Fiscal Spending News, the Cost of Capital, and Corporate Investment*

Matthew Carl†
Dimensional Fund Advisors

Philip Coyle‡
Study Center Gerzensee

Julio Mereb§
São Paulo School of Economics–FGV

February 2026

Abstract

We revisit the effect of government spending on corporate investment. Employing a narrative approach to identify exogenous variation in government expenditures (Ramey, 2011b; Ramey and Zubairy, 2018), we find that a one-percentage-point increase in military spending news, as a share of GDP, raises capital expenditures of publicly listed US firms by more than one percent over five years. The investment response is not driven by contractors with the Department of Defense, financial constraints, unconventional monetary policy, or geopolitical and economic uncertainty. Instead, we show that news about military spending lowers long-term nominal and ex-ante real interest rates on impact, with effects persisting for up to five years after the shock. Lower interest rates critically translate into a decline in the firm-level cost of capital, particularly the cost of debt. Consistent with the decline in the cost of capital, firms expand debt holdings and investment.

JEL: E22, E43, E62, G31, H32, H56, H57

Keywords: Fiscal spending shocks; military spending news; corporate investment; cost of capital; term structure of interest rates; crowding-in

---

*We thank Kenneth West, Lydia Cox, Charles Engel, Louphou Coulibaly, and participants at the University of Wisconsin-Madison Macro Brownbag and the University of Wisconsin-University of Minnesota workshop for helpful feedback. We gratefully acknowledge financial support from the JPGI Summer Research Fellowship from the Department of Economics at the University of Wisconsin-Madison. The views expressed here are those of the authors and not necessarily those of Dimensional Fund Advisors, their employees, or directors.

†Email: camatthew11@gmail.com

‡Email: philip.coyle@szgerzensee.ch

§Email: julio.mereb@fgv.br

1 Introduction

A longstanding question in macroeconomics is how government spending influences private investment. The prevailing view, grounded in a vast theoretical and empirical macroeconomics literature, holds that government spending crowds out private investment over the business cycle, unless the economy experiences severe slack accompanied by ample monetary accommodation. In canonical neoclassical and New Keynesian frameworks, a rise in government consumption, whether financed through deficits or higher taxation, extracts resources from the private sector and raises the price of current output relative to the price of future output. The resulting increase in the real interest rate makes it more costly for the private sector to expand the capital stock, thereby inducing a crowding-out of investment. While the existing evidence at the aggregate level supports this prediction, micro-level evidence on the causal impact of government spending on corporate investment, and especially the cost of capital, remains limited.

We revisit this question by providing novel firm-level evidence. Using the narrative military spending news shocks constructed by Ramey (2011b) and updated by Ramey and Zubairy (2018), we find that a one-percentage-point increase in unanticipated military spending, as a share of GDP, raises corporate investment by more than one percent over five years. Our empirical setting exploits a post-Great Moderation sample of large, publicly listed non-financial firms at a quarterly frequency, from 1983 to 2019. We estimate the empirical responses of corporate investment within a local projections framework, controlling for firms' cross-sectional heterogeneity and key determinants of investment, as identified in the corporate finance literature.

In our empirical setting, we exploit the news shocks to military spending as an exogenous source of variation in government expenditures to identify the corresponding corporate investment response. Military procurement, combined with narrative methods, has become one of the leading approaches in the fiscal shocks literature for isolating exogenous variation in government spending. It therefore offers a convenient benchmark for understanding how government outlays affect corporate investment. This type of identification strategy has also gained renewed importance in light of the resurgence of US involvement in wars and regime-change operations abroad.

We find that the rise in corporate investment is preceded by a decline in long-term Treasury yields. Specifically, we find that nominal and ex-ante real yields fall on impact in response to news shock to military spending, with effects persisting for up to five years. The decline in nominal and real yields eventually translates into lower borrowing costs for firms. Specifically, the cost of capital—measured as an average of the cost of equity and the cost of debt, weighted by the firm's capital structure—declines around two years after the news shock, with a pronounced decline in the cost of debt. Consistent with the easing in borrowing costs, firms increase debt holdings in response to the military spending news shock.

Our evidence on real interest rate dynamics is not at odds with the prior literature. Other studies have found that increases in government spending have weak or even negative effects on real interest rates and inflation (Mountford and Uhlig, 2009; Corsetti, Meier, and Müller, 2012). Our findings extend this evidence by showing how the decline in nominal interest rates propagates to firm-level borrowing costs, thereby linking fiscal expenditure shocks to corporate investment through the cost-of-capital channel.

To assess whether a particular subset of firms drives our findings, we first exploit heterogeneity in firms' financial constraints. For instance, Hebous and Zimmermann (2021) document that financially constrained firms increase investment after winning a government contract, as such assets enhance the collateral that can be pledged to lenders, thereby relaxing borrowing constraints. While financially-constrained firms indeed display larger investment responses to the news shocks in our sample, we also find that the crowding-in effect is not confined to them and operates broadly across the cross-section of firms.

Next, we examine whether firms directly impacted by military spending drive the increase in corporate investment. Given that federal procurement is concentrated in a few large firms (Cox, Müller, Pasten, Schoenle, and Weber, 2020), we exploit variation in federal procurement contracts awarded by the Department of Defense (DOD). By merging our panel of firms with contract-level data from the DOD, we distinguish between firms that have never received a DOD contract and those that have received at least one contract over the sample period. If our observed crowding-in effect is mainly driven by firms benefiting from cash injections from new contracts with the DOD, we expect firms without prior contracts to display muted or even negative investment responses following the shock. Instead, we find that both groups increase investment by a similar extent, and we do not reject that their responses are statistically equivalent.

We conduct several sensitivity checks to assess the robustness of our results to alternative samples and specifications. First, we examine whether the effect of news shocks on corporate investment is state-dependent. Various studies have found that government spending exerts a stronger impact on output during recessions (for example, Auerbach and Gorodnichenko, 2013; M., James, and Irina, 2015; Caggiano, Castelnuovo, Colombo, and Nodari, 2015). Consistent with prior evidence, we find that the estimated increase in investment is more than twice as large during recessions as in the full sample. Second, our results are robust to excluding observations following the 2008 Great Financial Crisis, when unconventional monetary policy and the zero lower bound on interest rates significantly affected economic conditions. Finally, our results are robust to controlling for economic policy uncertainty and geopolitical risk, which may correlate with military spending and corporate investment.

Employing a standard affine term-structure model drawn from the financial economics literature, we find that a decline in longer-term yields precedes the crowding-in effect of military spending. Combined with muted responses of inflation expectations, this decline implies a reduction in ex-ante real interest rates. Running time-series local projections, we estimate the dynamic responses of the nominal and ex-ante real interest rates to the news shocks. We find that nominal and expected real yields on the three-month T-Bill and the 10-year T-Note fall by 5 to 10 basis points on impact, even after controlling for information embedded in the yield curve.

The news shocks also generate an asymmetric long-run adjustment across maturities, thereby flattening the yield curve by about 25 basis points between four and five years after the shock. Specifically, the 10-year Treasury yield remains depressed for up to five years following the shock. In contrast, the three-month real T-Bill yield eventually rises by up to 20 basis points four years after the shock, consistent with a tightening in the policy rate.

Finally, we examine the extent to which the decline in Treasury yields translates into a lower cost of capital for firms. Since corporate investment increases following an exogenous rise in future military spending, we explore whether the news shock actually reduces firms' real borrowing costs by lowering their cost of capital. Following Frank and Shen (2016), we construct firm-level measures of the weighted-average cost of capital (WACC) by combining the cost of equity and the cost of debt.

Projecting the firm-level WACC measures onto the military spending news shock while controlling for our set of firm-level and aggregate variables, we find that firms' cost of capital declines in the first two years after the shock. The cost of debt, in particular, declines by about 0.6 percentage points over the same period. Also, consistent with the corporate investment and cost of capital dynamics, the Tobin's Q exhibits a hump-shaped response, peaking at about one percent between the first three to four years after the news shock.

If firms' borrowing costs decline, an implication of this channel is that firms issue more debt following the shock. Consistent with the lower cost of debt, we find that firms increase their debt holdings by about two percentage points over five years. Additionally, consistent with a more pronounced decline in interest rates at longer maturities, firms' long-term debt increases fivefold relative to short-term debt.

Taken together, we regard our findings as consistent with a conventional Keynesian transmission mechanism—whether of the Old or New strand—in which fluctuations in aggregate demand and nominal variables carry real effects (Ball, Mankiw, and Romer, 1988; Tobin, 1993; Greenwald and Stiglitz, 1993). In our setting, news about higher future military spending raises effective demand for firms' output and reduces borrowing costs, to the extent that the news shocks lower long-term Treasury yields, thereby affecting the firm's cost of capital. The anticipated increase in future government spending, reinforced by the decline in the cost of capital, stimulates corporate investment.

Related literature. This paper contributes to three strands of literature. The first concerns the macroeconomic effects of fiscal spending shocks. Over the past two decades, a vast empirical and theoretical literature emerged examining the identification of fiscal shocks and the causal effects of government spending on macroeconomic outcomes.[1] Findings across studies often differ, reflecting differences in empirical settings, the type of spending considered, the state of the economy, and how the policy was financed (Ramey, 2019).

Three identification strategies have become especially influential in the empirical macroeconomics literature. The first leverages on military buildups as an instrument to government spending (Hall, 1980, 1986; Barro, 1981), the second employs narrative techniques based on US involvement in wars (Ramey and Shapiro, 1998; Ramey, 2011b), and the third exploits decision and implementation lags in fiscal policy within a structural vector autoregression (SVAR) framework (Blanchard and Perotti, 2002). Subsequent studies have analyzed fiscal spending within war periods (Ramey and Zubairy, 2018), when interest rates are near the zero lower bound (Miyamoto, Nguyen, and Sergeyev, 2018), or have incorporated expectations of future government expenditures (Auerbach and Gorodnichenko, 2012; Ben Zeev and Pappa, 2017; Barnichon, Debortoli, and Matthes, 2021).

We tie our paper to this broad literature by employing the government spending shocks constructed by Ramey and Zubairy (2018) within a sample of publicly traded firms from Compustat. We view our findings as a natural benchmark for comparison across studies, since military procurement, in combination with narrative methods, has become one of the leading approaches for identifying fiscal spending shocks in this literature. Our contribution is to connect aggregate government spending shocks to firm-level investment decisions. In doing so, our paper bridges the empirical macroeconomics and corporate finance literatures.

Second, our paper extends the findings on the effects of fiscal expenditure shocks on interest rates. Using aggregate macroeconomic data, Mountford and Uhlig (2009) and Corsetti,

[1] Although not the focus of this paper, an extensive literature has examined the effects of fiscal policy within both the representative-agent (Woodford, 2011; Werning, 2011; Sims and Wolff, 2018; Bilbiie, Monacelli, and Perotti, 2019; Bouakez, Guillard, and Roulleau-Pasdeloup, 2020; Woodford and Xie, 2022; Bianchi-Vimercati, Eichenbaum, and Guerreiro, 2024) and heterogeneous-agent (Oh and Reis, 2012; Bilbiie, Monacelli, and Perotti, 2013; Giambattista and Pennings, 2017; Kocherlakota, 2022; Auclert, Rognlie, and Straub, 2023; Bayer, Born, Luetticke, and Müller, 2023; Broer, Krusell, and Öberg, 2023; Angeletos, Lian, and Wolf, 2024; Bartal and Becard, 2024; Ferriere and Navarro, 2024; Wolf, 2025) frameworks.

Meier, and Müller (2012) document that deficit-financed increases in fiscal spending are associated with declines in real interest rates. Ramey (2016) reports similar evidence. More recently, Jørgensen and Ravn (2022) find that prices exhibit flat or even negative responses to positive government spending shocks.

While our results corroborate these studies, we extend these findings along three dimensions. First, building on the financial economics literature, we document that even *nominal* interest rates decline following news about military spending, especially at longer maturities. Second, the decline in long-term interest rates, nominal or real, eventually flattens the yield curve. Adding to prior evidence, our results are consistent with muted responses of inflation expectations across horizons. Cox, Müller, Pasten, Schoenle, and Weber (2020) corroborates these findings by showing that government spending is concentrated among sectors with relatively stickier prices. Finally, we crucially link our estimated interest-rate dynamics to firm-level borrowing costs. To our knowledge, our paper is the first to study how government spending propagates to the firm-level cost of capital.

Third, we contribute to the literature that leverages disaggregated or micro-level data to study the effects of fiscal shocks on macroeconomic outcomes. While most studies exploit variation across subnational units (Feyrer and Sacerdote, 2011; Chodorow-Reich, Feiveson, Liscow, and Woolston, 2012; Conley and Dupor, 2013; Acconcia, Corsetti, and Simonelli, 2014; Dupor and Mehkari, 2016; Dupor and McCrory, 2018; Auerbach, Gorodnichenko, McCrory, and Murphy, 2022), others rely on firm-level data (Hebous and Zimmermann, 2021), or a combination of both (Cohen, Coval, and Malloy, 2011; Kim and Nguyen, 2020; Dupor, Karabarbounis, Kudlyak, and Saif Mehkari, 2023). In particular, our paper is closely related to Hebous and Zimmermann (2021). Using federal procurement contracts, they find a positive fiscal multiplier on corporate investment among financially constrained firms. The multiplier is nil within the unconstrained sample. They argue that winning a government contract enhances the collateral value of the firm, thereby easing its borrowing constraints.

We similarly document a crowding-in effect of government spending on corporate investment, but differ in one key dimension. In our setting, corporate investment rises following military spending news among unconstrained and constrained firms alike. As previously highlighted, our mechanism explicitly links changes in macroeconomic conditions induced by higher future military procurement to firm-level borrowing costs, insofar as the decline in interest rates following military spending news transmits to firms' cost of capital.

The remainder of our paper is structured as follows. Section 2 describes the data. Section 3 outlines the empirical strategy. Section 4 presents our main results on the effects of military spending news shocks on corporate investment. Section 5 inspects whether interest rates and the firm-level cost of capital behave in a manner consistent with the crowding-in effect on corporate investment. Section 6 concludes.

2 Data

This section describes the data used in our empirical analysis. We intend to estimate the impact of military spending news shocks on corporate investment at the firm level. An extensive literature has exploited military spending or US involvement in wars to identify government spending shocks. In particular, as our baseline measure of fiscal news shocks, we consider the discounted present value of military spending associated with major US war events, as constructed by Ramey and Zubairy (2018). As discussed in the literature, military spending news shocks are not a relevant instrument for total government spending when World War II and the Korean War are excluded from the sample. Consequently, we use news shocks to military spending as an exogenous source of variation in government spending to estimate the corresponding responses in corporate investment.

We gather firm-level balance sheet and financial data from the CRSP-Compustat merged database, covering a post-Great Moderation sample from 1983:4-2019:4. The sample period reflects data availability, as Compustat data is sparse prior to the 1980s. We also use various aggregate data on macroeconomic quantities and prices from standard sources.[2] Table A.1.1 provides details and definitions for all variables used in the empirical analysis.

2.1 Firm level data

We obtain firm-level accounting data at the quarterly frequency from the merged CRSP-Compustat (CCM) database, over the period 1983:4—2019:4. Following standard practice, we remove financial (SIC codes 6000 - 6799) and utility (SIC codes 4900 - 4999) firms from the sample. We also exclude firm-quarters with negative book assets and capital stock values. Given our focus on corporate investment responses, we restrict the sample to firms with at least 40 quarters of investment spells. Additionally, we exclude firm-quarters with acquisitions that exceed five percent of total assets to ensure that capital stock changes are mainly driven by investment rather than mergers and acquisitions. We winsorize all variables at the 0.5^{th} and 99.5^{th} percentiles to mitigate the effect of outliers. At the end of this cleaning procedure, we are left with 360,736 unique firm-quarter observations.

As is well known, the Compustat database offers several notable advantages. First,

[2] Specifically, we use real GDP, government consumption, and taxes from the Federal Reserve Bank of St. Louis (FRED) and the Bureau of Economic Analysis (BEA); zero-coupon spot rates from the FRED; expected inflation from the Federal Reserve Bank of Cleveland and FRED; the ratio of general government debt to GDP from the Bank of International Settlements (BIS).

it provides a long high-frequency panel of firms. Second, it contains detailed accounting and cash-flow information, enabling us to construct key control variables that account for confounding factors that affect firms' investment decisions. Following Frank and Shen (2016), we also use the CCM dataset to compute firm-level average cost of capital (WACC) measures. The WACC is defined as the average of equity and corporate debt costs, weighted by market leverage. We detail our approach to compute the WACC in Section 5.2.

Summary statistics are reported in Table 1. Variable definitions can be found in Table A.1.1 in the Appendix. On average, firms invest slightly less than one percent of their capital stock on an annualized basis, and maintain leverage ratios of roughly 27 percent. Both investment and leverage distributions are right-skewed, as the means exceed the medians. The Tobin's Q—our proxy for the firm's investment opportunities—is greater than one on average, indicating that the typical firm faces profitable investment opportunities.

2.2 Department of Defense (DOD) procurement contracts

To investigate the impact of news about military spending on firm-level outcomes, we merge firm-level contracts from the Department of Defense (DOD) to Compustat data.[3] Since news about wars may affect expected future contract awards in order to supply materials and war-related goods and services to the government, we compare outcomes in the group of treated firms that have had at least one contract with the DOD in the past with the control group consisting of firms that have never had any such contract. If firms' responses look similar across groups, this suggests that government spending shocks have demand spillovers on the overall economy. Alternatively, the average effects of government spending stem from firms securing government contracts.

Due to the Federal Funding Accountability and Transparency Act, signed into law on September 26, 2006, federal procurement contracts, grants, loans, and other financial assistance awards over $25,000 must be publicly available on the USASpending.gov website, hosted by the Treasury Department.[4] Cox, Müller, Pasten, Schoenle, and Weber (2020) compile subsets of the USASpending.gov data starting in 2000, which we employ in our empirical analysis.

We successfully matched approximately 1,800 firms, representing roughly 30 percent of the Compustat sample. Although DOD contracts comprise a subset of the universe of federal

[3]According to the Federal Acquisition Regulation, these "contract actions" denote "any oral or written action that results in the purchase, rent, or lease of supplies or equipment, services, or construction using appropriated dollars over the micro-purchase threshold, or modifications to these actions regardless of dollar value."

[4]See Cox, Müller, Pasten, Schoenle, and Weber (2020) for an in-depth discussion on the background, details, scope, and limitations of the federal procurement contracts in the USAspending.gov database.

procurement contracts—which span a wide range of goods and services from labor-intensive to R&D-intensive industries—military-based contracts tend to be much higher in value than other, more ordinary types of contracts. We find that the mean value of a contract is $53 million with a median of $300,000, suggesting a heavily right-skewed distribution. In contrast, Cox, Müller, Pasten, Schoenle, and Weber (2020) find for the universe of federal procurement contracts $206,023 and $3,640 for the mean and median contract values, respectively. These figures are consistent with the fact that firms involved in contracts with the DOD tend to display larger book values: $4.03 billion versus $1.64 billion, respectively. Figures A.1.2, A.1.3, and A.1.4 present plots of summary statistics.

2.3 Time series data

Our primary measure of government spending shocks follows (Ramey and Zubairy, 2018). The time series identifies shocks using narrative methods and extends the defense news series from (Ramey, 2011b), focusing on major war events involving the US and changes in the associated present discounted value of military spending. The identifying assumption is that wars and the corresponding variation in military spending are exogenous to the business cycle. Panel B of Table 1 presents summary statistics of Ramey's military news shock, and Figure 1 plots the time series of shocks. Conditional on a government spending shock, the average shock size is -0.4% of GDP, meaning that the government plans to cut military spending. As seen from Figure 1, much of the variation in the shock series comes in the early 2000s. The shock ranges from roughly -10 percent of GDP to 5 percent of GDP. As a robustness check, we employ the identification strategy in Auerbach and Gorodnichenko (2012) in Appendix A.2. Since Auerbach and Gorodnichenko (2012) considers the unforecasted change in actual government spending, this shock may capture effects of actual spending as opposed to spending news.

We also use quarterly time series data on macroeconomic aggregate variables. Specifically, we collect government consumption expenditures and gross investment, GDP, taxes, and the government debt-to-GDP ratio from FRED. All variables, except the government debt-to-GDP ratio, are deflated using an implicit price deflator and detrended by taking logarithms and applying the Hamilton (2018) filter. Because the debt-to-GDP ratio is not stationary in our sample, we also detrend this variable by directly applying the Hamilton filter.

Finally, we utilize data on Treasury yields and inflation expectations. We build zero-coupon spot curves for US Treasuries from 1983:4 to 2019:4 (148 quarters) using a few sources. First, we obtain data on the 3-month T-Bill yield from the H.15 release published by the Federal Reserve Board. We supplement these data with the zero-coupon yield data constructed by Gürkaynak, Sack, and Wright (2007), which include yield estimates based on fitted Nelson-Siegel-Svensson curves for bonds with maturities between one and 30 years. We follow Adrian, Crump, and Moench (2013) to extract the principal components from the Treasury yields with maturities of three months, one to five years, and ten years.

In addition to the yield curve data, we obtain term-structure estimates of inflation expectations from the Cleveland Fed. The Cleveland Fed produces annual inflation expectations estimates ranging from 1 to 30 years.

3 Empirical Strategy

To assess the effect of military spending news shocks on corporate investment, we estimate the average firm-level investment response to the shock. We estimate panel cumulative local projections (Jordà, 2005) over horizons of up to five years:

$$\Delta \log(k_{i,t+h}) = \alpha_{i,h} + \alpha_{s,q,h} + \gamma_h \varepsilon_t^g + \mathbf{\Gamma}'_{1,h}\mathbf{Z}_{i,t-1} + \mathbf{\Gamma}'_{2,h}\mathbf{Y}_{t-1} + e_{i,t+h} \tag{1}$$

where $\Delta \log(k_{i,t+h})$ denotes the cumulative log-change in firm i's capital stock between year-quarter t and $t+h$, with $h = 0, 1, 2, \ldots 20$. The term $\alpha_{i,h}$ captures firm fixed effects that absorb time-invariant heterogeneity across firms. The term $\alpha_{s,q,h}$ represents sector-quarter fixed effects that control for sector-specific variation in response to aggregate shocks. The variable ε_t^g denotes the military spending news constructed by (Ramey and Zubairy, 2018). The coefficients $\{\gamma_h\}_{h=0,\ldots,20}$ capture the empirical impulse response of average firm investment to a news shock to military spending.

The vectors $\mathbf{Y}_{t-1}$ and $\mathbf{Z}_{i,t-1}$ contain lagged aggregate and firm-level controls, respectively. These controls account for aggregate and firm-specific time-varying variables that influence firm investment opportunities. Specifically, the vector $\mathbf{Y}_{t-1}$ includes four lags of the cyclical components of real GDP, real government consumption plus gross investment, real taxes, and the government debt-to-GDP ratio. The vector also includes lags of the military spending news shock. The vector $\mathbf{Z}_{i,t-1}$ includes lagged firm-level controls commonly used in the corporate finance literature. We consider firm i's size, leverage, Tobin's Q, cash flow, and profitability. Standard errors are clustered at the firm and time levels.

As emphasized in the empirical literature, panel local projections offer a flexible approach to estimate empirical dynamics while directly incorporating nonlinearities, state dependence, and time-varying effects in the empirical specification. This approach also mitigates endogeneity concerns by directly controlling for cross-sectional heterogeneity and firm characteristics relevant to investment decisions, which would be infeasible within an SVAR framework.

In addition, local projections are less sensitive to misspecification, as we separately estimate the empirical response for each horizon. Our identification relies on the assumption that military spending news shocks are exogenous to the US business cycle and to individual firm-level investment decisions.

To examine heterogeneity in firms' responses, we extend equation (1) as follows:

$$\Delta \log(k_{i,t+h}) = \alpha_{i,h} + \alpha_{s,q,h} + \gamma_h \varepsilon_t^g S_{i,t} + \beta_h \varepsilon_t^g (1 - S_{i,t}) + \mathbf{\Gamma}'_{1,h} \mathbf{Z}_{i,t-1} + \mathbf{\Gamma}'_{2,h} \mathbf{Y}_{t-1} + e_{i,t+h}, \quad (2)$$

where $S_{i,t}$ is an indicator variable that takes one if firm i satisfies a particular condition to be specified later—e.g., whether the firm displays a high leverage ratio. This modification allows us to compare empirical responses across firm groups. In equation (2), coefficients $\{\gamma_h, \beta_h\}_{h=0,\ldots,20}$ capture the empirical impulse responses to a news shock to military spending across financially-constrained and unconstrained firms, respectively.

4 Corporate Investment Dynamics

In this section, we present the estimated effects of news about military spending on corporate investment. As discussed earlier, we begin by examining the average panel response of corporate investment, and then investigate whether a particular subset of firms drives the empirical results. Figure 2 displays the average investment response to the news shock.[5] On impact and over the first year, corporate investment exhibits a negative but negligible response to the shock. Thereafter, corporate investment increases for up to five years following the shock, in contrast with the predictions of workhorse macroeconomic models. Quantitatively, our estimates indicate that a one-percent unexpected rise in future military spending, as a share of GDP, leads to more than a one-percent increase in firm investment five years after the announcement. This effect is economically meaningful and statistically significant at the one-percent level. Given that the average annual investment rate in our sample is around one percent, our result implies a sizable increase in investment for the average Compustat firm.

Robustness checks

The crowding-in result we document is robust to a range of alternative model specifications and variable definitions.

[5] To ensure that panel stationary issues do not drive our results, we extend the horizon in Figure 2 to 25 quarters. As shown in the plot, the investment response eventually fades away after five years.

Alternative measure of investment. First, we examine the sensitivity of our finding to how investment is measured in the data. In the baseline specification, we calculate investment using the perpetual inventory method. As an alternative, we compute the ratio of capital expenditures to the lagged capital stock. Figure A.1.1a reports the empirical results under this alternative measure. Investment dynamics are qualitatively similar, though the crowding-out effect over the first year is slightly more pronounced, while the long-run crowding-in is even stronger, reaching about 1.75 percentage points over five years.

Great Financial Crisis sample. Second, we check whether our finding is driven by unconventional monetary policy implemented after the Great Financial Crisis (GFC). Investment may have responded differently during this period because the cost of capital, as reflected in interest rates, was unusually depressed. Low interest rates and ample liquidity may have enabled firms to finance investment more cheaply. To address this concern, we exclude observations from our sample after 2007. The resulting corporate investment response is shown in Figure A.1.1b. Similar to Figures 2 and A.1.1a, we find that corporate investment exhibits a crowding-out over the first year after the shock, followed by a long-run crowding-in, reaching a roughly 1.5 percent increase after five years.

State of the business cycle. Third, we assess the sensitivity of our results to the state of the business cycle. Prior research has documented that fiscal spending shocks have more pronounced effects on economic activity during recessions (e.g., Auerbach and Gorodnichenko, 2012, 2013; M., James, and Irina, 2015; Caggiano, Castelnuovo, Colombo, and Nodari, 2015; Ramey, 2016; Ramey and Zubairy, 2018). Consistent with this evidence, Figure A.1.1c shows that the state of the economy influences the response of corporate investment to government spending. While the crowding-out effect is more pronounced in the first year during recessions, corporate investment is more than twice as responsive to the news shock as during expansions, reaching roughly four percent five years after the shock.

Geopolitical and economic uncertainty. Fourth, we assess whether geopolitical and economic policy risks bias our estimates. Military spending may be positively correlated with geopolitical tensions or economic policy uncertainty faced by the US. If those risks correlate negatively with corporate investment, their contemporaneous variation may bias our empirical results downward. We use the Geopolitical Risk Index of Caldara and Iacoviello (2022) and the Economic Policy Uncertainty index of Baker, Bloom, and Davis (2016) to control for proxies of geopolitical risk and economic policy uncertainty. Figure A.1.1d plots the corporate investment response from this augmented specification. We find that the long-run crowding-in response of corporate investment is robust to these controls. The crowding-in effect is more pronounced under this specification, with corporate investment rising to almost two percent over five years.

Financial constraints. Fifth, Figure A.1.5 compares the investment response of financially constrained relative to unconstrained firms, following Hebous and Zimmermann (2021). We consider three standard proxies for financial constraints in the empirical analysis: small versus large firms, highly-leveraged versus lowly-leveraged firms, and firms sorted according to the Whited-Wu index. We find results similar to those of Hebous and Zimmermann (2021) for financially-constrained firms. The crowding-in effect on corporate investment is higher among this set of firms, with peak responses about 0.3-0.4 percentage points higher than those of unconstrained firms two years after the shock. In contrast to their paper, however, less constrained firms also increase investment. As we argue later, the widespread crowding-in effect is consistent with the accommodative response of longer-term nominal and real interest rates to the military spending news shock.

Extensions

Alternative identification strategy. We consider an alternative identification strategy, following Auerbach and Gorodnichenko (2012). We provide the details on this approach in Appendix A.2. Under this approach, we find no significant effects of government spending on corporate investment, as shown in Figure A.2.2. We interpret the absence of significant results as reflecting the distinction between surprises in realized spending and spending news. The news about military spending appears to capture economic variation that is distinct from that induced by this alternative shock.

Aggregate responses. Finally, in Appendix A.3, we turn to a time-series setting to explore the effects of military spending news on aggregate macroeconomic variables. Our main finding—that military spending news shocks raise the average investment of Compustat firms on average—is at odds with the conventional view that government outlays crowd out private investment.[6]

Specifically, we investigate the dynamic responses to military spending news of three time series: (i) the capital expenditures from the National Income Product Account (NIPA)

[6]For instance, Blanchard and Perotti (2002), Ramey (2011b), and Ramey (2016) find that aggregate non-residential and residential investment fall in response to positive innovations in government spending. We note, however, that the negative responses reported in Ramey (2016) are not robust to the post-Korean War period. In results not shown here, using the same data and specification as in Ramey (2016), we find that non-residential and residential investment exhibit muted or even statistically significant positive responses to military spending news over the sample period considered in our paper. These results are provided upon request.

tables, (ii) aggregate investment by Compustat firms, and (iii) the "residual" component obtained by subtracting Compustat firms' investment from the NIPA aggregate. Consistent with the firm-level evidence presented before, our time-series results suggest that investment components outside the Compustat sample also crowd in following the news shock.[7] We find that an increase in future military spending leads to positive and sometimes statistically significant responses in NIPA capital investment and in the residual investment component.

Fiscal multiplier. In Appendix A.3.1, we estimate the corresponding fiscal multipliers for the investment series using the military spending news shock as an instrument for total government spending. As noted in the previous literature, military spending news lacks relevance as an instrument when World War II and the Korean War are excluded from the sample. To address this issue, we employ the Fuller limited-information maximum likelihood (LIML) estimator, which is more robust to weak instruments than the standard two-stage least squares (2SLS) estimator. We find that the cumulative fiscal multiplier for NIPA capital investment is positive and statistically significant in some periods. We similarly find positive, though not statistically significant, estimates for Compustat and residual investment.

4.1 Keynesian versus granular effects of military spending news

In this section, we further investigate whether a subset of firms drives the crowding-in response of corporate investment. We distinguish between a "direct" and "indirect" effect of military spending news. The direct effect, which we call "granular," captures the impact of news about military spending on anticipated government contracts awarded to firms directly engaged in defense procurement. As emphasized by (Cox, Müller, Pasten, Schoenle, and Weber, 2020), military procurement contracts are highly concentrated among a small set of firms. Moreover, Gabaix (2011) shows that idiosyncratic fluctuations of large firms can induce aggregate variations in output. The indirect effect, which we call "Keynesian," reflects the impact of government spending on aggregate demand, reinforced by demand linkages and multiplier effects.[8].

Given the nature of the shock (i.e., news about military spending), a plausible explanation for our results is that the granular channel dominates. In this case, firms whose core activities are tied to defense procurement—e.g., Boeing, Raytheon, or Northrop Grumman—are likely to benefit disproportionately from future DOD contracts. The mechanism is straightforward: When the government announces higher future defense expenditures,

[7]We also investigate the responses of output, government spending, the government debt-to-GDP ratio, taxes, and consumption to the military spending news shock. See Appendix A.3 for detailed results.

[8]Such a mechanism would be consistent, for instance, with Samuelson's multiplier-accelerator effect on investment

these firms anticipate new contract opportunities and raise investment in preparation. To assess this explanation, we analyze all Department of Defense (DOD) procurement contracts awarded between 2000:3 and 2018:4 and merge these contracts with our sample of Compustat firms. Data on procurement contracts include the contract release date, the awarded firm, the contract duration, and the contract dollar amount.

In principle, one can decompose the total effect of military spending news into the granular and Keynesian components. In practice, however, this task is challenging. News about military spending often does not translate into procurement outlays immediately due to implementation delays. Tracking how much of the new spending will be allocated to procurement contracts and, most importantly, how long procurement contracts will translate into increased demand for firms' goods and services is difficult to gauge. To address this issue, we classify firms into two groups: those that were awarded at least one DOD contract in the sample and those that were never DOD contractors. The investment response of firms that were never DOD contractors provides a lower bound for the Keynesian effect of government spending, since these firms do not benefit directly from military procurement. Any positive investment response by these firms arises from demand spillovers.

Figure 3 plots the estimated investment responses for both groups of firms. We find that firms that never received a DOD contract are as responsive to the shock as firms that held a DOD contract at least once. This finding provides compelling evidence that demand spillovers, rather than direct defense procurement, drive the corporate investment response.

The results thus far point to a demand-driven crowding-in of corporate investment, consistent with a Keynesian transmission mechanism. We document that firms that have won at least one DOD contract over our sample are no more responsive to the military spending news shock than those that have never won one. We next examine whether interest rates and firms' cost of capital behave in a manner consistent with the rise in firm investment.

5 Firm Cost of Capital Dynamics

Given that Compustat firms crowd in following news shocks to military spending, is the behavior of interest rates and firm-level cost of capital consistent with the rise in investment? To answer this question, we study the effects of news about military spending on yields across different maturities, and how it propagates to the firm-level average cost of capital in Compustat. We follow Frank and Shen (2016) in computing the firm-level average cost of capital, which comprises both the cost of equity and the cost of debt. Prior to our work, studies have documented muted, or even negative, interest rate responses to aggregate government spending shocks (Mountford and Uhlig, 2009; Corsetti, Meier, and Müller, 2012; Ramey, 2016), which stand in stark contrast to theoretical predictions of workhorse neoclassical and New Keynesian general equilibrium models. Other studies have focused on the impacts of government spending on the yield curve, finding mixed results that depend on anticipation effects, if the government spending is deficit-financed, and the type of fiscal spending (Plosser, 1987; Dai and Philippon, 2005; Bretscher, Hsu, and Tamoni, 2020).

5.1 The effect of military spending news on interest rates

To estimate the dynamic responses of nominal and ex-ante real interest rates to the military spending news shock, we follow the financial economics literature and employ an affine model of the term structure (see, e.g., Litterman and Scheinkman, 1991; Dai and Singleton, 2000; Duffee, 2002). Denote by y_t^m ($\tilde{y}_t^m = y_t^m - \tilde{\pi}_t^m$, $\tilde{\pi}_t^m \equiv \mathbb{E}_t[\pi_{t,t+m}]$) the (ex-ante real) zero-coupon spot rate on a Treasury bill or note with m quarters to maturity, where $\tilde{\pi}_t^m$ is the expected inflation rate, $\mathbb{E}_t[\pi_{t,t+m}]$, over the same horizon.[9] Then, for $m = 1$ and 40 and $h = 1,2,\ldots,20$ quarters, we estimate the following linear regressions projecting, respectively, nominal and ex-ante real interest rate changes onto the government spending shock and controls:

$$y_{t+h}^m - y_t^m = \alpha_{m,h} + \beta_{m,h}\varepsilon_t^g + \mathbf{\Phi}_{m,h}(4)\mathbf{X}_{t-1} + \epsilon_{t+h}^m, \text{ and} \tag{3}$$

$$\tilde{y}_{t+h}^m - \tilde{y}_t^m = \alpha_{m,h} + \beta_{m,h}\varepsilon_t^g + \mathbf{\Phi}_{m,h}(4)\mathbf{X}_{t-1} + \epsilon_{t+h}^m. \tag{4}$$

The coefficients of interest in equations (3) and (4) are $\{\{\beta_{m,h}\}_{h=1,\ldots,20}\}_{m=4,40}$, which trace the effect of the government spending shock on the change over an h-quarter horizon in the spot rate on a Treasury with a duration of m quarters. We also control for four lags of a vector of macro-financial variables in $\mathbf{X}_{t-1}$, including the first three principal components from the nominal or ex-ante real term structure, the cyclical components of real GDP, government consumption expenditures plus gross investment, government debt, and taxes, as well as the government spending shock ε^g and the one-period *change* in the (ex-ante real) yield $y_t^m - y_{t-1}^m$ ($\tilde{y}_t^m - \tilde{y}_{t-1}^m$).

The OLS estimates $\left\{\{\hat{\beta}_{m,h}\}_{h=1,\ldots,20}\right\}_{m=1,40}$ are portrayed in Figure 4 and capture the empirical response functions of interest rates to government spending shocks. Panels (a) and (b) report the effects of the government spending shock on the change in the nominal and ex-ante real three-month and 10-year Treasury yields, respectively. According to panel (a), an increase in military spending news causes both the nominal and ex-ante real T-Bill yields to fall on impact. The effect is slightly larger for the nominal rate, indicating a modest

[9] Because one-quarter-ahead inflation expectations are unobservable, we use the one-year-ahead inflation expectation when constructing the ex-ante real yield for the three-month T-Bill.

negative effect of the shock on inflation expectations. The negative effect is short-lived, as the response in the nominal rate is not statistically significantly different from zero for horizons greater than one year. In contrast, the ex-ante real rate increases over five years due to a marked fall in short-term inflation expectations.[10] Four years after an increase in military spending news, ex-ante real yields on the three-month T-Bill increase by over 20 basis points on average.

Panel (b) shows similar short-run dynamics for the ten-year T-Note. On impact, the nominal yield on the 10-year Treasury falls by more than ten basis points. Moderate declines in expected inflation ten years ahead lead to roughly a five-basis-point decline in the ex-ante real rate. The empirical responses suggest that the effect persists for up to five years. The point estimates are almost always negative and often statistically significant. Around four years after the shock, the nominal (ex-ante real) 10-year Treasury yield remains almost 20 (10) basis points below its pre-shock level.

These dynamics provide strong evidence that news shocks to military spending induce meaningful variation in the term structure of interest rates. Contrary to conventional wisdom, we find that nominal and expected real yields—both on short- and long-dated Treasuries—fall on impact in response to military spending news. Furthermore, the military spending news shock leads to asymmetric long-run dynamics along the term structure, with an increase in short-dated yields and a reverse trend in long-dated yields. Therefore, the shock induces a long-run flattening of the term structure slope.

We conduct several robustness checks similar to those in Section 4. First, we rule out that our findings are driven by unconventional monetary policy and the zero lower bound on the policy rate by dropping observations after the Great Financial Crisis. As Figures A.1.6a and A.1.6b indicate, the dynamic responses of nominal and real interest rates are not driven by observations after 2007.

We also explore the dynamics of the policy rate, term, and credit spreads, and other measures of economic and political risk in Appendix A.4. As expected, the dynamics of the Federal Funds rate are similar to those of the three-month T-Bill discussed above. Moreover, we confirm that the term spread—the difference between the 10-year and three-month yields—significantly falls by up to 30 basis points four years after the shock. In contrast, we find that credit spreads tend to widen, suggesting incomplete pass-through of lower Treasury yields to corporate borrowing costs. Consistent with the prior sensitivity checks in Section A.1.1d, we do not find that the military spending news shock induces significant variation in measures of economic and political risk.

[10]We do not report empirical responses of inflation expectations because they are implicitly given by the difference between nominal and ex-ante real interest rates.

Overall, our findings on interest rate dynamics are consistent with the crowding-in of corporate investment documented in Section 3. The rise in aggregate demand induced by the news shock to military procurement is preceded by a decline in long-term ex-ante real interest rates.[11] Given the empirical responses of long-term Treasury yields, how much of the estimated fall actually translates into lower borrowing costs for firms? Motivated by this question, we next examine the effect of news about military spending on firms' cost of capital.

5.2 Firm-level cost of capital

We estimate firm-level borrowing costs following Frank and Shen (2016), who compute the cost of capital in a sample of Compustat firms. The weighted average cost of capital (WACC) combines the cost of equity and the cost of debt, weighted by market leverage (mkt_lvg_{it}) as follows:

$$wacc_{it}^{j} = r_{it}^{\mathrm{E}_j} \times (1 - mkt\_lvg_{it}) + r_{it}^{D} \times mkt\_lvg_{it} \times (1 - tax\_rate_{it}), \quad (5)$$

for firm i in the year-quarter t, where $j \in \{\mathrm{CAPM}, \mathrm{FF3}, \mathrm{FF5}, \mathrm{Car4}\}$ indexes alternative measures of the cost of equity under the CAPM, the Fama-French three- and five-factor, and the Carhart four-factor models, respectively, and tax_rate_{it} denotes the corporate tax rate faced by firm i. Our goal is to investigate whether the decline in Treasury yields documented in Section 5.1 translates into lower borrowing costs for publicly listed firms and, in turn, into a rise in corporate investment.

We take the Fama-French three-factor model ($j = \mathrm{FF3}$) as our baseline and report results for the alternative equity cost measures in Appendix A.1. Figure 5 plots the dynamics of the cost of capital along with the cost of equity, the cost of debt, and the Tobin's Q. As shown in panel 5b, the WACC closely follows the equity cost component due to the market leverage weight, displaying a cumulative decline for seven quarters by about four percent before briefly rising and declining again toward the end of the five-year horizon. The cost of debt, shown in panel 5c, follows a similar pattern, decreasing by up to -0.6 percentage points before reaching a non-significant 0.3 percentage-point rise over five years. Consistent with the rise in corporate investment, military procurement news induces a rise in the Tobin's Q of about one percent two to three years after the shock in panel 5d.

[11] Attempting to rationalize the effects of government spending on the real exchange rate and consumption, Corsetti, Meier, and Müller (2012) argued within a Dynamic General Equilibrium Model (DSGE) that spending reversals induced by fiscal rules can decrease the long-term real interest rate despite a short-term rate increase. However, we do not find evidence of long-run spending reversals in government spending in response to military spending news shocks in our sample.

Figure A.1.7 presents the WACC dynamic responses for alternative equity cost measures. The results are qualitatively similar to the baseline, except for the CAPM model. Under CAPM, the decline in the WACC is smaller, at about -0.6 percent, and is followed by a steady increase up to 0.75 percentage points after five years. The WACC under the Carhart four-factor model exhibits the largest trough of around –4 percent. The WACC under the Fama–French five-factor model hovers around zero. Across models, the trough occurs around seven quarters after the shock. In Figure A.1.8, we portray the corresponding equity cost components used to calculate the WACC. As in the baseline, the cost of equity is the primary driver of the decrease in the WACC.

For comparison, we estimate the responses of WACC measures and their components to the government spending shock under the identification strategy of Auerbach and Gorodnichenko (2012). The resulting dynamics are in Figures A.2.3 and A.2.4. Similar to previous results, the military spending news shock induces a decline in the cost of capital in the first five quarters, except under the CAPM. We find positive but non-statistically significant responses for the cost of debt under this identification strategy.

5.3 Firm-level debt dynamics

The decline in nominal and ex-ante real yields in response to military spending news passes through to the average cost of capital, primarily through the cost of debt, as discussed in Section 5.2. Both the decline in the cost of capital and the rise in Tobin's Q are consistent with the rise in corporate investment. Finally, are firms' debt dynamics consistent with the decline in interest rates and the cost of debt? In this section, we examine whether firms adjust their balance sheets in a manner consistent with falling borrowing costs.

We estimate empirical debt responses to the military spending news shock by running the following panel local projections:

$$\%\Delta b_{i,t+h} = \boldsymbol{\alpha}_{i,h} + \boldsymbol{\alpha}_{s,q,h} + \gamma_h \varepsilon_t^g + \boldsymbol{\Gamma}'_{1,h}\mathbf{Z}_{i,t-1} + \boldsymbol{\Gamma}'_{2,h}\mathbf{Y}_{t-1} + e_{i,t+h} \tag{6}$$

where $\%\Delta b_{i,t+h}$ denotes the cumulative percentage change in firm i's debt stock between year-quarter t and $t+h$. All other variables are defined as in equation (1).

Figure 6 depicts the empirical responses. Following the news shock, firms steadily increase total debt holdings, with a more prominent increase in long-term debt. Consistent with the decline in longer-term yields, long-term debt increases by one percent over five years, whereas short-term debt increases by about 0.2 percentage points over the same horizon. These findings are consistent with firms exploiting lower long-term borrowing costs to expand debt financing, thereby reinforcing the crowding-in effect on investment.

6 Conclusion

This paper revisits the longstanding question in macroeconomics of how government spending influences corporate investment. In our empirical setting, we employ the news shocks to military spending constructed by Ramey and Zubairy (2018). Military procurement, combined with narrative methods, has become one of the leading approaches for identifying exogenous variation in government expenditures. Our granular evidence thus offers a convenient benchmark for understanding how aggregate government spending affects firm-level investment and the associated cost of capital. To our knowledge, our paper is the first to study how government outlays propagate to firm-level cost of capital.

Using a sample of US publicly listed firms (CRSP-Compustat), we find that a one-percentage-point increase in military spending news, as a share of GDP, raises corporate investment by more than one percent over five years. In our panel local projections, we control for firms' cross-sectional heterogeneity and key determinants of investment, as identified in the corporate finance literature.

We show that our finding is not driven by a specific subset of firms. Specifically, we rule out that our result is driven by large contractors with the Department of Defense (DOD), which are directly impacted by military spending. By merging our panel of firms with contract-level data from the DOD, we distinguish between firms that have never received a DOD contract and those that have received at least one contract over the sample period. We find that both groups increase investment by a similar extent, and we do not reject that their responses are statistically equivalent.

Similarly, we rule out that our finding is driven by financially-constrained firms, as in Hebous and Zimmermann (2021). Our results are also robust to excluding observations following the 2008 Great Financial Crisis, when unconventional monetary policy and the zero lower bound on interest rates significantly affected economic conditions. Lastly, our results are robust to controlling for economic policy uncertainty and geopolitical risk. Consistent with the existing evidence, we also find that recessions substantially increase the crowding-in effect on corporate investment. The estimated investment rise is more than twice as large during recessions as in the full sample, reaching roughly four percent after five years.

In line with the widespread increase in corporate investment, we find that this rise is preceded by a decline in long-term Treasury yields. By employing a standard affine term-structure model, we explicitly control for information embedded in the yield curve in our specifications. Our estimates indicate that the nominal 10-year T-Note falls by 10 basis points on impact in response to news about military spending, with effects persisting for up to five years. The news shocks also generate an asymmetric long-run adjustment across maturities, thereby flattening the yield curve by about 25 basis points between four and five years after the shock. While the 10-year Treasury yield remains depressed across the entire horizon, the three-month real T-Bill yield eventually rises by more than 20 basis points, indicating a policy rate tightening.

The decline in nominal and real yields crucially translates into lower borrowing costs for firms. Following Frank and Shen (2016), we construct firm-level measures of the weighted-average cost of capital (WACC) by combining the cost of equity and the cost of debt, weighted by the firm's market leverage. The cost of capital declines around two years after the news shock, with a 0.6 percentage-point decline in the cost of debt. Moreover, the Tobin's Q exhibits a hump-shaped response over the first three to four years after the news shock, peaking at one percent.

Aligned with this easing in financing conditions, firms increase debt holdings by about two percentage points following the news shock to military spending. In keeping with the yield-curve flattening, long-term debt increases fivefold relative to short-term debt. Our findings on interest rates, in addition to not being at odds with prior evidence, are the first to explicitly link interest rate and cost of capital dynamics.

Taken together, we regard our findings as congruent with a conventional Keynesian transmission mechanism in which fluctuations in aggregate demand and nominal variables carry real effects. In our setting, news about higher future military spending raises effective demand for firms' output and reduces firms' cost of capital. The anticipated increase in future government spending, reinforced by the decline in the cost of capital, stimulates corporate investment.

This paper opens several avenues for future research. A first question concerns how to reconcile the decline in nominal and real interest rates with positive fiscal spending innovations. Corsetti, Meier, and Müller (2012) show that, within a Dynamic General Equilibrium Model (DSGE) framework, spending reversals induced by fiscal rules can decrease long-term real interest rates despite a short-term rate increase. We, however, do not find evidence of spending reversals in government spending following military spending news in our sample. A second avenue is whether small firms also crowd in and benefit from lower costs of capital following fiscal spending news shocks. Addressing this question requires data on the universe of US firms, which is beyond the scope of this paper and therefore remains an important direction for future work. A third question is whether the effects we document are driven by news shocks as opposed to contemporaneous surprises in realized expenditures (e.g., Auerbach and Gorodnichenko, 2012). Lastly, an open question is whether the type of fiscal spending matters for the crowding-in to materialize (e.g., military spending versus transfers).

References

Acconcia, A., G. Corsetti, and S. Simonelli (2014): "Mafia and Public Spending: Evidence on the Fiscal Multiplier from a Quasi-experiment," *American Economic Review*, 104(7), 2185–2209.

Adrian, T., R. K. Crump, and E. Moench (2013): "Pricing the term structure with linear regressions," *Journal of Financial Economics*, 110(1), 110–138.

Angeletos, G.-M., C. Lian, and C. K. Wolf (2024): "Can Deficits Finance Themselves?," *Econometrica*, 92(5), 1351–1390.

Auclert, A., M. Rognlie, and L. Straub (2023): "The Trickling Up of Excess Savings," *AEA Papers and Proceedings*, 113, 70–75.

Auerbach, A., Y. Gorodnichenko, P. B. McCrory, and D. Murphy (2022): "Fiscal multipliers in the COVID19 recession," *Journal of International Money and Finance*, 126, 102669.

Auerbach, A. J., and Y. Gorodnichenko (2012): "Measuring the Output Responses to Fiscal Policy," *American Economic Journal: Economic Policy*, 4(2), 1–27.

——— (2013): "Fiscal Multipliers in Recession and Expansion," in *Fiscal Policy after the Financial Crisis*, NBER Chapters, pp. 63–98. National Bureau of Economic Research, Inc.

Baker, S. R., N. Bloom, and S. J. Davis (2016): "Measuring economic policy uncertainty," *The Quarterly Journal of Economics*, 131(4), 1593–1636.

Ball, L., N. G. Mankiw, and D. Romer (1988): "The New Keynesian Economics and the Output-Inflation Trade-off," *Brookings Papers on Economic Activity*, 19(1), 1–82.

Barnichon, R., D. Debortoli, and C. Matthes (2021): "Understanding the Size of the Government Spending Multiplier: It's in the Sign," *The Review of Economic Studies*, 89(1), 87–117.

Barro, R. J. (1981): "Output Effects of Government Purchases," *Journal of Political Economy*, 89(6), 1086–1121.

Barro, R. J., and C. J. Redlick (2011): "Macroeconomic effects from government purchases and taxes," *The Quarterly Journal of Economics*, 126(1), 51–102.

Bartal, M., and Y. Becard (2024): "Consumption tax cuts vs stimulus payments," *Journal of Public Economics*, 239, 105227.

Bayer, C., B. Born, R. Luetticke, and G. J. Müller (2023): "The Coronavirus Stimulus Package: How Large is the Transfer Multiplier," *The Economic Journal*, 133(652), 1318–1347.

Ben Zeev, N., and E. Pappa (2017): "Chronicle of a War Foretold: The Macroeconomic Effects of Anticipated Defence Spending Shocks," *The Economic Journal*, 127(603), 1568–1597.

Bianchi-Vimercati, R., M. Eichenbaum, and J. Guerreiro (2024): "Fiscal stimulus with imperfect expectations: Spending vs. tax policy," *Journal of Economic Theory*, 217, 105814.

Bilbiie, F. O., T. Monacelli, and R. Perotti (2013): "Public Debt and Redistribution with Borrowing Constraints," *The Economic Journal*, 123(566), F64–F98.

——— (2019): "Is Government Spending at the Zero Lower Bound Desirable?," *American Economic Journal: Macroeconomics*, 11(3), 147–73.

Blanchard, O., and R. Perotti (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *The Quarterly Journal of Economics*, 117(4), 1329–1368.

Bouakez, H., M. Guillard, and J. Roulleau-Pasdeloup (2020): "The optimal composition of public spending in a deep recession," *Journal of Monetary Economics*, 114, 334–349.

Bretscher, L., A. Hsu, and A. Tamoni (2020): "Fiscal policy driven bond risk premia," *Journal of Financial Economics*, 138(1), 53–73.

Broer, T., P. Krusell, and E. Öberg (2023): "Fiscal multipliers: A heterogeneous-agent perspective," *Quantitative Economics*, 14(3), 799–816.

Caggiano, G., E. Castelnuovo, V. Colombo, and G. Nodari (2015): "Estimating Fiscal Multipliers: News From A Non-linear World," *The Economic Journal*, 125(584), 746–776.

Caldara, D., and M. Iacoviello (2022): "Measuring geopolitical risk," *American Economic Review*, 112(4), 1194–1225.

Chodorow-Reich, G., L. Feiveson, Z. Liscow, and W. G. Woolston (2012): "Does State Fiscal Relief during Recessions Increase Employment? Evidence from the American Recovery and Reinvestment Act," *American Economic Journal: Economic Policy*, 4(3), 118–45.

Cohen, L., J. Coval, and C. Malloy (2011): "Do powerful politicians cause corporate downsizing?," *Journal of Political Economy*, 119(6), 1015–1060.

Conley, T. G., and B. Dupor (2013): "The American Recovery and Reinvestment Act: Solely a government jobs program?," *Journal of Monetary Economics*, 60(5), 535–549, Aggregate Implications of Local Public Finance.

Corsetti, G., A. Meier, and G. J. Müller (2012): "Fiscal Stimulus with Spending Reversals," *The Review of Economics and Statistics*, 94(4), 878–895.

Cox, L., G. Müller, E. Pasten, R. Schoenle, and M. Weber (2020): "Big g," *NBER working paper*.

Dai, Q., and T. Philippon (2005): "Fiscal Policy and the Term Structure of Interest Rates," Working Paper 11574, National Bureau of Economic Research.

Dai, Q., and K. J. Singleton (2000): "Specification analysis of affine term structure models," *The Journal of Finance*, 55(5), 1943–1978.

Duffee, G. R. (2002): "Term premia and interest rate forecasts in affine models," *The Journal of Finance*, 57(1), 405–443.

Dupor, B., M. Karabarbounis, M. Kudlyak, and M. Saif Mehkari (2023): "Regional Consumption Responses and the Aggregate Fiscal Multiplier," *The Review of Economic Studies*, 90(6), 2982–3021.

Dupor, B., and P. B. McCrory (2018): "A Cup Runneth Over: Fiscal Policy Spillovers from the 2009 Recovery Act," *Economic Journal*, 128(611), 1476–1508.

Dupor, B., and M. S. Mehkari (2016): "The 2009 Recovery Act: Stimulus at the extensive and intensive labor margins," *European Economic Review*, 85, 208–228.

Ferriere, A., and G. Navarro (2024): "The Heterogeneous Effects of Government Spending: It's All About Taxes," *The Review of Economic Studies*, 92(2), 1061–1125.

Feyrer, J., and B. Sacerdote (2011): "Did the Stimulus Stimulate? Real Time Estimates of the Effects of the American Recovery and Reinvestment Act," Working Paper 16759, National Bureau of Economic Research.

Frank, M. Z., and T. Shen (2016): "Investment and the weighted average cost of capital," *Journal of Financial Economics*, 119(2), 300–315.

Gabaix, X. (2011): "The granular origins of aggregate fluctuations," *Econometrica*, 79(3), 733–772.

Giambattista, E., and S. Pennings (2017): "When is the government transfer multiplier large?," *European Economic Review*, 100, 525–543.

Gilchrist, S., and E. Zakrajšek (2012): "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, 102(4), 1692–1720.

Greenwald, B., and J. E. Stiglitz (1993): "New and Old Keynesians," *Journal of Economic Perspectives*, 7(1), 23–44.

Gürkaynak, R. S., B. Sack, and J. H. Wright (2007): "The US Treasury yield curve: 1961 to the present," *Journal of Monetary Economics*, 54(8), 2291–2304.

Hall, R. E. (1980): "Labor supply and aggregate fluctuations," *Carnegie-Rochester Conference Series on Public Policy*, 12(1), 7–33.

——— (1986): "The Role of Consumption in Economic Fluctuations," in *The American Business Cycle: Continuity and Change*, NBER Chapters, pp. 237–266. National Bureau of Economic Research, Inc.

Hall, R. E. (2009): "By how much does GDP rise if the government buys more output?," Discussion paper, National Bureau of Economic Research.

Hamilton, J. D. (2018): "Why You Should Never Use the Hodrick-Prescott Filter," *The Review of Economics and Statistics*, 100(5), 831–843.

Hebous, S., and T. Zimmermann (2021): "Can government demand stimulate private investment? Evidence from U.S. federal procurement," *Journal of Monetary Economics*, 118, 178–194.

Jordà, O. (2005): "Estimation and Inference of Impulse Responses by Local Projections," *American Economic Review*, 95(1), 161–182.

Jørgensen, P. L., and S. H. Ravn (2022): "The inflation response to government spending shocks: A fiscal price puzzle?," *European Economic Review*, 141, 103982.

Kim, T., and Q. H. Nguyen (2020): "The effect of public spending on private investment," *Review of Finance*, 24(2), 415–451.

Kocherlakota, N. R. (2022): "Stabilization with fiscal policy," *Journal of Monetary Economics*, 131, 1–14.

Litterman, R. B., and J. Scheinkman (1991): "Common factors affecting bond returns," *The Journal of Fixed Income*, 1(1), 54–61.

M., F. S., M. James, and P. Irina (2015): "State-dependent effects of fiscal policy," *Studies in Nonlinear Dynamics & Econometrics*, 19(3), 285–315.

Miyamoto, W., T. L. Nguyen, and D. Sergeyev (2018): "Government Spending Multipliers under the Zero Lower Bound: Evidence from Japan," *American Economic Journal: Macroeconomics*, 10(3), 247–77.

Mountford, A., and H. Uhlig (2009): "What are the effects of fiscal policy shocks?," *Journal of Applied Econometrics*, 24(6), 960–992.

Oh, H., and R. Reis (2012): "Targeted transfers and the fiscal response to the great recession," *Journal of Monetary Economics*, 59, S50–S64, Supplement issue:October 15-16 2010 Research Conference on 'Directions for Macroeconomics: What did we Learn from the Economic Crises' Sponsored by the Swiss National Bank (http://www.snb.ch).

Ottonello, P., and T. Winberry (2020): "Financial Heterogeneity and the Investment Channel of Monetary Policy," *Econometrica*, 88(6), 2473–2502.

Plosser, C. I. (1987): "Fiscal policy and the term structure," *Journal of Monetary Economics*, 20(2), 343–367.

Ramey, V. A. (2011a): "Can government purchases stimulate the economy?," *Journal of Economic Literature*, 49(3), 673–685.

——— (2011b): "Identifying government spending shocks: It's all in the timing," *The Quarterly Journal of Economics*, 126(1), 1–50.

——— (2016): "Macroeconomic Shocks and Their Propagation," Working Paper 21978, National Bureau of Economic Research.

Ramey, V. A. (2019): "Ten Years after the Financial Crisis: What Have We Learned from the Renaissance in Fiscal Research?," *Journal of Economic Perspectives*, 33(2), 89–114.

Ramey, V. A., and M. D. Shapiro (1998): "Costly capital reallocation and the effects of government spending," *Carnegie-Rochester Conference Series on Public Policy*, 48, 145–194.

Ramey, V. A., and S. Zubairy (2018): "Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data," *Journal of Political Economy*, 126(2), 850–901.

Sims, E., and J. Wolff (2018): "THE OUTPUT AND WELFARE EFFECTS OF GOVERNMENT SPENDING SHOCKS OVER THE BUSINESS CYCLE," *International Economic Review*, 59(3), 1403–1435.

Stock, J. H., and M. Yogo (2002): "Testing for weak instruments in linear IV regression," Discussion paper, National Bureau of Economic Research Cambridge, Mass., USA.

Tobin, J. (1993): "Price Flexibility and Output Stability: An Old Keynesian View," *Journal of Economic Perspectives*, 7(1), 45–65.

Werning, I. (2011): "Managing a Liquidity Trap: Monetary and Fiscal Policy," NBER Working Papers 17344, National Bureau of Economic Research, Inc.

Wolf, C. K. (2025): "Interest Rate Cuts versus Stimulus Payments: An Equivalence Result," *Journal of Political Economy*, 133(4), 1235–1275.

Woodford, M. (2011): "Simple Analytics of the Government Expenditure Multiplier," *American Economic Journal: Macroeconomics*, 3(1), 1–35.

Woodford, M., and Y. Xie (2022): "Fiscal and monetary stabilization policy at the zero lower bound: Consequences of limited foresight," *Journal of Monetary Economics*, 125, 18–35.

Tables

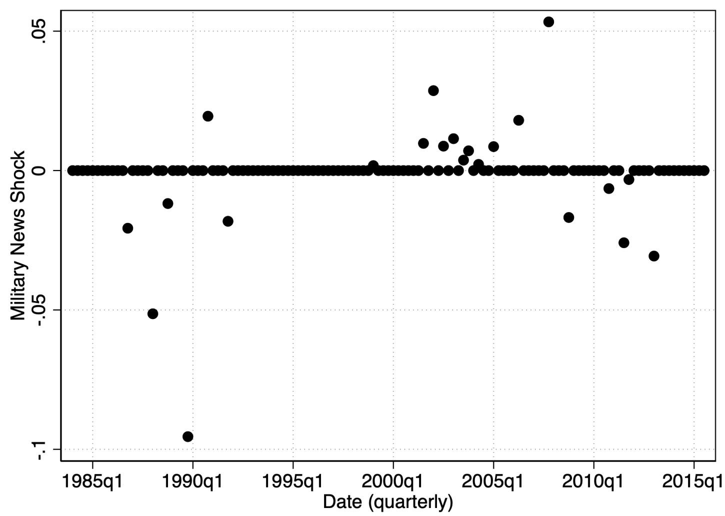
Table 1
Summary Statistics

Variable	Mean	Median	St. Dev.	95th Percentile
		Panel A: Panel Data		
Capital Investment	0.00286	-0.00449	0.09498	0.12009
%Δ Debt Stock	0.06048	-0.01183	0.74503	0.50813
Leverage	0.27331	0.23420	0.23250	0.67825
Tobin's Q	1.91226	1.40310	1.71576	4.67807
Market leverage	0.1874867	0.1471436	0.1742802	0.5393966
Corporate tax rate	0.301568	0.3499899	0.1580175	0.5
Debt cost	0.0889602	0.0779737	0.0648927	0.1773507
$\text{WACC}_{\text{CAPM}}$	0.0890243	0.0873135	0.0369198	0.1538499
WACC_{FF3}	0.1093625	0.0956037	0.3637045	0.7379617
WACC_{FF5}	0.1045011	0.0982473	0.4912701	0.9304146
WACC_{Car}	0.0914304	0.087143	0.4347223	0.8166987
		Panel B: Time Series Data		
Military spending news (full)	-0.00088	0.00000	0.01235	0.00929
Military spending news (non-zero)	-0.00466	0.00190	0.02859	0.02736
$cycl(\log(G))$	0.00126	0.00342	0.03081	0.04551
$cycl(\log(GDP))$	0.00284	0.00688	0.02390	0.03727
$cycl(\log(Taxes))$	0.03182	0.06954	0.14552	0.18220
$cycl\,(Gov.\ Debt/GDP)$	0.01008	-0.00411	0.08983	0.16290
$y_t^1 - y_{t-1}^1$	-0.0004658	0.00005	0.0050287	0.0067
$y_t^{40} - y_{t-1}^{40}$	-0.000611	-0.0001756	0.0052903	0.0080493
$\tilde{y}_t^1 - \tilde{y}_{t-1}^1$	-0.0003001	-0.0003541	0.0069039	0.0109883
$\tilde{y}_t^{40} - \tilde{y}_{t-1}^{40}$	-0.0003795	-0.0000535	0.0042426	0.0061575
Level	-0.0055344	-0.0054949	0.0226847	0.0379505
Slope	0.0007756	0.0008412	0.0031362	0.0061744
Curvature	-0.000091	-0.00005024	0.000911	0.0012788
$\widetilde{\text{Level}}$	-0.0006148	-0.0006696	0.0242924	0.0325608
$\widetilde{\text{Slope}}$	0.000316	-0.000103	0.0051425	0.0089403
$\widetilde{\text{Curvature}}$	0.0001685	0.000091	0.0015018	0.0025845
EPU Index	142.9453	134.3147	40.43167	223.213
GPR Index	83.48538	78.35478	31.71938	128.0811

Figures

Figure 1
Narrative-Based Military Spending News Shock

(a) Full Shock Series



(b) Non-zero Shock Series

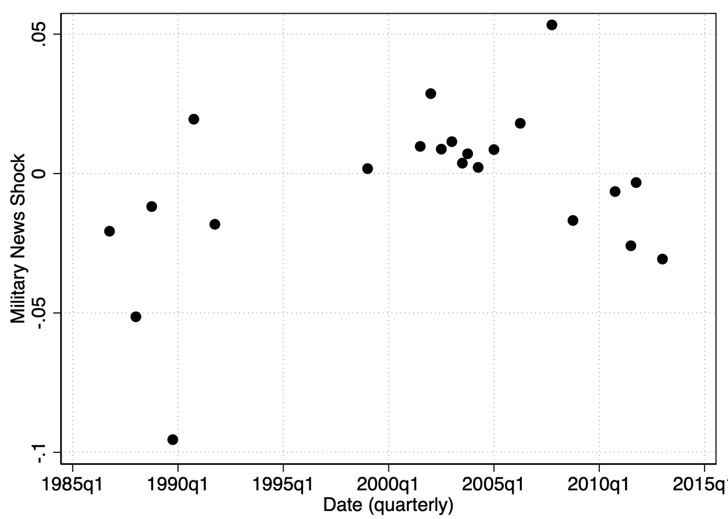


Figure 2
The Average Response of Corporate Investment to Fiscal Shocks

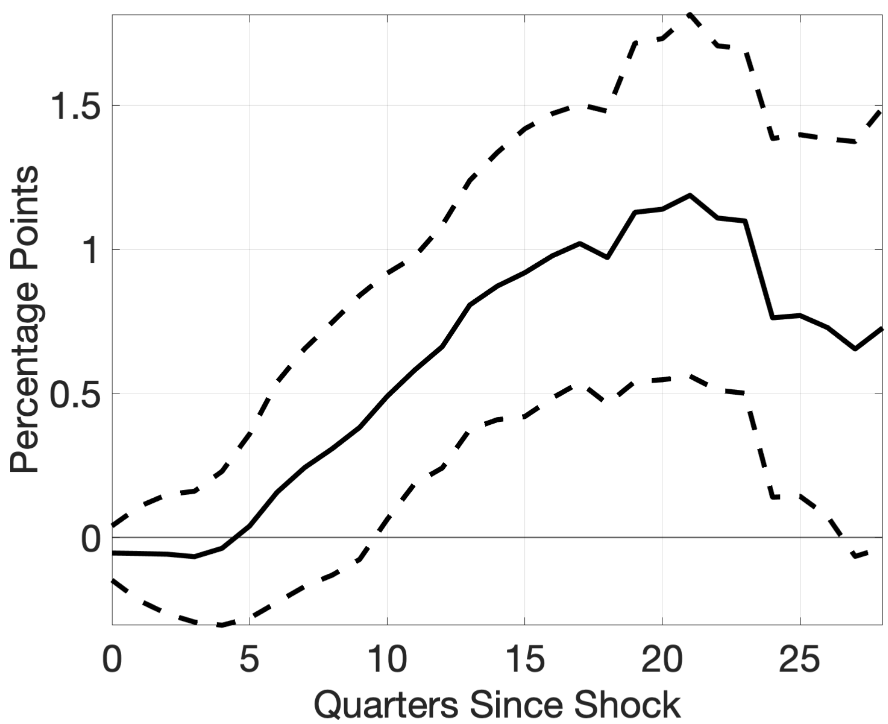


Figure 3
The Average Response of Corporate Investment to Fiscal Shocks
— DOD Contractors vs. Never DOD Contractors —

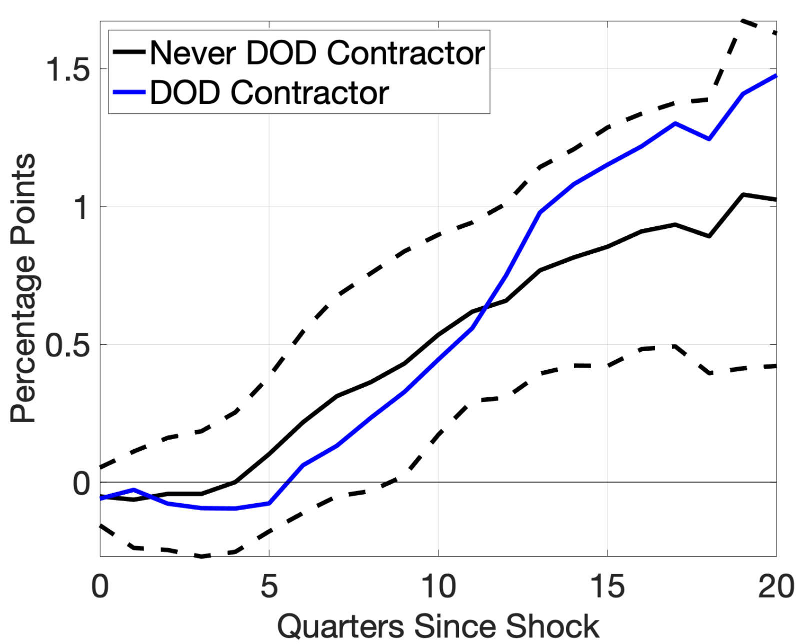
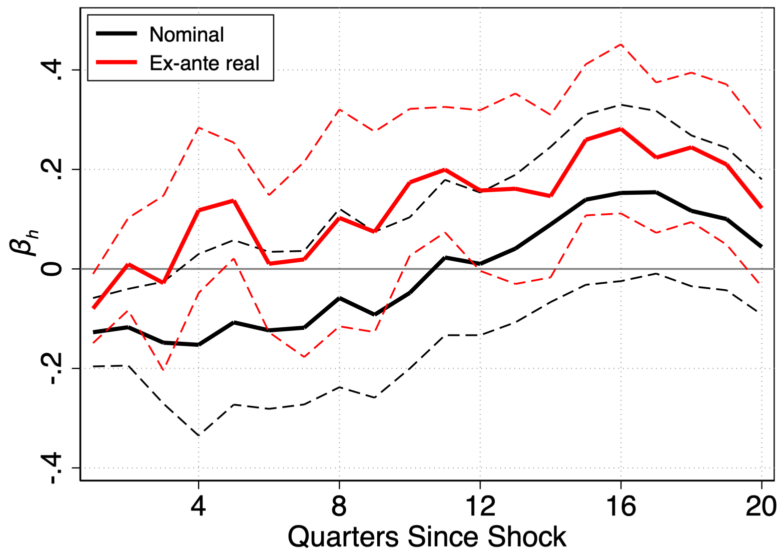


Figure 4
The Response of Interest Rates to Fiscal Shocks

(a) 3-month Treasury Bill Yield



(b) 10-year Treasury Note Yield

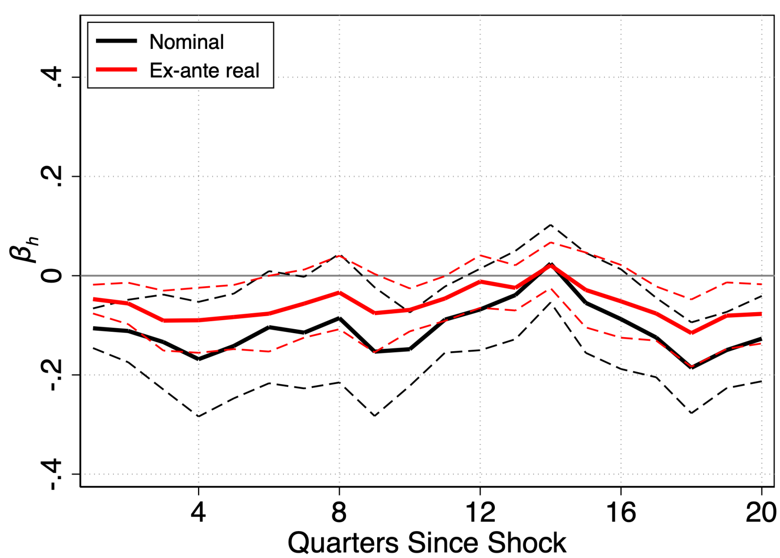
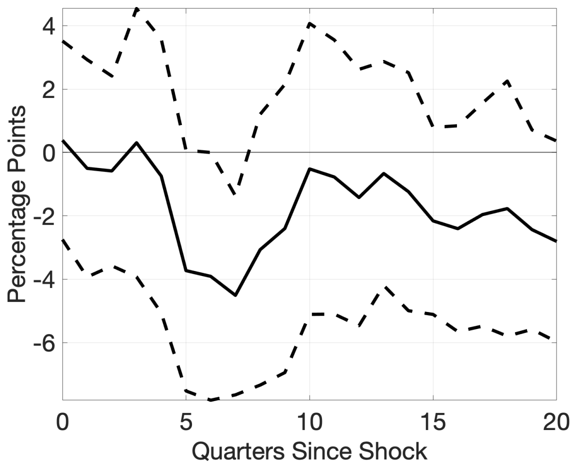
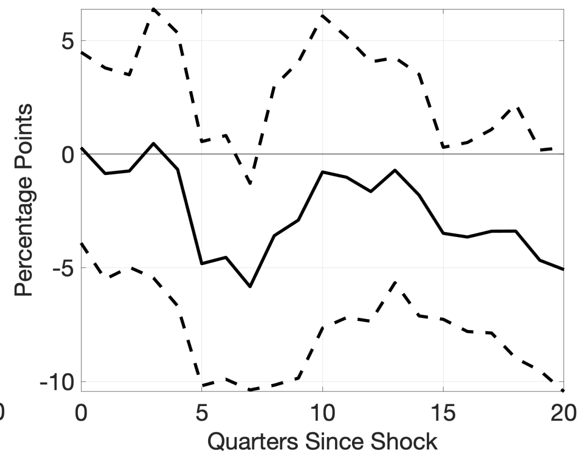


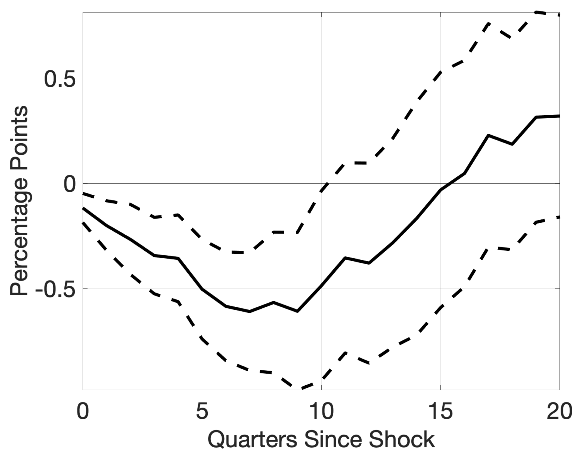
Figure 5
The Response of WACC and Tobin's Q to Fiscal Shocks



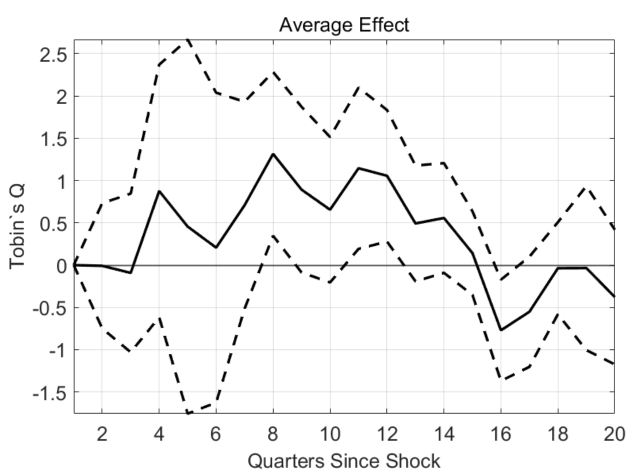
(a) WACC using Fama-French 3-factor model



(b) Equity cost: Fama-French 3-factor model



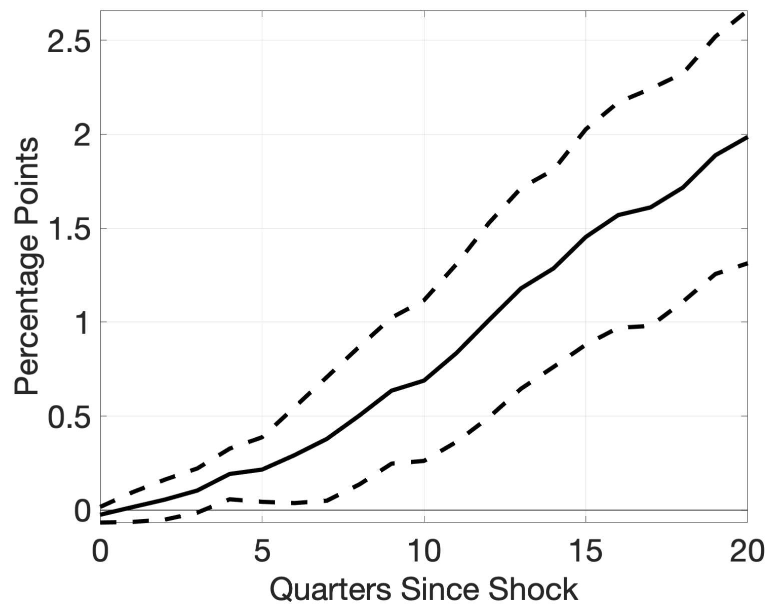
(c) Debt cost



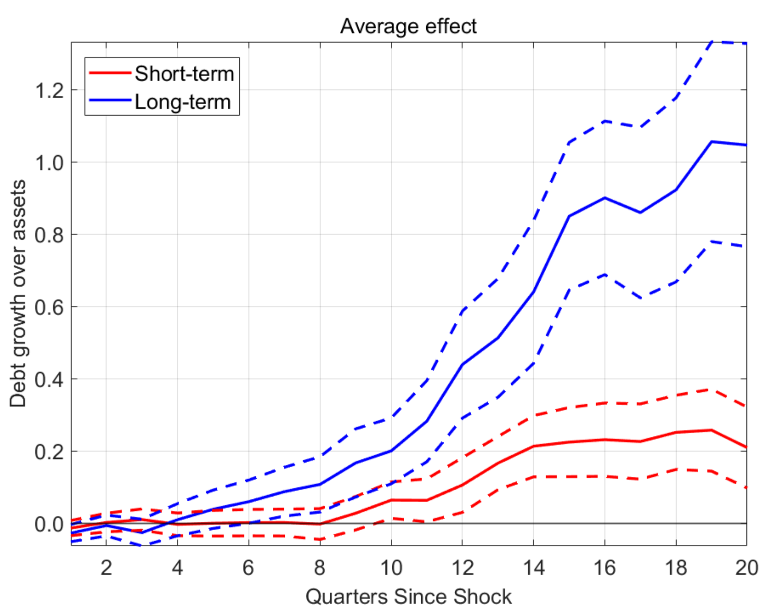
(d) The Response of Tobin's Q to Fiscal Shocks

Figure 6
The Average Response of Corporate Debt to Fiscal Shocks

(a) All Corporate Debt



(b) Short- vs. Long-term Corporate Debt



Appendix A

A.1 Additional Tables and Figures

Table A.1.1
Variable Definitions

Variable	Source/Definition	Dates
	Compustat Variables	
Corporate Investment	$\Delta log(k_{j,t+1})$ See Ottonello and Winberry (2020) Appendix for details.	1983:1—2019:4
Size	log(`atq`) Log of total assets.	1983:1—2019:4
Leverage	(`dlcq` + `dlttq`)/`atq` Short-term + long-term debt to total assets.	1983:1—2019:4
Tobin's Q	(`atq` + `prccq` × `cshoq` - `ceqq`)/`atq` Total assets + stock price × shares outstanding - common equity to total assets.	1983:1—2019:4
Cash-Flow	(`ibp` + `dqp`)/`atq` Income before extraordinary items + depreciation and amortization to total assets.	1983:1—2019:4
Profitability	`oiadpq`/`atq` Operating income before depreciation to total assets.	1983:1—2019:4
Market leverage (`mkt_lev`)	(`dlttq` + `dlcq`)/(`atq` + `prccq`×`cshoq` - `seqq` - `txdbq`) Short and long-term debt to total assets + stock price × shares outstanding - parent's stockholders equity - deferred taxes.	1983:1—2019:4
Corporate tax rate (`tax`)	`txtq`/`piq` Income taxes (total) to pretax income ratio.	1983:1—2019:4
Debt cost	`xintq`/(4×(`dlttq` + `dlcq`)) Interest expense to total debt ratio.	1983:1—2019:4
$\text{WACC}_{\text{CAPM}}$	`eq_cost_capm`×`(1-mkt_lev)` + `debt_cost`×`mkt_lev`×`(1-tax)` Weighted-average cost of capital using the cost of equity from the capital asset pricing model (CAPM).	1983:1—2019:4
WACC_{FF3}	`eq_cost_ff3`×`(1-mkt_lev)` + `debt_cost`×`mkt_lev`×`(1-tax)` Weighted-average cost of capital using the cost of equity from the Fama-French three-factor model.	1983:1—2019:4
WACC_{FF5}	`eq_cost_ff5`×`(1-mkt_lev)` + `debt_cost`×`mkt_lev`×`(1-tax)` Weighted-average cost of capital using the cost of equity from the Fama-French five-factor model.	1983:1—2019:4

WACC_{Car}	eq_cost_car4×(1-mkt_lev) + debt_cost×mkt_lev×(1-tax) Weighted-average cost of capital using the cost of equity from the Carhart four-factor model.	1983:1—2019:4
	Aggregate Variables	
Government spending shock	Military spending news/exp(trend(log(*Real GDP*))), where trend(log(*Real GDP*)) is the trend component from a Hamilton filter and Military spending news is from Ramey and Zubairy (2018)	1983:1—2015:3
Cyclical real GDP	FRED/BEA (GDP, USAGDPDEFQISMEI). Extract cylical component from log(Real GDP) = log(GDP/USAGDPDEFQISMEI) using Hamilton filter	1983:1—2019:4
Cyclical real gov. consumption expenditure	FRED/BEA (GCE, USAGDPDEFQISMEI). Extract cyclical component from log(Real GCE) = log(GCE/USAGDPDEFQISMEI) using Hamilton filter	1983:1—2019:4
Cyclical real taxes	FRED/BEA (USAGDPDEFQISMEI, Table 3.1). Extract cyclical component from log(Real taxes) = log(BEA Taxes/USAGDPDEFQISMEI) using Hamilton filter	1983:1—2019:4
Cyclical gov. debt to GDP ratio	BIS (general gov. debt to GDP). Extract cylical component from *Gov. Debt/GDP* = general gov. debt to GDP using Hamilton filter	1983:1—2019:4
Zero coupon spot rates	FRED/FRB (DTB3); Gürkaynak, Sack, and Wright (2007)	1983:1—2019:4
Expected inflation	FRED/Cleveland Fed (EXPINF<YY>YR for <YY> ∈ {1—30})	1983:1—2019:4
Level factor	The first principal component extracted from the three-month, one-, two-, three-, four-, five-, and ten-year zero coupon Treasury yields.	1983:1—2019:4
Slope factor	The second principal component extracted from the three-month, one-, two-, three-, four-, five-, and ten-year zero coupon Treasury yields.	1983:1—2019:4
Curvature factor	The third principal component extracted from the three-month, one-, two-, three-, four-, five-, and ten-year zero coupon Treasury yields.	1983:1—2019:4

Figure A.1.1
The Average Response of Corporate Investment to Fiscal Shocks
— Robustness Exercises —

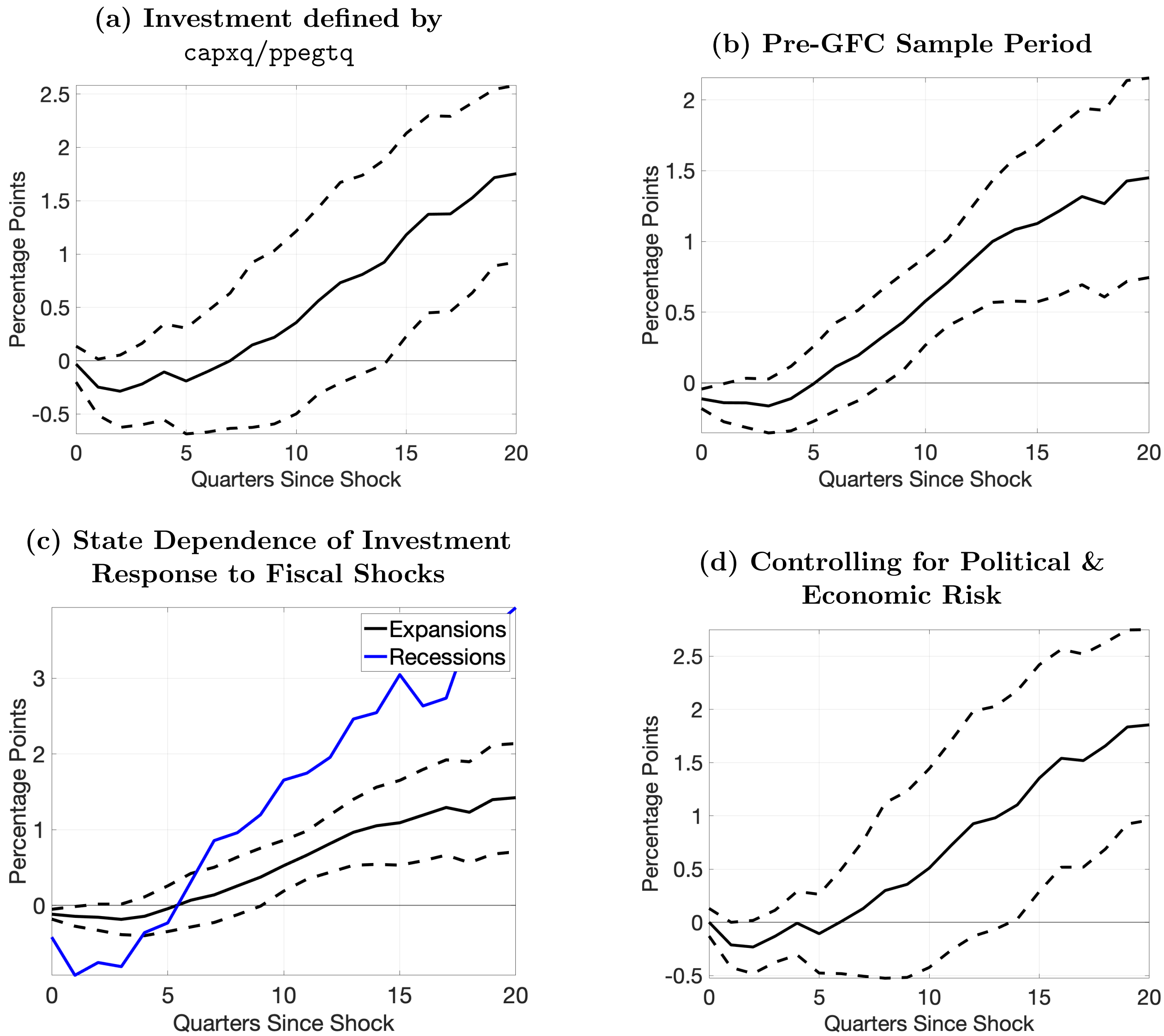


Figure A.1.2
Histogram of DOD contract amounts, in log dollars

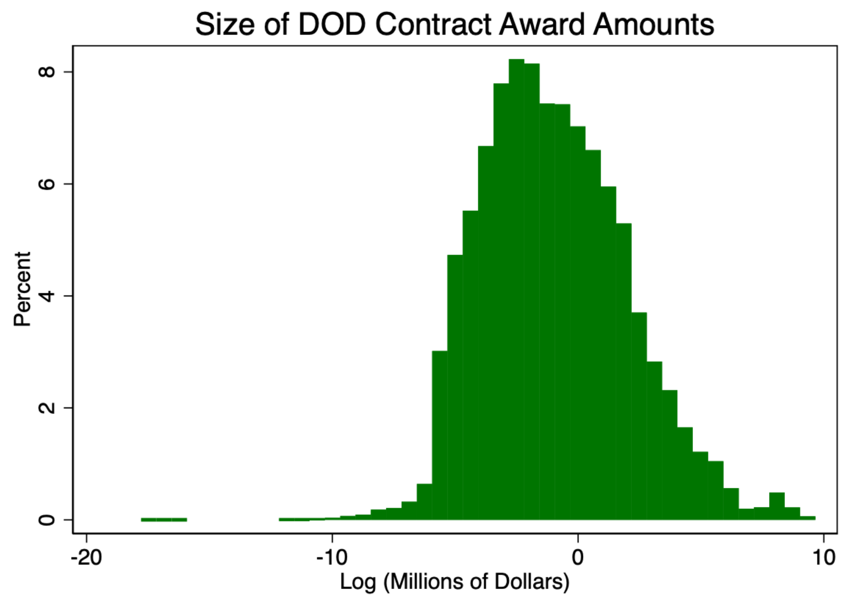


Figure A.1.3
Aggregate DOD contracts time-series

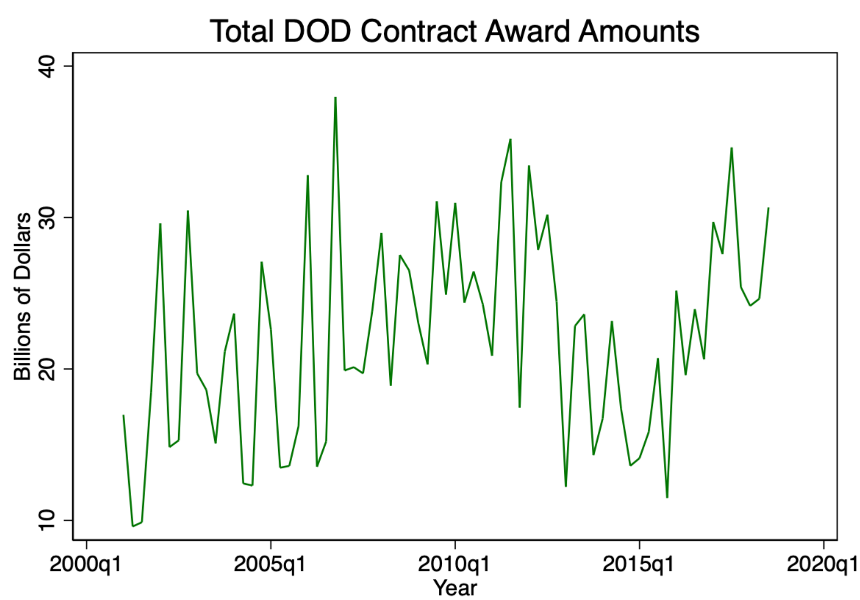


Figure A.1.4
Number of contracts over the sample

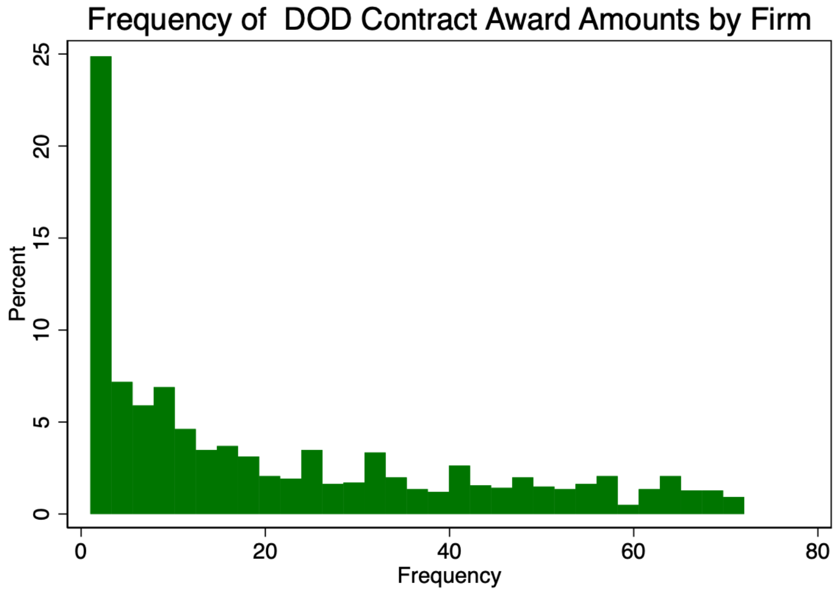
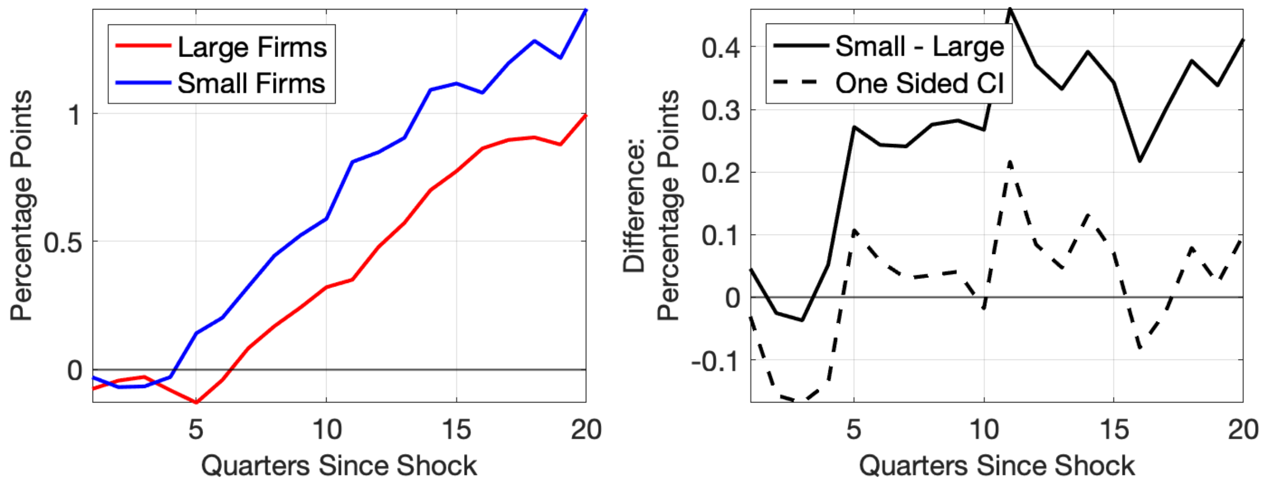
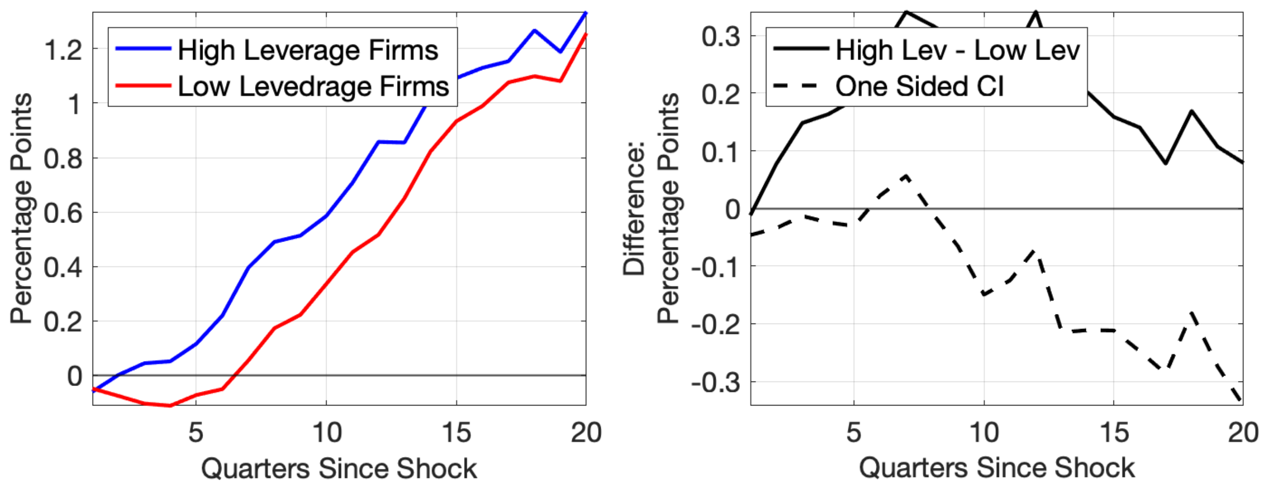


Figure A.1.5
The Heterogeneous Response of Corporate Investment to Fiscal Shocks

(a) Size



(b) Leverage



(c) Financial Constraint Proxy (Whited-Wu Index)

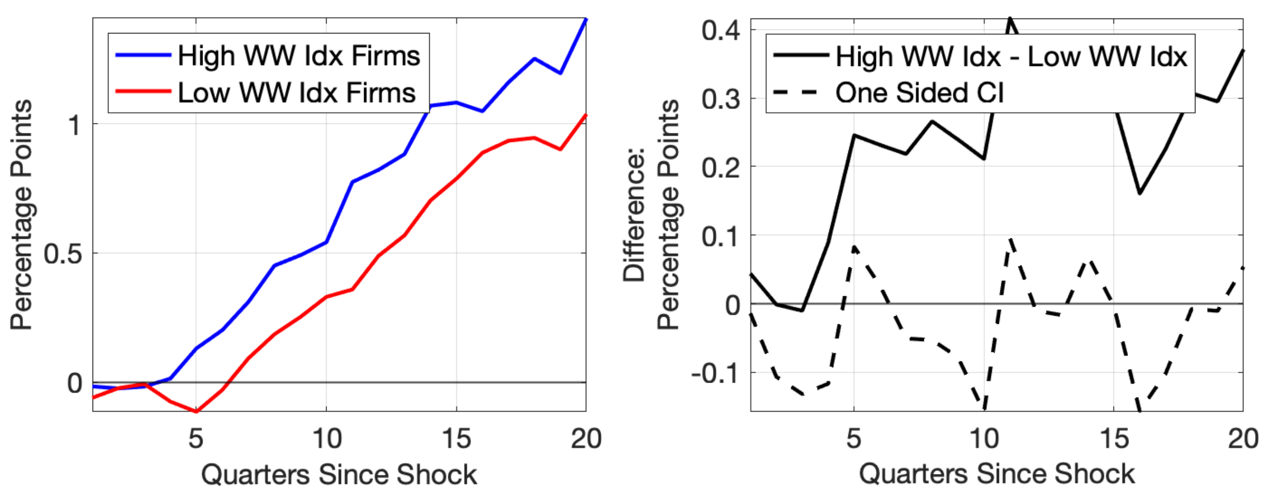
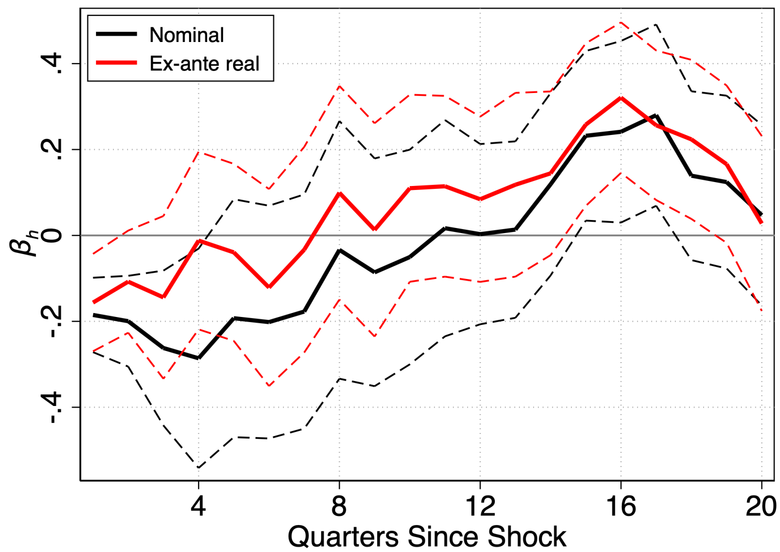


Figure A.1.6
The Response of Interest Rates to Fiscal Shocks in the pre-ZLB Period
— Robustness Exercises —

(a) 3-month Treasury Bill Yield



(b) 10-year Treasury Note Yield

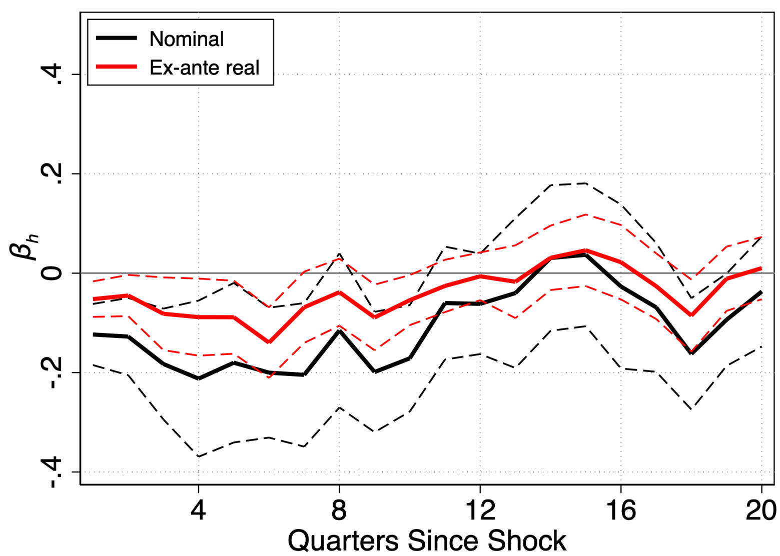
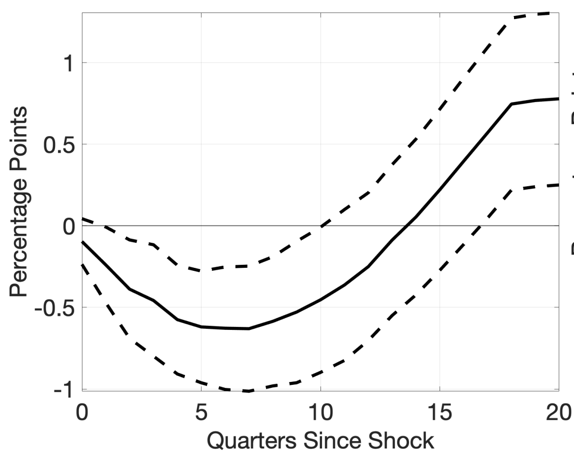
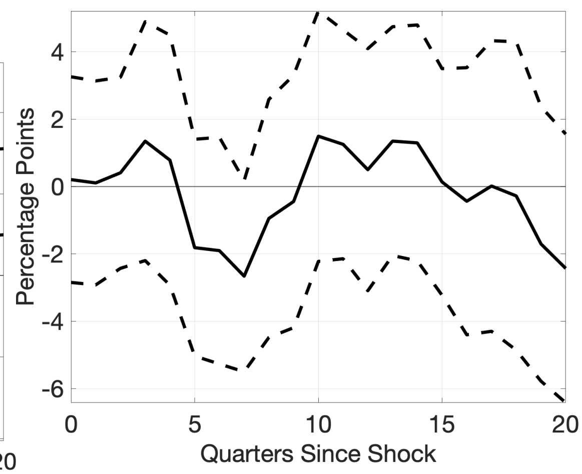


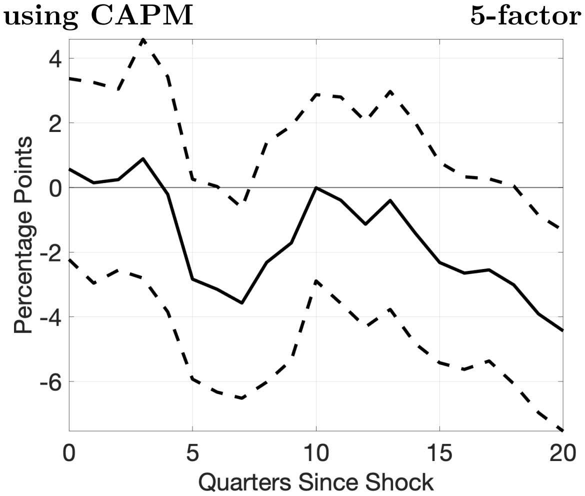
Figure A.1.7
The Response of WACC to Fiscal Shocks



(a) WACC using CAPM

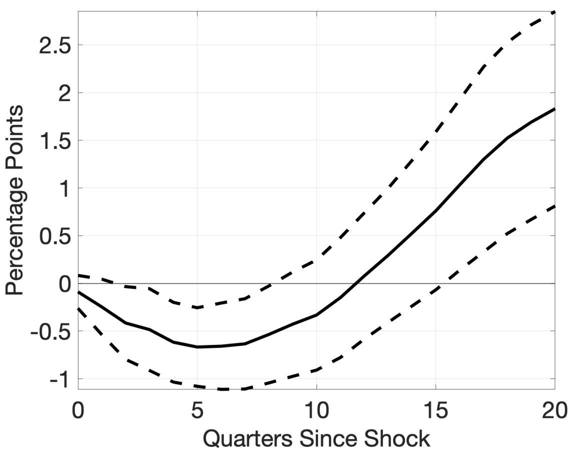


(b) WACC using Fama-French 5-factor model

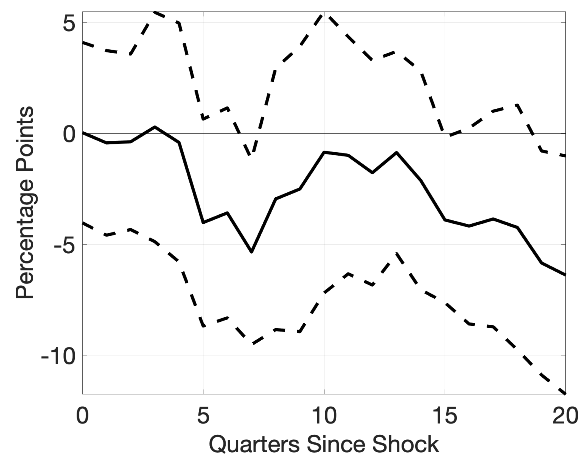


(c) WACC using Carhart 4-factor model

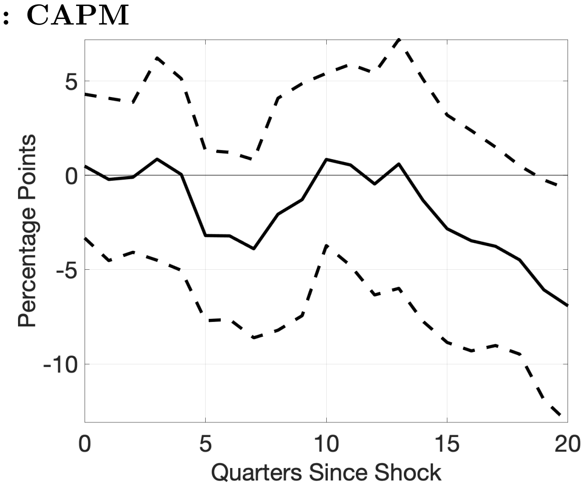
Figure A.1.8
The Response of WACC Components to Fiscal Shocks



(a) Equity cost: CAPM



(b) Equity cost: Fama-French 5-factor model



(c) Equity cost: Carhart 4-factor model

A.2 Auerbach & Gorodnichenko (2012) identification strategy

We also considered the identification strategy in Auerbach and Gorodnichenko (2012) as a robustness check. Building upon the seminal work of Blanchard and Perotti (2002), they assumed that government spending is exogenous to shocks within the quarter, yet accounting for potential anticipation using Greenbook and SPF forecasts. Following their approach, we computed the alternative shocks measure by regressing government consumption spending on the contemporaneous and lagged forecast errors and lags of other controls:

$$g_t = \alpha_0 + \alpha_1(4)\text{fe}_t + \alpha_2(3)g_{t-1} + \alpha_3(3)y_{t-1} + \alpha_2(3)\text{taxes}_{t-1} + \alpha_2(3)\text{debt}_{t-1} + \varepsilon_t^g, \quad \text{(A.2.1)}$$

where we control the government consumption spending g on four lags of itself, GDP (y), US general government debt over GDP (debt), real taxes (taxes), and the contemporaneous and lagged forecast errors (fe) associated with the difference between the first vintage of the quarterly growth rate of government spending and its corresponding professional forecast submitted at the end of the previous quarter. With the exception of forecast errors, which are measured as quarterly growth rates, all variables are Hamilton-filtered.[12] The residuals $\hat{\varepsilon}_t^g$ resulting from regression (A.2.1) are portrayed in Figure A.2.1 and comprise the shock measure under the Auerbach and Gorodnichenko (2012) and Blanchard and Perotti (2002) (AG-BP) identification strategy.

In Figure A.2.2, we portray the average investment response to a one percent innovation in government consumption spending. The corporate investment response is muted in the first three years, after which it displays a crowding-in even though the estimated impulse response is not statistically significant.

[12]Taxes include contributions for government social insurance from persons and transfer receipts from businesses (net) and persons. We deducted from this measure government social benefits to persons. We used the GDP implicit price deflator in the BEA National Accounts to deflate the resulting net taxes measure we computed.

Figure A.2.1
Government spending shocks under Blanchard and Perotti (2002) identification.

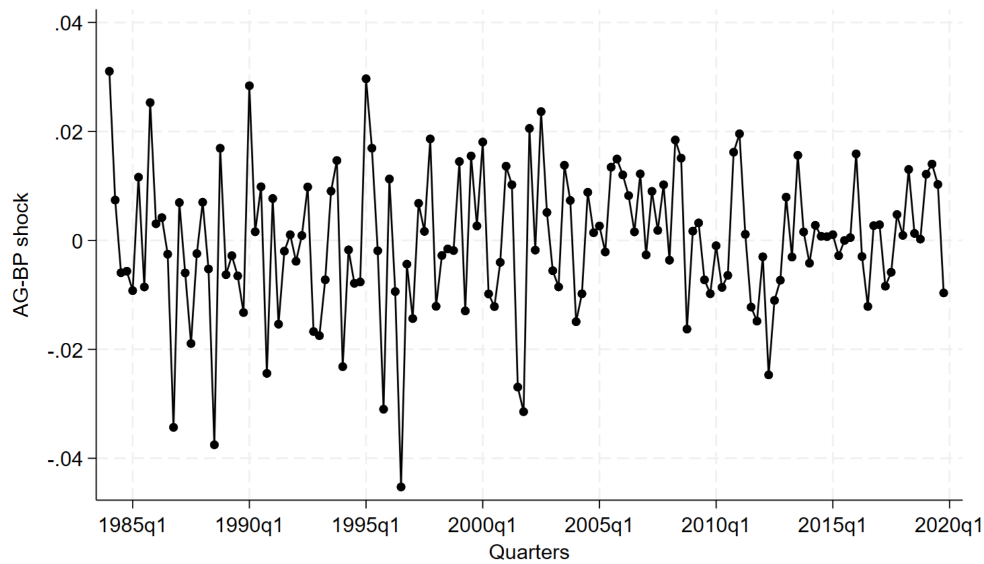


Figure A.2.2
The Average Cumulative Response of Corporate Investment to B-P shock

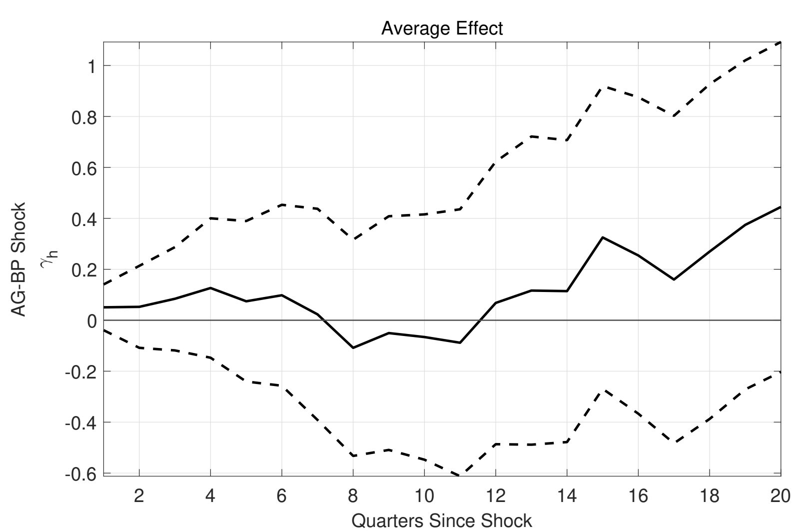
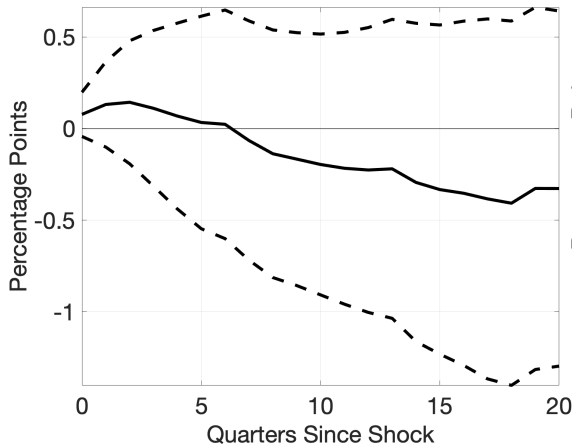
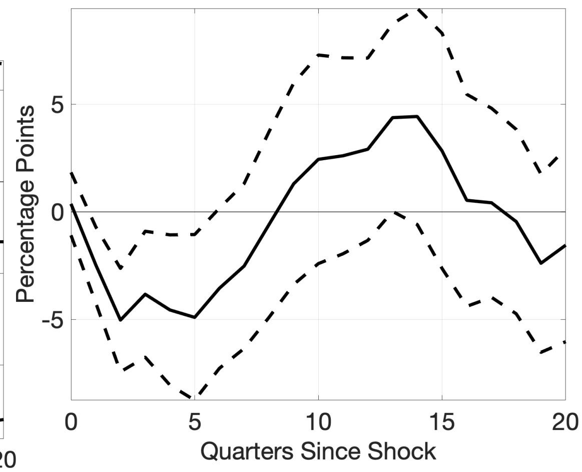


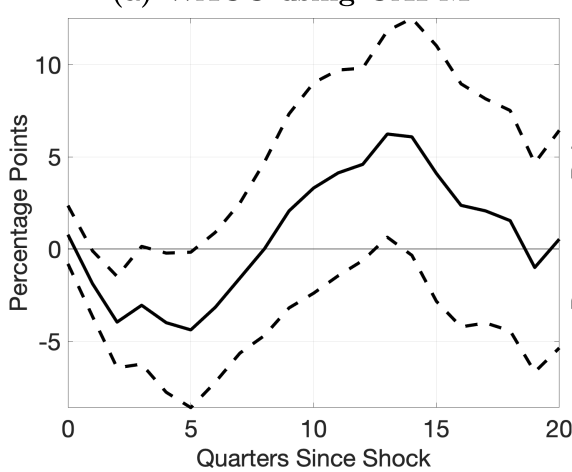
Figure A.2.3
The Response of WACC to Fiscal Shocks: A-G Identification Strategy



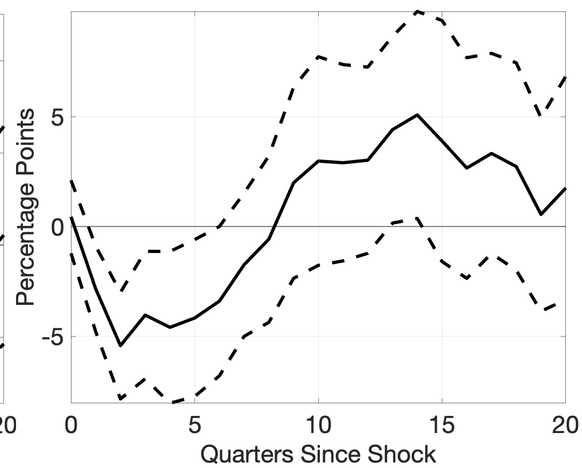
(a) WACC using CAPM



(b) WACC using Fama-French 3-factor model

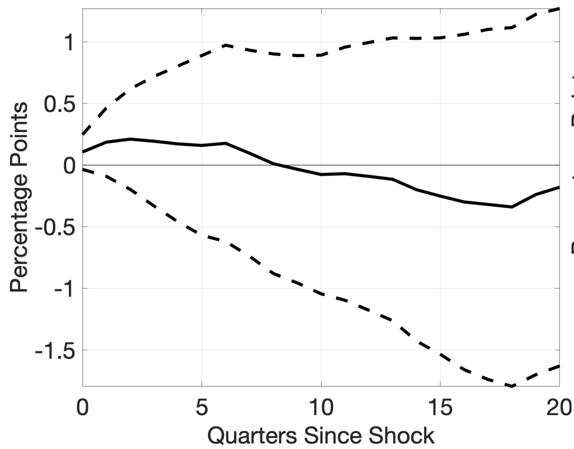


(c) WACC using Fama-French 5-factor model

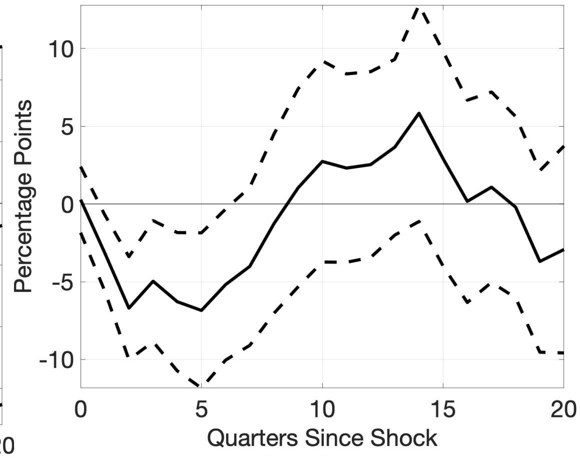


(d) WACC using Carhart 4-factor model

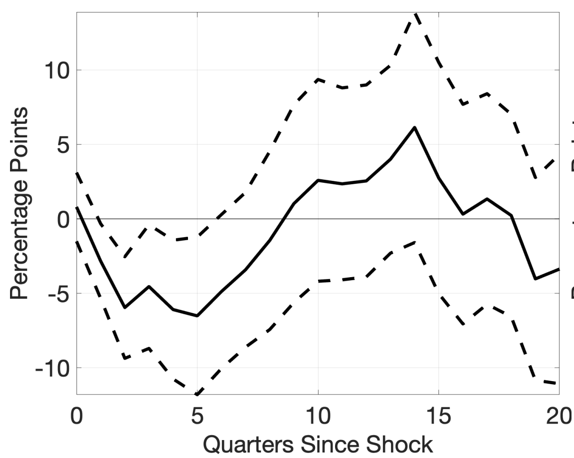
Figure A.2.4
The Response of WACC Components to Fiscal Shocks: A-G Identification Strategy



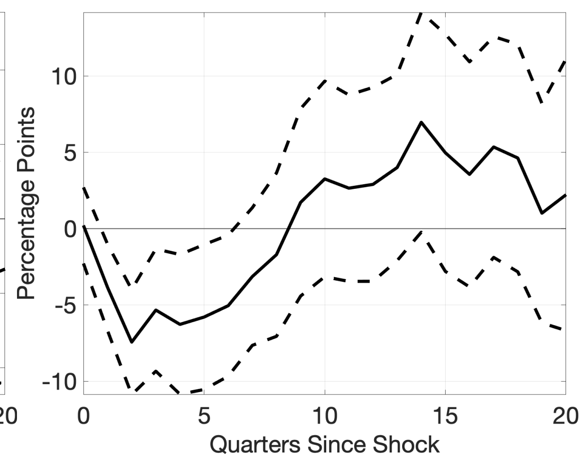
(a) Equity cost: CAPM



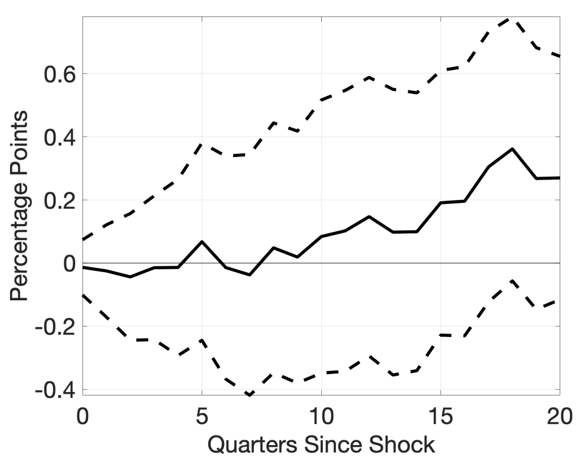
(b) Equity cost: Fama-French 3-factor model



(c) Equity cost: Fama-French 5-factor model



(d) Equity cost: Carhart 4-factor model



(e) Debt cost

A.3 Responses of Economic Aggregates

The empirical evidence that capital investment by Compustat firms crowds *in* following fiscal spending news starkly contrasts the predictions of workhorse macroeconomic models. While some empirical papers using macro-level data have found evidence consistent with these theoretical predictions, more recent papers have documented findings in contrast with the conventional wisdom.[13]

As discussed in Section 2.3, our identification approach in this paper follows the narrative military spending news approach introduced in Ramey (2011b). In this paper and other subsequent work (e.g. Ramey, 2016), aggregate non-residential and residential investment is shown to *fall* in response to positive innovations in military spending news. Hence, how can we reconcile the empirical evidence that aggregate investment crowds *out* in response to fiscal shocks with the responses in the corporate investment we have presented thus far?

First, and most pressingingly, we note that the result in Ramey (2016) that non-residential and residential investment statistically significant decline following the military spending news shock is not robust to the post-Korean War period. In results not shown here, using the same data and specification from Ramey (2016), we find that non-residential and residential investment exhibit muted or even statistically significantly *positive* responses to military spending news in the sample period we consider in this paper.

Next, we acknowledge that there is a significant challenge in comparing our results with those from the existing literature. This challenge is due to the myriad identification approaches, econometric specifications, variable definitions, and sample periods considered by the wealth of papers studying government spending shocks and investment. Hence, we proceed to establish a set of baseline results within a setting most closely mirroring that from our panel regression analysis above.

In this context, we seek to provide answers to several questions concerning the relationship between our results and the evidence from the literature on the effect of fiscal shocks on investment. First, what are the dynamic responses to government spending shocks of the capital expenditures portion of investment in the National Income Product Account (NIPA) tables, aggregate capital investment observed by the universe of Compustat firms, and the "residual" component that nets out the latter from the former? Second, what are the responses of other economic aggregates like output, government spending, the government debt-to-GDP ratio, taxes, and consumption? And finally, how do the fiscal multipliers implied by these aggregate economic responses in our sample compare to those from the existing literature?

[13]For an extensive review of the literature on the effects of fiscal shocks on private investment, see Ramey (2011a).

To establish a baseline set of results about the responses of different components of investment to fiscal shocks, we carefully build a quarterly time series of real, seasonally adjusted corporate investment from Compustat as well as capital investment from NIPA, which we use to construct the residual component that nets out investment from Compustat from the NIPA series. We are scrupulous in construction of these investment series given the disparate sample periods and approaches for seasonal adjustment, deflating, and detrending utilized in "off-the-shelf" variables. Accordingly, we take the following steps in this analysis:

1. Obtain aggregate nominal (not seasonally adjusted) Compustat investment by summing the `capex` variable quarter-by-quarter across firms.
   (a) Multiple series by 4 to convert to an annual rate (dollar flow) for comparison with NIPA series.
2. Obtain nominal (not seasonally adjusted) NIPA capital investment from FRED by summing fixed gross private domestic investment in structures (`NA000339Q`) and equipment (`NA000340Q`).
3. Seasonally adjust aggregate nominal Compustat and nominal NIPA capital investment using X-13 from 1984:1—2019:4.
4. Compute (seasonally adjusted) residual NIPA investment equal to the difference between the two seasonally adjusted series.
5. Deflate all series using a common implicit price deflator, `USAGDPDEFQISMEI` from FRED.
6. Take logs and Hamilton-filter all series to extract the cyclical component of each series.
   (a) Note: Hamilton filtering drops 11 observations. Final series run from 1986:3—2019:4.

We then ask how these three investment series respond to fiscal shocks by estimating the following local projections, for $h = 0, 1, \ldots, 20$:

$$Y_{t+h} = \alpha_h + \beta_h \varepsilon_t^g + \mathbf{\Phi}_h(4)\mathbf{X}_{t-1} + \epsilon_{t+h}, \qquad \text{(A.3.1)}$$

where we take Y_{t+h} to be the cyclical components of investment described above. ε_t^g is the government spending shock, and $\mathbf{X}_{t-1}$ comprises the cyclical components of real GDP, real government consumption expenditures and gross investment, real taxes, and the government debt to GDP ratio, as well as the government spending shock ε_{t-1}^g and the LHS variable. The main coefficients of interest from equation (A.3.1) are the β_h, which capture the effect of the government spending shock on investment h periods after the shock.

The results are in Figure A.3.1. Panel (a) highlights that in our sample, which runs from 1986:3 until 2019:4, increases in military spending news lead to a positive and sometimes statistically significant response in capital investment from NIPA. On impact, the shock does not have a statistically significant effect; however, during the three-year period following the shock, the point estimate is positive and occasionally statistically significant. Thereafter, capital investment from NIPA does not appear to change.

In Panel (b), we report the response to the fiscal shock of aggregate capital investment within the universe of Compustat firms. The evidence is consistent with our results from the panel regression analysis in previous sections. On impact, capital investment by Compustat firms does not respond to the shock. However, Compustat firms *increase* their capital expenditures between one and two years following the shock. Remarkably, the effect persists even five years following the shock.

Finally, in Panel (c), we report the response of residual component of capital investment from NIPA that removes capital investment from Compustat firms. The results are consistent with the two distinct responses in NIPA and Compustat firm capital investment. On impact, there is a statistically significant increase in the residual component of capital investment from NIPA. Together with the muted response in capital investment by Compustat firms, we thus understand the overall muted response from Panel (a). A few years after the shock, the response of the residual component is mixed. While the point estimate is positive, it is only occasionally statistically significantly different from zero. Finally, at a four- to five-year horizon after the shock, the point estimate indicates that ex-Compustat capital investment from NIPA is not different from zero. This effect is enough to wash out the long-run crowding in effect for NIPA capital investment that is evident in the capital investment of Compustat firms.

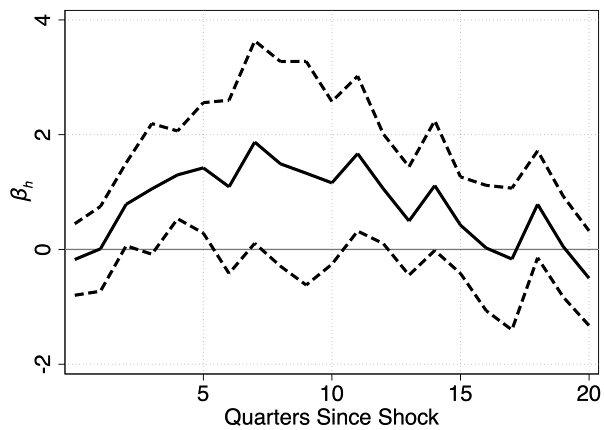
Next, study the responses of other key macroeconomic aggregates by estimating (A.3.1) with these variables entering as Y on the LHS. For more information on the variables we use for output, government expenditures and gross investment, the government debt-to-GDP ratio, and taxes, which comprise the familiar vector of controls $\mathbf{X}$, are defined in Table A.1.1. We also acquire from FRED data on durable (`PCEDG`) and non-durable (`PCEND`) consumption. We deflate these variables using the usual implicit price deflator (`USAGDPDEFQISMEI`), and detrend by taking logs and applying the Hamilton filter.

According to Panel (a) in Figure A.3.2, there is some evidence that the government spending shock increases output on impact. However, while the point estimate is mostly positive over the five-year horizon following the shock, the confidence intervals do not allow us to reject that the response is different than zero. Similarly, in Panel (b), government consumption expenditures and gross investment increase on impact in response to the government spending shock. The IRF further suggests that government spending does statistically significant increase at future horizons as well, with the confidence bands lying above zero at a few points over the five year horizon.

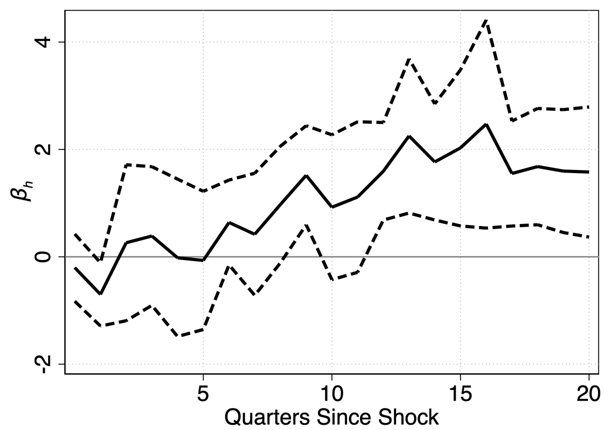
Interestingly, in our sample, the government debt-to-GDP ratio and taxes do not respond to government spending shocks on impact or in the future (Panels (c) and (d)). Finally, we depict the responses of durable and non-durable consumption in Panels (e) and (f), respectively. There is weak evidence that durable consumption responds to the government spending shock; in contrast, non-durable consumption appears to increase with a delay following the shock.

Figure A.3.1
The Response of Aggregate Investment to Fiscal Shocks

(a) NIPA Capital Investment



(b) Compustat Capital Investment



(c) Ex-Compustat NIPA Capital Investment

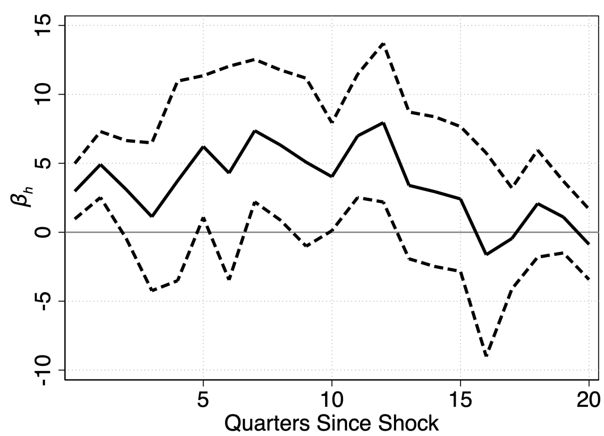
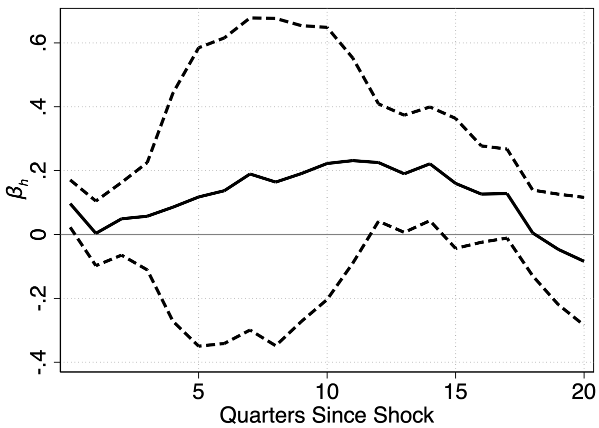
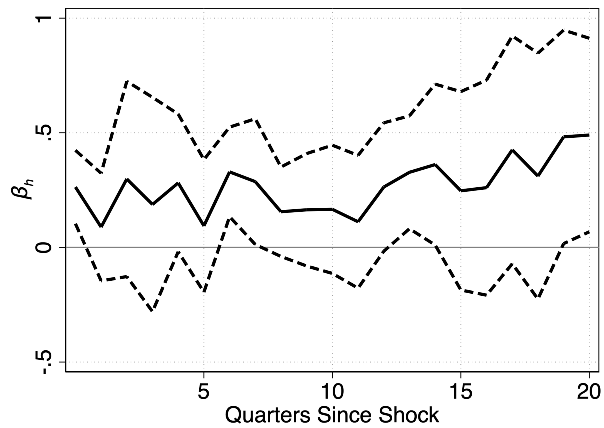


Figure A.3.2
The Responses of Macroeconomic Variables to Fiscal Shocks

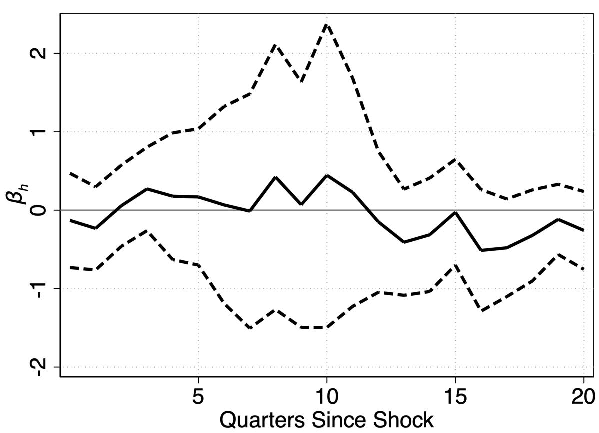
(a) Output



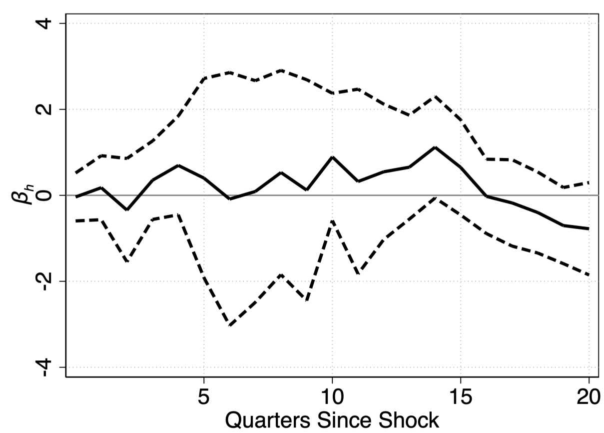
(b) Government Expenditures and Gross Investment



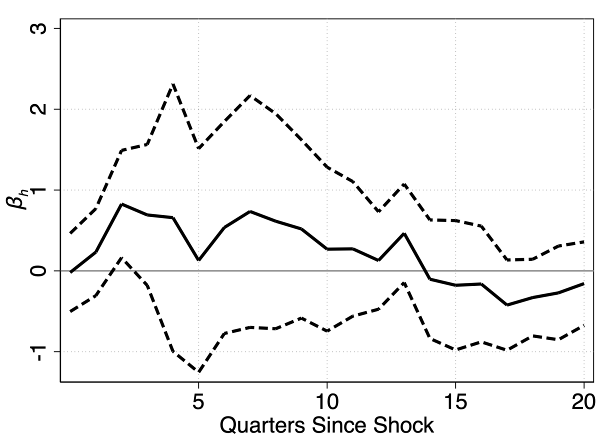
(c) Government Debt/GDP



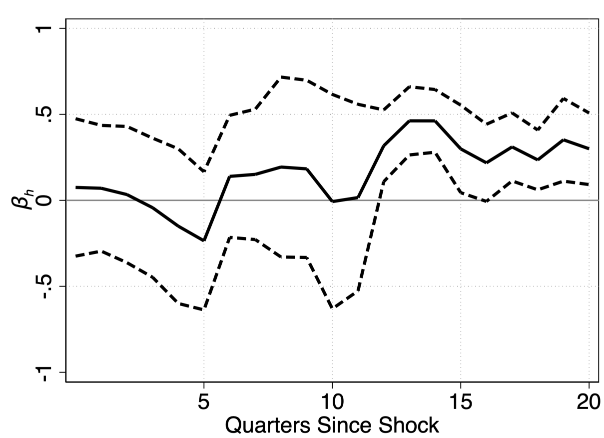
(d) Taxes



(e) Durable Consumption



(f) Nondurable Consumption



A.3.1 Fiscal Multipliers

Having established a set of baseline results on the dynamic responses of aggregate investment to the military spending news shock, next, we estimate the corresponding fiscal multipliers for the investment series. In particular, we follow Hall (2009) and Barro and Redlick (2011) in the outcome variables and government spending changes to the same units. Specifically, we write variables x_t in terms of percentage changes: $x_t = (X_{t+h} - X_{t-1})/X_{t-1} \approx \log(X_{t+h}) - \log(X_{t-1})$, and normalize by lagged output, GDP_{t-1}, as follows:

$$\frac{X_{t+h} - X_{t-1}}{GDP_{t-1}} = \frac{X_{t+h} - X_{t-1}}{X_{t-1}} \frac{X_{t-1}}{GDP_{t-1}} \approx (\log(X_{t+h}) - \log(X_t)) \frac{X_{t-1}}{GDP_{t-1}}.$$

The fiscal multipliers are then derived from the following model, for $h = 0, 1, \ldots, 20$:

$$(y_{t+h} - y_{t-1}) \frac{Y_{t-1}}{GDP_{t-1}} = \gamma_h + m_h (g_{t+h} - g_{t-1}) \frac{G_{t-1}}{GDP_{t-1}} + \mathbf{\Phi}_h(4)\mathbf{X}_{t-1} + \epsilon_{t+h}, \qquad \text{(A.3.2)}$$

where the outcome variable Y_t is one of the three aggregate capital investment series (NIPA, Compustat, or ex-Compustat NIPA), G_t is government consumption expenditures and gross investment, and $\mathbf{X}_{t-1}$ is a vector of controls that includes the LHS variable $(y_{t-1} - y_{t-2})\frac{Y_{t-2}}{GDP_{t-2}}$, the (endogenous) change government spending $(g_{t-1} - g_{t-2})\frac{G_{t-2}}{GDP_{t-2}}$, and the cyclical components of real GDP, real taxes, and the government debt to GDP ratio. Lowercase variables denote logs.

We use Ramey's news shock, ε_t^g, as an instrument for $(g_{t+h} - g_{t-1})G_{t-1}/GDP_{t-1}$. The reason for employing an instrumental variable is because of the endogeneity issue arising through reverse causality between changes in investment and changes in government spending. There are two key identifying assumptions. The first is that the instrument ε_t^g is *relevant*, that is, that it correlates with $(g_{t+h} - g_{t-1})G_{t-1}/GDP_{t-1}$ conditional on the controls $\mathbf{\Phi}_h(4)\mathbf{X}_{t-1}$. The second is that the instrument satisfies the *exclusion restriction*, that is, that ε_t^g correlates with the outcomes of interest Y_{t+h} *only through* the endogenous variable $(g_{t+h} - g_{t-1})\tilde{G}_{t-1}$.

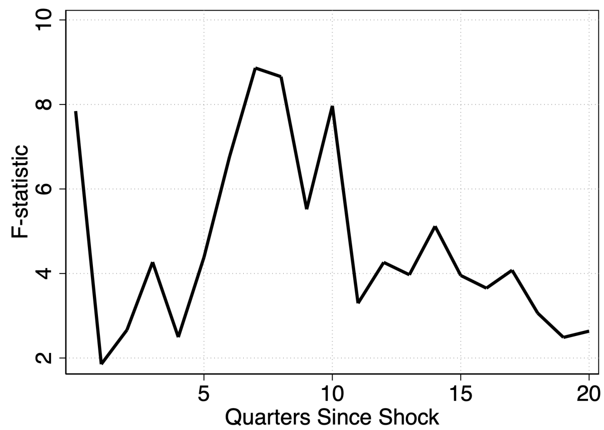
We argue that the exclusion restriction holds, as military spending news is plausibly orthogonal to economic conditions. For more discussion, see Ramey (2011a). Moreover, the evidence we obtain via weak IV tests corroborates Ramey's concerns about the low correlation of the military spending news shock with government spending in the post-Korean war sample. Depicted in Figure A.3.3, the Kleibergen-Paap rk Wald F-statistics are below the critical values of 10 required for relevance.

Hence, we follow Stock and Yogo (2002) and estimate (A.3.2) using the Fuller limited-information maximum likelihood estimator, which is more robust compared to two-staged least squares (2SLS) estimation. Considering this alternative shock measure is interesting insofar as the fiscal shocks literature has discussed the importance of the inclusion of World War II and the Korean War for the military spending news shock to meet be a relevant instrument for government spending. The results from this estimation are in Figure A.3.4. Contrary to the existing literature, in Panel (a) we find that the cumulative fiscal multiplier for capital investment in NIPA is not statistically significantly different from zero. Moreover, the point estimate is actually *positive* and statistically significant four years after the shock, suggesting that government spending causes capital investment to crown in. Panels (b) and (c) depicts the cumulative multiplier on capital investment by Compustat and ex-Compustat NIPA firms. We cannot reject that the multipliers are different than zero for these aggregate investment series.

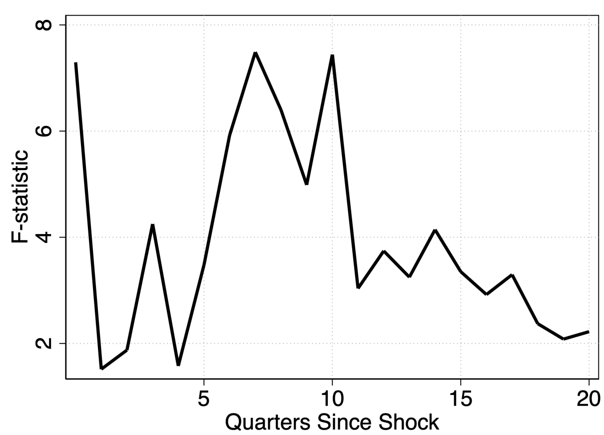
In conclusion, the evidence we find in our time series analyses of the effect of fiscal shocks on components of aggregate investment connects to and sheds new light to the literature in macroeconomics about the effects of fiscal shocks on investment.

Figure A.3.3
F-statistics

(a) NIPA Capital Investment



(b) Compustat Capital Investment



(c) Ex-Compustat NIPA Capital Investment

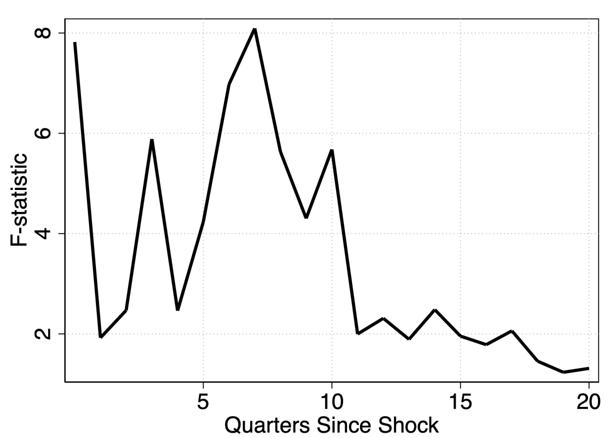
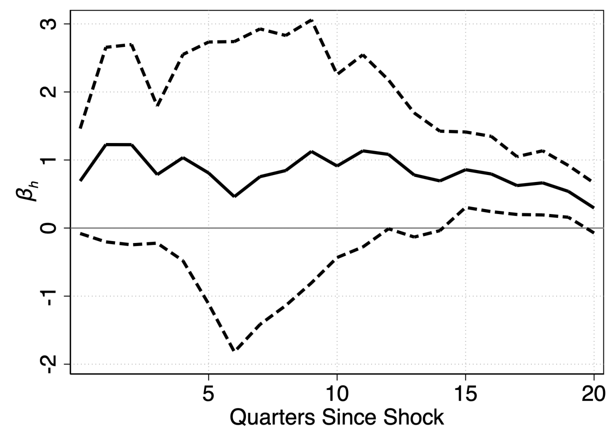
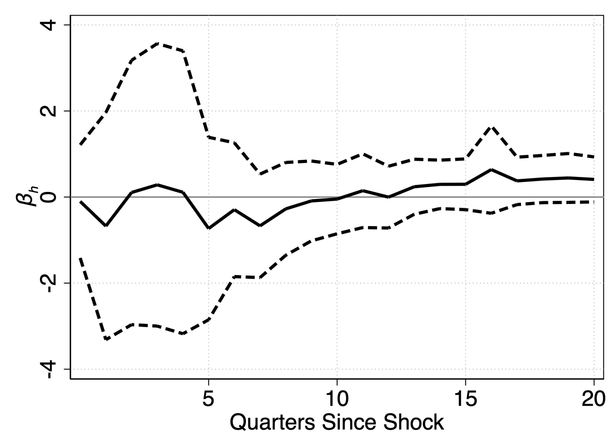


Figure A.3.4
Aggregate Cumulative Investment Multiplier

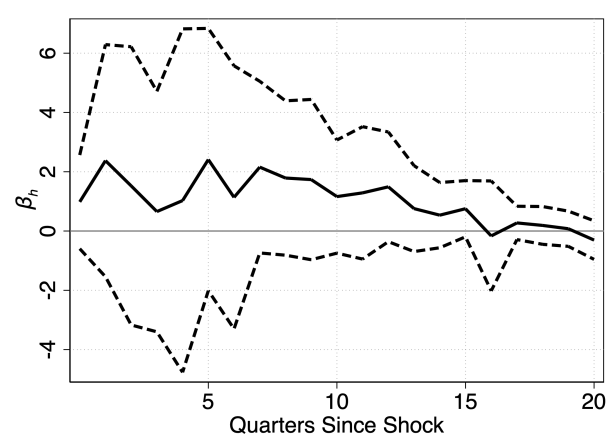
(a) NIPA Capital Investment



(b) Compustat Capital Investment



(c) Ex-Compustat NIPA Capital Investment



A.4 The effect of government spending shocks on asset prices and risk

This appendix provides additional evidence on the effect of the military spending news shock on interest rates and measures of political risk outcomes. In particular, we investigate the dynamics of the Federal Funds Rate, term and credit spreads, the economic policy uncertainty (EPU) index (Baker, Bloom, and Davis, 2016), geopolitical risk (GPR) index (Caldara and Iacoviello, 2022), and presidential party following the shock.

The interest rate regressions follow an analagous specification to equations (3) and (4) in the main text. Specifically, we run the following local projections, for $h = 1, \ldots, 20$:

$$y_{t+h} - y_t = \alpha_h + \beta_h \varepsilon_t^g + \mathbf{\Phi}_h(4)\mathbf{X}_{t-1} + \epsilon_{t+h}, \tag{A.4.1}$$

where y is the outcome variable of interest, ε^g is the narrative military spending news shock, and $\mathbf{X}_{t-1}$ is a vector of controls and their lags including the cyclical components of real GDP, government consumption expenditures and gross investment, government debt, and taxes as well as the government spending shock ε_{t-1}^g, the regressand Δy_{t-1}, and the level, slope, and curvature factors derived from the nominal or ex-ante real term structure.

The first set of results, depicted in Figure A.4.1, show the dynamics of the Federal Funds Rate to the military spending news shock. Panel (a) depicts the response in the full sample, and Panel (b) restricts the sample to the pre-ZLB period. As expected, the IRFs closely mirror the responses of the three-month T-Bill yields in Figure 4a. In both the full and pre-ZLB samples, the nominal rate statistically significantly declines by at least 10 basis points, an effect which persists for up to a year following the military spending news shock. Thereafter, there is some evidence of a long-run increase in the policy rate, particularly of the ex-ante real Federal Funds rate.

Next, we consider the responses of two measures of interest rate spreads. First, we construct a simple measure of the term spread, which is the 10-year T-Note yield minus the 3-month T-Bill yield. The asymmetric response in the short- and long-term yields suggests a flattening term structure slope, and we present this evidence formally here. Second, we consider a measure of corporate credit spreads from Gilchrist and Zakrajšek (2012), henceforth the GZ spread. Each spread measure enters as y on the LHS of (A.4.1), and so the coefficients of interest, β_h, capture the cumulative change in the spread in response to the military spending news shock. We continue to control for lags of the level, slope, and curvature factors in the (nominal or ex-ante real) term structure to account for information already priced in the yield curve at the time of the shock.

Figure A.4.2 reports the results. Consistent with the dynamics of the short- and long-term interest rates in Figure 4, Panel (a) confirms there is a pronounced long-run decline the nominal and ex-ante real term spread. Five years after the military spending news shock, the term spread falls by almost 20 basis points. The decline is particularly pronounced for the ex-ante real term spread. In Panel (b), we find that the GZ spread statistically significantly *increases* in response to the military spending news shock, both on impact and over most of the five-year horizon following the shock. The increase in the GZ spread is between 10 and 20 basis points, on average.

We note that the increase in the GZ spread, which is a measure of the spread between yields faced by large public firms and Treasury yields of a comparable maturity, is not inconsistent with a falling cost of capital faced by the firms in our sample, as we argue in Section 5.2. In particular, it suggests the pass-through of falling Treasury yields to the yields faced by public firms is merely incomplete.

Finally, we investigate the responses of three measures capturing economic or political risk. To this end, we estimate the following local projections, for $h = 0, \ldots, 20$:

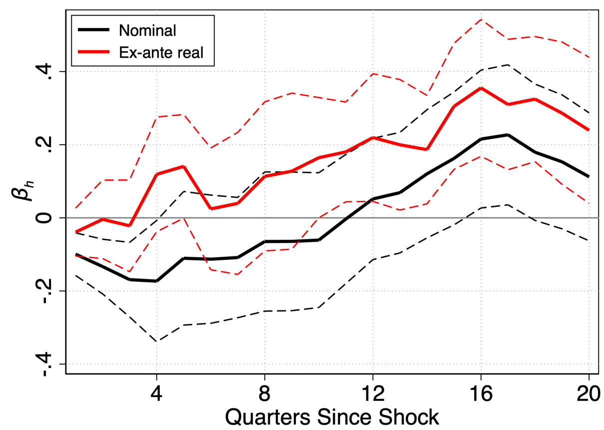
$$Y_{t+h} = \alpha_h + \beta_h \varepsilon_t^g + \mathbf{\Phi}_h(4)\mathbf{X}_{t-1} + \epsilon_{t+h}, \tag{A.4.2}$$

where variables are defined the same as in (A.4.1), except $\mathbf{X}_{t-1}$ now comprises the cyclical components of real GDP, government spending, taxes, and the government spending-to-GDP ratio, as well as the military spending news shock and the LHS variable.

The results are depicted in Figure A.4.3. Panels (a) and (b) report the responses of the EPU index and the GPR indices, respectively. On impact, the military spending news shock does not cause a statistically significant response in the uncertainty and risk indices. Indeed, there is little evidence from the IRFs that the EPU or GPR indices change in response to the government spending shocks. These results, therefore, do not lend support to the hypothesis that the military spending news shock induces a measurable change in economic or political risk. Panel (c) similarly shows that the military spending news shock does not lead to a significant change in the likelihood of a particular presidential party.

Figure A.4.1
The Response of the Federal Funds Rate

(a) Federal Funds Rate



(b) Federal Funds Rate (pre-ZLB)

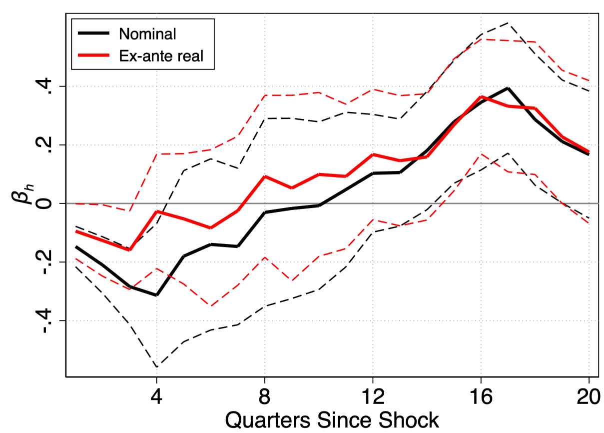
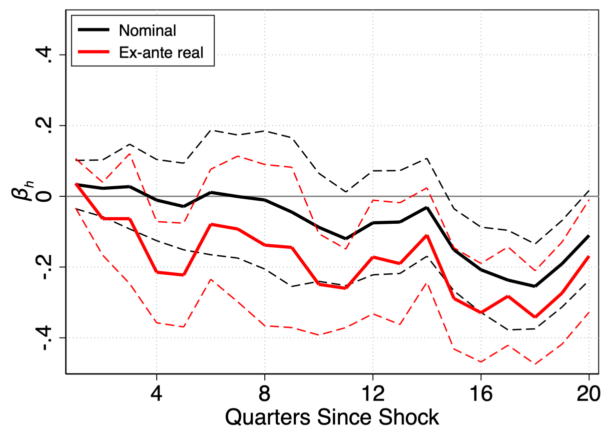


Figure A.4.2
The Response of Interest Rate Spreads

(a) Term Spread



(b) GZ Spread

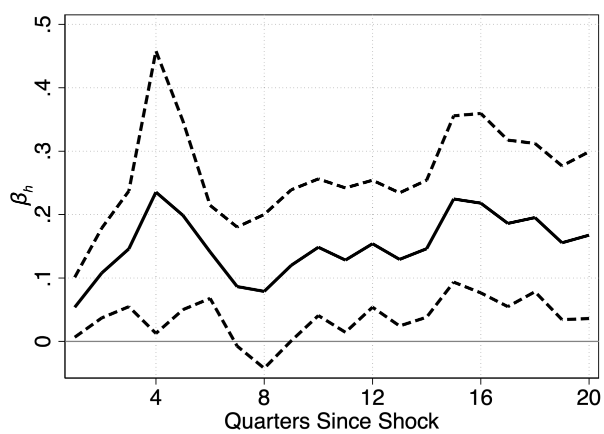
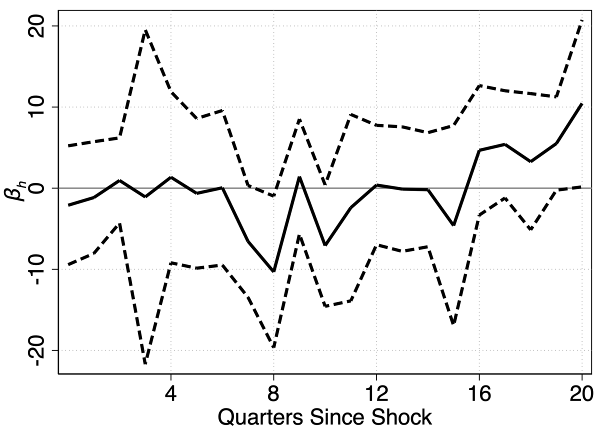
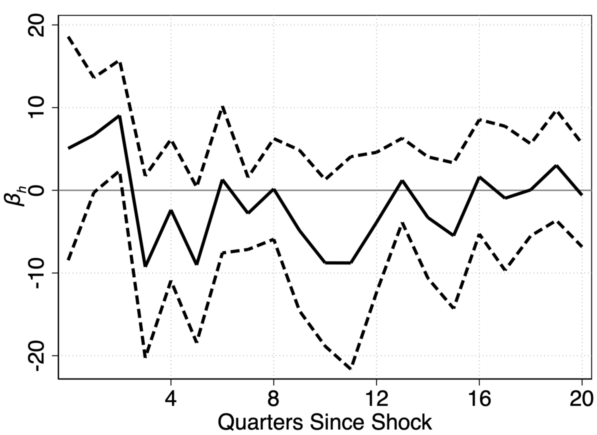


Figure A.4.3
The Responses of Uncertainty Measures to Fiscal Shocks

(a) std(Economic Policy Uncertainty)



(b) std(Global Geopolitical Risk)



(c) $\mathbb{1}$(Republican President)