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Taxes and Firm Investment

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UNIVERSITY COLLEGE DUBLIN
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Taxes and Firm Investment^{*}

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January, 2021

Abstract

We investigate the firm level investment responses to narrative shocks to average personal and corporate tax rates using a universal micro dataset of publicly traded U.S firms for the post-1962 period. By allowing for heterogeneous effects over the business cycle and accompanying monetary policy regime, as well as over firm-level characteristics, we show that : (i) corporate tax multipliers are negative overall, but this result is driven by smaller firms who face larger borrowing constraints, especially during high-unemployment periods or when the accompanying monetary policy is contractionary; (ii) while the magnitude and the significance of personal income tax multipliers are smaller on the aggregate, there is some evidence of positive personal tax multipliers in high-unemployment state by large (dividend-paying) firms, which is consistent with the recent literature.

Keywords: Investment, taxation, fiscal policy, fiscal multiplier

JEL Codes: C33, C53, E62, G32

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1 Introduction

Fiscal policy continues to receive attention from both policymakers and academics due to increasing income inequality, social problems, and slowing global economic growth in the wake of the COVID-19 global pandemic. Due to nationwide lock-downs and decreased demand, many large companies around the world filed for insolvency. In uncertain times, it is imperative to understand how macroeconomic policy affects firm-level decisions. Unfortunately, we are still far away from reaching a consensus on the effects of fiscal policy innovations on major macroeconomic variables, and the dependency of fiscal impacts on the accompanying monetary policy. This is partly related to a number of challenges associated with investigating the timing and magnitude of fiscal shocks.

To start with, identification of fiscal policy innovations is a difficult task, as there is a gap between the announcement of fiscal policy changes and their implementation. Recent studies (Ramey 2011; Mertens and Ravn 2012) solve this problem by identifying fiscal shocks through a narrative approach, which uses historical records of fiscal policy announcements. The second problem associated with the fiscal policy research is that not all fiscal policy instruments are the same. Mertens and Ravn (2012) document significantly different effects in the short-run for personal and corporate taxes, while Lee and Gordon (2005) do the same for the long-run.

Finally, recent economic studies have documented various heterogeneous effects of fiscal policy innovations over state of the economy (i.e. the business cycle) and/or through group characteristics (i.e. income and indebtedness). Concerning heterogeneity over the business cycle, Auerbach and Gorodnichenko (2012) and Arin, Koray, and Spagnolo (2015) show that government spending multipliers are larger during recessions and low growth periods. Similarly, Sims and Wolff (2018) and Arin, Koray, and Spagnolo (2015) contend that tax multipliers are larger during expansions and high growth periods. Concerning heterogeneity over group characteristics, Ma (2019) examines differences by income level and finds that consumption increases for the poor and decreases for the rich in response to a rise in government expenditure. In the same spirit, Cloyne and Surico (2017) show that households with mortgage debt exhibit large and significant consumption responses to tax changes while homeowners who have paid off their debts do not.

Needless to say, it is reasonable to expect similar asymmetric effects at the firm level. In fact, Crouzet and Mehrotra (2020) has suggested that the largest 1% of companies are less sensitive to aggregate macroeconomic shocks. Conversely, Eskandari and Zamanian (2020) that the investment response of large firms to a marginal (corporate) tax cut is almost twice the response of small firms.

In this study, we combine narrative macroeconomic data on fiscal policy with microeconomic firm level data to investigate the heterogeneous effects of fiscal policy on the investment behavior of firms. Firm-level investment is not only an important cause of business cycles but also the most volatile component of output, therefore it has significant importance for macroeconomic policy making decisions. We contribute to the relevant literature in multiple ways. First and foremost,

and unlike the previous literature (Eskandari and Zamanian 2020), we argue that not only shocks to corporate income tax but also shocks to personal income tax may have significant effects on firm-level investment behavior. Previous finance literature (Von Eije and Megginson 2008; Wu 2018) has argued that some firms (particularly large firms) may choose not to pay dividends to their investors after a positive personal income tax shock, and instead may choose to invest in plant, property and equipment. Another strand of the literature (the financial accelerator literature) contends that macroeconomic policy shocks (whether they are monetary or fiscal in nature) affect the assets and net worth of firms, and therefore their ability to borrow for investments. This second transmission channel evidently applies to both corporate and personal tax shocks, in addition to monetary policy shocks. In a recent paper, Cloyne, Ferreira, et al. (2018) show that it is young (non-dividend paying) firms that adjust their capital expenditure significantly in response to monetary policy innovations. This result is in line with the seminal paper Gertler and Gilchrist (1994) who showed that small manufacturing firms are more sensitive to monetary policy shocks. Our second contribution lies in the fact that we control for heterogeneous effects over the business cycle, the accompanying monetary policy regime, and over firm characteristics simultaneously in order to have a more complete picture of the transmission mechanisms.

Our results show that firm-level responses to corporate tax innovations are significantly negative over a horizon of two years, but only during high-unemployment periods. Interestingly, during low-unemployment periods, both corporate and personal tax multipliers are not statistically different than zero. There is some evidence of positive personal tax multipliers during high-unemployment periods, which is consistent with the recent finance literature arguing that dividends and investments may be substitutes (Wu 2018) and the amount of the dividend will be higher, the higher is the tax advantage on the dividend (Von Eije and Megginson 2008). We also show that the magnitude of small firms' response to fiscal policy innovations is greater than that of large firms, especially if the accompanying monetary policy is 'tight', a result consistent with Jones and Olson (2014), among others. The latter result also suggests that it is the constrained firms that drive the negative overall response of investment to corporate tax shocks. Interestingly this becomes clearer when we divide the sample by whether the firms pay dividends or not, rather than by firm size.

The remainder of the paper is organized as follows: Section 2 reviews data and methodology, section 3 presents empirical results, and section 4 concludes.

2 Data and Methodology

2.1 Data

Our macroeconomic data include the narrative corporate and personal tax measures of Mertens and Ravn (2012). Using narrative data allows us to identify causal effects of fiscal policy on investment,

while using firm-level microdata allows us to study heterogeneity and control for firm characteristics.

The merged macroeconomic time series together with the micro panel dataset comprises of close to 500,000 firm-year observations for the U.S. for the 1962–2019 time period. Our benchmark regression uses physical investment (which includes purchases of property, plant, and equipment) as the outcome of interest. We will also include some control variables like cash holdings and an indebtedness measure (leverage).¹ These financial variables are downloaded from COMPUSTAT.

- Investment is given as the dollar value of property, plant, and equipment on the firm’s balance sheet.
- Total assets is the dollar value of all assets on the firm’s balance sheet.
- Paying dividends status indicates whether the firm pays dividends in the current quarter.
- Cash and short term assets is the dollar value of these assets on the firm’s balance sheet.
- Total debt is the dollar value of said liabilities on the firm’s balance sheet.
- Leverage is given as the ratio of total debt to total assets.

COMPUSTAT data have numerous advantages compared with the information provided by the US Census Bureau Quarterly Financial Report (QFR), used in previous studies (Eskandari and Zamanian 2020). First and foremost, Compustat spans all industries, whereas QFR covers limited number of manufacturing-oriented sectors. Second, COMPUSTAT data constitute the entire universe of active and inactive publicly held companies. These data are highly precise, complying with strict Securities and Exchange Commission (SEC) disclosure standards. The QFR, on the other hand, provides a subset of survey data subject to sampling and nonsampling errors (response errors, nonresponse, and coverage errors). Finally, the QFR covers mostly small firms. In contrast, COMPUSTAT covers a broad spectrum of firms ranging from small to large. For example, the aggregate sales volume of the QFR firms in Q1 2020 is \$2.8 trillion, whereas COMPUSTAT firms report \$6.5 trillion of sales for the same time period. Therefore, our paper complements Eskandari and Zamanian (2020), in the sense that we cover a large number of firms and industries and we investigate personal income tax innovations in addition to corporate income tax policy shocks.

The COMPUSTAT balance sheet data is usually reported quarterly. Over certain intervals, some firms only report at the annual level. In such cases we fill in the missing values by linear interpolation. The results are not sensitive to this practice; we alternatively drop firms when they stop reporting quarterly, and the results are unaffected.

¹We also tried binning using leverage to allow for asymmetric effects; however, results were not statistically significant. Though not reported in the paper, the results are available upon request.

Table 1: Summary Statistics

	Mean	Median	Stdev	Min	Max	N
Year	1991.67	1992	8.32	1970	2007	418048
Gross Investment	1707.5	70.97	7017.46	-39.43	425046.5	418048
Share Investment	.67	.55	2.81	-.03	1083.33	416876
Paying Dividends	.81	1	.39	0	1	418048
Cash & Short-Term Inv.	223.56	8.26	3691.59	-74.62	321583	412258
Leverage Ratio	.75	.25	25.34	-2088	4901	389067
Corp Tax Shock	.05	0	.82	-3.48	7.38	418048
Pers Tax Shock	-.01	0	.12	-1.08	.43	418048
Large Firm	.44	0	.5	0	1	416929
High Unemployment	.37	0	.48	0	1	418048
Monetary Contraction	.5	0	.5	0	1	418048

This table reports summary statistics for the COMPUSTAT data at the quarterly frequency. An observation is a firm-quarter.

2.2 Methodology: Impulse Responses by Local Projection

We use the local projection technique due to Jordà (2005) to construct impulse response functions to narratively identified tax shocks. This involves running separate regressions for each time period following the shock, over the course of the impulse response horizon. We calculate impulse responses for eight quarters following a tax shock. The baseline specification is as follows:

$$\Delta y_{i,t+h} = \alpha_h + X_{i,t-1}\beta_h + NS_t\gamma_h + \epsilon_{i,t+h} \quad (1)$$

where $\Delta y_{i,t+h}$ gives the change in the outcome variable for firm i , h periods after a reference period t . We consider investment as the primary outcome, defined as the value of property, plants, and equipment. All results cluster standard errors by time as firms respond contemporaneously to any confounding shocks in the same time period.

The explanatory variable of interest is NS_t , which gives narratively identified shocks. We consider average personal and corporate income tax shocks from Mertens and Ravn (2012). For a time period t when no shock occurs, the variable is set to zero; otherwise it is the change in the average tax liability associated with the shock.

The matrix $X_{i,t-1}$ includes various sets of control variables including average personal and corporate tax levels along with the federal funds rate, a recession indicator, firm-specific cash and short term assets and leverage, and seasonal fixed effects. We consider alternatively a ‘minimalist’ specification that excludes controls (aside from a linear time trend). Note that in all specifications, first-differencing nets out any firm-specific, time-invariant component of outcomes.

First we consider asymmetric effects by firm size. Letting $s \in \{small, large\}$ denote firm size

class – divided at the median of total asset value – we consider the following specification:

$$\Delta y_{i,t+h} = \alpha_{s,h} + X_{s,i,t-1}\beta_{s,h} + NS_t\gamma_{s,h} + \epsilon_{s,i,t+h} \quad (2)$$

which allows unrestricted asymmetric responses to tax innovations by firm size class.

We are also interested in differential effects of narrative shocks depending on economic conditions. To this end we consider the following specification:

$$\Delta y_{i,t+h} = \alpha_{r,h} + X_{r,i,t-1}\beta_{r,h} + NS_t\gamma_{r,h} + \epsilon_{r,i,t+h} \quad (3)$$

which is identical to (1) except that it separates narrative shocks into two categories by high and low unemployment episodes, denoted by r . A shock either occurs during a low unemployment ($r = 0$, unemployment rate $< 6.5\%$) or a high unemployment ($r = 1$, unemployment rate $> 6.5\%$) episode. These episodes were classified according to Ramey and Zubairy (2018). We also consider heterogeneity by expansionary and contractionary (accompanying) monetary policy, allowing asymmetric effects based on whether the federal funds rate is rising or falling.

Finally, we consider two-way asymmetry in investment responses by both firm size class, and unemployment or monetary policy bins alternatively.

$$\Delta y_{i,t+h} = \alpha_{s,r,h} + X_{s,r,i,t-1}\beta_{s,r,h} + NS_t\gamma_{s,r,h} + \epsilon_{s,r,i,t+h} \quad (4)$$

2.3 Methodology: Impulse Response Functions

The results give impulse responses in investment change to a narratively identified tax shock in $t = 0$. Colour code: red/top row = minimalist specification (includes linear time control); blue/bottom row = control variables added (FFR, recession dummy, average tax rates, cash and short term investments, quarter fixed-effects). The left hand side gives responses to corporate income tax shocks, while the right gives responses to personal income tax shocks. All impulse responses are changes in an outcome variable compared to time zero. The impulse responses we calculate are average responses across all firms.

The COMPUSTAT data provide a long, unbalanced panel of firm balance sheets from 1962 to 2019. In order to control for firm-specific characteristics, we do not aggregate the data into a time series. Because firms enter and leave the sample at different times, we restricted our sample to firms that were present through the entire impulse response horizon. As a robustness check, we considered filling out the panel with zeros for missing entries² and our results remained essentially the same. These two approaches eliminate the problem of firm selection into and out of the sample in response to tax shocks.

²In this case we include all firms, including those who disappear during the impulse response horizon. Once a firm disappears, we set its investment to zero for subsequent time periods.

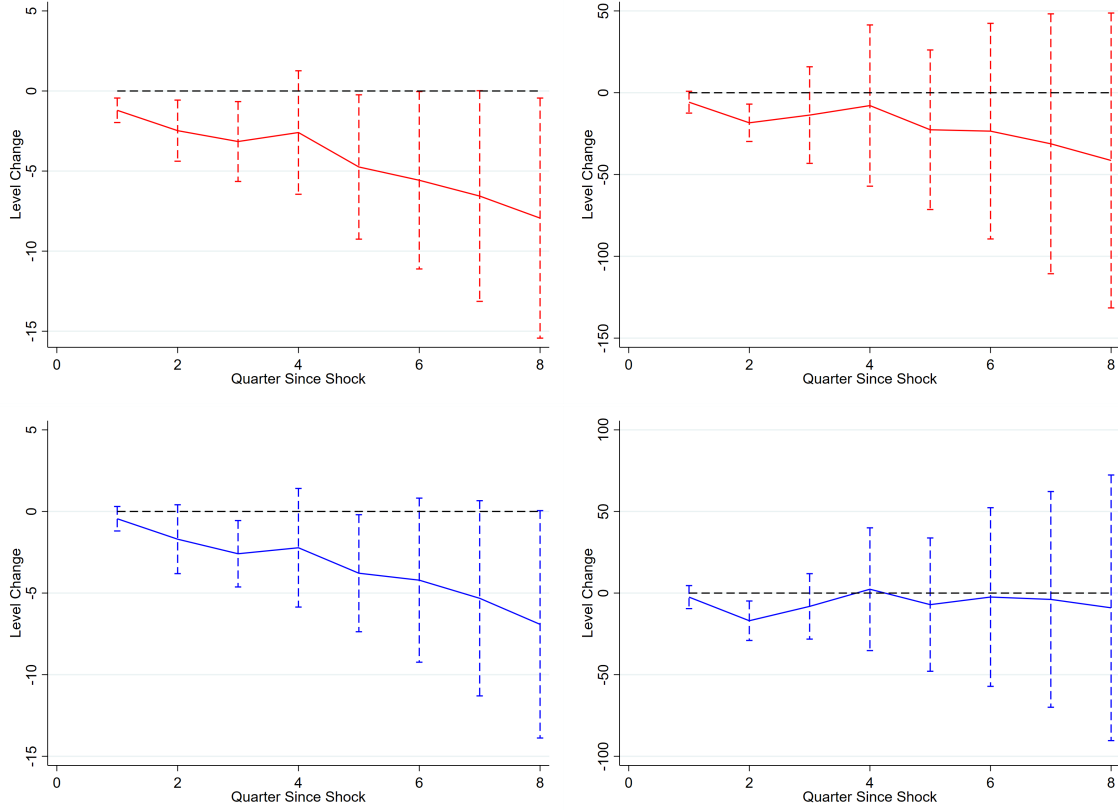
A similar problem involves reporting frequency. Although the vast majority of reporting is at the quarterly frequency, over some time intervals certain firms report annually. In such cases we fill in missing value by linear interpolation. Again, the results are not sensitive to our choice of approach.

3 Results

3.1 Benchmark Models

Figure 1 presents impulse responses to narratively identified tax shocks over the eight quarters following the shock. The left panel presents the impulse response functions to a corporate income tax shock, and the right panel does the same for the personal income tax shocks. Investment falls following an increase in corporate income taxes, but the response of investment to personal income tax shocks is only minimally significant after two quarters. The relatively smaller investment response for the personal income tax shocks, both in terms of magnitude and significance, may explain the weaker/insignificant long-run growth effects of personal income taxes argued by the previous studies (Lee and Gordon 2005).

Figure 1: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, All Firms

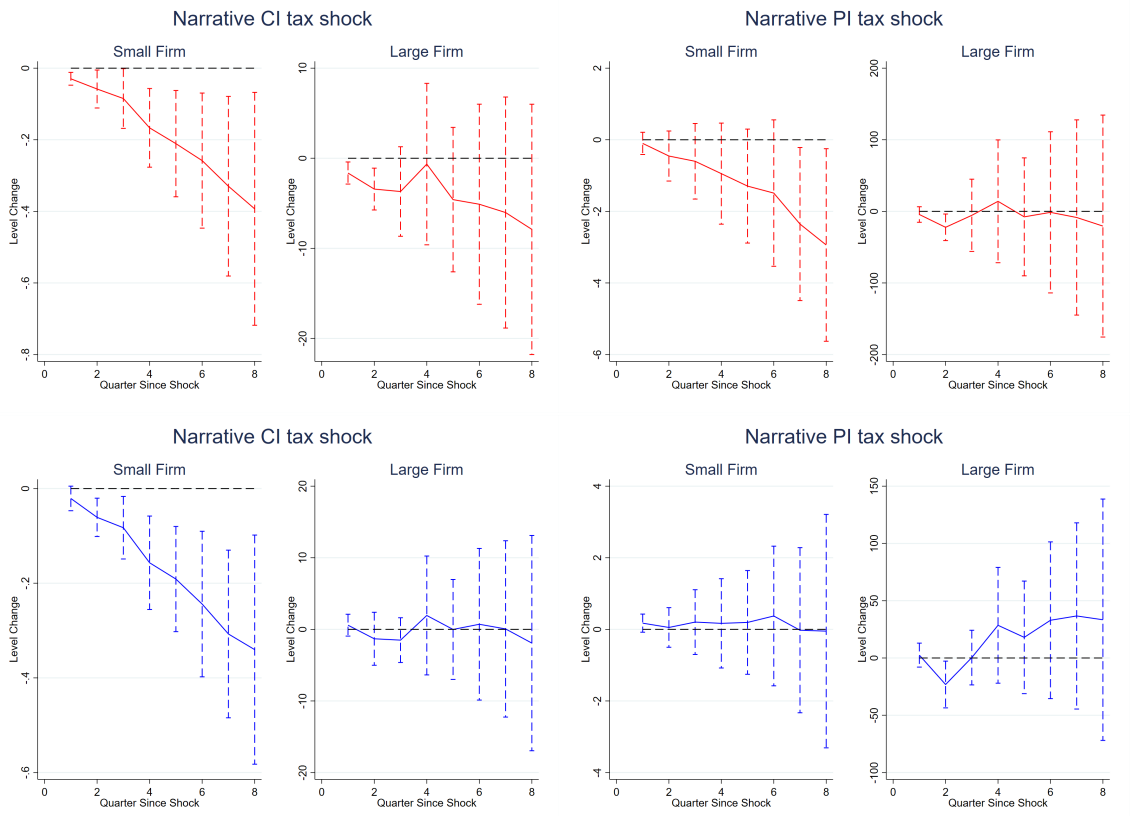


This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet.

As our main research question is the asymmetric/heterogeneous effects of tax policy innovations, we continue our empirical analysis by binning our sample by firm size. As mentioned earlier, a number of previous studies (Gertler and Gilchrist 1994; Cloyne, Ferreira, et al. 2018; Crouzet and Mehrotra 2020) have argued that smaller firms may be more sensitive to aggregate policy innovations. Figure 2 presents impulse response functions for models that separate firms by size bins based on total asset valuation, split at the median. We observe that small firms drive the negative investment response to corporate income tax shocks, while large firms exhibit no statistically significant response (once control variables are included). Gertler and Gilchrist (1994) suggested that firm size is negatively related to borrowing constraints, and positive corporate tax shocks may be increasing the wedge between external and internal financing and forcing smaller firms to shed inventories. The minimalist specification suggests a negative investment response to personal income tax shocks

by small firms, but this result is not robust to the inclusion of control variables.

Figure 2: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Firm Size Bin

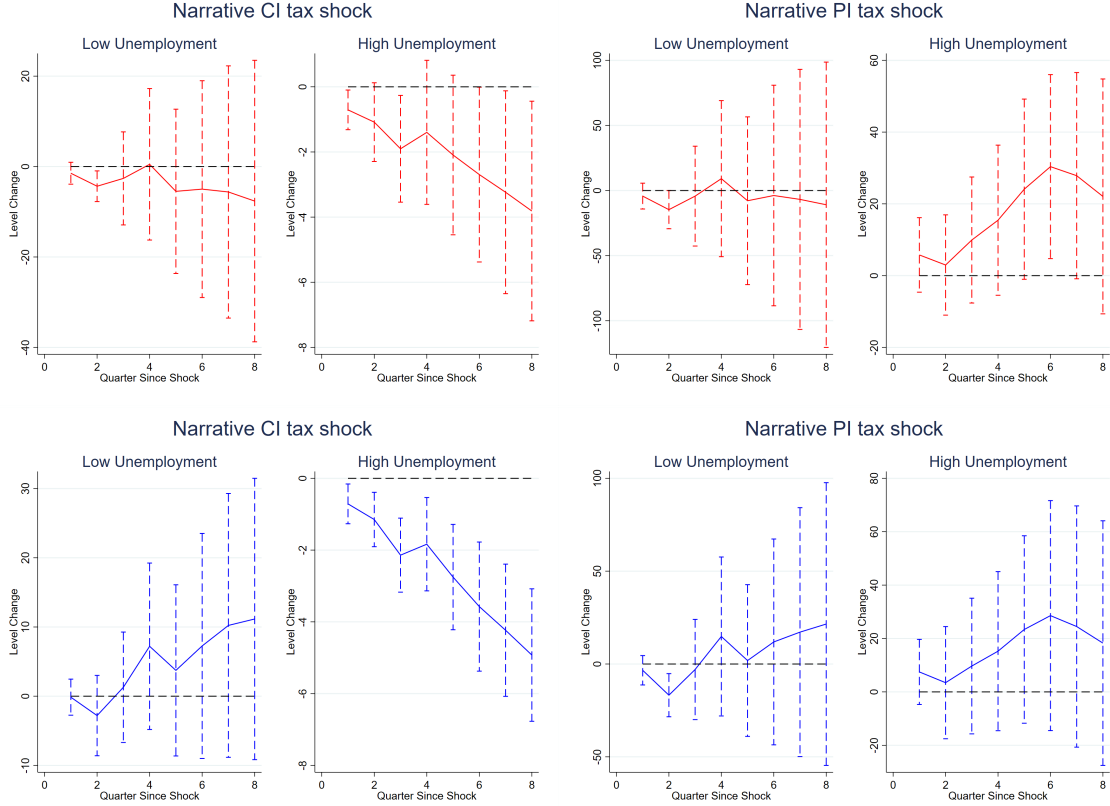


This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. Large firms are defined as those above median total asset valuation.

Figure 3 plots investment responses by unemployment state, with high unemployment periods defined as those during which unemployment exceeds 6.5%, following Ramey and Zubairy (2018). The negative response to corporate income tax shocks happens during high unemployment periods, but not low unemployment periods (with controls). These results somewhat contradict the earlier results of Sims and Wolff (2018) and Arin, Koray, and Spagnolo (2015), however, we should note that this aforementioned result applies only to corporate tax shocks, as opposed to total tax shocks, which can affect the economy through other transmission channels, especially consumption channel. There is some evidence that the investment response to personal income tax shocks is positive during

high unemployment periods, although this is not statistically significant in the specification that includes controls.

Figure 3: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Unemployment Bin

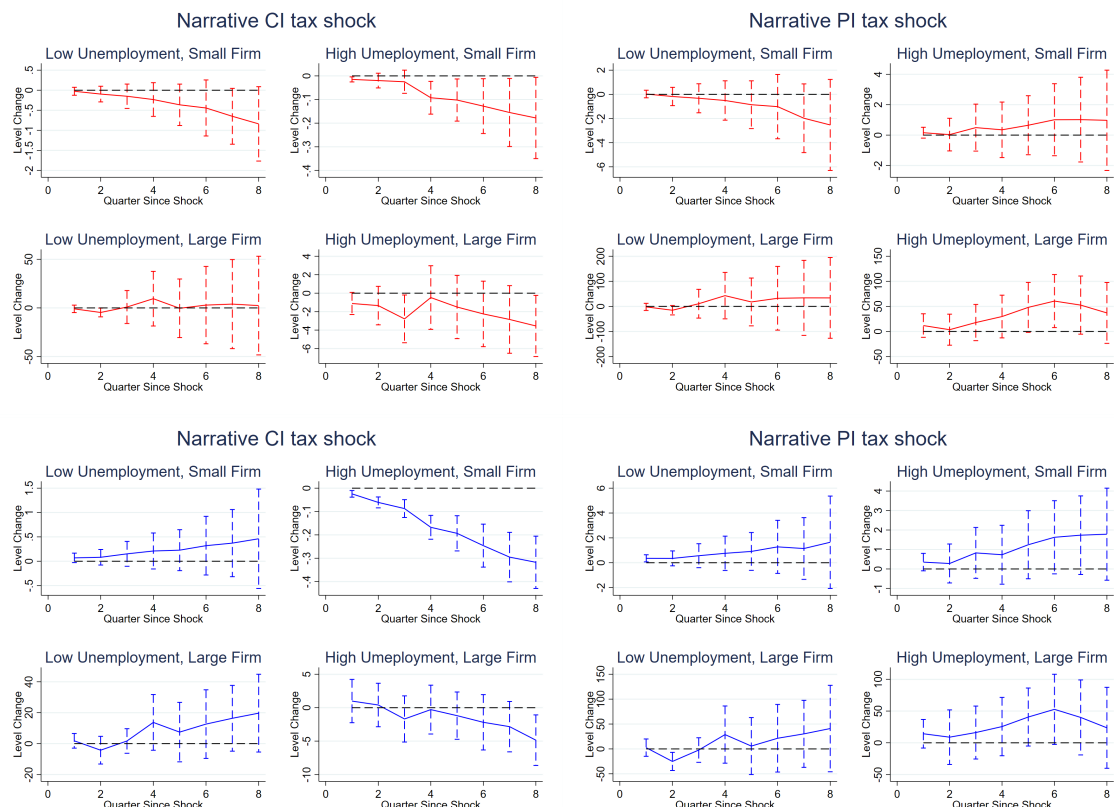


This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. High unemployment is defined as a prevailing unemployment rate above 6.5%, following Ramey 2011.

Figure 4 separates events into four bins based on both firm size and prevailing unemployment rates. The most robust result is the negative response of small firms during high unemployment periods to corporate income tax shocks. This provides further evidence that factors that contribute to borrowing constraints are the main driver behind the cyclical behavior of investment. Large firms exhibit a similar but weaker response during such periods. We also observe that the positive responses to personal income tax shocks during high unemployment periods are concentrated among large firms. This is once again consistent with our initial hypothesis that large, dividend-paying

firms may be treating investments and dividends as substitutes.

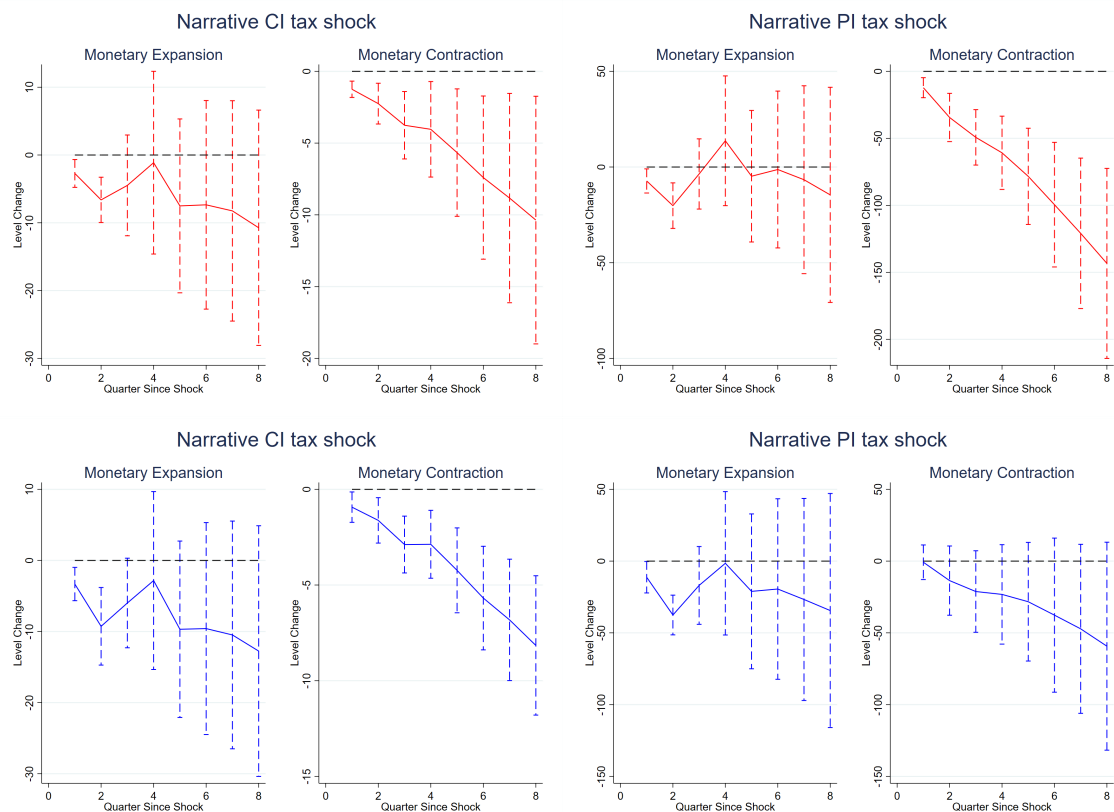
Figure 4: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Unemployment and Firm Size Bins



This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. Large firms are defined as those above median total asset valuation. High unemployment is defined as a prevailing unemployment rate above 6.5%, following Ramey 2011.

Figure 5 analyzes impulse responses separately depending on whether the tax shock happens during a monetary expansion or contraction. The negative response to corporate income tax shocks happens primarily during contractions. This result is consistent with Jones and Olson (2014) who document that tax multipliers are larger if the accompanying monetary policy is contractionary. On the contrary, there is relatively weaker evidence for a negative response to personal income tax shocks during contractions, an effect that disappears usually after two quarters during monetary expansions and insignificant for monetary contractions with the inclusion of controls.

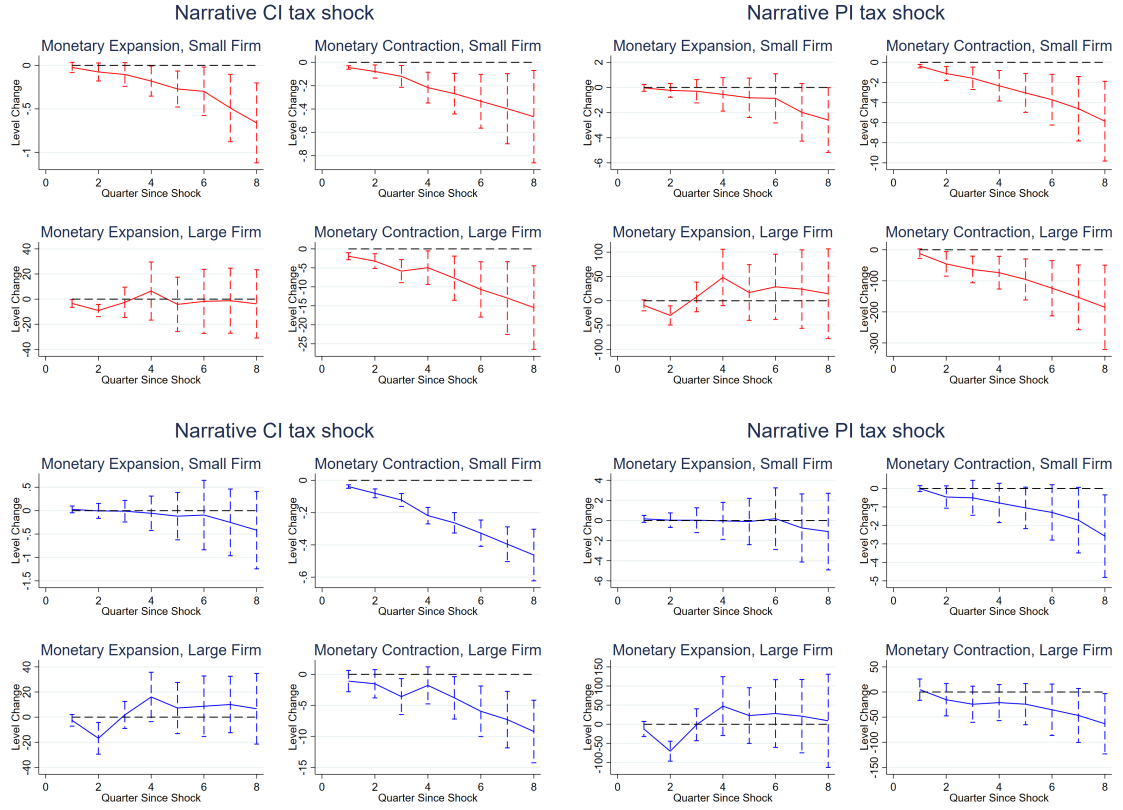
Figure 5: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Monetary Expansion Bin



This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. A period of fiscal contraction is defined as one in which an increase in the federal funds rate compared to the previous quarter occurs.

Figure 6 bins the data by firm size and monetary expansion/contraction. The most robust result is the negative response of small firms during contractions to corporate income tax shocks. There is also significant evidence of a negative response by large firms during contractions, and small firms during monetary expansions; however, both relationships weaken with the inclusion of control variables. Robust also is the negative response by small firms during contractions to personal income tax shocks. Once again, we provide evidence that financial frictions amplify the effects of macroeconomic shocks, consistent with the theoretical predictions of Kiyotaki and Moore (1997) and Bernanke, Gertler, and Gilchrist (1999).

Figure 6: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Monetary Expansion/Contraction and Firm Size Bins



This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. Large firms are defined as those above median total asset valuation. A period of fiscal contraction is defined as one in which an increase in the federal funds rate compared to the previous quarter occurs.

3.2 Robustness Checks

We consider several robustness checks. First, we separate firms by dividend-paying status (whether or not the firm is paying dividends in the current quarter), considering also interactions with firm size. We also present specifications containing controlled lags of dependent variables. Finally, we consider an alternative definition of firm size that sets the cut-off for the large firm bin at the 90th percentile instead of the 50th.

3.3 Dividend-Paying Status

Cloyne, Ferreira, et al. (2018) argue that "age" and "dividend-paying status" of the firm are better proxies to identify whether the firms are facing borrowing/financial constraints than the firm size. Therefore, we re-run our analyses by replacing the firm size with whether the firm is paying dividends or not.

Our empirical results support, once again, the prior findings: while non-dividend paying small firms decrease their investment in response to a positive shock to corporate income taxes due to their borrowing constraints, it is dividend-paying firms that increase their capital purchases in response to a positive shock to personal income taxes.

3.4 Controlled Lags

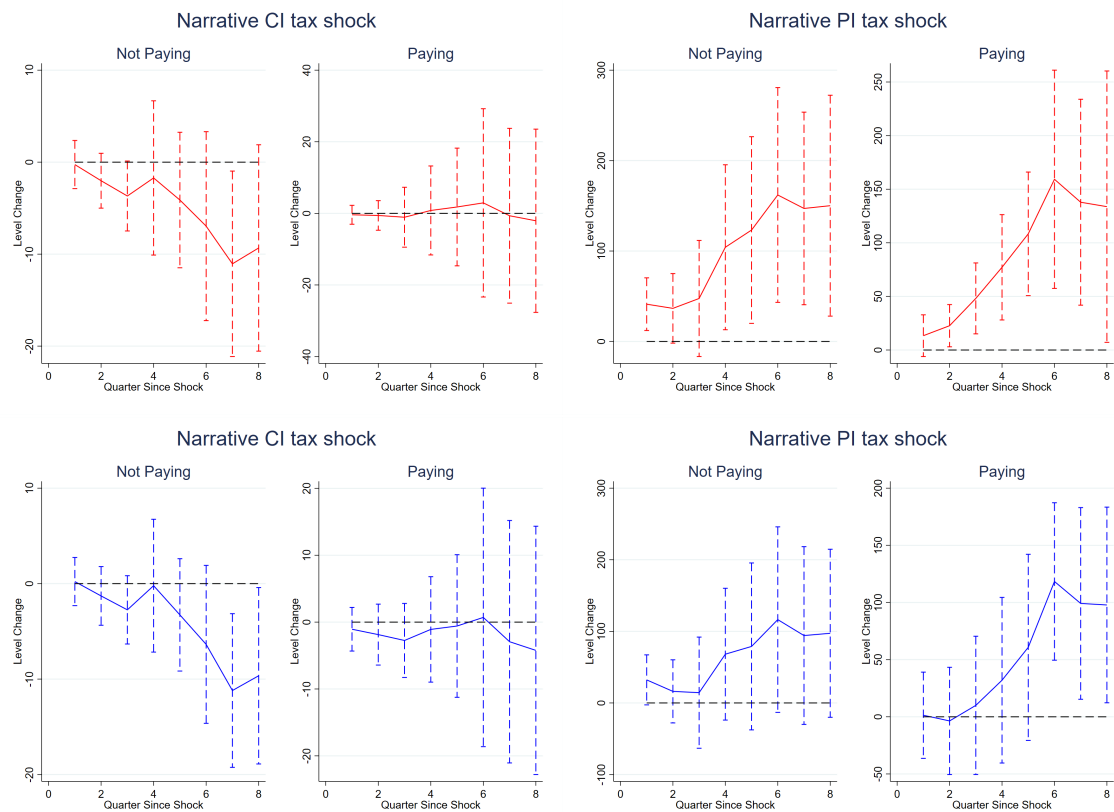
As a robustness check, we added the lagged dependent variable from one period prior, as a control variable to the "minimalist specification". Figures 9–11 present the impulse response functions for these models.

Figure 9 presents the impulse response functions for both corporate and personal income tax shocks, binned by size and unemployment status. While the results for corporate income taxes are qualitatively similar to our previous results, the impulse response functions for the personal income tax innovations are statistically significantly positive throughout the impulse response horizon. However, if we bin the sample according to the accompanying monetary policy, the positive impulse responses to personal income tax shocks only remain for the expansionary periods (Figure 10). And the last result disappears when we bin firms by both accompanying monetary policy and by firm size.

3.5 Top 10% of Firms

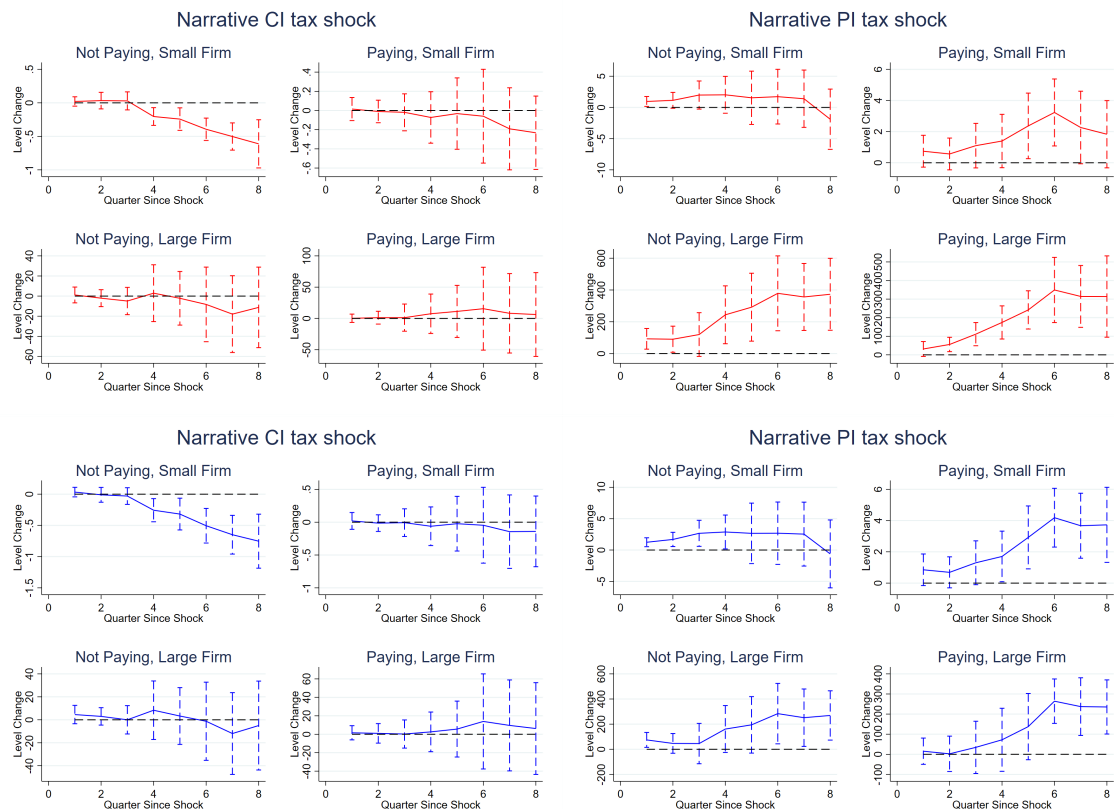
While the baseline specification bins firms using the median as a cutoff, we consider here a cutoff at the 90th percentile. Figures 12 to 14 recreate the baseline results using the bottom 90% of firms as the small bin, and the top 10% as the large. Figure 12 considers only size bins, while 13 and 14 bin also by the unemployment rate threshold and monetary regime respectively. The results are similar to the baseline, with negative responses to corporate income taxes being concentrated among small firms, and during periods of high unemployment and monetary contractions.

Figure 7: Impulse Response: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Dividend-Paying Status



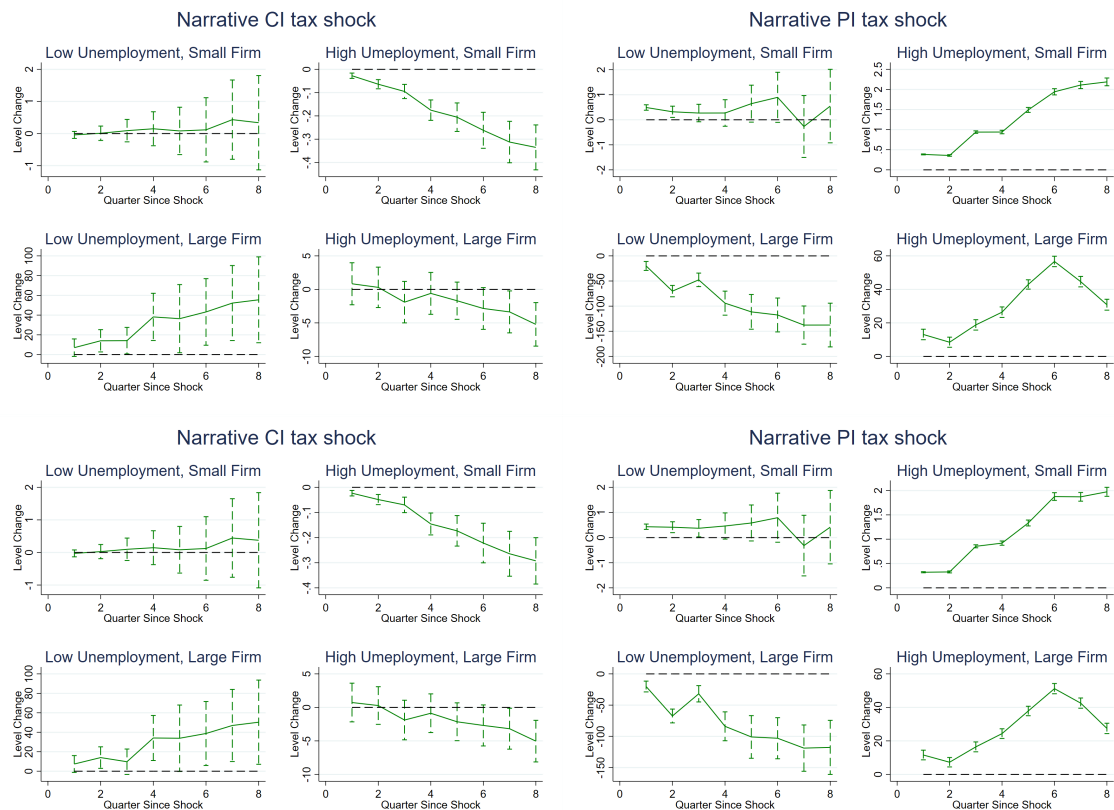
This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a 'minimalist' specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of 'cash and other short term assets' on the firm's balance sheet. High dividend is defined as a prevailing dividend rate above 6.5%, following Ramey 2011.

Figure 8: Impulse Response: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Dividend-Paying Status and Firm Size Bins



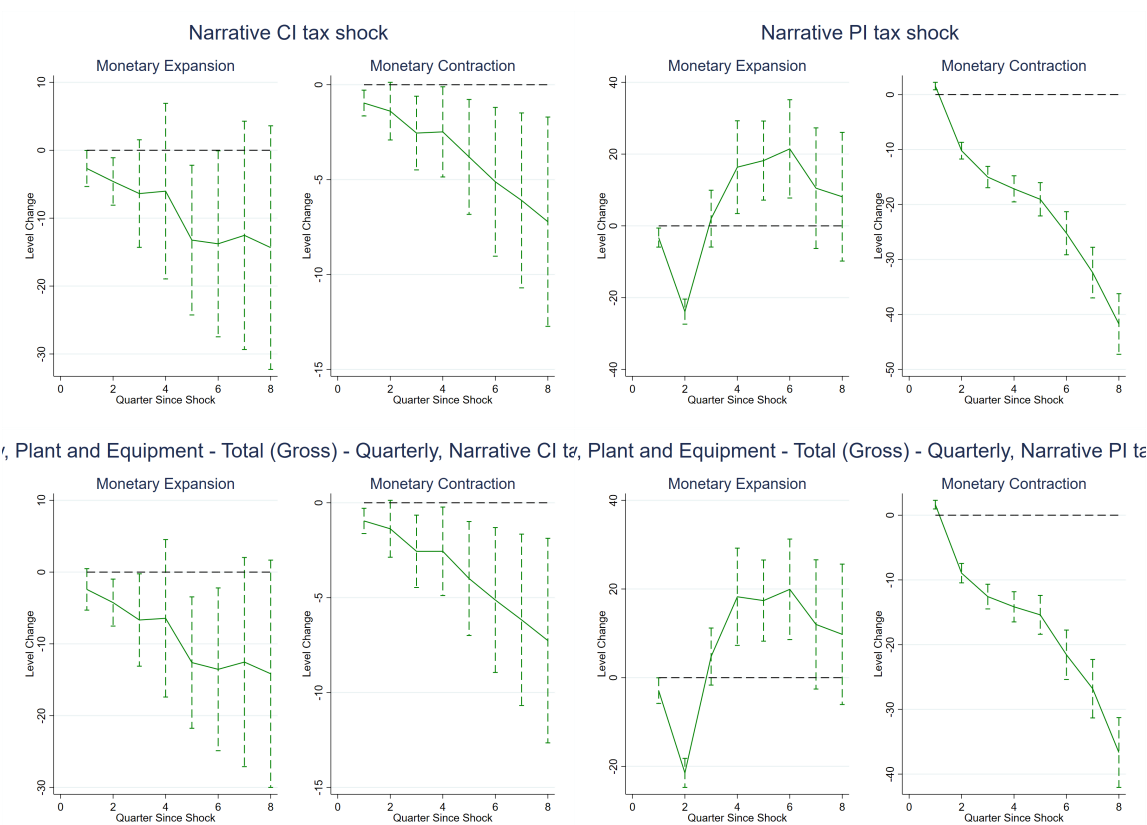
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Figure 9: Controlled Lags: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Unemployment and Firm Size Bins



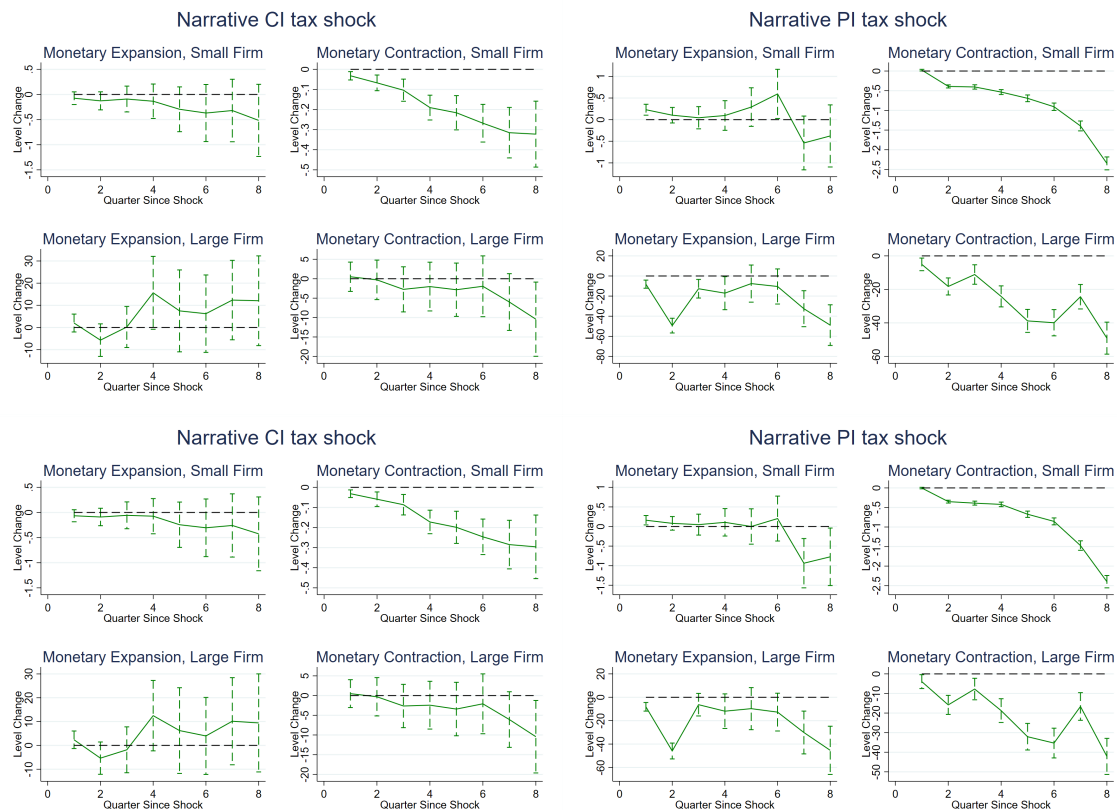
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Figure 10: Controlled Lags: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Monetary Expansion Bin



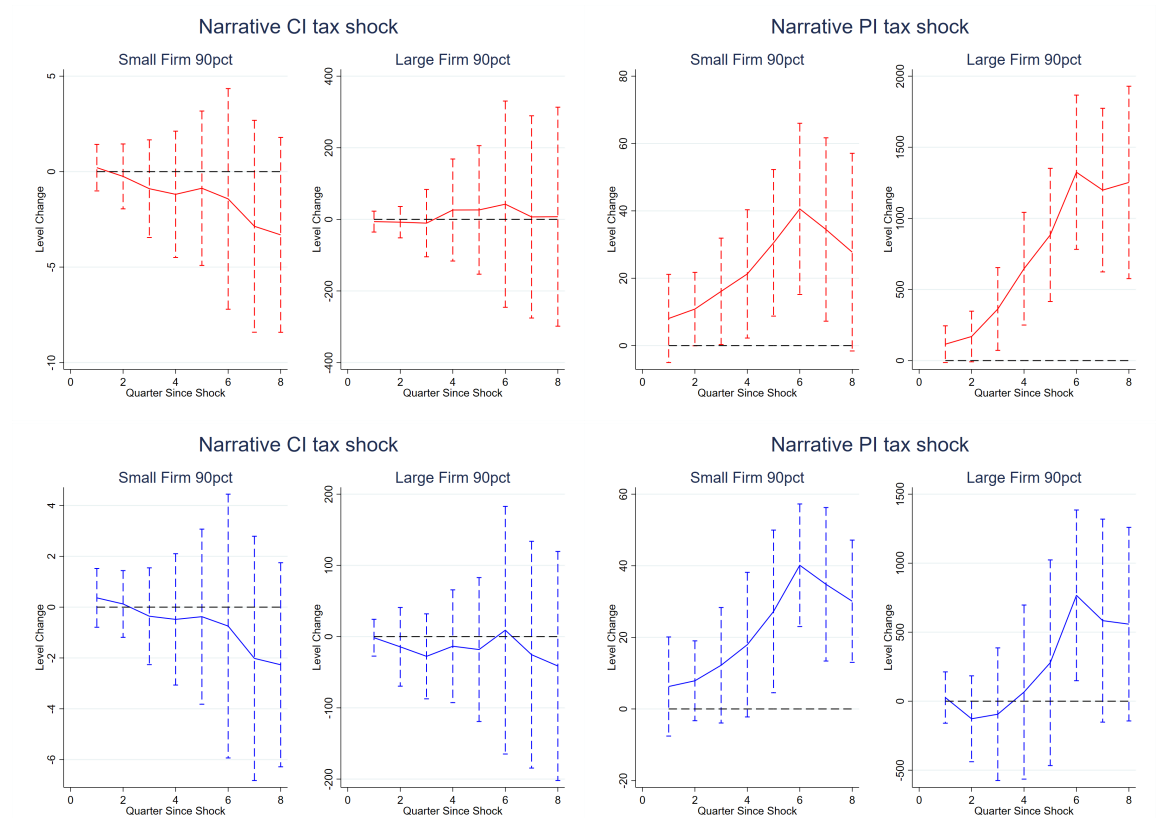
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Figure 11: Controlled Lags: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Monetary Expansion/Contraction and Firm Size Bins



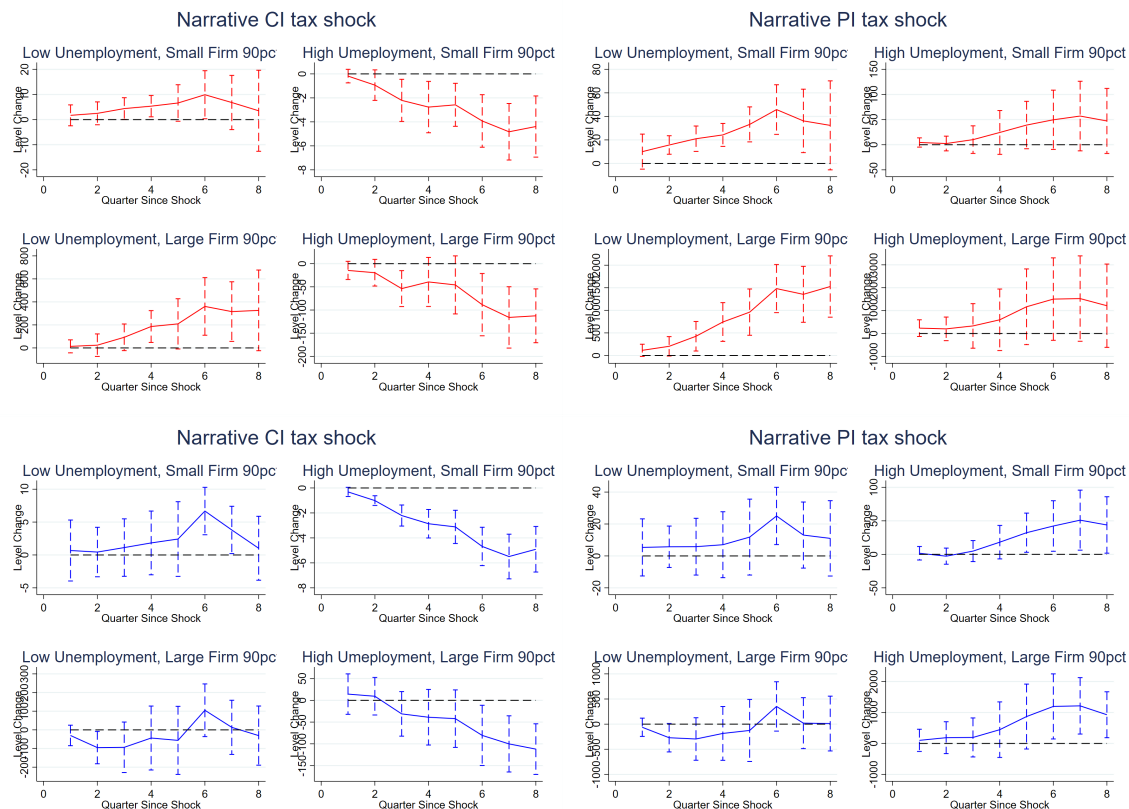
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Figure 12: Impulse Response: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Firm Size Bin



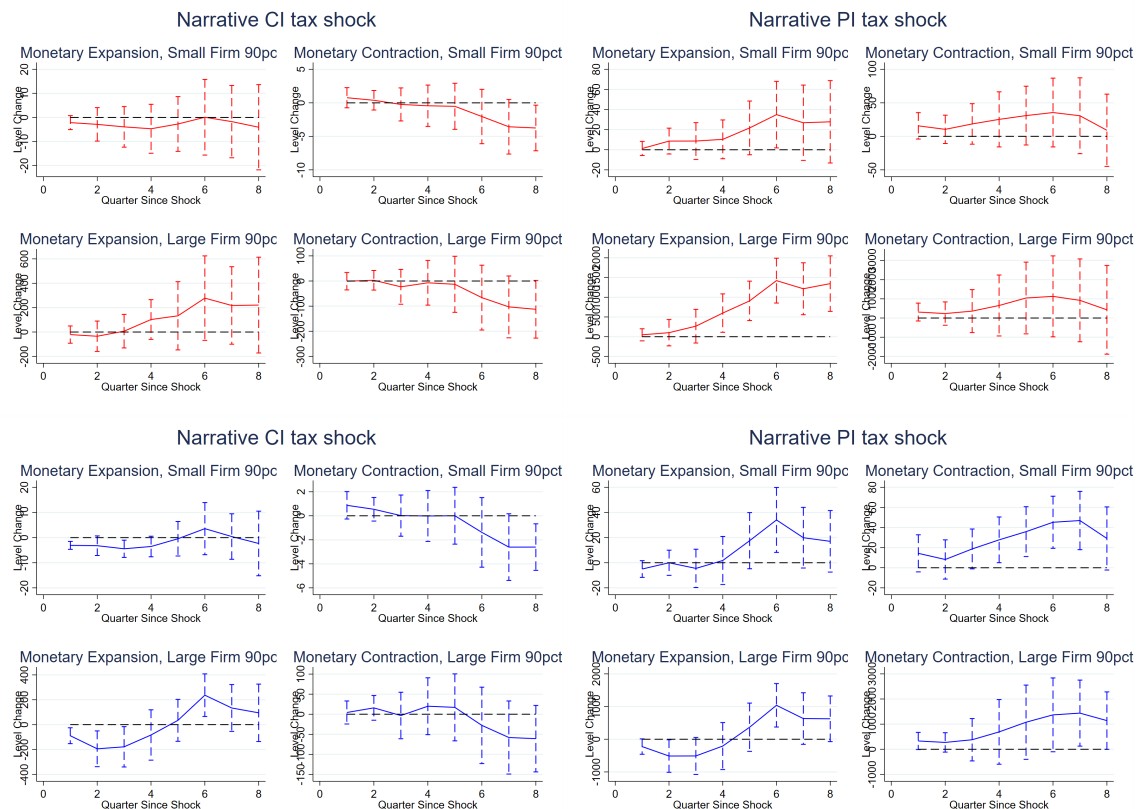
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Figure 13: Impulse Response: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Unemployment and Firm Size Bins



This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a ‘minimalist’ specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of ‘cash and other short term assets’ on the firm’s balance sheet. Large firms are defined as those above median total asset valuation. High unemployment is defined as a prevailing unemployment rate above 6.5%, following Ramey 2011.

Figure 14: Impulse Response: Property, Plant, and Equipment Impulse Response to Narrative Tax Shocks, By Monetary Expansion/Contraction and Firm Size Bins



This figure plots impulse response functions to narratively identified tax shocks at time zero. The top row provides a 'minimalist' specification with only a time trend. The bottom adds control variables, including prevailing corporate and personal income tax rates, and the value of 'cash and other short term assets' on the firm's balance sheet. Large firms are defined as those above median total asset valuation. A period of fiscal contraction is defined as one in which an increase in the federal funds rate compared to the previous quarter occurs.

4 Conclusion

In the midst of a pandemic that forces governments to use fiscal policy front-and-center for sustained economic recovery, it is essential to understand the transmission mechanisms for the fiscal policy. Our paper contributes to the ongoing discussion by investigating how tax policy innovations affect firm investment behavior. While doing so, we tackle a number of issues that may have plagued the previous literature. We not only use a universal dataset of public firms, which minimizes the sample selection bias, but also a disaggregated measure for corporate and personal taxes (as opposed to total tax liability) which solves the aggregation problem. Moreover, we identify the aforementioned tax shocks using a narrative approach, and therefore take into consideration the gap between the announcement and implementation of policy innovations. Finally, we control for a number of possible heterogeneous effects over size, business cycle and the accompanying monetary policy innovations.

Our results are striking. First of all, we show that, overall, firms respond more to corporate tax shocks compared to personal tax shocks, both in terms of magnitude and significance. This result supports some earlier studies, like Lee and Gordon (2005), who documented growth-retarding effects for corporate taxes, but not for personal taxes. Then, we show that the negative response to corporate income tax policy shocks are mostly driven by smaller firms. This result resembles to that of Gertler and Gilchrist (1994), Cloyne, Ferreira, et al. (2018), and Crouzet and Mehrotra (2020) who showed that smaller, younger and non-dividend paying firms respond more to aggregate policy changes. This is due to the fact that smaller and younger firms are constrained and rely more on external financing. This assumption is further supported by the fact that the decline in investment is more pronounced if the accompanying monetary policy is contractionary. Finally, our results show that large, dividend-paying firms may choose to increase their capital purchases in response to a positive shock, consistent with the finance literature. Future research may include applying our research framework to individual household data to investigate the consumption response to disaggregated tax shocks.

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