On the amplification effects of small firms: The firm credit channel of fiscal stimulus*

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Abstract

This paper shows that the local fiscal multiplier depends on the firm size distribution where the stimulus takes place. Using cross sectional and time variation in national military procurement across MSAs in U.S. and lagged firm creation I show that the local fiscal multiplier is 1.57 and increase with the share of small firms, implying multipliers of 0.95-2.15 in the interquantile range. At micro level, I document that within firms that did not receive a government contract, small firms increase investment, operating revenues and financing by 5%-10% relative to large firms after an aggregate local fiscal stimulus. I find positive spillovers for small firms and neutral for large firms. I propose a firm credit channel of fiscal policy where the stimulus reduces the default risk of credit constrained small firms, boosting borrowing, investment and production, amplifying endogenously the fiscal multiplier. Using a two firms open economy New Keynesian model with credit market imperfections calibrated to match the share of small firms, leverage and external finance premium the mechanism can account for 70% of the heterogeneous response of investment and 10-20% of the sensitivity of the local fiscal multiplier to firm size heterogeneity.

Keywords: *Fiscal stimulus, Firm size distribution, Amplification, Financial Accelerator*
JEL classification: E62, E52

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1 Introduction

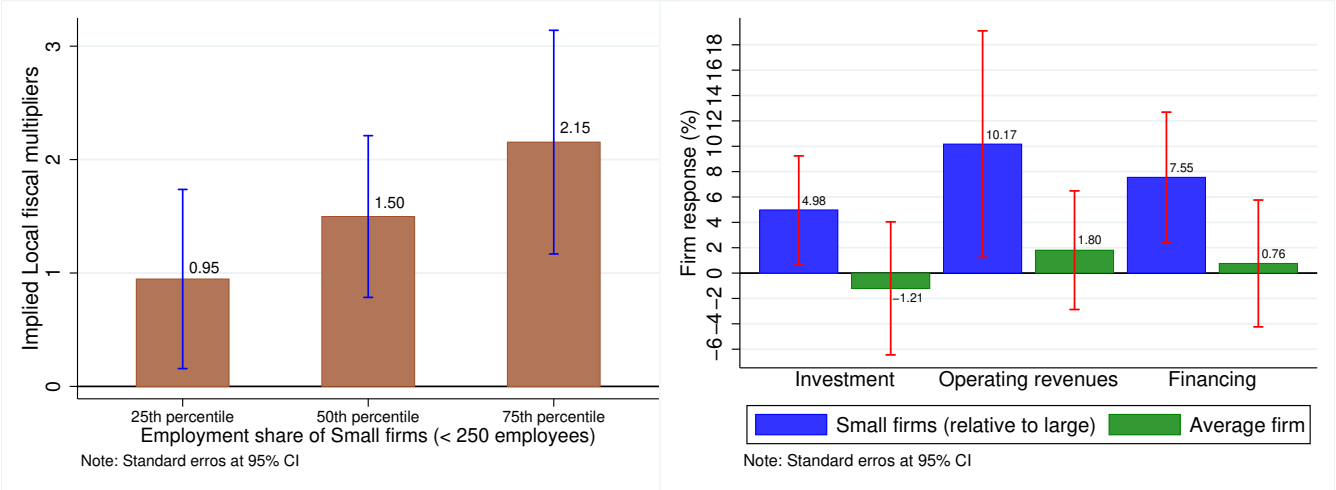
How does the effectiveness of fiscal stimulus depend on the composition of firms where the stimulus takes place? A better understanding of the transmission mechanism and effectiveness of fiscal policy is needed in both academic and policy circles. This paper study the effects of government spending on output, the so-called government spending multiplier. The empirical evidence reports a wide range of multipliers, from as low as 0.5 to larger than 2 (Ramey (2011); Auerbach and Gorodnichenko (2012)). There is no such a thing as a unique fiscal multiplier, it depends on the characteristics of the economy. Government spending naturally affects firms' decision to produce and invest. Little is known about the role of firm heterogeneity on the transmission mechanism of fiscal policy. The main contribution of the paper is to fill this gap.

Conditional on surviving small and young firms grow faster than large and more mature firms contributing disproportionately to output growth (Decker et al., 2014). Given the enormous heterogeneity in productivity, investment and borrowing behaviour across firms, this paper asks: How does firm size heterogeneity affects the fiscal multiplier? Which firms are the most responsive to aggregate fiscal stimulus? Are spillover effects heterogeneous by firm size? The first contribution of the paper is to document a novel determinant of the fiscal multiplier, a *firm-dependent* multiplier where small firms amplify local fiscal stimulus.[1] Increasing the employment share of small firms by 1% increase the local fiscal multiplier by 4.3%, from 1.57 to 1.64. At micro level, within firms that did not receive a government contract I show that small firms increase investment, operating revenues and financing between 5% and 10% relative to large firms. Figure 1 presents the main findings of the paper.

Small firms are typically more bank dependent and credit constraints, and are cyclically more sensitive than large firms to the local business cycle (Beck et al., 2005; Fort et al., 2013). In the presence of credit market imperfections firm's credit spreads are countercyclical, implying that during booms firms become less risky and have better growth opportunities. The latter is particularly true for small firms that respond by investing and borrowing more (Gilchrist and Zakrajšek (2012)). I present a *firm credit channel of fiscal policy* to explain the sensitivity of the local fiscal multiplier to the firm size distribution, where the stimulus increase borrower's net worth reducing the default risk of credit constrained small firms, boosting borrowing, investment and production, amplifying endogenously the fiscal multiplier due to a *"financial accelerator"* mechanism as in Bernanke et al. (1998).

[1] As a parallel of the state-dependent fiscal multiplier (Auerbach and Gorodnichenko (2012)).

Figure 1: The local fiscal multiplier and firm size heterogeneity



(a) The local fiscal multiplier (b) Firm's responses

Note: Panel (a) display the implied 1-year local fiscal multiplier along the distribution of the employment share of small firms in MSAs in US from Equation (1). Sample period is 2001-2013 and includes 344 MSAs. Data for the share of small business is from Business Dynamic Statistics. The government spending shock is identified with the cross-sectional variation of DoD spending across MSAs. Standard errors are clustered at MSAs level. See Section 2 for details. Panel (b) shows the response of investment, operating revenues and financing (change in total liabilities) for the average firms and small firms relative to large firms that *did not received* a DOD contract to a state-level DOD shock. Firm data is from ORBIS (includes both private and public firms). See Equation (5) in Section 3 for details.

Using cross sectional and time variation in national military procurement across metropolitan areas (MSAs) in U.S. and lagged employment creation by new business I estimate the sensitivity of local fiscal multiplier to the firm size distribution.[2] This method identifies an open economy local fiscal multiplier: it measures the effect of an increase in spending in one specific MSA within a monetary union relative to the response of all other MSAs (Nakamura and Steinsson (2014)). This spending increase is financed by taxing individuals in all U.S. MSAs. For the firm size distribution across MSAs I use panel data from Business Dynamic Statistics (BDS), the public-release sample of statistics aggregated from the Census' Longitudinal Business Database. Military spending is potentially endogenous since DOD contracts are notably political and firms politically connected can affect the allocation of spending (Choi et al. (2020)). I use an IV strategy which exploits the heterogeneous sensitivity of MSA' military procurement to an increase in (aggregate) *federal* military spending. The employment share of small firms will not be exogeneous if firms in other MSAs anticipate the stimulus and changes their location, entry or exit decisions.

[2]Department of Defense (DOD) spending explains more than 50% of the discretionary spending of the federal government and is the third largest component of government spending, representing 18% of total U.S. budget. See Demyanyk et al. (2019) for further details and Cox et al. (2020) for a detailed characterization of total government procurement.

To avoid this endogeneity concerns I instrument the share of small firms with a 20-year lagged firm entry. The results show that local fiscal stimulus get amplified in MSAs with a higher share of small firms. Figure 1(a) shows that the size of the *local* fiscal multiplier jumps from 0.95 to 2.15 if the employment share of small firms goes from the 25th to the 75th percentile of the distribution. Consistent with a loosening of small firms constraints, I find that the survival rate of small firms increase, while those of large firms are not affected.

The central question in this literature is if the fiscal multiplier is greater or lower than 1, i.e. the direction and strength of indirect effects. I study the spillover effects of aggregate local fiscal stimulus for different types of firms that did not received a direct contract from the government. I document positive spillovers for small firms and neutral or negative for large firms. This is the second contribution of the paper. I use contract level data from *USAspending.org* to identify the contractors, match them with a firm panel data from ORBIS and exclude all firms that received any DOD contract during the sample period to avoid endogeneity concerns associated with the direct effects.[3] Using firm level panel data from ORBIS, with both private and public firms that did not received a DOD contract, I study the behavior of operating revenues, investment, short-term and total financing of more than 7,600 non-financial firms headquartered on the state where the local fiscal stimulus takes place.[4,5] To the best of my knowledge, there are no papers studying either spillover effects at firm level nor its aggregate implications with both *private* and public firms. This distinction is key given the evidence that small private firms exhibit different investment, revenues and financing dynamics along the business cycle (Dinlersoz et al. (2019)).

In addition to excluding government contractors my regressions include firm fixed effect to control for unobserved time-invariant heterogeneity at firm level (e.g. industry), state-year fixed effects to control for time varying omitted variables at state level and other shocks that may be occurring at the same time of the fiscal stimulus, and lastly firm level controls. Figure 1(b) shows that the average firm that did not receive a DOD contract is barely affected by an aggregate local fiscal stimulus, implying that there are not signifi-

[3] Ferraz et al. (2015), Lee (2017), Goldman (2020) and Choi et al. (2020) study the direct effects of government spending at firm level.

[4] I do not exploit the geographic variation of DOD contracts at MSAs level because of data availability. Appendix B.1 shows that the sensitivity of the local fiscal multiplier to the share of small firms holds at state level, i.e. are robust to the geographic aggregation.

[5] Similarly, Cohen et al. (2011) and Kim and Nguyen (2020) study the response of public corporations in Compustat to government spending shocks headquartered in the state that received the fiscal stimulus.

cant crowding-out effects. This effect is explained by two opposite forces: small firms are expanding while large firms are contracting or are not significantly impacted. Relative to large firms, small firms increase investment by 5% and their financing by 7.5%. This larger use of external finance by small firms is associated with a decrease or null impact in borrowing costs. I interpret this evidence as aggregate fiscal stimulus ease borrowing constraints of small firms.

I build a two firms New Keynesian open economy model with credit market imperfections to rationalize the empirical evidence and quantitatively evaluate the firm credit channel of fiscal stimulus. I embed the financial accelerator mechanism in a standard open economy model and allow for firms to have different access to credit markets (Bernanke et al. (1998)). The model implies a countercyclical credit spread where expansionary government spending shocks leads to an increase in the price of capital, firm's net worth and to a decrease in the risk premium. The supply of credit increase due to a reduction of the borrower's perceived default risk. Housing is the main collateral value of small and young firms (Bahaj et al. (2019)). I empirically document that local housing prices increase 1.25% after a local fiscal stimulus (Auerbach et al. (2019)). Therefore improvements in collateral values ease financial constraints allowing small credit constrained firms to increase borrowing and expand (Kiyotaki and Moore (1997); Adelino et al. (2015)). Calibrated to match the share of small firms, leverage and external finance premium the mechanism can account for 70% of the heterogeneous response of investment and 10-20% of the sensitivity of the local fiscal multiplier to firm size heterogeneity.

Related literature. Neoclassical and Keynesian theories mostly ignores the role of firm heterogeneity on the fiscal multiplier, typically, they employ a representative firm assumption (Baxter and King (1993); Burnside et al. (2004); Galí et al. (2007)). In the same vein, the firm distribution where the fiscal stimulus takes place has received almost no attention in the literature that empirically estimates the size of fiscal multipliers.[6] I contribute to this literature with a novel determinant of fiscal multipliers.

The theory predicts that fiscal stimulus increase interest rates reducing the availability of credit in the economy, crowed-out by the government. Murphy and Walsh (2018) review this literature and concludes that the empirical evidence fails to support this theoretical prediction. There is a huge literature that study the role of heterogeneity in firm's credit frictions for the transmission mechanism of monetary policy (Gertler and Gilchrist (1994); Bernanke et al. (1998); Ottonello and Winberry (2018); Cloyne et al. (2019)). Regardless

[6] Ramey (2019) and Chodorow-Reich (2019) review the literature on the closed economy and geographical cross-sectional fiscal multipliers.

the renewed interest in fiscal policy and the focus on the heterogeneity in households' credit constraints (Hagedorn et al. (2019); Auclert et al. (2018)), the literature neglect the role of credit market imperfections for firm's financing decisions and their aggregate implications for the size of the fiscal multiplier (Kaplan and Violante (2014); Farhi and Werning (2016); Demyanyk et al. (2019); Canzoneri et al. (2016); Hagedorn et al. (2019); Corbi et al. (2019)). This paper contributes to this literature showing that heterogeneity in firm's financial frictions shape the effectiveness of fiscal policy.

Melina and Villa (2014) and Olivero et al. (2019) document a negative relationship between credit spreads and aggregate government spending shocks that leads to an increase in bank's lending. Auerbach et al. (2020b) show that the interest rate on consumer loans decrease after a fiscal stimulus in a local economy, with a larger reduction for riskier loans. I emphasize that these effects are present at firm level and are heterogeneous by firm size. In the theory front, Canzoneri et al. (2016) using a model of costly financial intermediation show that fiscal multipliers are higher in recessions due to a counter-cyclical credit spread. Fernández-Villaverde (2010) and Carrillo and Poilly (2013) show that financial frictions amplify closed economy fiscal multiplier in a standard DSGE model.

I also contribute to the limited empirical evidence on firm's response to fiscal stimulus. In line with my results, Goldman (2020) finds that US listed firms that received government contracts increased capital expenditures and have more access to bank loans and reports strong positive spillover among listed firms that did not receive a procurement contract through local supply chains. Ferraz et al. (2015) and Lee (2017) using quasi-natural designs in Brazil and Korea find that firms that received a procurement contract tend to grow faster and the effects persist over time. These results are stronger for small and young firms and financially constrained firms. Zwick and Mahon (2017) find that small firms responds 95% more than large firms to investment tax incentives due to financial frictions in US. Notwithstanding, Kim and Nguyen (2020) and Cohen et al. (2011) document a reduction in capital expenditures and sales growth of corporations, particularly strong on smaller and financially constraint listed firms. Choi et al. (2020) documents that grants allocated to politically connected firms does not create any employment.

Road map. Section 2 presents the macro empirical evidence on how firm heterogeneity affects the size of the local fiscal multiplier. Section 3 presents the firm level evidence on the differential response of small firms to aggregate local fiscal stimulus. Section 4 presents a quantitative model to provide a structural interpretation of the findings and evaluate the proposed mechanism. Finally, Section 5 concludes.

2 Empirical evidence: fiscal stimulus and small firms

This section presents how the local fiscal multiplier depends upon the firm size distribution. The empirical strategy uses a panel data set of output, government military spending and firm size characteristics across metropolitan areas in U.S.[7]

2.1 Data

I use annual data on the geographical allocation of DOD procurement contracts for 2000-2013 from Demyanyk et al. (2019) aggregated at metropolitan area. They collect DD-350 and DD-1057 military procurement forms from USAspending.gov with information about the total amount obligated and duration of the contract, and the name and location of the prime contractors.[8] From the majority of contracts, information on the location where the majority of the work was actually performed is available. Relative to studies that exploit the cross-sectional variation of DOD contracts at state level to estimate state-level fiscal multipliers, this data allows me to reduce endogeneity concerns due to political lobby and omitted variable bias with the inclusion of MSA fixed effects, increasing the cross-sectional dimension from 50 states to 344 MSAs.[9] The data for the employment share of small firms across MSAs is from Business Dynamic Statistics (BDS). The BDS includes employment statistics by firm size operating in each MSA tabulated from micro data in the Longitudinal Business Database (LBD). The LBD covers the universe of firms and establishments in the nonfarm business sector with at least one paid employee.[10] Small firms are those with less than 250 employees. Data for real GDP is from the Bureau of Economic Analysis (BEA). Appendix A.1 presents the summary statistics.

2.2 Econometric specification

I estimate the causal effect of firm size heterogeneity on the local fiscal multiplier using the following panel specification:

[7] Bureau of Economic Analysis (BEA) defines an MSA as: "An area consisting of a core county or counties in which lies an urban area having a population of at least 50,000, plus adjacent counties having a high degree of social and economic integration with the core counties as measured through commuting ties."

[8] Modifications to existing contracts and de-obligation are observed. Demyanyk et al. (2019) void contracts where obligations and de-obligations are within 0.5% of each other.

[9] For a further discussion of the construction of this dataset see Demyanyk et al. (2019).

[10] Davis and Haltiwanger (2019) using BDS data study how the young-firm activity shares move with local economic conditions, local house prices and credit supply.

$$\frac{Y_{m,t+l} - Y_{m,t-1}}{Y_{m,t-1}} = \delta_m + \delta_t + \beta \frac{G_{m,t+l} - G_{m,t-1}}{Y_{m,t-1}} + \gamma \frac{G_{m,t+l} - G_{m,t-1}}{Y_{m,t-1}} \times (S_{m,t-1} - \bar{S}) + \eta S_{m,t-1} + \epsilon_{m,t} \tag{1}$$

$Y_{m,t}$ is real GDP for MSA m in year t, $G_{m,t}$ denotes federal military spending allocated to MSA m in year t, $S_{m,t-1}$ is the log-employment share of small firms in MSA m a year before the fiscal stimulus and represents the firm size structure of location m and $\bar{S} = \sum_m \sum_t \frac{S_{m,t}}{n_m n_t}$ is its average across all MSA-year observations, with n_m denoting the number of MSAs and n_t the number of years in the sample.[11] I include the share of small firms itself ($S_{m,t-1}$) and therefore the interaction term captures the effect of the employment share of small firms on the local fiscal multiplier aside from the direct effect that small firms may have on output. I add MSA fixed effects to control for time-invariant unobserved heterogeneity across MSAs such as industry production structure (share of manufacturing, construction, services, etc). Lastly, time fixed effects control for aggregate shocks, such as national monetary policy and tax policy. Therefore the only possible confounding factors that may remain have to vary both across MSAs and over time. I study the sensitivity of the local fiscal multiplier to the firm size distribution at horizon $l = 0, 1, 2$. Standard errors are clustered at MSA level.

In Equation (1) the coefficient β denotes the average local fiscal multiplier: it defines the dollar increase in real output following a one dollar increase in federal government spending in a MSA with the average employment share of small firms. I de-mean the log-share of small firms only for interpretation purposes, but this does not affect the estimation of the firm-size sensitivity γ (Basso and Rachedi (2018)).[12] The coefficient of interest is γ, which captures the sensitivity of the local fiscal multiplier to the firm size distribution. The interpretation is as follows: when the employment share of small firms increase by 1% above the average, the local fiscal multiplier would be $\beta + \gamma$. If $\gamma > 0$, a higher share of small firms amplify the fiscal stimulus.

The challenge in the fiscal literature is that government spending is rarely exogenous, i.e. varies automatically along the cycle. In this case, military spending is potentially endogenous since DOD contracts are notably political. Therefore I identify government spending shocks following the approach of Nakamura and Steinsson (2014), which exploits the heterogeneous sensitivity of MSA' military procurement to an increase in (aggregate) *federal* military spending. The identification assumption relies on a weaker exogeneity restriction than previous studies that use

[11] A similar specification is used by Basso and Rachedi (2018) to study the sensitivity of the local fiscal multiplier to the age structure across U.S. states.

[12] As $\bar{S}$ does not depend on m nor t, the specification is equivalent to $\frac{Y_{m,t+l} - Y_{m,t-1}}{Y_{m,t-1}} = \delta_m + \delta_t + \theta \frac{G_{m,t+l} - G_{m,t-1}}{Y_{m,t-1}} + \gamma \frac{G_{m,t+l} - G_{m,t-1}}{Y_{m,t-1}} \times S_{m,t-1} + \eta S_{m,t-1} + \epsilon_{m,t}$, with $\theta = \beta + \gamma \bar{S}$.

military spending at national (Ramey (2011); Burnside et al. (2004)) or state level (Nakamura and Steinsson (2014); Basso and Rachedi (2018); Dupor and Guerrero (2017)): the U.S. as a country does not engage in aggregate military buildups or drawdowns (as the Iraq War) because a specific MSA (e.g. *San Francisco-Oakland-Berkeley, CA*) is experiencing or is expected to suffer from sluggish growth relative to the others (e.g. *Champaign-Urbana, IL*) (Chodorow-Reich (2019)). To address this endogeneity problem, I use a two instruments Bartik-style IV approach where the first stage estimates:

$$\frac{G_{m,t+l} - G_{m,t-1}}{Y_{m,t-1}} = \alpha_m + \alpha_t + \phi \left(s_m \times \frac{G_{t+l} - G_{t-1}}{Y_{m,t-1}} \right) + \psi Z_{m,t-1} + \epsilon_{m,t} \tag{2}$$

where G_t is the aggregate federal military spending in period t, s_m is the MSA's average share of DOD contract $(G_{m,t}/G_t)$ over the relevant period and $Z_{m,t-1}$ incorporates the instruments for the share of small firms and its interaction with changes in DOD spending. The instrument for local government spending relies on the variation of aggregate (federal) DOD spending, which by construction is orthogonal to the variation in the local economic activity that can shape the allocation of federal spending across MSAs (Auerbach et al. (2020a, 2019); Demyanyk et al. (2019)).

The identification of whether an MSA's firm size structure affects the transmission mechanism of fiscal stimulus in the baseline specification with location and time fixed effects comes from the variation of the share of small firms across MSAs and its changes over time. For instance, the dispersion in the share of small firms across MSAs ranges from 33.4% to 73.5% in 2006 and 76% of MSAs changed their relative ranking by at least 10 positions between 2001 and 2013.[13]

I estimate the firm size sensitivity of the local fiscal multiplier using instrumental variables for both military spending and the share of small firms. The employment share of small firms in the MSA that received the fiscal stimulus will not be exogenous if firms anticipate the higher government spending.[14] To avoid this endogeneity concerns I instrument the share of small firms with lagged employment share of firm entry. Gourio et al. (2016) presents evidence at state level that shocks to firm entry can have effects on GDP for as long as 12 years, dying out for longer horizons. For this reason I use the employment share of new businesses that were born 20 years before the DOD spending shock arrives for the employment share of small firms.

2.3 Results

Table 1 presents the first empirical fact: local fiscal stimulus get amplified in MSAs with a higher employment share of small business. Column (2) reports a one-year local multiplier equal

[13] And 25% of MSAs changed their relative ranking by more than 50 positions during the sample period.

[14] For example, new business may decide to enter the market in anticipation of a higher aggregate demand. Startups tend to born small increasing the employment share of small firms.

to 1.57 for an MSA with the average employment share of small firms, in line with the cross-sectional multiplier literature (Nakamura and Steinsson (2014); Chodorow-Reich (2019)). The coefficient of interest, γ, is positive and significant suggesting that a higher share of small firms increase the effectiveness of fiscal stimulus. Column (2) is interpreted as follows: the one-year local fiscal multiplier for the average MSA in the distribution of the employment share of small business increase from 1.57 to 1.64 (= 1.573 + 0.068) when the employment share of small firms increase by 1% above the mean. Therefore the marginal effect of increasing the employment share of small firms by 1% on the fiscal multiplier is 4.32% (= 0.068/1.57). Combining the estimated coefficients with the inter-quantile range in the distribution of the employment share of small firms over the sample period imply that the local fiscal multiplier vary between 0.95 and 2.15.[15] [16]. The first stage F-stat shows that instruments are relevant suggesting that the specification is well identified.

The output response at 2-years horizon indicates even a larger sensitivity of the fiscal multiplier to the share of small firms. Column (3) shows that the marginal effect of increasing the share of small firms by 1% on the local multiplier is 5.34%.[17] Lastly, column (1) indicates that on impact the average local fiscal multiplier is positive but the share of small firms does not play a significant role in amplifying the fiscal stimulus. I conjecture that these results may imply a loosening of firm's constraint that takes time to develop.

Table 1: The local fiscal multiplier: the role of small firms

Output response	On Impact (1)	1-year (2)	2-years (3)
Military contracts (β)	1.465***	1.573***	1.442***
	(0.345)	(0.369)	(0.380)
Military contracts $\times$ Emp share of Small (γ)	0.038	0.068**	0.077**
	(0.034)	(0.028)	(0.038)
Emp share of Small (η)	0.069***	0.101**	0.077
	(0.021)	(0.040)	(0.062)
Obs.	4,128	3,784	3,440
MSA and Time FE	Yes	Yes	Yes
Cluster SE	MSA	MSA	MSA
1st Stage F-stat	19.46	18.41	22.78

Note: This table shows estimates of Equation (1). Small firms are defined as those with less than 250 employees. Sample period is 2001-2013 and includes 344 MSAs.***: p<0.01 ;**: p<0.05;*: p<0.1.

[15] Both multipliers are statistically significant at 5% level. The difference in multipliers across the 25^{th} and 75^{th} percentiles is 1.20 and statistically significant at 1% level.

[16] Figure 1(a) in the introduction shows the heterogeneity in the one-year local fiscal multipliers.

[17] The impact of the small firms at higher horizons are still positive but become not significant.

Exclusion Restriction. The identification of the firm size sensitivity of local fiscal multipliers hinges on instrumenting the employment share of small firms with a 20-year lag in the employment share of new firms. The implicit exclusion restriction posits that, conditional on MSA and time fixed effects, whatever determines the cross-sectional variation in new business (i.e. startups) has no other long lasting effect on the size of fiscal multipliers 20 years later. The IV approach would not be valid if the sensitivity to federal government spending shocks - i.e., s_m in Equation (2) - is related to MSA' firm creation 20 years later. Yet, in the data this correlation is -0.005.

Robustness. Appendix A.2 presents evidence that the sensitivity of the local fiscal multiplier to the share of small firms is robust to an array of specifications and time-varying controls. Column (1) reproduces the two-year output response that is used as the baseline. Column (2) shows the OLS results with multipliers considerable lower, implied by attenuation bias and the fiscal foresight problem of government spending shocks. MSA and time fixed fixed controls for time-invariant and aggregate shocks such as MSA production structure. If time-variant omitted variables remain, controlling for dynamic time-MSA varying factors may reduce the bias due to other confounding at play. Column (3) shows that controlling for the lagged log share of manufacturing, construction and retail sectors in MSA's value added does not change either quantitatively nor significantly the effect of small firms on the local fiscal multiplier. Column (4) evidence that the normalization is for interpretation purposes but does not affect either the implied local multipliers or the significance of the interaction term. Lastly, Column (5) shows that results are robust to the definition of small firms and evidence that the sensitivity of the output response depends on the overall MSA's firm size distribution.

Local fiscal stimulus and firm's constraints. A higher share of small business amplify the fiscal stimulus. Does this higher aggregate demand loose firm level constraints? Is this particularly stronger for small firms? Young firms are born small because of borrowing constraints, uncertainty about own productivity that takes time to learn, limited reputations that leads to challenges of building up a customer base. A natural conjecture is that a higher aggregate demand may help to loosen these constraints. For instance if this is the case, the survival rate of credit constraint firms should increase as the financial wedge relax (i.e. countercyclical credit spread). Table 2 shows that the exit rate decrease by 0.94% in MSAs hit by a fiscal stimulus relative to MSAs that did not received the stimulus. Furthermore, the exit rate of small firms decrease by 1%. Conversely the exit rate of large firms is not statistically affected.

Why does small firms that otherwise would exit the market survive when a fiscal stimulus hit a specific MSA? If the fiscal stimulus improves collateral values it may help to relax credit constraint for borrowers, amplifying the output response (Bernanke et al. (1998)). Larger values of firm's collateral reduce information asymmetries between banks and borrowers allowing for higher leverage. These constraints are particularly relevant for small firms (Gertler and Gilchrist (1994)). Adelino et al. (2015) and Bahaj et al. (2019) present evidence that housing is the main collateral

value of small and young firms and therefore they are particularly sensitive to variations in house prices. As a suggestive evidence that a collateral credit channel can be behind the amplification effects of small firms, Column (4) shows that housing prices increases by 1.25% in an MSA hit by a DOD spending shock.

Table 2: Fiscal stimulus increase survival rate of Small business

	Exit rate			Housing
Dependent variable	All	Small	Large	Prices
	(1)	(2)	(3)	(4)
Military contracts (β)	-0.936*	-1.006**	0.727	1.251*
	(0.495)	(0.441)	(1.720)	(0.681)
Obs.	3,784	3,784	3,784	3,652
MSA and Time FE	Yes	Yes	Yes	Yes
SD Cluster	MSA	MSA	MSA	MSA
1st Stage F-stat	6.742	6.742	6.742	7.791

1-year multiplier. ***: p<0.01 ;**: p<0.05;*: p<0.1

3 Micro evidence: the behaviour of Small and Large firms

Which firms are the most responsive to fiscal stimulus? Are spillover effects heterogeneous by firm size? This section study the heterogeneous behavior of small and large firms combining a panel of US non-financial private and public firms from ORBIS that **did not receive** a DOD contract with an aggregate local fiscal stimulus. For this purpose I merge 3 datasets: (i) balance sheet information of non-financial firms from ORBIS database; (ii) firms that were granted a DOD contracts from USAspending.gov; and (iii) aggregate local fiscal stimulus at state level. The focus of this section is on indirect or spillover effects of fiscal stimulus that shed light on the amplification effects of small firms.

3.1 Data

I build an annual US firm level panel data from ORBIS and state military spending from 1997-2016. I use data from ORBIS, a commercial database distributed by Bureau van Dijk containing basic firm-level balance sheet information with the advantage that it includes data on small and

large, unlisted and listed firms.[18] I study the behavior of operating revenues, investment, short-term, long-term and total financing of more than 7,600 non-financial firms headquartered on the state where the *local* fiscal stimulus takes place.[19,20] Appendix B.2 presents variables definition and descriptive statistics of each variable used in the estimation.[21] The local aggregate shock at state level is from Dupor and Guerrero (2017) that update Nakamura and Steinsson (2014) military spending until 2014. I extend the military procurement spending until 2016 aggregating the DOD contract level data from USAspending.gov at state level.

The DOD buys goods and services directly from specific firms that can bias any inference from firm behavior given the endogeneity and selection concerns of who and when received a military contract. In order to deal with it I *excluded all firms that received at least one DOD contract during the sample period*.[22] The goal here is to exclude the direct and endogeneous effects of DOD contracts on firm's behavior and focus on spillover effects of aggregate spending shocks.[23] Appendix B.4 shows that firms that received a DOD contract and I excluded from the sample were mostly large (76% were listed firms and only 19% were small firms), produced manufacturing goods (58%) and represent around 10% of total firms in the sample.

3.2 Firm level econometric specification

I study the average firm's responses to local fiscal stimulus estimating the following:

$$\Delta y_{i,s,t} = \alpha_i + \alpha_t + \beta \frac{G_{s,t} - G_{s,t-2}}{Y_{s,t-2}} + \eta D_{s,t-2} + \theta X_{i,s,t-2} + \epsilon_{i,s,t} \tag{3}$$

where Δy is the two-year log change of operating revenues and fixed assets for firm i located in state s at time t. Firm's investment is defined as the log change in fixed asset and firm's operating revenues are net sales plus other operating revenues. $\frac{G_{s,t}-G_{s,t-2}}{Y_{s,t-2}}$ is the local fiscal stimulus

[18] I drop duplicates and double reporting for the same firm, exclude states with less than 10 firms in the sample period and drop the top and bottom 2% of outliers for each variable.

[19] A similar approach is followed by Cohen et al. (2011) study the response of public corporations in Compustat to seniority-linked government spending shocks headquartered in the congressman state. Using public firms from compustat, Kim and Nguyen (2020) use population revision census shocks and match them with corporations' headquarter at state level.

[20] I do not exploit the geographic variation of DOD contracts at MSAs level because of data availability. Appendix B.1 shows that the sensitivity of the local fiscal multiplier to the share of small firms holds at state level, i.e. are robust to the geographic aggregation.

[21] Appendix B.3 shows the descriptive statistics of the variables used in the analysis by state.

[22] I excluded DOD contractors for the whole sample period, no matter when the contract was granted.

[23] Ferraz et al. (2015) and Lee (2017) exploit quasi-natural experiments in Brazil and Korea due to randomness in the procurement process and are able to estimate the causal *direct* effect of government spending on firm behaviour.

normalized by state GDP. In order to control for other shocks that can occur in the same state, $D_{s,t-2}$ include state level controls such as GDP growth and the change in state taxes. $X_{i,s,t-2}$ controls for firm level characteristics such as the log of total assets and profitability to account for changes in firm growth and creditworthiness, respectively. Nakamura and Steinsson (2014) show that the two-year change captures the dynamic effects of government spending on output in a parsimonious way.[24] Finally, I include firm and time fixed effects. Firm fixed effects controls for time invariant firm-specific trends such as their industry sector that could affect firm's response to DOD local stimulus. Time fixed effects controls for aggregate (national) shocks common to all firms such as the stance of monetary policy or federal tax policy. Standard errors are clustered at state level, allowing the error term to be correlated across firms within a state.

Military spending at state level is subject to endogeneity concerns as discussed in previous section given that firms politically connected can alter the allocation of DOD contracts (Choi et al. (2020)). To address this endogeneity problem I follow a standard Bartik IV approach for the identification of the shock and exclude firms that did receive a contract:

$$\frac{G_{s,t} - G_{s,t-2}}{Y_{s,t-2}} = s_s \times \frac{G_t - G_{t-2}}{Y_{t-2}}$$

where s_s is the average share of national DOD spending received by state s $(G_{s,t}/G_t)$ over 1990-1996. Again the instrument relies on the heterogeneous sensitivity of states to aggregate variation of federal DOD contracts, exogenous to local economic activity.

In order to investigate the heterogeneous response of small and large firms to local fiscal stimulus I include an interaction term between firm size and the government spending shock:

$$\Delta y_{i,s,t} = \alpha_i + \alpha_t + \beta_1 \frac{G_{s,t} - G_{s,t-2}}{Y_{s,t-2}} + \beta_2 \frac{G_{s,t} - G_{s,t-2}}{Y_{s,t-2}} \times Small_{i,s,t-2} + \eta D_{s,t-2} + \theta X_{i,s,t-2} + \epsilon_{i,s,t} \tag{4}$$

where $Small_{i,s,t-2}$ is a dummy that takes value 1 if the firm before the fiscal stimulus have less than 250 employees (i.e. firm size is predetermined and exogenous at the moment of the shock).

While regression (3) and (4) allows me to mitigate concerns about reverse causation and unobserved firm-level factors driving firm's response to fiscal stimulus by using firm-level data and including firm fixed effects, the concern that the estimates could be biased due to time-varying omitted variables remains. I therefore focus on within state-year variation in firm's behavior across different firm groups, small vs large. I estimate the following regression with state-year $(\alpha_{s,t})$ and firm fixed effects (α_i):

[24] Results that regress a one-year changes in firm level variables on one-year changes in DOD spending are robust and are available upon request.

$$\Delta y_{i,s,t} = \alpha_i + \alpha_{s,t} + \beta_1 \frac{G_{s,t} - G_{s,t-2}}{Y_{s,t-2}} \times Small_{i,s,t-2} + \theta X_{i,s,t-2} + \epsilon_{i,s,t} \quad (5)$$

Note that Equation (5) is only able to estimate the differential response of small relative to large firms to a *local* fiscal stimulus.

3.3 Results

Table 3 presents evidence that for the average firm a local fiscal stimulus increase operating turnover and decrease investment, though not significant (see columns (1) and (3)).[25] However, when I take into account the heterogeneous response by firm size, small firms increase their operating turnover by 10.7% and investment by 4.8% relative to large firms in response to an aggregate local DOD shock (see columns (2) and (4)). Large firms are barely affected (negative but not significant). Therefore, within firms that did not received a DOD contract there is a differential response to local fiscal stimulus by firm size. I interpret these findings as evidence of *positive spillovers* for small firms and neutral or negative for large firms. This evidence is in line with the aggregate evidence at MSA level presented in last section which focus on the share of small-firms activity.

These results are robust to controlling for state-year fixed effects, which address concerns about time-varying omitted variable bias. Column (3) and (6) shows that small firms increase investment by 5% *relative* to large firms and operating revenues by 11.2%. The fact that small firms respond to higher government spending increasing investment reflects that easing credit constraints are worth to study as a plausible mechanism.

3.4 Fiscal stimulus and Firm's use of external finance

During booms firms become less risky, have better growth opportunities and the value of collateral increases which leads firms to raise investment and borrowing (Bahaj et al. (2019)). Credit spread are countercyclical. Appendix B.5 shows that the investment and financial expenses of small firms are more sensible to aggregate output growth. How does the use of external finance of small firms reacts to fiscal stimulus? This subsection provides evidence that expansionary government spending loosen borrowing constraints of small firms.

I focus now on firm's financing decision after a local fiscal stimulus. I defined financing as the log change in total liabilities and short-term financing as current liabilities with maturity below one year.[26] As a proxy of the interest rate that firms face I construct an implicit borrowing cost variable

[25] These results are in line with Cohen et al. (2011) and Kim and Nguyen (2020), which find a reduction of capital expenditures for large public corporations after government spending shocks.

[26] There may be concerns about the decision to focus on total liabilities and not directly on total debt or

Table 3: Heterogeneous Firms' responses to Local Fiscal stimulus

	Operating Revenues growth			Investment (Δ Fixed Assets)		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔG	1.804	-0.990		-1.205	-2.519	
	(2.384)	(2.610)		(2.675)	(2.509)	
$\Delta G \times$ Small		10.737**	11.168**		4.848**	4.978**
		(4.508)	(4.552)		(2.307)	(2.173)
ΔGDP	0.092	0.085		0.138	0.136	
	(0.185)	(0.181)		(0.129)	(0.129)	
$\Delta Taxes$	-0.128**	-0.129**		-0.087	-0.088	
	(0.058)	(0.059)		(0.059)	(0.058)	
Small	0.055***	0.046***	0.046***	0.019	0.015	0.016
	(0.012)	(0.012)	(0.013)	(0.025)	(0.026)	(0.025)
Total Assets	-0.177***	-0.177***	-0.173***	-0.327***	-0.327***	-0.326***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)
Profitability	-0.020	-0.020	-0.021	0.097***	0.097***	0.097***
	(0.013)	(0.013)	(0.013)	(0.019)	(0.019)	(0.019)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	Yes	Yes	No
State × Year FE	No	No	Yes	No	No	Yes
Obs	59,412	59,412	59,412	61,011	61,011	61,011
Cluster SE	State	State	State	State	State	State
Kleibergen-Paap rk Wald F	9.435	4.882	45.64	9.338	4.845	41.88

Note: Data is from ORBIS. Direct contractors that received a DOD contracts during sample period were excluded. Small firms are defined as those with less than 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

defined as the change in financial expenses over total liabilities. Table 4 reports the results. Firm's use of external finance of small firms improve significantly after a fiscal stimulus. Relative to large firms, small business increase financing by 7.5%. Financing decisions for the average firm that did not receive a DOD contract are not significantly affected.[27]

Small firms may face borrowing constraints and a higher aggregate demand can help to relax

bank loans. The reason of doing this is data availability (sample size is reduced by half). Nevertheless, Appendix B.6 presents evidence that the results are robust even for the reduced sample available that have available information for total, short-term and long-term debt. Quantitatively responses are larger but much less precisely estimated.

[27] Appendix B.7 shows that this evidence is robust if we decompose small firms between those that have less than 100 employees and those that have between 100 and 250 employees at the moment of the fiscal stimulus.

these constraints, reducing borrower's perceived default risk due to an increase in firms' cash flows, allowing for an expansion of investments propagating the effects of fiscal stimulus. Concretely, a counter-cyclical risk premium as a result of credit market imperfections where loans interest rates and firm's credit spreads decrease due to fiscal stimulus increase earnings and the value of pledgeable collateral, propagating endogenously government spending shocks. Column (8) and (9) shows that the implicit cost of borrowing decrease for small firms.

Table 4: Fiscal stimulus and firm's use of external finance

	Total financing growth			Short-term financing growth			Δ Finan Exp/Liab.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔG	0.758	-1.265		-0.429	-2.043		0.123	0.245	
	(2.550)	(2.062)		(2.385)	(2.709)		(0.317)	(0.318)	
$\Delta G \times$ Small		7.302**	7.550**		5.829**	6.800**		-0.619**	-0.670**
		(2.851)	(2.624)		(2.429)	(2.740)		(0.296)	(0.297)
ΔGDP	-0.011	-0.015		0.033	0.030		-0.007	-0.007	
	(0.116)	(0.116)		(0.097)	(0.096)		(0.012)	(0.012)	
$\Delta Taxes$	-0.068	-0.070		-0.034	-0.035		0.015*	0.015*	
	(0.051)	(0.050)		(0.051)	(0.050)		(0.008)	(0.008)	
Small	0.017	0.011	0.010	0.032**	0.074**	0.027**	-0.002	-0.002	-0.002
	(0.015)	(0.017)	(0.017)	(0.013)	(0.031)	(0.013)	(0.002)	(0.002)	(0.002)
Total Assets	-0.204***	-0.204***	-0.203***	-0.186***	0.006***	-0.184***	0.006***	-0.023***	0.006***
	(0.009)	(0.009)	(0.009)	(0.006)	(0.006)	(0.007)	(0.001)	(0.001)	(0.001)
Profitability	0.061***	0.061***	0.060***	0.065***	0.065***	0.065***	-0.001	-0.001	-0.001
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.001)	(0.001)	(0.001)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
State × Year FE	No	No	Yes	No	No	Yes	No	No	Yes
Obs	62,054	62,054	62,054	62,054	62,054	62,054	38,916	38,916	38,916
Cluster SE	State	State	State	State	State	State	State	State	State
Kleibergen-Paap rk Wald F	9.265	4.836	43.15	9.265	4.836	43.15	10.460	5.444	43.18

Note: Data is from ORBIS. Direct contractors that received a DOD contracts during sample period were excluded. Small firms are those with less than 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

This suggestive evidence points to a relaxation of borrowing constraint as a mechanism behind the larger real effects of fiscal stimulus on small firms. Given that the demand for credit increase after a spending shock, I conjecture here that the supply of credit increase due to a reduction of the borrower's perceived default risk.

Taking stock of the evidence. Section 2 provides evidence that local fiscal stimulus get amplified in MSAs with a higher employment share of small firms. Quantitatively, increasing the share of small firms by 1% above the average share implies a 5.34% larger two-year local fiscal multiplier.

Furthermore, the survival rate of small firms and local housing prices increase. This evidence leads to conjecture that small firm constraints may loose after a government spending shock. Section 3 using firm level data shows that, within firms that did not received a direct DOD contract, the investment's response of small firms is around 5% larger than of large firms. At the same time, small firms improve their balance sheet increasing earnings by more than 10% relative to large firms. This increase in investment and earnings is accompanied by an increase of 7.5% in borrowing and a reduction of borrowing costs.

4 The Model

This section develops a framework to interpret the role of firm heterogeneity and financial frictions on the local fiscal multiplier. I embed a financial accelerator mechanism with endogenous (countercyclical) default risk a la Bernanke et al. (1998) in a model of government spending within a monetary union and two firms that are heterogeneous in the cost of external finance. (Nakamura and Steinsson (2014)).[28] The model consist in two regions that belongs to a monetary and fiscal union: "home" and the "rest of the union". There are 5 types of agents: households, entrepreneurs, retailers, capital goods producers and a government with a fiscal and monetary authority.

4.1 Households

The home region has a continuum of household types indexed by x. Households decide to consume home and foreign goods, to supply labor and invest its saving in a financial intermediary that pays the riskless rate of return. A household's type specify the type of labor supplied by that household. Home households of type x solves the following problem,

$$\underset{\{C_{t+j},H_{t+j}(x),D_{t+j}\}}{Max} E_t \sum_{j=0}^{\infty} \beta^j U(C_{t+j}, H_{t+j}(x)) \tag{6}$$

subject to,

$$P_t C_t + D_{t+1}(x) = w_t(x) H_t(x) + R_t D_t(x) - T_t + \Pi_t \tag{7}$$

D_{t+1} are deposits at a financial intermediary, R_t is the risk-free interest rate, P_t is a price index

[28] Corsetti et al. (2013) study the transmission mechanism of fiscal policy in a small open economy with fixed exchange rate in a similar spirit of Nakamura and Steinsson (2014). Empirically, Ilzetzki et al. (2013) provides evidence that validates the Mundell-Flemming that states that fiscal policy is more effective under fixed exchange rates.

that gives a consumer the minimum price of a unit of consumption C_t, w_t is the real wage rate received for working H_t hours by household type x T_t are lump-sum taxes collected by the federal fiscal authority and lastly Π_t are profit from home intermediate producers.

$$C_t = \left[\phi_H^{1/\eta} C_{Ht}^{\frac{\eta-1}{\eta}} + \phi_F^{1/\eta} C_{Ft}^{\frac{\eta-1}{\eta}}\right] \tag{8}$$

ϕ_H and ϕ_F denote household's relative preference for home and foreign goods. I normalize and set these preferences as $\phi_H + \phi_F = 1$. C_{Ht} and C_{Ft} are consumption of composites home and foreign goods and $\eta > 0$ is the elasticity of substitution between home and foreign goods.

$$C_{Ht} = \Big[\int_0^1 c_{ht}(z)^{\frac{\theta-1}{\theta}}\Big]^{\frac{\theta}{\theta-1}} \quad \text{and} \quad C_{Ft} = \Big[\int_0^1 c_{ft}(z)^{\frac{\theta-1}{\theta}}\Big]^{\frac{\theta}{\theta-1}} \tag{9}$$

$\theta > 0$ is the elasticity of substitution across different varieties. $c_{ht}(z)$ and $c_{ft}(z)$ denotes the consumption variety z of home and foreign produced goods.

In equilibrium, household deposits at intermediaries equal total loanable funds supplied to entrepreneurs: $D_t = B_t$. Goods markets are completely integrated across regions and therefore home and foreign consumers face the same prices.

Households minimize the cost of buying the consumption basket C_t. These optimal decisions implies demand curves for home and foreign goods and for each of the differentiated products of the form:

$$C_{Ht} = \phi_H C_t \Big(\frac{P_{Ht}}{P_t}\Big)^{-\eta} \quad \text{and} \quad C_{Ft} = \phi_F C_t \Big(\frac{P_{Ft}}{P_t}\Big)^{-\eta} \tag{10}$$

$$c_{ht}(z) = C_{Ht} \Big(\frac{p_{Ht}(z)}{P_{Ht}}\Big)^{-\theta} \quad \text{and} \quad c_{ft}(z) = C_{Ft} \Big(\frac{p_{ft}(z)}{P_{Ft}}\Big)^{-\theta} \tag{11}$$

where

$$P_{Ht} = \Big[\int_0^1 p_{ht}(z)^{1-\theta} dz\Big]^{\frac{1}{1-\theta}} \quad \text{and} \quad P_{Ft} = \Big[\int_0^1 p_{ft}(z)^{1-\theta} dz\Big]^{\frac{1}{1-\theta}} \tag{12}$$

and

$$P_t = \left[\phi_H P_{Ht}^{1-\eta} + \phi_F P_{Ft}^{1-\eta}\right]^{\frac{1}{1-\eta}} \tag{13}$$

The problem of the foreign household is defined analogously.

4.2 Entrepreneurs

There is a continuum of risk neutral entrepreneurs indexed by $e \in [0, 1]$.

$$B^e_{t+1} = P^e_{kt} K^e_{t+1} - N^e_{t+1} \tag{14}$$

Demand for capital,

$$E_t(R^{k,e}_{t+1}) = E_t \left[\frac{MPK^e_{t+1} - (1-\delta) P^e_{k,t+1}}{P^e_{kt}} \right] \tag{15}$$

where $MPK^e_{t+1} = (1-\alpha) \frac{y_{eht}}{K_{eht}} S_{eht}$.

Supply of capital,

$$E_t(R^k_{t+1}) = s\left(\frac{N^e_{t+1}}{P^e_{kt} K^e_{t+1}} \right) R_{t+1} \tag{16}$$

where $s'(.) < 0$, i.e. the external finance premium decrease with the share of firm's self-financing investment (i.e. that is financed by internal funds).

Describe optimal contract and idiosyncratic risk of investments:

$$E_t \Big[\bar{\omega}^e_{t+1} R^{ek}_{t+1} P^e_{kt} K^e_{t+1} \Big] = E_t \Big[Z^e_{t+1} B^e_{t+1} \Big] \tag{17}$$

Entrepreneurs in general equilibrium. The aggregate entrepreneurial net worth at the end of period t is defined as entrepreneurial equity of those firms that survive in time $t-1$ plus entrepreneurial wage for the unit of labor supplied inelastically,

$$N_{t+1} = \gamma V_t + W^e_t \tag{18}$$

and the law of motion of the aggregate net worth is as follows:

$$N_{t+1} = \gamma \left[R^k_t P_{k,t-1} K_t - \left(R_t + \frac{\mu \int_0^{\bar{\omega}_t} \omega dF(\omega) R^k_t P_{kt} K_t}{P_{k,t-1} K_t - N_t} \right) (P_{k,t-1} K_t - N_t) \right] + W^e_t \tag{19}$$

The demand for the firm e is:

$$y_{eht}(x) = \Big(nC_{Ht} + (1-n) C^*_{Ht} + nI_{Ht} + (1-n) I^*_{Ht} + nG_{Ht} \Big) \Big(\frac{p_{eht}(x)}{P_{Ht}} \Big)^{-\theta} \tag{20}$$

Finally, optimal labor decisions requires that wages are equal for both types of firms within a region,

$$W_t(x) = f_l(H_{et}(x), K_{et}(x))S_{et}(x) \tag{21}$$

4.3 Capital Producers

Entrepreneurs used capital from production but do not permanently own it. They purchase it from perfectly competitive capital producers firms at the end of time $t-1$, used in production and resold the undepreciated part $(1-\delta)K_t$ at time t. Capital producers purchase investmen goods, I_t and old capital to produce new capital goos solving the following problem:

$$\underset{\{K_{t+1},I_t\}}{Max} E_0 \sum_{t=0}^{\infty} \beta^t [P_t^k K_{t+1} - I_t - \tilde{P}_t^k (1-\delta)K_t] \tag{22}$$

subject to,

$$K_{t+1} = \phi\Big(\frac{I_t}{K_t}\Big)K_t + (1-\delta)K_t \tag{23}$$

where $\phi'(.) \geq 0, \phi''(.) \leq 0, \phi(0) = 0$ and $\tilde{P}_t^k$ is the price of capital of previously-installed capital.[29] The link between the price of capital and investment behavior is due to capital adjustment costs. In equilibrium the price of a unit of capital in terms of the home goods is given by,

$$P_t^k = \left[\phi'\Big(\frac{I_t}{K_t}\Big)\right]^{-1} \tag{24}$$

$$\tilde{P}_t^k = \left[(1-\delta) + \phi\Big(\frac{I_t}{K_t}\Big) - \phi'\Big(\frac{I_t}{K_t}\Big)\frac{I_t}{K_t}\right]P_t^k \tag{25}$$

4.4 Retailers

There are two different intermediate goods, one produced by a small firm and the other priduced by the large firm. These intermediate goods are combined in a CES aggregate to a single wholesale good as follow:

$$Y_t = [aY_{L,t}^{\rho} + (1-a)Y_{S,t}^{\rho}]^{1/\rho} \tag{26}$$

[29] Pancrazi et al. (2016) show that the approximation of the previously installed capital with the newly installed capital has first order equilibrium distortions in an economy with positive depreciation rate. Here I follow their suggested correction.

where ρ is the elasticity of substitution between small and large firms goods produced and a is the output share of large firms in aggregate output.

The production of each intermediate good is as follows:

$$Y_{i,t} = K_{it}^{\alpha} H_{it}^{\Omega} H_{it}^{e\,(1-\Omega-\alpha)} \tag{27}$$

where i = L, S.

Capital is firm-specific with law of motion:

$$K_{i,t+1} = \phi_i\Big(\frac{I_{it}}{K_{it}}\Big)K_{it} + (1-\delta)K_{it} \tag{28}$$

There are heterogeneous adjustment cost.

The price of capital differs across firms but optimal portfolio decisions requires:

$$E_t[(R^k_{H,L,t+1} - R^k_{H,S,t+1})\beta C_t/C_{t+1}] = 0 \tag{29}$$

$$E_t[(R^k_{F,L,t+1} - R^k_{F,S,t+1})\beta C^*_t/C^*_{t+1}] = 0 \tag{30}$$

In order to account for nominal rigidities, I assume the existence of a monopolistically competitive retail sector subject to a price-setting decision a là Calvo. Retailers buy output from entrepreneurs, costlessly differentiate and sell a CES aggegate of these retail goods to households and firms (converted into consumption and investment, respectively). As these retailers have market power and therefore make non-zero profits return these profits to households in a lump-sum form.

Retailers have a probability $1-\theta$ of changing their price each period. With probability θ keep its price unchanged, which implies that its optimal price decision involves setting its price equal to a constant markup over a weighted average of current and expected future marginal cost. This optimization problem yields a standard home and foreign Phillips curves.

4.5 The Government

There is a federal government that follows a balanced budget, purchasing goods and leaving lump-sum taxes in both home and foreign regions,

$$nP_{Ht}G_{Ht} + (1-n)P_{Ft}G_{Ft} = T_t \tag{31}$$

n is the relative size of the home region, P_{Ht} is the home relative price of home goods and G_{Ht} is the per capita government purchases of home consumption goods. Lump-sum taxes are defined as $T_t = nT_{Ht} + (1-n)T_{Ft}$. I assumed that government demand mimic the private demand for differentiated goods:

$$g_{ht}(z) = G_{Ht}\Big(\frac{p_{Ht}(z)}{P_{Ht}}\Big)^{-\theta} \qquad \text{and} \qquad g_{ft}(z) = G_{Ft}\Big(\frac{p_{ft}(z)}{P_{Ft}}\Big)^{-\theta} \tag{32}$$

The policy experiment explored here is an increase in government spending in the home region financed with an increase in federal lump-sum taxes (Farhi and Werning (2016)).

The Monetary authority follows a standard Taylor rule for the country nominal interest rate (in linearised form),

$$\hat{R}_t = (1-\rho_R)(\phi_\pi \hat{\pi}_t + \phi_Y \hat{Y}_t) + \rho_R \hat{R}_{t-1} \tag{33}$$

where ρ_R denotes the degree of interest rate smoothing, ϕ_π is the response to the weighted average deviation of the two regions of national inflation from target and ϕ_Y is the reaction to (weighted average) national output gap. Lastly, $\hat{\pi}_t = n\hat{\pi}_{Ht} + (1-n)\hat{\pi}_{Ft}$ and $\hat{Y}_t = n\hat{Y}_{Ht} + (1-n)\hat{Y}_{Ft}$, where a variable with a hat () is expressed as deviations of their respective steady state values.

4.6 Equilibrium

Definition Given $F_{ij}(\omega)$, a competitive equilibrium is a sequence of allocation and price functions, $\{C_{it}, C^e_{it}, H_{ijt}, D_{it}, W_{it}, Y_{ijt}, K_{ij,t+1}, B_{ijt}, P^k_{ijt}, R^k_{ij,t+1}, R_{t+1}, G_{it}, T_t, \bar{\omega}_{ijt}\}_{t=0}^{\infty}$, for $i = H, F$ and $j = L, S$ such that:

1. Household solve H1;

2. Entrepreneur j solve $E1$ subject to Intermediaries participation constraint;

3. Phillips curve, Government Budget constraints and Monetary rule are satisfied;

4. Goods markets clears: $Y_t = nY_{Ht} + (1-n)Y_{Ft}$
   $Y_{it} = C_{it} + I_{it} + G_{it}$,
   $C_{it} = [n(C_{it} + C^e_{it}) + (1-n)(C^*_{it} + C^{e*}_{it}]; I_{it} = [nI_{it} + (1-n)I^*_{it}]$

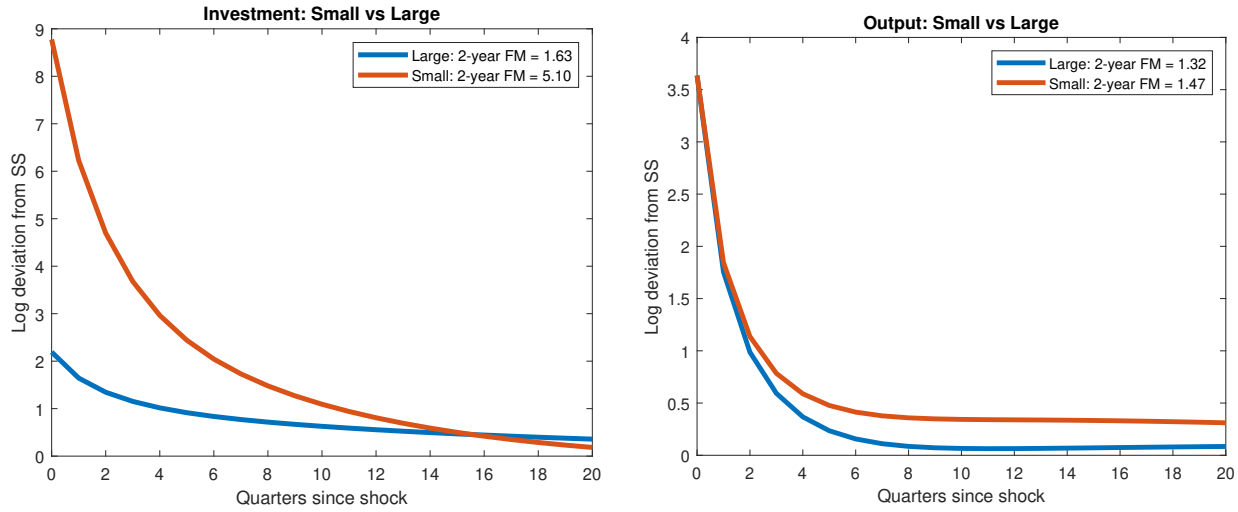
5. Bond market clears: $\sum_j (Q_{ijt}K_{ij,t+1} - N_{ij,t+1}) = \sum_j B_{ij,t+1} = D_{it+1}$

Table 5: *Calibration*

Parameter	Notation	Target/Source	Small	Large
Emp. share		BDS	46%	54%
Steady-state risk spread		ORBIS	3%	1%
Annual Business failure	$F(\bar{\omega})$	BDS	7%	1%
Steady-state ratio of capital to net worth	$\frac{K}{N}$	ORBIS	2.08	2.22
Cap. Adj. Cost	ϕ		0.1	0.5
Elast. of risk premium wrt leverage ratio	ν		0.045	0.025
Standard error of idiosyncratic shock	σ_ω		0.300	0.209
Threshold value of idiosyncratic shock	$\bar{\omega}$		0.457	0.548
Monitoring cost	μ		0.091	0.136
Survival rate of entrepreneurs	γ		0.979	0.988

4.7 Results

Figure 2: Heterogeneous firm's behavior



(a) Investment (b) Output

Note:

Table 6: Local fiscal multipliers: the role of small firms

		Data	Model
Investment Fiscal Multiplier (2-year) - Small firms		4.848	5.092
Investment Fiscal Multiplier (2-year) - Large firms		-2.519	1.634
Difference in Investment response (2-year)		4.978	3.331
Investment: Ratio of Model-Data explained		**66.8**%	
Average Local Output Fiscal Multiplier (2-year)	β	1.442	1.439
Sensitivity wrt SMEs	γ	0.077	0.008
Δ Local Multiplier of 1% increase in Share of SMEs	γ/β	5.34%	0.58%
Local Fiscal Multiplier: Ratio of Model-Data explained		**10.9**%	

5 Conclusions

The response of governments across the world to cope with the effects of COVID-19 crisis involve a massive fiscal stimulus in the form of transfers to households, unemployment checks and targeted spending to industries or types of business (e.g. Paycheck Protection Program). The evidence presented in this paper helps to rationalize why governments may choose to protect small firms, which leads at the same time to an increase the effectiveness of their fiscal stimulus.

This paper presents evidence of a firms-dependent multiplier where the heterogeneous behaviour of small and large firms where the fiscal stimulus takes place shape the effectiveness of fiscal stimulus. A firm credit channel of fiscal stimulus is emphasized, where the aggregate effects of government spending depends on the distribution of financial constraints that firms face, which can vary over time. A "financial accelerator" mechanism is at play that endogenously leads to amplification effects. The propagation of government spending shocks through the interaction of firm heterogeneity and credit markets restricts the class of models able to match the empirical evidence presented here. Lastly but not least important, I show that the spillover effects of demand shocks on small firms can be sizable.

Further research is needed to improve our understanding of the links between firms and household decision in the amplification of fiscal stimulus. Is there a link between small firms owners and/or workers credit constraints? What is the role of input-output linkeages between small and large firms for the amplification? Do small firms use more intensively non-tradeable factors of production? Recent contributions brings the complex network structure between consumption and production into the transmission mechanism of fiscal policy (Patterson et al. (2019); Bouakez et al. (2020)).

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A Appendix: MSA Evidence

A.1 MSA level data - Summary Statistics

Table 7: *Summary statistics*

Variable	Mean	SD	p25	p50	p75
GDP growth (%)	1.71	4.11	-0.35	1.67	3.77
DOD spending growth (%)	0.10	1.16	-0.06	0.01	0.15
Ratio DOD spending over GDP (%)	1.36	2.71	0.15	0.45	1.42
Employment share of SMEs (Emp $<$ 250) (%)	46.27	6.56	41.85	45.35	49.87
Employment share of Small (Emp $<$ 100) (%)	37.77	6.06	33.64	36.70	41.08

Note: This table reports summary statistics for core variables of interest used in this study. The data covers 344 MSAs.

A.2 Results at MSA level - Robustness

Table 8: The local fiscal multiplier: Robustness

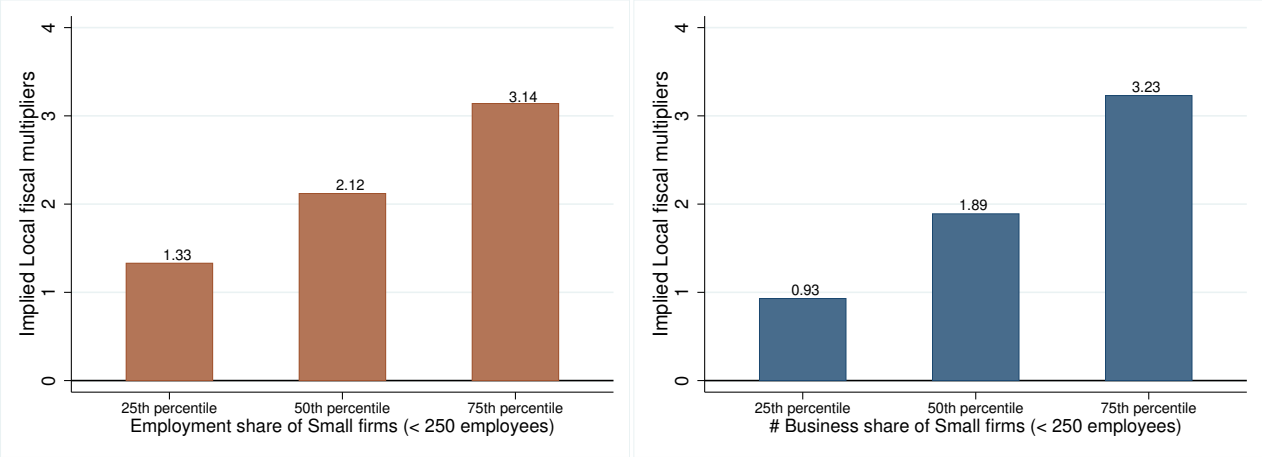
	Baseline	OLS	Industry shares	Interaction $S_{m,t-1}$	Small ($<$ 100 Emp)
	(1)	(2)	(3)	(4)	(5)
Military contracts (β)	1.442***	0.313***	1.123***	-28.06*	1.371***
	(0.380)	(0.083)	(0.035)	(14.33)	(0.353)
Military contracts $\times$ Emp share of Small (γ)	0.077**	0.012***	0.072**	7.709**	0.065**
	(0.038)	(0.004)	(0.036)	(3.768)	(0.030)
Emp share of Small (η)	0.077	0.120**	0.110*	0.077	0.108*
	(0.062)	(0.057)	(0.064)	(0.062)	(0.066)
Obs.	3,440	3,440	2,989	3,440	3,440
MSA and Time FE	Yes	Yes	Yes	Yes	Yes
Cluster SE	MSA	MSA	MSA	MSA	MSA
1st Stage F-stat	22.78		57.49	7.17	22.63

Note: Column (1) reproduces the two-year output response that I set as my baseline. Column (2) estimate Equation 1 by OLS. Column (3) includes lagged industry shares dynamic controls (log share of value added in manufacturing, construction and retail sectors). Column (4) is estimates Equation 1 where the firm size interaction is not normalized. Column (5) estimates Equation 1 where Small firms are those with less than 100 employees. Sample period is 2001-2013 and includes 344 MSAs. ***: p<0.01 ;**: p<0.05;*: p<0.1.

B Appendix: Robustness Micro level evidence

B.1 Results at State level

Figure 3: Aggregate effects of firm heterogeneity - State level Evidence



Note: The figure display the sensitivity of the local fiscal multiplier to the firm size distribution at state level. Sample period is 1977-2014. Data for the share of small business is from Business Dynamic Statistics. The government spending shock is identified with the cross-sectional variation of DoD spending across US states from Dupor and Guerrero (2017).

Table 9: The local fiscal multiplier: the role of small business

Dependent variable	Output		Earnings	
	(1)	(2)	(3)	(4)
Military contracts (β)	2.260***	2.126***	1.713***	1.600***
	(0.559)	(0.512)	(0.393)	(0.381)
Military contracts $\times$ Emp share of Small (γ)	0.190**		0.092**	
	(0.074)		(0.042)	
Military contracts $\times$ # Business share of Small (γ)		4.398***		1.589**
		(1.026)		(0.712)
Emp share of Small (η)	-0.153**		-0.115**	
	(0.075)		(0.056)	
#Business share of Small (η)		-3.918		-0.346
		(2.417)		(1.733)
Obs.	1,759	1,800	1,759	1,800
R2	0.285	0.258	0.526	0.522
State and Time FE	Yes	Yes	Yes	Yes

***: p<0.01 ;**: p<0.05;*: p<0.1

B.2 Firm level data - ORBIS

Table 10: Descriptive Statistics: ORBIS 1997-2016 - 7,635 firms & 60,054 obs.

Variable	Definition	Obs.	Mean	Median	SD	p25	p75
ΔSales	Log change in operating turnover	59,596	0.161	0.095	0.560	-0.088	0.343
Investment	Log change in fixed assets	61,111	0.150	0.055	0.679	-0.152	0.383
ΔWork. Capital	Growth in Net Current assets (how much capital is used by day to day activities)	55,485	-0.003	-0.042	1.087	-0.487	0.413
ΔFinancing	Log change in total financing, defined as current liabilities (Loans+Creditors+Other current liab) + long-term liabilities (Long term financial debts + other long term liab. and provisions))	62,054	0.167	0.078	0.555	-0.137	0.397
ΔST-Financing	Log change in short-term debt (with maturity less or equal than a year)	62,054	0.159	0.104	0.570	-0.154	0.421
$\Delta \frac{FinExp}{Liab}$	Change in all financial expenses such as interest charges, write-off financial assets over total liabilities	38,916	0.234	-0.011	5.505	-1.447	1.631
Total Assets$_{-2}$	Log of total assets	62,054	18.422	18.457	2.438	16.739	20.144
Profitability$_{-2}$	EBIT (Gross profit-Other operating expenses) over total assets	62,054	-0.119	0.048	0.807	-0.072	0.103
Small	Dummy equal to 1 if Employment is less than 100	62,054	0.189	0.000	0.391	0.000	0.000
Medium	Dummy equal to 1 if Employment is less than 250	62,054	0.307	0.000	0.461	0.000	1.000
ΔG	Military Procurement growth over State GDP	62,054	0.001	0.000	0.005	-0.001	0.002
ΔGDP	State GDP growth	62,054	0.050	0.046	0.049	0.021	0.083
$\Delta Taxes$	State Total Tax Collection	62,054	0.043	0.058	0.086	-0.001	0.095

B.3 ORBIS: Descriptive Statistics by State

State	Obs.	ΔSales	Investment	ΔWork. Capital	ΔFinancing	ΔST-Financing	$\frac{FinExp}{Finan_{-2}}$
AL	309	0.046	0.043	-0.156	0.060	0.048	0.050
AR	332	0.091	0.118	-0.036	0.103	0.072	0.046
AZ	902	0.216	0.157	-0.044	0.187	0.179	0.085
CA	10,277	0.201	0.186	0.051	0.195	0.190	0.090
CO	2,171	0.228	0.197	-0.091	0.249	0.233	0.099
CT	1,235	0.114	0.141	-0.015	0.131	0.145	0.074
DE	604	0.169	0.150	0.019	0.197	0.204	0.087
FL	3,193	0.166	0.146	0.001	0.184	0.182	0.091
GA	1,669	0.124	0.120	-0.042	0.138	0.137	0.076
HI	122	0.048	0.020	-0.215	0.070	0.096	0.039
IA	318	0.047	0.098	-0.022	0.102	0.095	0.052
ID	169	0.244	0.147	-0.051	0.163	0.129	0.092
IL	2,392	0.102	0.102	0.002	0.113	0.104	0.070
IN	691	0.118	0.149	0.060	0.113	0.115	0.067
KS	484	0.100	0.072	-0.095	0.124	0.101	0.072
KY	396	0.103	0.110	0.091	0.127	0.079	0.063
LA	396	0.166	0.152	-0.028	0.196	0.170	0.074
MA	2,812	0.203	0.197	0.066	0.187	0.172	0.090
MD	1,000	0.203	0.211	-0.002	0.178	0.205	0.073
MI	946	0.075	0.082	-0.025	0.098	0.110	0.056
MN	1,570	0.143	0.130	0.005	0.133	0.123	0.070
MO	912	0.106	0.133	-0.046	0.146	0.122	0.057
MS	142	0.104	0.130	-0.069	0.147	0.130	0.058
NC	1,249	0.134	0.111	-0.022	0.131	0.128	0.072
NE	155	0.120	0.186	0.180	0.228	0.185	0.077
NH	195	0.101	0.093	0.046	0.125	0.107	0.079
NJ	2,884	0.141	0.112	0.010	0.137	0.136	0.079
NV	1,127	0.235	0.210	-0.121	0.244	0.289	0.111
NY	4,861	0.140	0.128	-0.007	0.147	0.141	0.077
OH	2,140	0.072	0.072	-0.017	0.095	0.073	0.055
OK	638	0.250	0.221	-0.089	0.255	0.191	0.073
OR	587	0.102	0.083	0.053	0.096	0.095	0.071
PA	2,349	0.160	0.151	0.032	0.158	0.156	0.069
RI	208	0.128	0.100	-0.052	0.158	0.108	0.087
SC	285	0.104	0.072	-0.099	0.088	0.098	0.049
TN	927	0.159	0.168	-0.003	0.174	0.164	0.064
TX	7,051	0.181	0.168	-0.033	0.197	0.182	0.075
UT	566	0.210	0.148	0.100	0.176	0.184	0.119
VA	1,623	0.161	0.170	-0.042	0.151	0.133	0.068
VT	111	0.124	0.117	-0.225	0.150	0.115	0.066
WA	1,162	0.225	0.203	0.016	0.227	0.194	0.093
WI	894	0.105	0.092	-0.023	0.097	0.096	0.044

B.4 DOD Contractors

Table 11: *Descriptive Statistics: DOD Contractors*

Obs	13,762 (12.12%)
Firms	847 (7.2%)
Share of Small (< 100)	9.7%
Share of SME (< 250)	18.9%
Share of Listed	75.9%
Manufacturing (20-39)	57.8%
Services (70-89)	19.6%
Trans., Commun., Electric, Gas, And Sanitary Ss (40-49)	10.6%
Wholesale (50-51)	4.7%
Retail (52-59)	3.9%
Mining (1-9)	1.8%

	Mean	Median
Employment	6,240.5	1,965
Profitability ($EBIT/TA_{-2}$)	-0.001	0.071
Log Total Assets	19.235	19.314
Leverage	0.56	0.50
Financial Exp/Liab$_2$ (%)	5.03	3.07

B.5 Cyclicallity of Small versus Large firms

Table 12: *Cyclicality of Firm's Investment and Financial Expenses*

Firm size	Investment	Financial Expenses
Small	0.043*** (0.002)	-0.083*** (0.024)
Large	0.019*** (0.001)	-0.070*** (0.013)
All	0.028*** (0.001)	-0.074*** (0.012)

Note: This table shows the linear combination of β_1 and β_2 coefficients of the following regression: $y_{it} - y_{i,t-1} = \alpha + \beta_1 \Delta GDP^{agg}_{t,t-1} + \beta_2 \Delta GDP^{agg}_{t,t-1} Small_{i,t-1} + Small_{i,t-1} + \theta X_{i,t-1} + \psi \Delta GDP^{agg}_{t-1,t-2} + \epsilon_{it}$, with $y =$ Investment and $(\frac{Finan.Exp}{Liab})$. Standard errors in parenthesis.***: p<0.01 ;**: p<0.05;*: p<0.1.

B.6 Robustness from ORBIS - Loans and Long-term debt

Table 13: Fiscal stimulus and Firm's use of external finance

	Total debt growth	Long-term debt growth	Short-term debt growth	Δ Fin.Exp/Debt
	(1)	(2)	(3)	(4)
$\Delta G \times$ SMEs	18.848***	10.386*	8.981†	-0.677
	(6.824)	(5.923)	(5.397)	(1.403)
SMEs	-0.016	0.001	0.015	-0.003
	(0.036)	(0.030)	(0.043)	(0.005)
Total Assets	-0.250***	-0.263***	-0.137***	0.015***
	(0.014)	(0.016)	(0.012)	(0.003)
Profitability	0.078***	0.045***	0.062***	-0.010***
	(0.017)	(0.015)	(0.017)	(0.003)
Firm FE	Yes	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes	Yes
Obs	35,076	46,946	37,852	23,377
Cluster SE	State	State	State	State
Kleibergen-Paap rk Wald F	48.44	44.22	46.57	49.76

Note: Data is from ORBIS. Direct contractors that received a DOD contracts during sample period were excluded. Small firms are defined as those with less than 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1;†: p<0.15

B.7 Robustness from ORBIS - Small and Medium firms

Table 14: Heterogeneous Firms' responses to Fiscal stimulus

	Operating Revenues growth		Investment (Δ Fixed Assets)		Working capital growth	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔG	1.804	-1.631	-1.202	-3.275	0.594	-0.954
	(2.392)	(2.753)	(2.657)	(2.370)	(5.189)	(5.618)
$\Delta G \times$ Small		11.078**		1.195		12.702**
		(4.309)		(4.098)		(5.585)
$\Delta G \times$ Medium		13.041***		12.601***		-2.337
		(3.997)		(3.224)		(7.599)
ΔGDP	0.084	0.076	0.136	0.130	-0.126	-0.129
	(0.183)	(0.179)	(0.129)	(0.130)	(0.199)	(0.198)
$\Delta Taxes$	-0.125**	-0.127**	-0.086	-0.090	-0.190	-0.191
	(0.059)	(0.061)	(0.059)	(0.059)	(0.139)	(0.137)
Small	0.114***	0.102***	0.033	0.030	-0.007	-0.017
	(0.028)	(0.027)	(0.043)	(0.045)	(0.033)	(0.033)
Medium	0.097***	0.088***	0.036	0.027	0.014	0.016
	(0.013)	(0.014)	(0.023)	(0.024)	(0.035)	(0.033)
Total Assets	-0.169***	-0.170***	-0.325***	-0.326***	-0.217***	-0.217***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.028)	(0.028)
Profitability	-0.021	-0.021	0.097***	0.097***	0.075***	0.074***
	(0.013)	(0.013)	(0.019)	(0.019)	(0.010)	(0.10)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	59,412	59,412	61,011	61,011	55,069	55,069
Cluster SE	State	State	State	State	State	State
Kleibergen-Paap rk Wald F	9.420	3.292	9.321	3.280	9.286	3.276

Note: Data from ORBIS. Small and Medium firms are defined as those with less than 100 and 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

Table 15: Heterogeneous Firms' responses to Fiscal stimulus

	Operating Revenues growth	Investment	Working capital growth
	(1)	(2)	(3)
$\Delta G \times \text{Small}_{100}$	11.773**	1.727	11.494*
	(4.474)	(3.949)	(6.668)
$\Delta G \times \text{Medium}_{100-250}$	12.847***	12.461***	-1.724
	(3.883)	(3.310)	(7.753)
Small_{100}	0.104***	0.024	-0.021
	(0.027)	(0.046)	(0.032)
$\text{Medium}_{100-250}$	0.090***	0.028	0.020
	(0.014)	(0.022)	(0.033)
Total Assets	-0.166***	-0.325***	-0.216***
	(0.007)	(0.008)	(0.028)
Profitability	-0.022	0.096***	0.073***
	(0.013)	(0.019)	(0.009)
Firm FE	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes
Obs	59,412	61,011	55,069
Cluster SE	State	State	State
Kleibergen-Paap rk Wald F	22.89	23.05	24.52

Note: Data from ORBIS. Small and Medium firms are defined as those with less than 100 and 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

Table 16: Fiscal stimulus and Firm's use of external finance

	Total financing growth		Short-term financing growth		Δ Finan Exp/Liab	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔG	0.774	-1.860	-0.441	-2.279	0.115	0.252
	(2.545)	(2.005)	(2.383)	(2.704)	(0.312)	(0.302)
$\Delta G \times \text{Small}_{100}$		8.691**		6.884***		-0.731
		(3.782)		(2.420)		(0.606)
$\Delta G \times \text{Medium}_{100-250}$		8.778**		5.314**		-0.535
		(3.273)		(2.329)		(0.627)
ΔGDP	-0.011	-0.017	0.028	0.024	-0.008	-0.007
	(0.117)	(0.116)	(0.097)	(0.096)	(0.012)	(0.012)
$\Delta Taxes$	-0.068	-0.071	-0.032	-0.034	0.015*	0.015*
	(0.051)	(0.050)	(0.050)	(0.050)	(0.008)	(0.008)
Small_{100}	0.025	0.017	0.081**	0.074**	-0.000	0.001
	(0.033)	(0.036)	(0.031)	(0.031)	(0.002)	(0.003)
$\text{Medium}_{100-250}$	0.008	0.002	0.057***	0.054***	0.001	0.002
	(0.020)	(0.022)	(0.017)	(0.017)	(0.002)	(0.002)
Total Assets	-0.203***	-0.204***	-0.180***	-0.181***	0.006***	0.006***
	(0.011)	(0.011)	(0.007)	(0.007)	(0.001)	(0.001)
Profitability	0.061***	0.061***	0.064***	0.064***	-0.002	-0.001
	(0.008)	(0.008)	(0.007)	(0.007)	(0.001)	(0.001)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs	62,054	62,054	62,054	62,054	38,916	38,916
Cluster SE	State	State	State	State	State	State
Kleibergen-Paap rk Wald F	9.248	3.279	9.248	3.279	10.460	5.444

Note: Data from ORBIS. Small and Medium firms are defined as those with less than 100 and 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

Table 17: Fiscal stimulus and Firm's use of external finance

	Total financing growth	Short-term financing growth	Δ Finan Exp/Liab
	(1)	(2)	(3)
$\Delta G \times \text{Small}_{100}$	9.198**	7.938***	-0.407
	(3.694)	(2.685)	(0.679)
$\Delta G \times \text{Medium}_{100-250}$	8.721**	6.236**	-0.590
	(3.241)	(2.599)	(0.424)
Small_{100}	0.014	0.072**	0.002
	(0.036)	(0.031)	(0.003)
$\text{Medium}_{100-250}$	0.003	0.054***	0.002*
	(0.021)	(0.017)	(0.001)
Total Assets	-0.203***	-0.179***	0.005***
	(0.011)	(0.007)	(0.001)
Profitability	0.060***	0.064***	-0.001
	(0.008)	(0.007)	(0.001)
Firm FE	Yes	Yes	Yes
State × Year FE	Yes	Yes	Yes
Obs	62,054	62,054	38,220
Cluster SE	State	State	State
Kleibergen-Paap rk Wald F	23.80	23.80	20.39

Note: Data from ORBIS. Small and Medium firms are defined as those with less than 100 and 250 employees. Sample period is 1997-2016. ***: p<0.01 ;**: p<0.05;*: p<0.1.

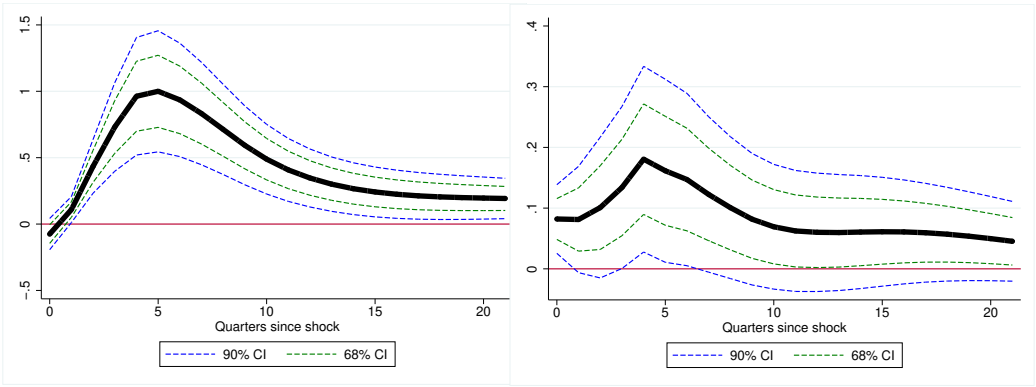
Table 18: *Interest rates* (%)*, Leverage and firm's size*

	Interest rate	Leverage	
Firm size	(FinExp/Liab)	(STD+LTD)/Ass	Liab/Ass
Small (Emp $<$ 250)	4.82	0.20	0.52
Large (Emp $\geq$ 250)	3.30	0.26	0.55
All	3.72	0.26	0.55
3-month T-Bill	1.98		

C Appendix: Aggregate Evidence - Fiscal stimulus and Credit spreads

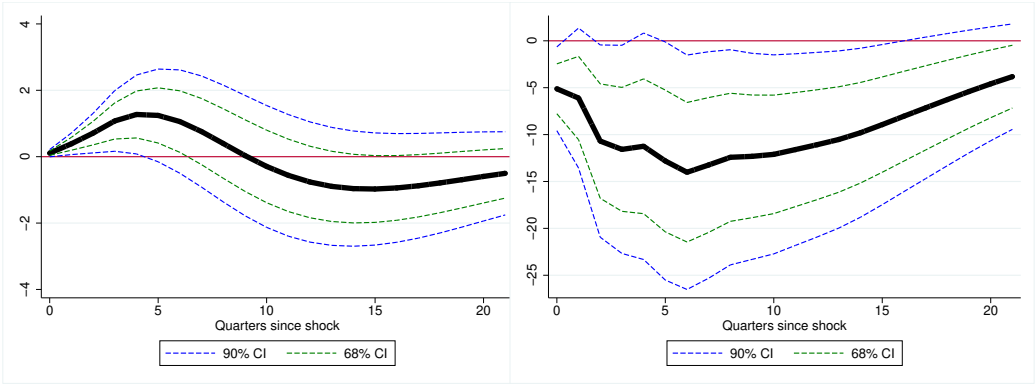
C.1 Appendix: SVAR - Defense News shocks and Credit markets

Figure 4: IRF to a (Ramey) Defense News Shock: 1948Q1 - 2008Q4



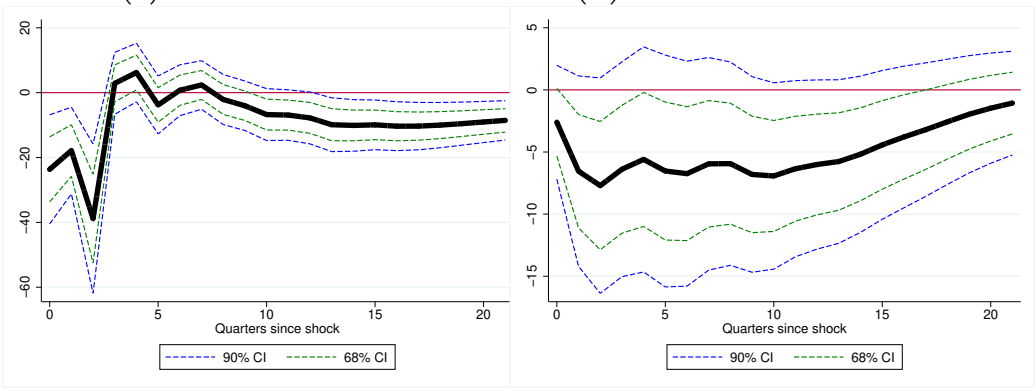
(a) Government Spending

(b) GDP



(c) Business Loans

(d) Bank Prime Loan Rate

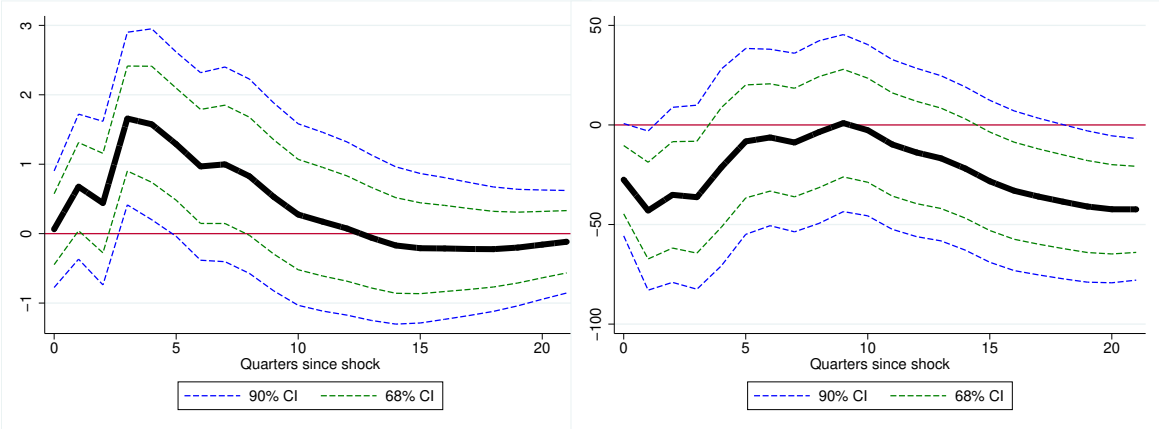


(e) Real BAA Bond rate

(f) 3-month T-Bill rate

C.2 Appendix: SVAR - SPF shock and Credit markets

Figure 5: IRF of a SPF errors shock: 1966Q3-2007Q4



(a) House Prices (b) Bank loan rate

Note: SVAR includes SPF errors, log real per capita Gov. spending, Taxes, GDP, log real House prices and bank loan rate. Standard errors come from 500 Montecarlo simulations (linear and quadratic trends and 4 lags are included).