rebound following the shutdown when backpay was received. Columns 4-8, in logs, confirm that a similar pattern is seen across all categories in the table: durables, non-durables, services, dining, and mortgage spending. The rebound following the shutdown, while significant, is much smaller for the dining category. The fact that there is a decline and corresponding rebound in mortgage spending suggests re-timing in the paying of bills.

The second row of Table 7 presents an indicator for the time period in between the announcement of the shutdown and the first post-shutdown paychecks arriving. The third row of the table shows an indicator for the final week of October, when the post shutdown paychecks arrived with

[14] See, for instance, Bishop and Park (2011) which demonstrates that marginal propensities to consume drop steeply following a relaxation in binding borrowing constraints. Kaplan and Violante (2014) and Eggertsson and Krugman (2012) both spell out mechanisms by which credit or liquidity constrained households become more responsive to income changes with potential macroeconomic consequences. Zeldes (1989), Johnson, Parker, and Souleles (2006), Souleles (2000b), Souleles (2000a) and Blundell, Pistaferri, and Preston (2006) also estimate a higher level of consumption elasticity among households with less credit and net worth. In addition, recent work has suggested a potentially large role of credit constraints in the consumption decline seen during the Great Recession (eg. Baker (2014), Mian, Sufi, and Rao (2013) and Dynan (2012).

additional income for pay during the shutdown. In all specifications, the pre-repayment coefficient is either zero or negative and significant. The rebound in spending does not occur until paychecks arrive, and not when information has been announced that the shutdown will end. This is consistent with credit constraints rather than changes in expectations due to the shutdown.[15]

We also test this theory using savings behavior, and test whether liquid assets (and/or total assets) and credit availability seems to ameliorate declines in spending here. We aggregate household savings in the nine months preceding the shutdown, and interact savings with the federal government by shutdown down indicators $\mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i \times Savings$. If liquidity constraints played a large role in the consumption drop during the shutdown, we would expect the coefficient on this interaction to be large and significant as households with higher savings would not face liquidity constraints.

Table 8 presents a specification in which the affected worker and shutdown indicators $\mathbb{1}\{j = t\}_t \times \mathbb{1}\{Gov\}_i$ are interacted with savings before the shutdown. Panel A demonstrates little differential change in savings behavior prior to the shutdown among affected workers, where savings are defined as the sum of all income minus transactions in the nine months prior to the shutdown, in thousands of dollars. This is consistent with the shutdown being an unexpected event and reinforces the fact that affected government workers behaved similarly to unaffected workers. Panel B shows that for every one thousand dollars saved before the shutdown, consumption during the shutdown saw an approximately 5% smaller decline. This is evidence that credit constraints may have played a role in the consumption drop seen following the shutdown, however given the small magnitudes it is unlikely that credit constraints can explain the entirety of the drop.

A second test of this channel is performed in panel C of Table 8. Here we examine the types of accounts that households had and how these drove heterogeneous spending responses during the shutdown. Columns (1)-(3) simply regress new account openings on whether a household was affected by the shutdown. That is, "Affected Employees" (federal workers affected by the shutdown) were more likely to open credit card accounts during the shutdown when compared to state government employees and non-affected federal workers (seen in Column (1)). This increased

[15] Appendix Figure A1 shows the differences in spending among affected and unaffected workers before, during, and after the shutdown. Three vertical lines denote the beginning of the shutdown, the announcement of the end of the shutdown, and the first federal payday following the shutdown's conclusion. A sharp increase in relative spending is only seen following the resumption of paychecks, not after the conclusion of the shutdown itself.

likelihood is not seen in savings and investment account openings. Moreover, column (4) shows that while affected households reduced spending significantly overall, affected households with access to credit (either new or existing) saw a significantly smaller decline in spending. The fourth column interacts the shutdown government interaction term with (1) an indicator of whether or not a credit card account was opened and (2) an indicator of whether or not they have a credit card account. Together, these findings suggest that at least some affected employees took the opportunity to increase their available credit in the face of going without pay for some time and that doing so enabled them to smooth consumption during the government shutdown. It seems clear that liquidity and credit constraints played an important role in driving household behavior immediately prior to and during the shutdown.

## 4.3 Spending Rebounds Following the Shutdown

Table 6 displays results of regressions of categorical spending on indicators for shutdown periods as well as the weeks immediately following the shutdown. Large rebounds in spending are observed in categories such as as shopping, clothing and home services following the shutdown. Results presented in Table 4 indicate that in the week following the shutdown, income increases by 35.3% on average while spending increases by 11.7%. There is a symmetric response to the rebound in spending following the shutdown. The results from after the shutdown indicate a spending elasticity to income of .329, which is very close to the estimate from the income and spending declines, which is 0.302.

Food related and transportation expenses show a mixed response to delayed paychecks received in the weeks following the shutdown. The first row of Table 6 shows food related expenditures. There is an approximate 8 percent increase in grocery spending, and this increase is significant at the 0.01 level. There is also a 5 percent increase in restaurant spending, however this increase is not statistically significant at conventional levels. The second row of Table 6 shows transportation related expenditures. There is a 4 percent increase in spending on public transportation, and this increase is significant at the 0.01 level. There is no significant response in spending in other transportation categories. Both the increase in spending on groceries and public transportation spending could indicate families retiming large recurring expenses due to the income disruption that followed the shutdown.

The third and fourth rows of Table 6 show the response to changes in discretionary spending. There is a 12% increase in shopping expenditure following the shutdown, and an 8% increase in clothing expenditure. Both increases are significant at the 0.01 level. Additional spending on home services increases by 1%, and the increase is significant at the 0.01 level. The fifth and sixth rows of 6 shows categories that are likely to be inelastic. There is no increase in medical and child spending, or interest income following the shutdown. There is a statistically significant increase in health and education spending, but these increases are economically quite small in magnitude and we can rule out effects larger than 1% in both cases. There is a significant increase in auto payments. This would reflect the retiming of bills, or using increased income to pay off accrued debts.

### 4.4 Placebos and Robustness

The final row of Figure 2 provides placebo tests in 2012. The main analysis is repeated using data from 2012 rather than 2013. In 2012 the federal government did not shut down and we should not observe the effects seen in 2013. As expected, there is no drop in income or spending during the same period in 2012 and both the income and spending series track each other quite closely, providing further support for the parallel trends assumption. The absence of any effect confirms our research design and indicates that the observed spending decline is due to the shutdown, and not anything in particular that happens to federal workers in October.

We also conduct further robustness tests. Table A1 presents results that indicate that the demographic characteristics of workers did not change during the time period studied. Modifying specifications through windsorization, changing the categorization of spending, restricting to subsamples, etc. produces no substantial changes in our main results. [16] We take this as further evidence of the robustness of our estimates and research design.

## 5 Conclusion

This paper uses detailed and comprehensive financial data to assess how affected households responded to the 2013 government shutdown. The shutdown represents an ideal natural policy ex-

[16] Available upon request from authors.

periment that subjected a large set of households to a temporary income disruption and further furloughed a subset of these workers, requiring them to stay home from work for two weeks. In this framework, we are able to test how households re-time, reallocate, and reduce their spending conditional on both the disruption and the furlough.

We present three main findings. The first is that households exhibit a large degree of excess sensitivity to the income shock we observe. Importantly, we argue that this income shock has virtually no permanent component and represents solely a transfer of approximately one week's wages to two weeks into the future. Second, we show that much of the decline in household spending during the shutdown is driven by changes in leisure time and work-related expenditures. Home production substitutes for some types of spending (eg. dining out of the home or paying for house cleaners), spending is reallocated (eg. shopping trips are curtailed), and some bills are deferred (eg. some bills paid at the end of a billing cycle rather than a beginning). Finally, we show that liquidity and credit constraints also drive significant changes in household spending. Despite our sample consisting largely of households with steady jobs and middle-class incomes, households with more indicators of having access to additional credit or savings have significantly smaller spending contractions during the shutdown.

This paper demonstrates that heterogeneity across households drives large differences in the overall responsiveness of spending and also in the types of spending adjustments that households make following income shocks. We present more evidence that measured spending changes may not accurately reflect changes in consumption or utility during periods with differing time-use patterns. Furthermore, we provide more evidence that large numbers of middle-income households live hand-to-mouth lifestyles with little margin for unexpected negative events. These facts are important both in informing the microeconomic underpinnings of future economic models and also in constructing government policy designed to insure against income disruptions.

# References


AGUIAR, M., AND E. HURST (2007): "Lifecycle Prices and Production," *American Economic Review*, 97(5), 1533–59.

AGUIAR, M., E. HURST, AND L. KARABARBOUNIS (2013): "Time Use During the Great Recession," *American Economic Review*, 103(5), 1664–1696.

BAILY, M. (1978): "Some Aspects of Optimal Unemployment Insurance," *Journal of Public Economics*, pp. 379–402.

BAKER, S. R. (2014): "Debt and the Consumption Response to Household Income Shocks," *Stanford University Working Paper*.

BAKER, S. R., AND C. YANNELIS (2014): "Did the 2013 Government Shutdown Severely Damage the U.S. Economy?," *SIEPR Policy Brief*, October.

BERG, J., T. A. REITZ, AND F. NELSON (2008): "Prediction Market Accuracy in the Long Run," *International Journal of Forecasting*, 24, 283–99.

BISHOP, T., AND C. PARK (2011): "Borrowing constraints and the marginal propensity to consume," *Journal of Economic Policy*, 33(4), 1–25.

BLUNDELL, R., L. PISTAFERRI, AND I. PRESTON (2006): "Consumption Inequality and Partial Insurance," *American Economic Review*, 98(5), 1887–1921.

BLUNDELL, R., AND R. TANNER (1998): "Is there a retirement savings puzzle?," *American Economic Review*, 88, 769–88.

BURDA, M., AND D. S. HAMERMESH (2010): "Unemployment, market work and household production," *Economics Letters*, 107(2), 131–133.

BURWELL, S. (2013): "Impacts and Costs of the October 2013 Federal Government Shutdown," *Executive Office of the President of the United States*.

CAMPBELL, J. (1987): "Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis," *Econometrica*, 55, 1249–73.

CARROLL, C. D. (2009): "Precautionary Saving and the Marginal Propensity to Consume Out of Permanent Income," *Journal of Monetary Economics*, 56(6), 1249–73.

CHETTY, R. (2006): "A General Formula for the Optimal Level of Social Insurance," *Journal of Public Economics*, 90(10), 2351–2356.

COULIBALY, B., AND G. LI (2006): "Do Homeowners Increase Consumption After the Last Mortgage Payment? an Alternative Test of the Permanent Income Hypothesis," *Review of Economics and Statistics*, 88(1), 10–19.

DYNAN, K. (2012): "Is a Household Debt Overhang Holding Back Consumption?," *Brookings Papers on Economic Activity*.

EGGERS, A., AND A. FOUIRNAIES (2014): "The Economic Impact of Economic News," *Unpublished Mimeo*.

EGGERTSSON, G., AND P. KRUGMAN (2012): "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach," *The Quarterly Journal of Economics*, 127(3), 1469–1513.

FLAVIN, M. (1981): "The Adjustment of Consumption to Changing Expectations about Future Income," *Journal of Political Economy*, 89, 974–1009.

FRIEDMAN, M. (1957): "A Theory of the Consumption Function," *Princeton: Princeton University Press*.

GELMAN, M., S. KARIV, M. D. SHAPIRO, D. SILVERMAN, AND S. TADELIS (2015): "How Individuals Smooth Spending:Evidence from the 2013 Government Shutdown Using Account Data," *Unpublished Mimeo*.

GRUBER, J. (1997): "The Consumption Smoothing Benefits of Unemployment Insurance," *American Economic Review*, 87(1), 192–205.

GULER, B., AND T. TASKIN (2013): "Does unemployment insurance crowd out home production?," *European Economic Review*, 62, 1–16.

HAIDER, S., AND M. STEPHENS (2007): "Is There a Retirement-Consumption Puzzle? Evidence Using Subjective Retirement Expectations," *Review of Economics and Statistics*, 89, 246–64.

HURD, M., AND S. ROHWEDDER (2006): "Some answers to the retirement consumption puzzle," *NBER Working Paper No. 242*.

JAPPELLI, T., AND L. PISTAFERRI (2007): "Do People Respond to Tax Incentives? An Analysis of the Italian Reform of the Deductibility of Home Mortgage Interests," *European Economic Review*, 51, 247–271.

——— (2010): "The Consumption Response to Income Changes," *Annual Review of Economics*, 2, 479–506.

JOHNSON, D., J. PARKER, AND N. SOULELES (2006): "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, 96(5), 1589–1610.

KAPLAN, G., AND G. VIOLANTE (2010): "How Much Consumption Insurance beyond Self-Insurance?," *American Economic Journal: Macroeconomics*, 2(4), 53–87.

——— (2014): "A Model of the Consumption Response to Fiscal Stimulus Payments," *Econometrica*, 82(4), 1199–1239.

MIAN, A., A. SUFI, AND K. RAO (2013): "Household Balance Sheets, Consumption, and the Economic Slump," *The Quarterly Journal of Economics*, 128(4), 1687–1726.

PISTAFERRI, L. (2001): "Superior Information, Income Shocks and the Permanent Income Hypothesis," *Review of Economics and Statistics*, 83(3), 465–476.

SOULELES, N. (2000a): "College Tuition and Household Savings and Consumption," *Journal of Public Economics*, 77(2), 185–207.

——— (2000b): "The Response of Household Consumption to Income Tax Refunds," *American Economic Review*, 89(4), 947–958.

STEPHENS, M. (2001): "The Long-Run Consumption Effects of Earnings Shocks," *Review of Economics and Statistics*, 83(1), 28–36.

——— (2003): ""3rd of tha Month": Do Social Security Recipients Smooth Consumption Between Checks?," *The American Economics Review*, 93(1), 406–22.

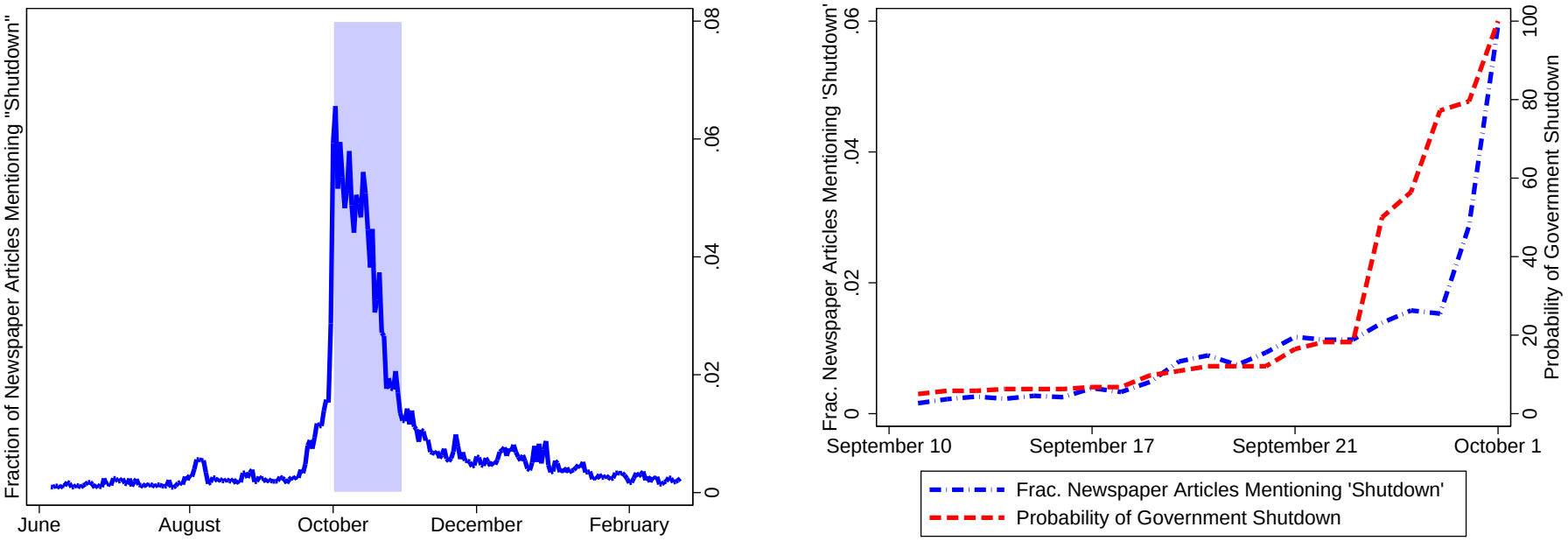
WOLFERS, J., AND E. ZITZEWITZ (2006): "Partisan Impacts on the Economy: Evidence from Prediction Markets and Close Elections," *Quarterly Journal of Economics*, 122(2), 807–29.

WOLPIN, K. (1982): "A New Test of the Permanent Income Hypothesis: The Impact of Weather on the Income and Consumption of Farm Households in India," *International Economic Review*, 23(3), 583–594.

ZELDES, S. (1989): "Consumption and Liquidity Constraints: An Empirical Investigation," *Journal of Political Economy*, 97(2), 1469–1513.

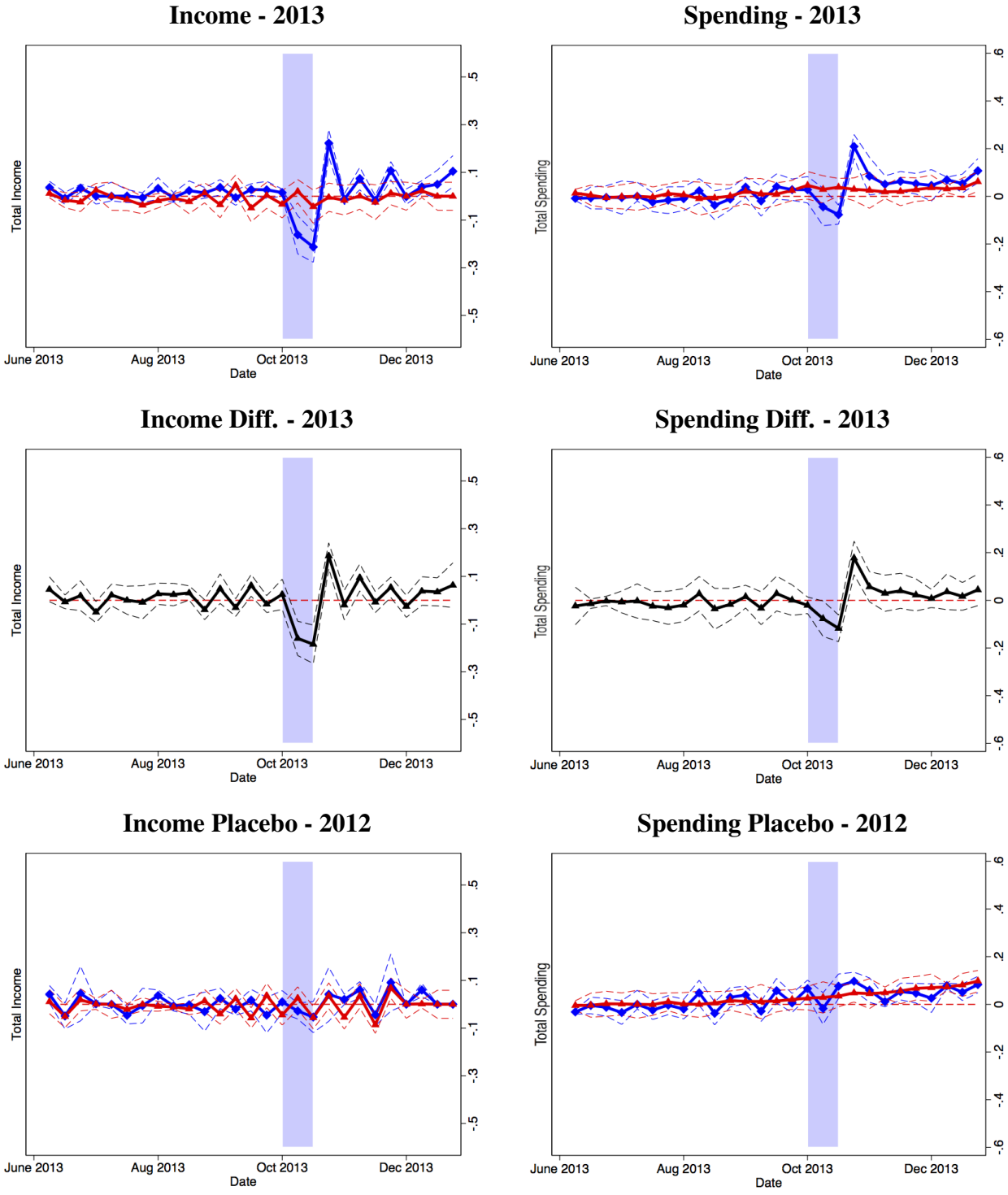
Figure 1: Anticipation of the Shutdown was Minimal Until One Week Before the Shutdown Occurred

**Number of News Stories Mentioning "Government Shutdown"** **Probability of Shutdown**



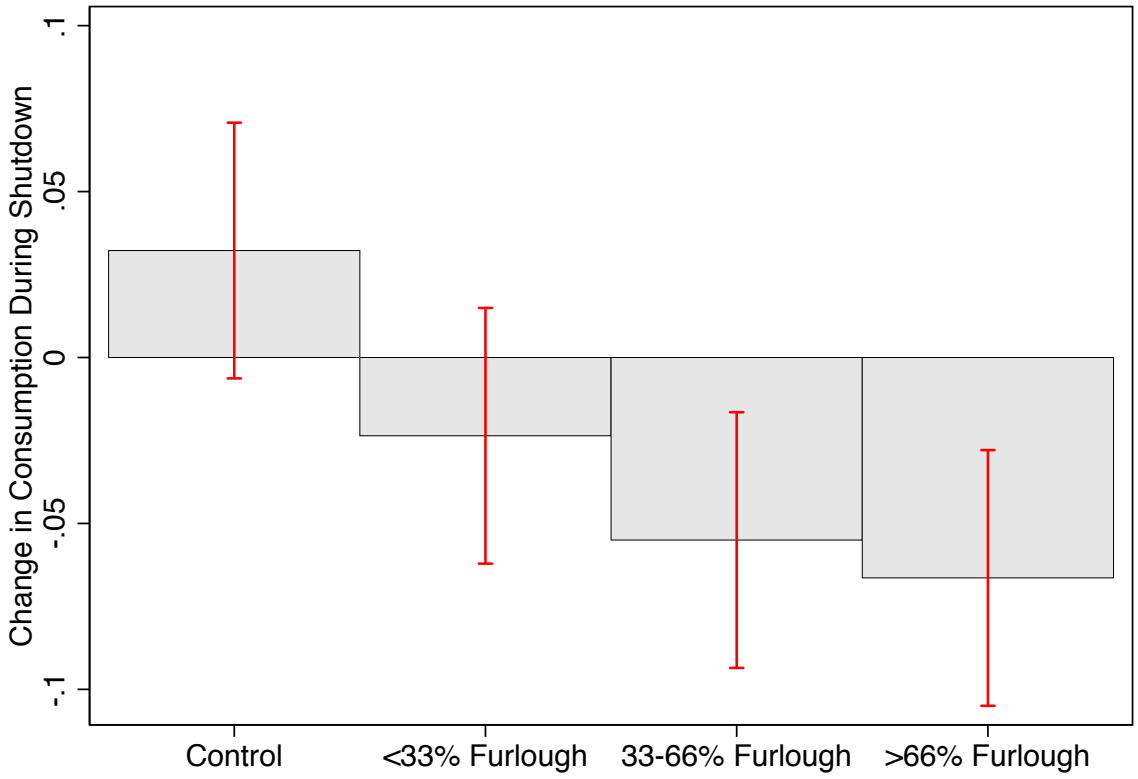

Notes: The panel on the left shows the fraction of newspaper articles mentioning the phrase "government shutdown". The ratios are calculated using data from all US newspapers in the Access World News NewsBank database, comprised of nearly 2000 newspapers in 2014, taking the total number of newspaper articles mentioning "government shutdown" as a fraction of the total number of newspaper articles each day. Query was run on June 15th. The panel on the right shows two series. In red is the probability of the federal government shutting down before October 1 from the online prediction market *Inkling Markets*, which featured the question "Will the U.S. government shut down due to lack of funding before 1/1/14?". In blue is the fraction of newspaper articles mentioning the phrase "government shutdown".

Figure 2: Overlay of Results for Federal and State Government Workers



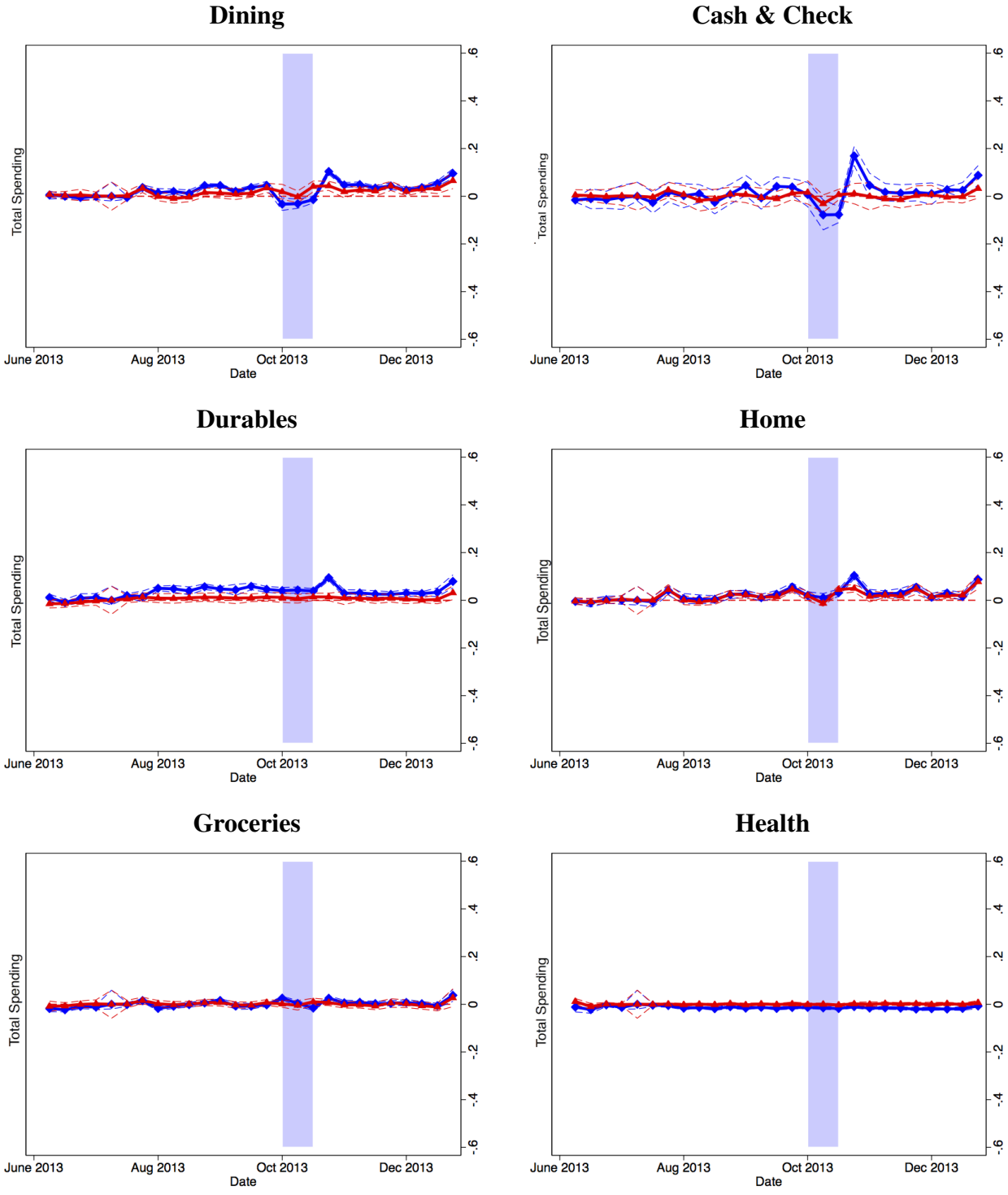

Notes: The dependent variable in each specification is log income or the log total amount spent in one week periods during the specified year. Each figure plots the coefficients on the fixed effects from regressions of income on time period dummies. The first three weeks of October are shaded, during which the federal government shutdown took place in 2013. The top row plots income and spending patterns for state government workers (red) and federal government workers affected by the shutdown (blue). The second row plots the difference between the two series. The bottom row mirrors the top row but uses data from 2012, when no government shutdown occured. The dashed lines show a 95% confidence interval. Standard errors are clustered at the agency level.

Figure 3: Transactions During the Shutdown for Furloughed and Exempted Workers



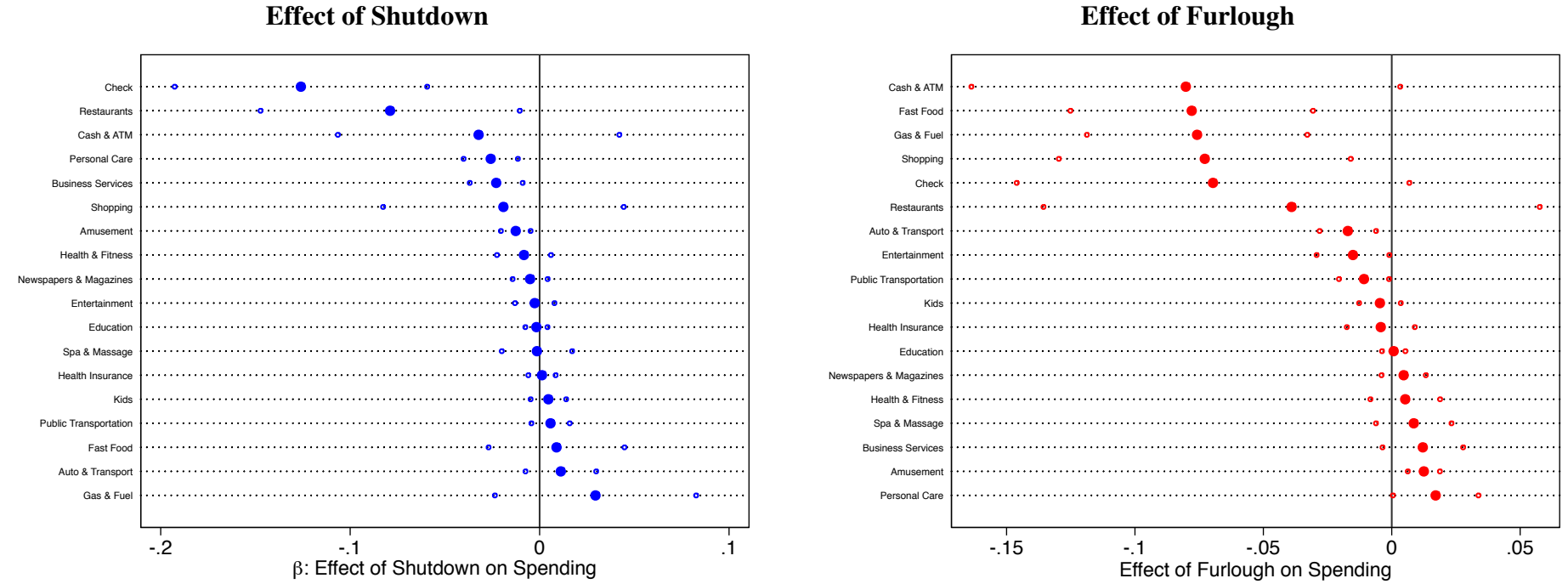

Notes: The dependent variable in each specification is the log total amount spent during the two-week period in October 2013 when the government shutdown took effect. Each gray bar shows the coefficients $\beta_y$ of an indicator of whether or not the government shutdown is in effect, $y_{it} = \alpha_t + \alpha_i + \sum_{j \in S} \beta_j \mathbb{1}[j = t] + \gamma X'_{it} + \epsilon_{it}$, where $i$ denotes an individual and $t$ denotes a week. The first bar denotes the $\beta$ for state government workers and federal workers at agencies unaffected by the shutdown. The second column denotes the $\beta$ for federal workers at agencies that had fewer than 33% of their workers furloughed. The third and fourth bars denote the impact of the shutdown for federal workers at agencies where more of the workers were furloughed, as noted. The red bars show a 95% confidence interval. All specifications include individual, week, and federal government by week fixed effects. Standard errors are clustered at the agency-week level.

Figure 4: Spending Difference by Category




Notes: The dependent variable in each specification is the log total amount spent in a specific category during one week periods during the second six months of 2013. Each category is listed above the panel. The figures plot the coefficients $\beta_y$ of interactions between indicators of whether or not an individual belongs to the treatment group of federal government agencies and time period dummies, $y_{it} = \alpha_t + \alpha_i + \sum_{j=0}^{T} \beta_j \mathbb{1}[j = t] * \mathbb{1}[FedGov]_{it} + \gamma X'_{it} + \epsilon_{it}$. The first three weeks of October are shaded, during which the federal government shutdown occurred. The dashed lines show a 95% confidence interval. Standard errors are clustered at the agency-week level.

Figure 5: Spending Difference by Category - Detailed




Notes: The dependent variable in each specification is the log total amount spent in a specific category during one week periods during the second six months of 2013. The figure on the left plots the coefficients $\beta_1$ of interactions between indicators of whether or not an individual belongs to the treatment group of federal government agencies and time period dummies, while the figure on the right shows the coefficients $\beta_2$ from an additional interaction including the probability of being furloughed. The specification estimated is $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it} + \gamma X'_{it} + \epsilon_{it}$. Here, 'Furloughed' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. The specification includes individual and time-period fixed effects. The category is listed to the left of each coefficient. The solid circles show the relative point estimates labeled above each panel. The hollow circles show a 95% confidence interval. Categories are sorted by magnitudes, with the largest negative effect at the top and the largest positive effect at the bottom. Standard errors are clustered at the agency-week level.

Table 1: Timeline of the 2013 Shutdown

| Date | Federal Government Shutdown Event |
|---|---|
| Sept. 10 | House introduces H.J. Res. 59 which defunds the Patient Protection and Affordable Care Act (ACA.) |
| Sept. 19 | White House issues veto threat for H.J. Res. 59. |
| Sept. 20 | House votes to keep the government open only if funding is halted for the ACA. |
| Sept. 20 | Filibuster delivered on house floor threatening a shutdown. |
| Sept. 27 | The Senate removes the provision defunding the ACA. |
| Sept. 29 | The House passes an amended version of H.J. Res. 59, which delays implementation of the ACA for one year and repeals a tax on medical devices. The House also votes to pay the military in the event of a shutdown. |
| Sept. 30 | The House sends another amended bill that would delay the individual mandate for one year and require members of Congress and staff to end employer health contributions. The Senate rejects the amendments. The Senate passes the bill paying the military in the event of a shutdown. The White House signs the bill into law. |
| Oct. 1 | The shutdown begins with the new fiscal year. Approximately 800,000 workers are furloughed. |
| Oct. 5 | House votes to approve back pay to furloughed workers. |
| Oct. 2-12 | Negotiations between congressional leaders and the White House, no significant progress is made. |
| Oct. 11-17 | Federal government workers miss scheduled pay checks. |
| Oct. 14 | Senate majority and minority leaders announce a bipartisan deal to end the shutdown and raise the debt ceiling. |
| Oct. 16 | Senate and House pass a bill late at night ending the shutdown. |
| Oct. 17 | President signs the bill into law. |
| Oct. 25-28 | First pay days following the end of the shutdown. Federal workers begin to receive back pay. |

Notes: The events described in the table above are compiled from the authors' own tabulations, primarily from media coverage of the shutdown and government documents. The left hand column gives the date in 2013. The right hand column gives a description of an event leading up to or during the October 1-17 government shutdown.

Table 2: Federal Government Agencies During the Shutdown

| Agency | Paid | Pct. Furloughed | Total Employees |
|---|---|---|---|
| NASA | NO | 97 | 18,250 |
| Housing and Urban Development | NO | 96 | 8,709 |
| Department of Education | NO | 94 | 4,225 |
| Environmental Protection Agency | NO | 94 | 16,205 |
| Securities and Exchange Commission | NO | 94 | 4,149 |
| Corp. for National and Community Service | NO | 88.2 | 610 |
| Department of Commerce | NO | 88 | 46,420 |
| Smithsonian Institution | NO | 84 | 3,514 |
| Department of Labor | NO | 82 | 16,304 |
| Department of Treasury | NO | 82 | 110,000 |
| Department of Interior | NO | 81 | 72,562 |
| Congress and Senate | NO | 75 | 11,629 |
| White House | NO | 74 | 11,701 |
| National Institutes of Health | NO | 73 | 18,646 |
| General Services Administration | NO | 65.4 | 11,821 |
| Small Business Administration | NO | 62 | 3,516 |
| Department of Energy | NO | 61 | 13,814 |
| Health and Human Services | NO | 52 | 78,814 |
| Health Resources and Services Administration | NO | 52 | 40,512 |
| Department of Defense | NO | 50 | 800,000 |
| Food and Drug Administration | NO | 45 | 14,800 |
| Federal Aviation Administration | NO | 33.7 | 46,070 |
| Department of Transportation | NO | 33 | 55,468 |
| Social Security Administration | NO | 28.9 | 62,243 |
| Department of Justice | NO | 19 | 114,486 |
| Department of Homeland Security | NO | 13.5 | 321,117 |
| Department of Agriculture | NO | 8.5 | 100,000 |
| Department of Veterans Affairs | NO | 4 | 332,025 |
| Bonneville Power Administration | YES | 0 | 3,000 |
| Department of State | YES | 0 | 48,900 |
| Federal Reserve Board | YES | 0 | 17,965 |
| US Postal Service | YES | 0 | 626,764 |

Notes: Calculations are done by the authors. The main source is the Office of Management and Budget Agency Contingency Plans and the *Washington Post*. Some departments are parts of other agencies. Paid refers to whether or not individuals employed by the department received pay between October 1 and October 25, 2013. Percent furloughed refers to the fraction of workers who were deemed non-essential and kept off the job while the 2013 shutdown was in effect.

Table 3: Summary Statistics

| | **Unaffected Government Worker Households** | | | **Affected Government Worker Households** | | |
|---|---|---|---|---|---|---|
| | Mean | Median | Standard Dev. | Mean | Median | Standard Dev. |
| Income (Weekly) | 1.744.14 | 1,495.36 | 1,239.321 | 2,092.70 | 1,893.56 | 1,307.34 |
| Number of Paychecks (Weekly) | 1.03 | 1.00 | .19 | 1.08 | 1.00 | 0.28 |
| Spending (Weekly) | 1,720.17 | 1,165.42 | 2,258.19 | 2,058.36 | 1,400.71 | 2,315.27 |
| Number of Transactions (Weekly) | 13.95 | 14 | 7.07 | 14.78 | 14 | 7.26 |
| Number of Households | | 91,650 | | | 61,160 | |

Notes: All data comes from a large online personal finance website. Income data is derived from direct deposit transfers into checking accounts. Income includes all take home pay in weekly periods. Transaction spending data is derived from bank, debit, and credit card transactions. Spending does not include durables and ongoing expenditures such as rent and education spending. Total spending includes ongoing expenditures. All dollar values are in 2013 dollars.

Table 4: The Effect of the Shutdown on Income and Spending

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | **Income** | | | | **Spending** | | | |
| Government X Shutdown | -0.234*** | -0.223** | -0.107*** | -0.0706* | -0.107*** | -0.0829*** | -0.0432** | -0.0673*** |
| | (0.0848) | (0.0861) | (0.0357) | (0.0408) | (0.0357) | (0.0104) | (0.0206) | (0.00661) |
| Government X Shutdown X Furlough | | -0.0212 | | -0.0759* | | | -0.103** | |
| | | (0.0526) | | (0.0444) | | | (0.0503) | |
| Government X Post | | 0.353*** | | | 0.113*** | | | 0.117*** |
| | | (0.0639) | | | (0.0329) | | | (0.0172) |
| Unit Fixed Effects | Individual | Individual | Individual | Individual | Individual | Agency | Agency | Agency |
| Time Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 | 3,366,464 | 3,366,464 | 20,721 | 20,721 | 20,721 |

Notes: The dependent variable in each specification is log income or the log total amount spent in weekly periods during 2013. Income includes all take home pay in the weekly periods. Transaction spending data is derived from bank, debit, and credit card transactions. Spending does not include durables and ongoing expenditures such as rent and education spending. Each row shows the coefficients and standard errors $\beta$ of an interaction between an indicator of whether or not an individual belongs to the treatment group of federal government agencies and a dummy for the 2013 federal government shutdown being in effect, $y_{it} = \alpha_t + \alpha_i + \beta \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \gamma X'_{it} + \epsilon_{it}$. Columns (2), (4) and (7) include an interaction $\mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it}$. Here, 'Furlough' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. Columns (2), (5) and (8) include an interaction of federal government workers and the week immediately following the shutdown. The inclusion of agency, individual and time period fixed effects in each specification is denoted below each column. Columns (5)-(8) collapse the data to the agency-week level. All dollar values are in 2013 dollars. Standard errors are clustered at the agency by week level.

Table 5: The Effect of the Shutdown on Spending by Subcategory

| | (1) | (2) | (3) |
|---|---|---|---|
| | **Restaurants** | **Fast Food** | **Groceries** |
| Government X Shutdown | -0.0789** | 0.00893 | 0.0528 |
| | (0.0349) | (0.0183) | (0.0326) |
| Government X Shutdown X Furlough | -0.0390 | -0.0779*** | -0.0612** |
| | (0.0493) | (0.0241) | (0.0273) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Auto Transport** | **Public Transport** | **Gas** |
| Government X Shutdown | 0.0112 | 0.00577 | 0.0295 |
| | (0.00952) | (0.00516) | (0.0271) |
| Government X Shutdown X Furlough | -0.0171*** | -0.0108** | -0.0758*** |
| | (0.00561) | (0.00497) | (0.0219) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Check** | **Shopping** | **Clothing** |
| Government X Shutdown | -0.126*** | -0.0191 | -0.0634** |
| | (0.0340) | (0.0324) | (0.0267) |
| Government X Shutdown X Furlough | -0.0696* | -0.0728** | 0.0258 |
| | (0.0390) | (0.0290) | (0.0312) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Cafes** | **Amusement** | **Home Services** |
| Government X Shutdown | -0.0406*** | -0.0126*** | 0.00877 |
| | (0.0122) | (0.00400) | (0.00895) |
| Government X Shutdown X Furlough | 0.0140 | 0.0125*** | -0.0106* |
| | (0.0117) | (0.00319) | (0.00634) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Kids** | **Health Insurance** | **Medical** |
| Government X Shutdown | 0.00463 | 0.00125 | -0.00169 |
| | (0.00479) | (0.00367) | (0.00299) |
| Government X Shutdown X Furlough | -0.00460 | -0.00427 | 0.000751 |
| | (0.00414) | (0.00675) | (0.00232) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Auto Payment** | **Education** | **Interest Income** |
| Government X Shutdown | 0.0237 | -0.00169 | -0.000597 |
| | (0.0238) | (0.00299) | (0.00206) |
| Government X Shutdown X Furlough | -0.0240* | 0.000751 | 0.00117 |
| | (0.0135) | (0.00232) | (0.00144) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |

Notes: The dependent variable in each specification is the log total amount spent in specific spending categories during one week periods during 2013. Each row shows the coefficients and standard errors $\beta_1$ and $\beta_2$ from the following specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it} + \gamma X'_{it} + \beta_3 \mathbb{1}[t = Shutdown + 1] * \mathbb{1}[FedGov]_{it} + \epsilon_{it}$. 'Furlough' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. Individual and week fixed effects are included. All dollar values are in 2013 dollars. Standard errors are clustered at the agency level by week.

Table 6: The Effect of the Shutdown on Spending by Subcategory Post-Shutdown

| | (1) | (2) | (3) |
|---|---|---|---|
| | **Restaurants** | **Fast Food** | **Groceries** |
| Government X Shutdown | -0.0789** | 0.00893 | 0.0528 |
| | (0.0349) | (0.0183) | (0.0326) |
| Government X Post | 0.0535 | 0.00849 | 0.0799*** |
| | (0.0373) | (0.0285) | (0.0289) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Auto Transport** | **Public Transport** | **Gas** |
| Government X Shutdown | 0.0112 | 0.00577 | 0.0295 |
| | (0.00952) | (0.00516) | (0.0271) |
| Government X Post | 0.00124 | 0.0439*** | -0.0264 |
| | (0.00696) | (0.0109) | (0.0276) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Check** | **Shopping** | **Clothing** |
| Government X Shutdown | -0.126*** | -0.0191 | -0.0634** |
| | (0.0340) | (0.0324) | (0.0267) |
| Government X Post | -0.0139 | 0.124*** | 0.0800** |
| | (0.0283) | (0.0262) | (0.0370) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Cafes** | **Amusement** | **Home Services** |
| Government X Shutdown | -0.0406*** | -0.0126*** | 0.00877 |
| | (0.0122) | (0.00400) | (0.00895) |
| Government X Post | 0.0152 | -0.00574 | 0.0136*** |
| | (0.0182) | (0.00629) | (0.00435) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Kids** | **Health Insurance** | **Medical** |
| Government X Shutdown | 0.00463 | 0.00125 | -0.00825 |
| | (0.00479) | (0.00367) | (0.00727) |
| Government X Post | 0.00477 | 0.00549*** | 0.00323 |
| | (0.00682) | (0.00159) | (0.00395) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |
| | **Auto Payment** | **Education** | **Interest Income** |
| Government X Shutdown | 0.0237 | -0.00169 | -0.000597 |
| | (0.0238) | (0.00299) | (0.00206) |
| Government X Post | 0.0305*** | 0.00926*** | 0.00167 |
| | (0.0108) | (0.00298) | (0.00212) |
| Observations | 3,366,464 | 3,366,464 | 3,366,464 |

Notes: This table mirrors Table 5 but examines the fall in spending during the shutdown as compared to the rebound in spending following the shutdown. The dependent variable in each specification is the log total amount spent in specific spending categories during one week periods during 2013. Transaction spending data is derived from bank, debit, and credit card transactions. Each table shows the coefficients and standard errors $\beta_1$ and $\beta_2$ from the following specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{1}[PostShutdown]_{it} + \gamma X'_{it} + \beta_3 \mathbb{1}[t = Shutdown + 1] * \mathbb{1}[FedGov]_{it} + \epsilon_{it}$. Individual and week fixed effects are included. All dollar values are in 2013 dollars. Standard errors are clustered at the agency level by week.

Table 7: Consumption Behavior Before and After Repayment

| | (1) **l(Spend)** | (2) **l(Spend)** | (3) **Spending** | (4) **Non-Durables** | (5) **Durables** | (6) **Services** | (7) **Dining** | (8) **Mortgage** |
|---|---|---|---|---|---|---|---|---|
| Government X Shutdown | -0.0856*** | -0.0857*** | -19.75*** | -0.0745*** | -0.0633*** | -0.0606*** | -0.0695*** | -0.119*** |
| | (0.00812) | (0.00814) | (4.071) | (0.00859) | (0.0112) | (0.00934) | (0.0105) | (0.0209) |
| Government X Pre-Repayment | | 0.00534 | 4.327 | -0.00209 | 0.00486 | 0.0106 | -0.0457*** | -0.0520** |
| | | (0.00775) | (3.261) | (0.0107) | (0.0177) | (0.00841) | (0.00870) | (0.0249) |
| Government X Post-Repayment | | 0.122*** | 25.22*** | 0.151*** | 0.0672*** | 0.144*** | 0.0248** | 0.181*** |
| | | (0.0143) | (5.580) | (0.0107) | (0.0118) | (0.0207) | (0.00937) | (0.0363) |
| Government X Post-Shutdown | 0.0636*** | | | | | | | |
| | (0.00839) | | | | | | | |
| Observations | 20,721 | 20,721 | 20,721 | 20,721 | 20,721 | 20,721 | 20,721 | 20,721 |
| $R^2$ | 0.845 | 0.845 | 0.670 | 0.791 | 0.729 | 0.842 | 0.741 | 0.825 |
| Day FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Day of Week FE | YES | YES | YES | YES | YES | YES | YES | YES |
| Month FE | YES | YES | YES | YES | YES | YES | YES | YES |

Notes: The dependent variable in each specification is the log total amount spent in specific categories at a daily frequency during the second half of 2013, with the exception of column (3) which shows levels. The categorical restrictions for the dependent variable in each specification are listed in bold above each specification. Each column shows the coefficients and standard errors from variants of the following specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} * \mathbb{1}[PostShutdown]_{it} + \beta_3 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{1}[PreRepayment]_{it} + \gamma X'_{it} + \epsilon_{it}$. The coefficients included are listed in each column. The inclusion of agency, individual and day fixed effects in each specification is denoted below each column. All dollar values are in 2013 dollars. Standard errors are clustered at the agency week level.

Table 8: Credit and Shutdown Spending

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Logs | | Levels | |
| | **Panel A: Savings** | | | |
| Pre-Shutdown | -0.0596 | -0.0595 | -110.5 | -110.3 |
| | (0.0825) | (0.0861) | (193.2) | (201.8) |
| Observations | 249,950 | 249,950 | 249,950 | 249,950 |
| | **Panel B: Spending** | | | |
| Government X Shutdown | -0.0197* | -0.0333*** | -92.05*** | -110.6*** |
| | (0.0100) | (0.0114) | (31.51) | (38.37) |
| Government X Shutdown X Savings | 0.00163*** | 0.000457** | 3.919** | 1.789* |
| | (0.000442) | (0.000181) | (1.796) | (1.032) |
| Savings | -0.00286*** | | -10.59*** | |
| | (0.000377) | | (1.208) | |
| Observations | 449,980 | 449,980 | 449,980 | 449,980 |
| Time Period | FE | FE | FE | FE |
| Fixed Effects | Agency X Week | Individual | Agency X Week | Individual |
| | **Panel C: Accounts** | | | |
| | **Credit Acc.** | **Savings Acc.** | **Investment Acc.** | **Spending** |
| Affected Employee | 0.0207*** | 0.00267 | 0.00418 | |
| | (0.00412) | (0.00404) | (0.00251) | |
| Gov. X Shutdown | | | | -0.0734*** |
| | | | | (0.0054) |
| Opened Credit Acc. | | | | 0.0281*** |
| | | | | (0.00854) |
| Had Credit Acc. | | | | 0.0471** |
| | | | | (0.0219) |
| Time Period | – | – | – | FE |
| Fixed Effects | – | – | – | Individual |
| Observations | 148,833 | 148,833 | 148,833 | 3,366,464 |

Notes: In Panel A, the dependent variable in Panel A is savings, defined as income minus transactions in each monthly period. 'Pre-shutdown' refers to the nine months prior to the shutdown in 2013 interacted with an indicator of an individual working for the federal government. In Panel B, savings are defined as the sum of all income minus transactions in the nine months prior to the shutdown, in thousands of dollars. Savings is measured in thousands of dollars. The dependent variable in each specification in Panel B is the log total amount spent in weekly periods during 2013. A constant is added to renormalize values to be positive. The inclusion of agency, individual and time period fixed effects in each specification is denoted below each column. Panel C has account level data. Columns (1) - (3) are run on a cross-section of households, giving differences in probabilities in having opened various types of accounts (noted above each column) in the two weeks prior to the shutdown. The "opened" and "had credit" account variables in Column (4) denote an interaction between having and opening credit accounts during the shutdown. Column 4 shows a specification analogous to the individual results in table 4. Standard errors are clustered at the agency level.

# A Payroll Matching Strategy

Our strategy for matching individual employees' payroll transactions to particular federal and state agencies proceeded in several steps.

We first assemble a first cut of all transactions from the online personal financial database that were identified by the site's categorization algorithm as payroll transactions. We limit this first cut to transactions that were greater than $100 and less than $50,000 in order to remove likely mis-categorized transactions. This yields approxmiately 350 million individual payroll transactions from January 2012 until December 2014.

Each transaction has two text fields, a detailed long-form description and a generally shorter and more generic description. Each can be from 1 to 244 characters in length. For instance, a transaction may have a detailed description of "CISCO SYSTEMS DES:REG.SALARY ID:CIS-XXXXXXX CO ID:XXX" or "TGT PAY TARGET REG SALARY CHECK DIR DEP" and a shorter description of "CISCO SYSTEMS DES" or "TGT PAY TARGET". Given these descriptions, we attempt to isolate strings that identify particular federal and state agencies and search for the strings in the two text description fields for each transaction.

To do so, we then construct a large set of potential identifiers. That is, the strings the are present in the textual transaction descriptions that indicate that the direct deposit/paycheck is from a particular federal or state employer. Our initial list is drawn from sources such as the Federal Account Symbols and Titles (FAST) book, the Green Book guide to federal ACH payments, and a list of all federal departments and agencies (we limit our search to departments/agencies with more than 100 employees). We supplement this list by manual inspection of the most common paycheck descriptors for each state, based on self-reported locations, as state governments are often one of the largest employers in a state. Finally, we manually inspect the most common identifiers for individuals who self-report being employed by the government to check if particular employing agencies can be identified at either a state or federal level. This set of potential identifiers includes approximately 250 strings.

We search our set of 350 million payroll transactions for each of these 250 strings. With the resultant dataset, we modify our initial set of strings to reduce the number of false positives that we observe. For instance, we drop all transactions that are actually tax refunds or federal

benefits payments but have text that is similar to many federal paychecks. We modify our regular expressions to preclude 'BANK OF AMERICA PAYROLL' from being a trigger for a California employee ('CA PAYROLL'). We also add descriptions that are slightly different from user to user, based on how a bank's system records the transaction (eg. 'DFAS-CLEVELAND' rather than 'DFAS CLEVELAND' or 'DEPARTMENT OF EDUC' rather than 'DEPARTMENT EDUC').

Moreover, at two agencies, the Social Security Administration and the United States Department of Agriculture our payroll matching strategy produced an implausibly high number of individuals. At the Social Security Administration this is likely due to beneficiaries of entitlement programs operated by the agency, which is confirmed by the large number of individuals above the age of 65 in this group. At the United States Department of Agriculture this is potentially due to payroll consolation, which is discussed further in section A.1. Given this we drop the Social Security Administration and the United States Department of Agriculture from the main analysis sample.

Our final list of identifiers includes 125 terms, 75 for federal agencies and 50 for state governments. The full list of identifying strings is the following: 'PAYROLL DEPOSIT HHS', 'NIH TREAS', 'NIH. TREAS', 'DIRECT DEPOSIT NIH', 'TSA2 TREAS', 'COM2 TREAS', 'SBA TREAS', 'HHS COM2', 'DEPOSIT ACH HHS', 'FAA TREA', 'COM TREAS', 'GSA TREAS', 'GSA TREAS', 'DOI1 TREAS', 'DOI TREAS', 'FED SAL DOI', 'DOT4 TREAS', 'DOT TREAS', 'FED SAL DOT', 'ACT3', 'PHS TREAS', 'STA TREAS', 'FED SAL PHS', 'ATTORNEY GENERAL DES', 'USCT TREAS', 'FED SAL USCT', 'TENN VALLEY AUTH', 'SUPREME COURT', 'MPLS USPS', 'FEDERAL RESERVE', 'DOD FED SALARY', 'COAST GUARD', 'USCG', 'US NAVY', 'NAVY FED', 'NAVY ACT', 'NAVY RES', 'IN ARMY', 'ARMY RC', 'ARMY ACT', 'MARINE CORP', 'ARMED FORCE', 'AF PAY', 'DFAS-CLEVELAND', 'DFAS CLEVELAND', 'DFAS-IN', 'DFAS IN', 'HOUSE OF R', 'U HOUSE R', 'US SENATE', 'HOMELAND SEC', 'DOJ TREAS', 'DEPT JUS', 'DEPT OF JUS', 'DEIRECT DEPOSIT DOJ', 'DOL TREAS', 'WHITE HOUSE DES', 'EPA TREAS', 'FOOD DRUG', 'NASA FCU', 'SEC TREAS', 'EPA TREAS', 'DIRECT DEPOSIT EPA ', 'NPS TREAS', 'CBP TREAS', 'DIRECT DEPOSIT CBP', 'DEPOSIT HRSA', 'VA TREAS', 'DEPARTMENT OF ED', 'DEPARTMENT ED', 'FED SAL BPA', 'DEPOSIT BPA TREAS', 'FED SAL COM', 'FED SAL', 'FED TREAS', 'ACH DEPOSITSOM PAYROLL', 'TEXAS COMPTROLLR', 'DEPOSIT PA TREASURY', 'SOM PAYROLL', 'DISTRICT COLU DIR', 'DISTRICT OF COLU DIR', 'PA TREASURY DEPT', 'KY PERSONNEL PAYROLL', 'ST IA PAYROLL', 'ST OF IA', 'STATE OHIO', 'STATE NC', 'NJ STATE', 'STATE ALASKA', 'STATE N J', 'COLORADO STATE', 'AR STATE', 'STATE

CONN', 'MA STATE', 'STATE NE', 'STATE NV', 'STATE ARIZONA', 'STATE INDIANA', 'STATE UTAH', 'STATE MINNESOPAYROLL', 'STATE MISSOUR', 'STATE TENNESSDIR', 'STATE TENNESS', 'STATE NEW MEX', 'STATE ALABAMA', 'STATE HAWAIIDIRECT', 'STATE MONTANA', 'STATE DELAWAR', 'STATE WYOMING', 'STATE KANSAS', 'STATE OF OHIO', 'STATE OF VERMONT', 'STATE OF RI', 'STATE OF KANSAS', 'STATE OF MI', 'WASTATETREASURER', 'STATE VERMONT', 'ST OF CA', 'NEW YORK STATE', 'STATE MD', 'PAYROLL DEPOSIT CANADA', 'PAYROLL DEPOSITCANADA', 'STATE FLORIDA', 'STATE MINNESO', 'STATE ILL'. Note that several agencies such as the Federal Reserve and the military were unaffected by the shutdown, and hence dropped from the final sample.

Using this final set of terms, we exclude individual users for several reasons. First, if a paycheck is too frequent or too widely varying in size within user, we assume the match is erroneous or the user has a non-standard position and pay-cycle. For instance, if a user is receiving 10 transactions per month from a given source or if the amount routinely more than doubles in size. We also exclude users if their transaction dates differ significantly from those on the federal payroll calendars for each agency (eg. paid on the 1st and 15th of the month except for holidays or weekends). For our sample of users, we only keep those who can be matched to a particular state or agency for at least 12 months during 2012 and 2013 and are active during our key period of July 2013 to January 2014 (3 months prior to and following the shutdown).

Our final treated sample of users contains 61,160 federal government workers in 38 different agencies and departments. Our control sample includes 91,650 state government employees across 36 states. The federal workers in our sample represent roughly 5 percent of the federal workforce. The online platform had approximately 5 million active users in 2014, and the US labor force has 156 million individuals corresponding to 4 percent of all workers using this platform. Thus the percentage of federal workers in our sample constructed using our payroll matching strategy corresponds roughly to the fraction of users of the online platform as a portion of all federal workers.

## A.1 Payroll Processing Agencies

This section discusses the potential for misclassification of federal government employees due to federal payroll consolidation, which could potentially bias estimates of the effect. of furloughs on consumption A potential concern is misclassification of federal workers due to payroll consolida-

tion. Following a 2001 initiative, the federal government undertook to consolidate payroll via four primary agencies, the Department of Defense, the Department of the Interior, the United States Department of Agriculture and the General Services Administration. While this would not affect the estimates of the total effect of the shutdown, this could potentially attenuate the estimates of the furlough effect if individuals were assigned to the Department of Defense, the Department of the Interior, the United States Department of Agriculture and the General Services Administration rather than the agency for which they actually work.

We examine the potential for this to affect out estimates in two ways. First, we compare the frequency of the payroll consolidation agencies in our sample the actual frequency of federal workers in each agency. We find that the fraction of included workers in our sample is quite close to the fraction of workers who actually work in each agency.[17] Second, we deal with this concern directly and as a robustness check drop the affected agencies from our analysis. We find that the estimates are statistically indistinguishable from the main estimates. We conclude that if there is any bias due to agency misclassification, that it is quantitatively quite small.

Table tab:agencies shows the fraction of percentage of federal government workers in each agency where payroll processing was consolidating. The first column shows the name of each agency. second column shows the percent of federal government workers in each agency as a fraction of all federal government workers calculated from table 2. The third column shows the percentage of federal workers in the main analysis sample classified as working for each agency. Table tab:agencies indicates that workers from the Department of Defense are slightly overrepresented– 30.93 percent of our sample works for the Department of Defense, while 26.37 percent of all federal workers. However, the difference is not large. At the Department of Interior the fraction of workers matched in our sample, 1.95 percent, is quite close to the actual fraction of federal workers employed by the Department of Interior, 1.95, and in fact flightily lower. The fraction of workers matched at the General Service Administration in our sample is 1.41 percent, which is double the actual percent of federal workers employed by the General Services Administration, .61 percent.

To test whether agency misclassification is biasing our results, we drop the affected agencies from our sample. If measurement error from agency misclassification of federal workers was substantially biasing our results in the main sample, dropping the agencies affected by misclas-

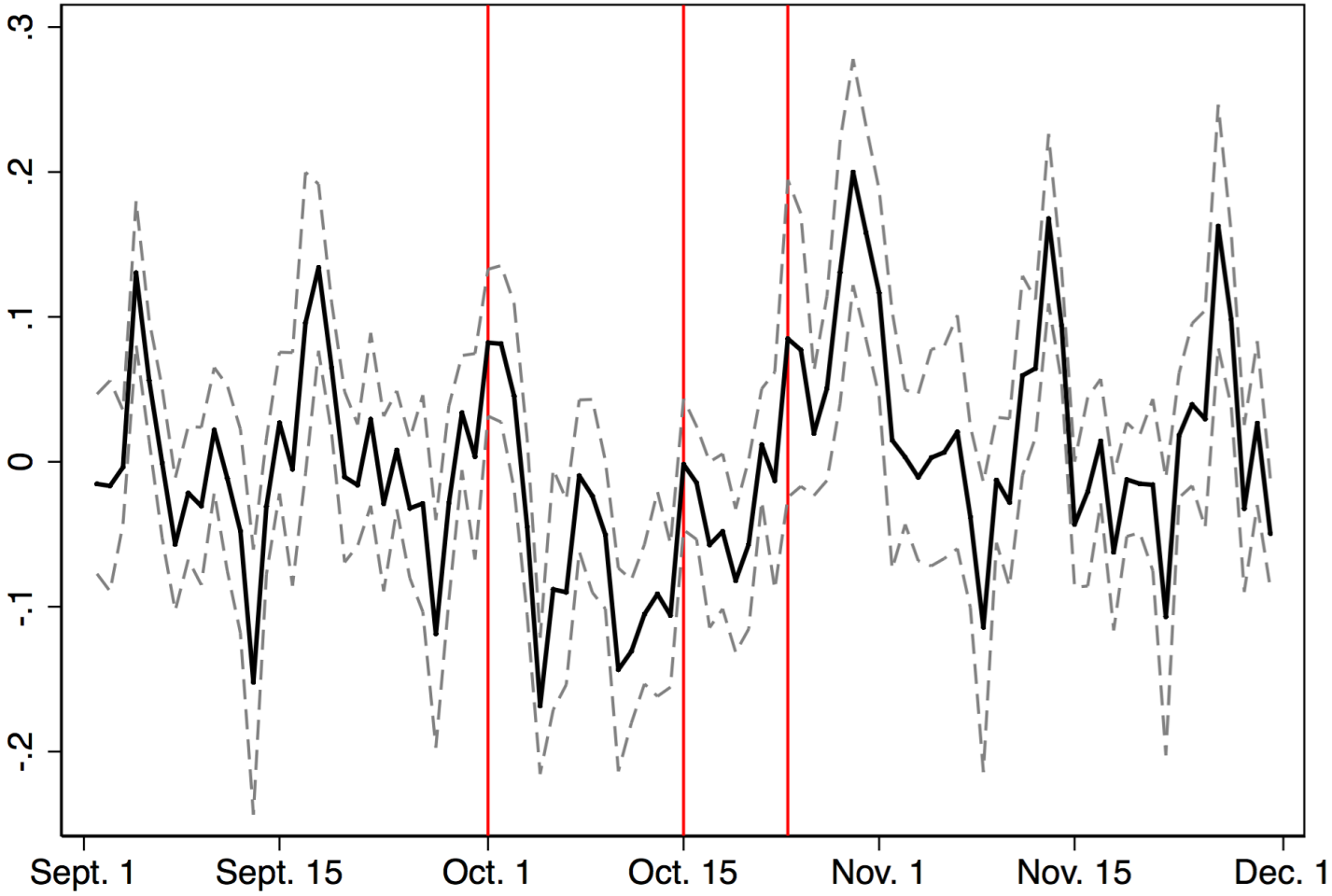
[17]This excludes the Social Security Administration and the United States Department of Agriculture, where we found a disproportionately higher number of workers. See section A.

sification would attenuate the coefficient on the Government X Shutdown X Furlough indicator. We would thus expect the coefficient on Government X Shutdown X Furlough to decrease (and increase in absolute value) when the misclassified agencies are dropped.

Table A3 repeats the main analysis in table 4 dropping agencies where the consolidation took place. Columns (1) through (4) show results analogous to table 4 at the agency level. Column (1) presents the main specification from table 4. Column (2) presents the same specification, dropping the General Service Administration employees. The coefficients on both the Government X Shutdown and Government X Shutdown X Furlough indicator are extremely close in columns (1) and (2). The fourth row shows the results from an F-test of the null that the coefficient on Government X Shutdown X Furlough is equal to the value in column (1). We fail to reject the null, with a p-value of 0.9355.

Columns (3) and (4) also additionally drop the Department of Interior workers as well as the Department of Interior and the Department of Defense workers respectively. The results are extremely similar to those in columns (1) and (2), and again the F-tests fail to reject the null that the coefficients are identical to the values in column (1). THe coefficients drop slightly, which is consistent with measurement error inducted by agency misclassification. However, the coefficients are very close to those in the main sample which suggests that quantitatively any bias is extremely small. Columns (5) and (6) repeat the analysis at the individual level, and the results are very similar to those at the aggregated level. The results in table A3 lead us to conclude that any biases resulting in misclassification are small and statistically and economically insignificant.

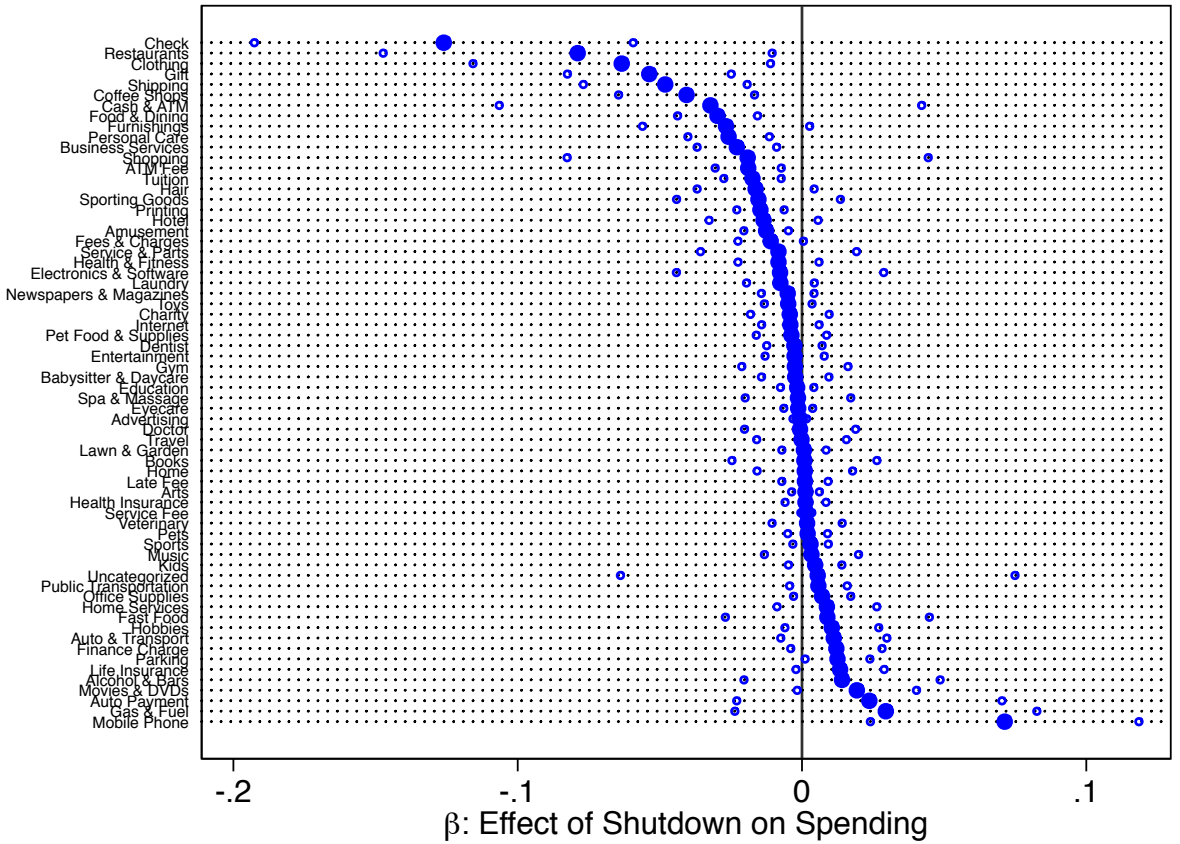
Figure A1: Daily Spending for Federal Government Workers




Notes: This figure depicts the trend of average daily spending for federal government workers from September 1, 2013 to December 1, 2013. The solid black line shows the coefficient for a dummy for each time period in a regression where the dependent variable is logged total household spending. The dashed lighter lines show a 95% confidence interval. The first solid red vertical line shows October 1, when the federal government shutdown began. The second solid red vertical line shows October 15, when the federal government shutdown officially ended. The third solid vertical red line shows October 23, after the first post-shutdown paychecks began to arrive. Daily spending in the above figure is not adjusted for seasonality or day of the week. Standard errors are clustered at the agency level.

Figure A2: Spending Differences by Additional Categories

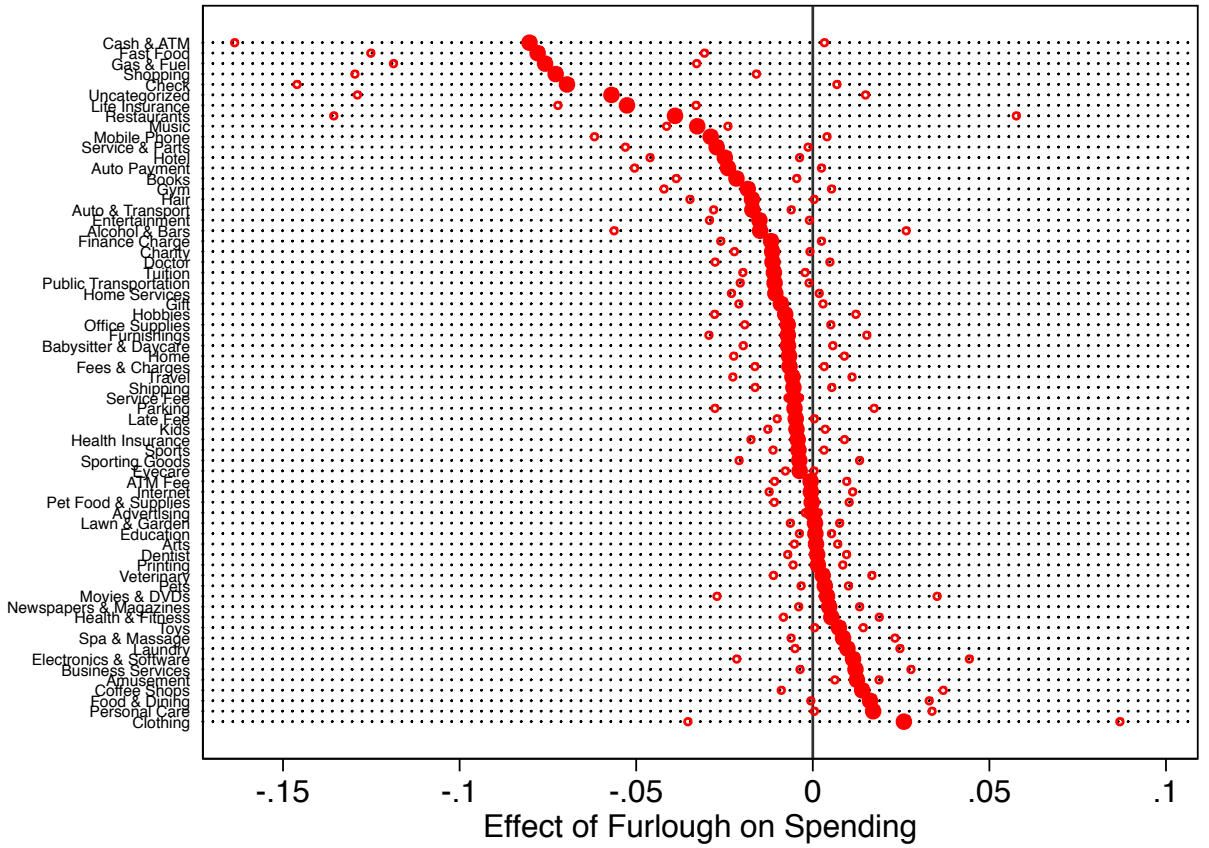
**Effect for Shutdown Period**




Notes: The figure on the left plots the coefficients $\beta_1$ of interactions between indicators of whether or not an individual belongs to the treatment group of federal government agencies and weekly time dummies from the specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it} + \gamma X'_{it} + \epsilon_{it}$. Here, 'Furlough' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. The specification includes individual and week fixed effects. The dependent variable in each specification is the log total amount spent in a specific category during one week periods during the second six months of 2013. The category is listed to the left of each coefficient. The solid circles show the relative point estimates labeled above each panel. The hollow circles show a 95% confidence interval. Categories are sorted by magnitude, with the largest negative effect at the top and the largest positive effect at the bottom. Standard errors are clustered at the agency level.

Figure A3: Spending Differences by Additional Categories

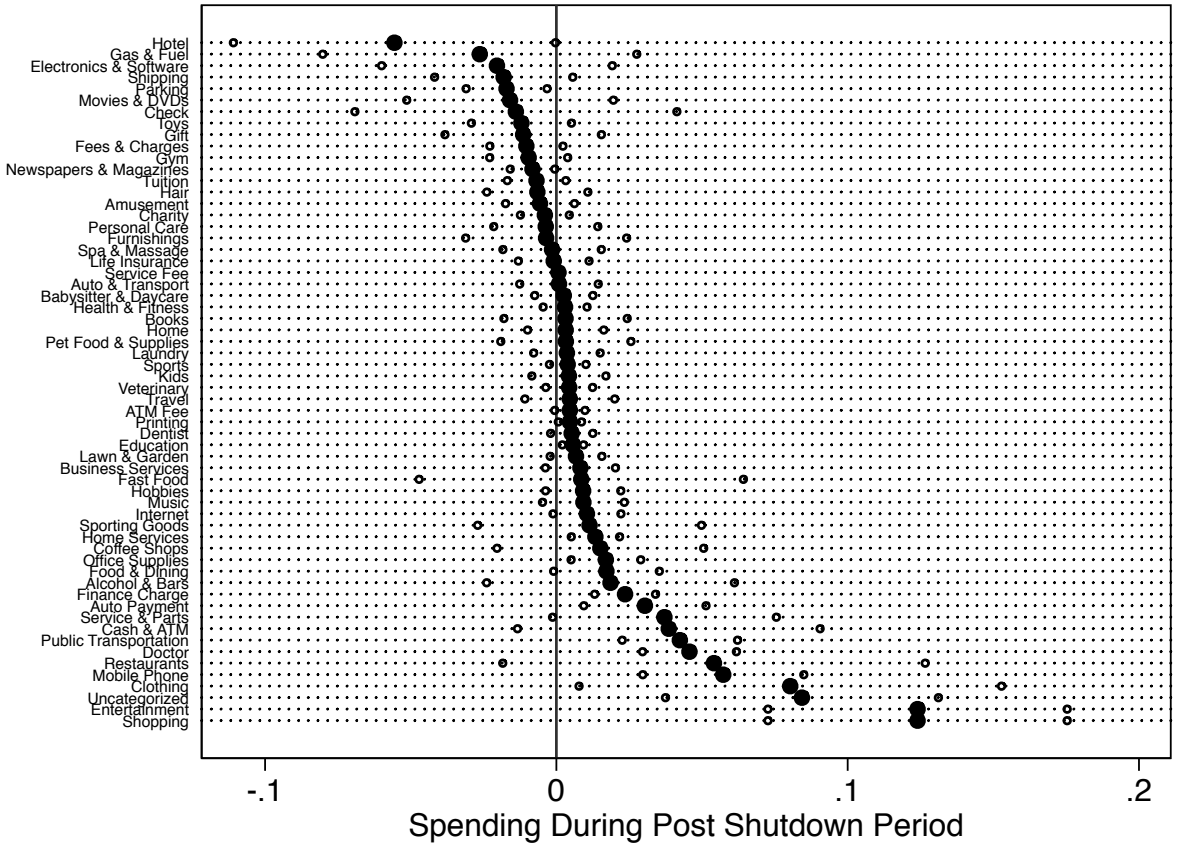
**Effect for Furloughed Workers**




Notes: The figure on the left plots the coefficients $\beta_2$ of interactions between indicators of whether or not an individual belongs to the treatment group of federal government agencies and weekly dummies, while the figure on the left shows the probability of being furloughed from the specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it} + \gamma X'_{it} + \epsilon_{it}$. Here, 'Furlough' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. The specification includes individual and week fixed effects. The dependent variable in each specification is the log total amount spent in a specific category during one week periods during the second six months of 2013. The category is listed to the left of each coefficient. The solid circles show the relative point estimates labeled above each panel. The hollow circles show a 95% confidence interval. Categories are sorted by magnitude, with the largest negative effect at the top and the largest positive effect at the bottom. Standard errors are clustered at the agency level.

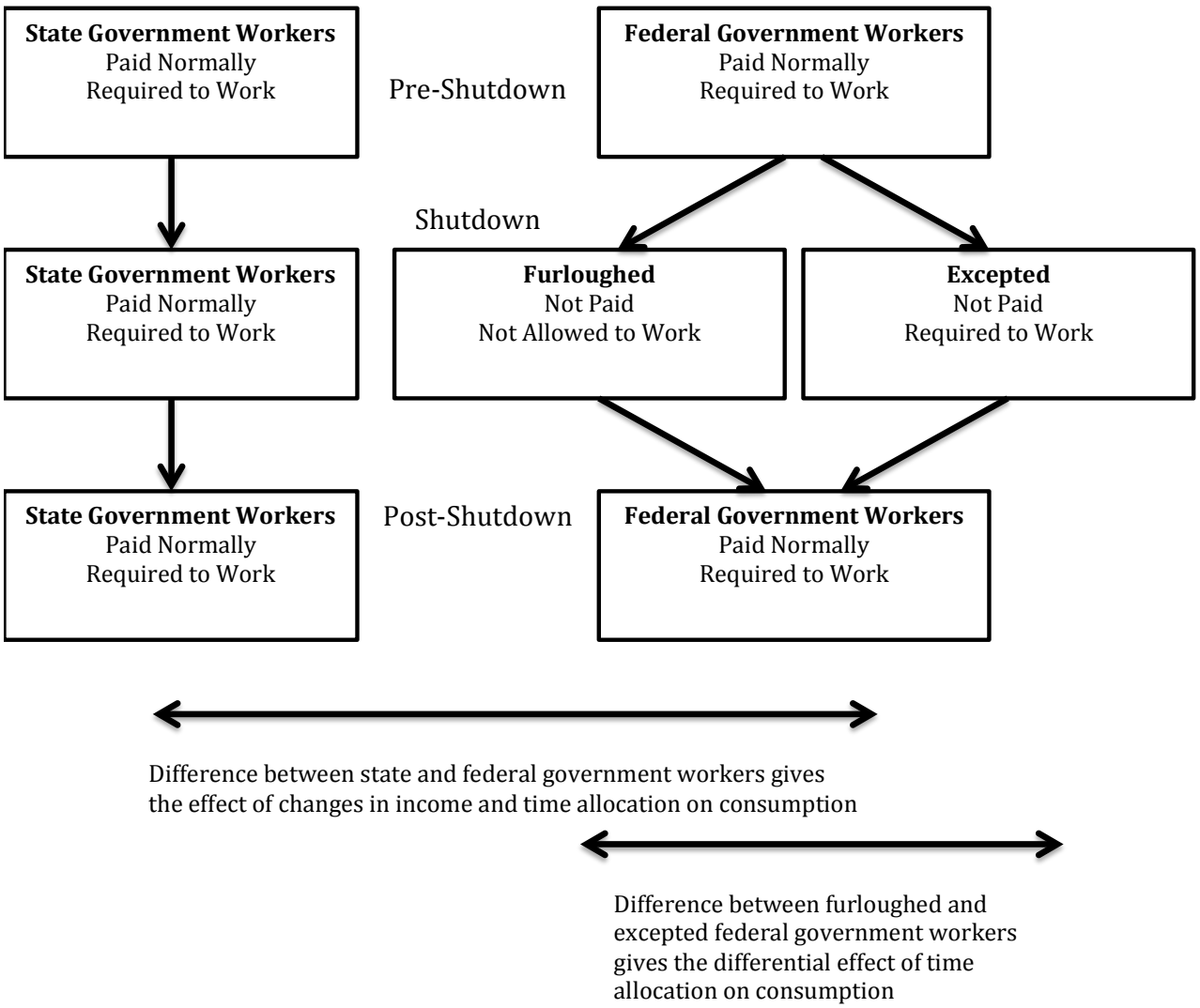
Figure A4: Spending Differences by Additional Categories

**Effect for Post-Shutdown Period**




Notes: The figure on the left plots the coefficients $\beta_1$ of interactions between indicators of whether or not an individual belongs to the treatment group of federal government agencies and weekly dummies from the specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} * \mathbb{1}[Post]_{it} + \gamma X'_{it} + \epsilon_{it}$. The specification includes individual and week fixed effects. The dependent variable in each specification is the log total amount spent in a specific category during one week periods during the second six months of 2013. The category is listed to the left of each coefficient. The solid circles show the relative point estimates labeled above each panel. The hollow circles show a 95% confidence interval. Categories are sorted by magnitude, with the largest negative effect at the top and the largest positive effect at the bottom. Standard errors are clustered at the agency level.

Figure A5: State and Federal Government Workers During the Shutdown




Notes: This chart shows income and time allocation effects for state and federal government workers before, during and after the shutdown. The category of worker, state or federal, and exempted or furloughed, is listed in bold at the top of each box. Whether or not they are being paid during the time period is listed first in plain text, and then whether or not they were required to work follows. The time period, pre-shutdown, during the shutdown, or post-shutdown is listed in the center of the diagram.

Table A1: Placebo Tests on Demographics

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | | | **Female** | |
| Government X Shutdown | 0.00114 | 0.00319 | 0.00177 | 0.00249 |
| | (0.00543) | (0.00281) | (0.00331) | (0.00292) |
| | | | **College** | |
| Government X Shutdown | -0.00348 | 0.00480 | 0.00474 | 0.00548* |
| | (0.0123) | (0.00321) | (0.00318) | (0.00272) |
| | | | **Graduate Degree** | |
| Government X Shutdown | -0.00175 | -0.00192 | -0.00202 | -0.00202 |
| | (0.00302) | (0.00137) | (0.00214) | (0.00217) |
| | | | **PhD** | |
| Government X Shutdown | 0.000210 | 0.000690* | -0.000315 | -0.000298 |
| | (0.000934) | (0.000376) | (0.000813) | (0.000817) |
| | | | **Owns Home** | |
| Government X Shutdown | 0.00703* | 0.00416 | 0.00389 | 0.00390 |
| | (0.00363) | (0.00390) | (0.00413) | (0.00414) |
| | | | **Married** | |
| Government X Shutdown | -0.000785 | -0.00490 | -0.00423 | -0.00437 |
| | (0.00403) | (0.00307) | (0.00364) | (0.00356) |
| | | | **Individuals in Household** | |
| Government X Shutdown | -0.00517 | 0.0119 | 0.0109 | 0.0115 |
| | (0.0317) | (0.0118) | (0.0131) | (0.0132) |
| | | | **Children** | |
| Government X Shutdown | -0.00200 | -0.00915 | -0.0237 | -0.0246 |
| | (0.0185) | (0.0181) | (0.0209) | (0.0207) |
| Observations | 136,505 | 136,505 | 136,505 | 136,505 |
| Time Period | FE | FE | FE | FE |
| Fixed Effects | Government | Agency | Agency | Agency X Week |

Notes: The dependent variable in each specification is listed above the specification in bold. Demographics are self-reported by individuals. Each table shows the coefficients and ($\beta_1$) standard errors from the following specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \gamma X'_{it} + \epsilon_{it}$. The inclusion of agency, individual and time period fixed effects in each specification is denoted below each column. Standard errors are clustered at the agency level.

Table A2: Payroll Processing Agencies in Sample

| **Federal Agency** | % Federal Workers | % Sample |
|---|---|---|
| Department of Defense | 26.37% | 30.93% |
| Department of Interior | 2.39% | 1.95% |
| General Services Administration | 0.61% | 1.41% |

Notes: This table shows the percentage of federal workers in agencies that administer federal payroll. Federal payroll processing was consolidated at the Department of Defense, Department of the Interior, the General Services Administration and the United States Department of Agriculture. The USDA was dropped from the sample, and this table shows the remaining agencies and fraction of workers at each agency. The first column shows the agency. The second column shows the percentage of the federal workforce calculated from table 2. The third column shows the percentage of federal workers in the sample classified as working for each agency.

Table A3: The Effect of the Shutdown Dropping Selected Agencies

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | | | **Spending** | | |
| Government X Shutdown | -0.0432** | -0.0442** | -0.0430* | -0.0438* | -.0706* | -0.0918*** |
| | (0.0206) | (0.0216) | (0.0219) | (0.0223) | (0.0408) | (0.0323) |
| Government X Shutdown X Furlough | -0.103** | -0.107** | -0.112** | -0.116** | -.0759* | -0.117*** |
| | (0.0503) | (0.0507) | (0.0488) | (0.0514) | (0.0444) | (0.0343) |
| Dropped Agencies | – | GSA | GSA | GSA | – | GSA |
| | – | – | DOI | DOI | – | DOI |
| | – | – | – | DOD | – | DOD |
| F-Test P-Value | – | 0.9355 | 0.8578 | 0.7927 | – | 0.2296 |
| Unit Fixed Effects | Agency | Agency | Agency | Agency | Individual | Individual |
| Time Fixed Effects | YES | YES | YES | YES | YES | YES |
| Observations | 20,721 | 20,356 | 19,991 | 19,626 | 3,366,464 | 2,573,084 |

Notes: The dependent variable in each specification is the log total amount spent in one week periods during 2013. Transaction spending data is derived from bank, debit, and credit card transactions. Spending does not include durables and ongoing expenditures such as rent and education spending. Selected government agencies are dropped from the sample, and listed below each specification. Federal payroll processing was consolidated at the Department of Defense, Department of the Interior, the General Services Administration and the United States Department of Agriculture. The USDA was dropped from the sample, and this table shows the remaining agencies and fraction of workers at each agency. Each table shows the coefficients and standard errors $\beta_1$ and $\beta_2$ from the following specification $y_{it} = \alpha_t + \alpha_i + \beta_1 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov]_{it} + \beta_2 \mathbb{1}[t = Shutdown] * \mathbb{1}[FedGov] * \mathbb{P}[Furlough]_{it} + \gamma X'_{it} + \epsilon_{it}$. Here, 'Furlough' is a probabilistic running variable which denotes the fraction of employees at an individual's agency who were furloughed. Individual or agency and week fixed effects are included. Columns (1)-(4) aggregate the data at the agency level, while columns (5)-(6) aggregate the data at the individual level. Columns (1) and (5) correspond to columns (4) and (7) respectively of table 4. The fourth row shows the p-value from an F-test against the null that the coefficient is identical to the full sample. Standard errors are clustered at the agency level.