Stock Market Responses to Monetary Policy Shocks: Universal Firm-Level Evidence*

K. Peren Arin[a,b], Samuel Kaplan[c,d], Efstathios Polyzos[a], and Nicola Spagnolo[b,e,f]

[a]Zayed University, United Arab Emirates

[b]Centre for Applied Macroeconomic Analysis (CAMA), Australia

[c]National University of Cordoba, Argentina

[d]Universidad de San Andres, Argentina

[e]Brunel University, UK

[e]Universita' Degli Studi della Campania "Luigi Vanvitelli", Italy

June 2022

*The authors are grateful to, Senad Lekpek for research assistance, and Rabah Belhadia, Olivia Cassero, Kevin Devereux, Faik Koray and Gabriel Mihalache for their invaluable comments. All errors are our own.

Abstract

Using a universal firm-level data set for the U.S., we investigate the stock price responses to unanticipated and unconventional monetary policy shocks. Our results show that indebtedness/leverage is more important than size or age in explaining the cross-firm variation in responses to monetary policy. We also show that the magnitude of the indebtedness is important while the debt structure is not, and our results are driven by the third quartile of firms in terms of their leverage. Finally, our results are robust to the use of different measures of monetary policy shocks.

JEL: J15, I26, Z13

Keywords: Monetary Policy, Firms, Debt

1 Introduction

Since the financial and economic crises of 1997-1999 and 2007-2009, academics and policymakers alike have been interested in the effects of monetary policy on asset prices and whether expansionary monetary policy can fuel financial market bubbles. Bernanke and Gertler, 1999 argue that "*in a world of efficient capital markets and without regulatory distortions, movements in asset prices simply reflect changes in underlying economic fundamentals*", and therefore there does not seem to be enough reason for policymakers to be concerned about the financial market volatility. The narket efficiency argument, however, does not hold if non-fundamental factors, like poor regulatory practices or irrational behavior by investors guide asset price volatility. Gilchrist and Leahy, 2002 affirm that the monetary policy influences financial markets through modifying expectations of future growth, and changing firms' ability to borrow and raise capital. Christiano et al., 2008 show that news shocks can create a boom-bust cycle in a monetized version of a real business cycle model, which contains sticky wages and a Taylor-rule based monetary policy [1].

Naturally, we are not the first to empirically investigate whether monetary policy shocks can affect financial markets[2]. Rigobon and Sack, 2004 show that an increase in short-term interest rates results in a decline in stock prices and in an upward shift in the yield curve that becomes smaller at longer maturities, which is consistent with Thorbecke, 1997 who document that an expansionary monetary policy shock increases both ex-ante and ex-post stock returns. In a similar fashion, Ioannidis and Kontonikas, 2008 investigate the impact of monetary policy on stock returns in 13 OECD countries over the period 1972-2002 and contend that monetary policy shifts significantly affect stock returns, even after controlling for alternative measures of stock returns, non-normality and co-movement among international stock markets. Y. D. Li et al., 2010 documents that there is some cross-country variation in the response of composite stock

[1]Caines and Winkler, 2021 argue that the central banks should include even the subjective asset price beliefs in their policy-making processes.They suggest that the policy-relevant interest rate should increase with subjective asset price beliefs, and the optimal monetary policy raises interest rates when expected capital gains are high but does not eliminate deviations of asset prices from their fundamental value.

[2]While our main variable of interest is on returns, there is also a literature which investigates the effects of monetary policy on financial market volatility. Please see Caporale et al., 2005

market indices to monetary policy shocks. They found that financial market openness drive the differences in terms of dynamic responses to monetary policy shocks. Bjorrnland and Leitemo, 2009 argue that there is mutual causality between monetary shocks and stock prices; real stock prices fall by seven to nine percent due to a monetary policy shock that raises the federal funds rate by 100 basis points while a one percent increase in stock prices by one percent leads to an increase in the interest rate of 4 basis points. On the contrary, Bouakez et al., 2013 use a structural vector auto-regression that relaxes the commonly imposed restrictions and argue that the interaction between monetary policy and stock returns is much weaker than suggested by the earlier literature.

The mixed evidence provided by the studies mentioned above shows there is no consensus on the transmission mechanisms of monetary policy into the financial markets. One should also note that the mixed evidence provided so far has been based on macro-level data, which is often plagued by aggregation problems. Only recently, the ever-increasing availability of granular data helped researchers to explain the cross-country variation in responses to macroeconomic shocks in different countries. The so-called "micro-data revolution" helped us understand how different economic agents, based on several factors, like their income, or financial constraints, react differently to macroeconomic shocks. Cloyne et al., 2019, for instance, show that households with mortgage drive the aggregate response of consumption to interest rate changes.In a similar vein, Cloyne and Surico, 2016 show that, once again, it is households with mortgage debt who exhibit large and significant consumption responses to tax changes. Conversely, homeowners without a mortgage, do not exhibit a significant response. Anderson et al., 2016 points out that consumption responses to a positive government shock are consistent with Real Business Cycle (RBC) models for wealthy consumers and Non-Ricardian/Keynesian models for poor consumers. On the firm side, Gertler and Gilchrist, 1994 in their seminal paper, show that firms are similar to consumers because small firms respond to monetary policy innovations more than larger firms. Crouzet and Mehrotra, 2020, on the other hand, argue that large firms (the top 1 percent by size) are less cyclically sensitive than the rest, yet, financial constraints do not explain differences in cyclicality. In a recent study, Cloyne et al., 2018 argue that it is not the size- but the age: younger firms that do not pay dividends exhibit the largest and most significant response to monetary policy shocks[3].

In this paper, instead of focusing on the real side, we give our attention to the financial side. As Bernanke and Gertler, 1999 contend, the most critical connections between the financial markets and the real economy are transmitted through the balance sheet channel as credit markets are not frictionless, and it is less costly for firms with strong financial positions to be extended credit. Therefore, a priori, we expect firm characteristics like the size, age, and leverage to explain the cross-firm variation in financial market responses to policy shocks as well. To investigate the micro-level responses to policy rate changes, one needs a panel dataset that spans several years, and provides detailed information about firm behavior through balance sheets. Our contribution to the literature lies in the fact that, by using micro-level data, we can investigate the heterogeneous effects of monetary policy innovations on different "groups" of firms and, therefore can reconcile the prior mixed evidence provided by the literature to a certain extent. Moreover, our universal dataset excludes the possibility of a sample selection bias.

Our results show that, among the 3 firm-level variables that we considered, indebtedness or leverage is the most important underlying factor that would help us understand the cross-firm variation in the stock price responses to monetary policy shocks. While the share prices of firms with a high debt/asset ratio react strongly to monetary shocks, firms with a lower debt do not show a large response, both in terms of magnitude and significance. Further analysis shows that these results are driven by the third quartile of firms (in terms of their indebtedness), and the sheer size of the debt (rather than its structure).

2 Data

2.1 Dependent Variable

The relevant variables in our work are returns and excess returns. We built our returns series from the monthly shares' price of public firms within the Compustat database, while excess returns for the shares of each company were computed as the monthly difference between the return for each firm and that of the S&P 500 index (that is considered as representative of the

[3]Thus, we expect small/young firms to be more sensitive to monetary shocks.

market portfolio):

$$ER_t = R_t - R(S\&P500)_t$$

Data on the S&P 500 was also extracted from Compustat. The sample size for returns of each company depends on the number of months starting in January 1990 that each firm has been public, meaning that the company's stock was traded in a public exchange like NYSE, ASE or, Nasdaq. The analyzed period extends between January 1990 and December 2020, so that it coincides with the available time frame for the monetary policy shock series. The total number of firms included in the sample is 15,510, and each company is considered only in the periods when it was public. Following common practice (Loughran and Ritter, 1997; Black et al., 2006; Strebulaev and Yang, 2013), we exclude financial firms[4] since their asset and debt structures are different from non-financial firms, thus hindering comparability (Chodorow-Reich, 2014)[5].

We choose excess returns over returns since this data series will relay firm-level responses more clearly. Total stock returns will include market reactions to monetary policy shocks and may mask (or obfuscate) the actual underlying response of each firm. This approach is opposite when firm-level responses are examined (Patelis, 1997; Bredin et al., 2007; E. X. Li and Palomino, 2014).

2.2 Independent Variables

We are considering two different measures for monetary policy innovations. The first monetary policy measure that we use is by Bu et al., 2021, which we label BRW from here on. To construct their monetary policy shock series, the authors follow a Fama-MacBeth two step procedure, where in the first stage, they estimate the impact of the unobserved policy shock on the full maturity structure of Treasury bonds. They use the 2-year treasury yield as an

[4]Following Strebulaev and Yang, 2013, we consider financial firms are those with Standard Industrial Classification (SIC) codes in the region 6000–6999.

[5]Chodorow-Reich, 2014 argues that high-frequency event studies show that the introduction of unconventional monetary policy in the winter of 2008–09 had a strong, beneficial impact on banks and, especially, on life insurance companies, thus leading to a markedly different impact of monetary policy shocks on financial firms with respect to non-financial firms.

instrument for the unobserved monetary surprise because not only captures crucial aspects of the Fed's monetary policy but also due to the possibility of reducing the Fed's information effect (information about central bank forecasts of economic fundamentals) as it is a short term rate. The first stage regression is then:

$$\Delta R_{i,t} = \theta_i + \beta_i \Delta R_{2,t} + \xi_i$$

Where $R_{i,t}$ stands for the change in the zero coupon yield with i maturity, and ξ_i is an error term that includes factors related to the Fed's information effect and is correlated to $R_{2,t}$ (the 2-year yield).All series are built using data for yields in a 1-day window around FOMC announcements, starting in 1994.

Finally, to recover the unobserved shock, the authors run the following regression, using the β_i coefficients estimated previously as regressors:

$$\Delta R_{i,t} = \alpha_i + e_t \beta_i + v_i$$

The series of estimated e_t are the policy shocks that we use in our exercise, and they represent "unconventional" monetary policy innovations as Bu et al., 2021 identify monetary policy changes at the zero lower bound[6] . The series start in January 1994 and end in September 2019. We end the sample at the end of 2019 in order to exclude the effects of the global pandemic.

The other monetary policy shock measure used in our analysis is the same one used the dynamic VAR framework of Gertler and Karadi, 2015. This measure is itself based on the seminal work of Kuttner, 2001 and uses high-frequency changes in the federal funds rate around FOMC announcements to identify policy shocks. In particular, the proposed measure is:

$$(E_t i_{t+j})^u = f_{t+j} - f_{t+j,-1}$$

Where $(E_t i_{t+j})^u$ is the surprise in the fed funds futures rates, while f_{t+j} represents the j

[6]Many recent studies use BRW as a benchmark measure for identifying unconventional monetary policy innovations. Please see Kim and Shin, 2021

months forward fed funds futures rate after the FOMC announcement, with $j = 0$ corresponding to the current month fed funds rate, and $f_{t+j,-1}$ being the rate before the announcement.The monetary policy surprise is measured in a 30-minute window around the FOMC announcement.We follow the methodology used in Gertler and Karadi, 2015,and resort to the 3-months forward fed funds futures rate, labelling it (following the authors) as FF4. One can think of this measure as a proxy for "unanticipated" monetary policy shocks as Gertler and Karadi, 2015 isolate unexpected variation in monetary policy by using high-frequency interest rate surprises.

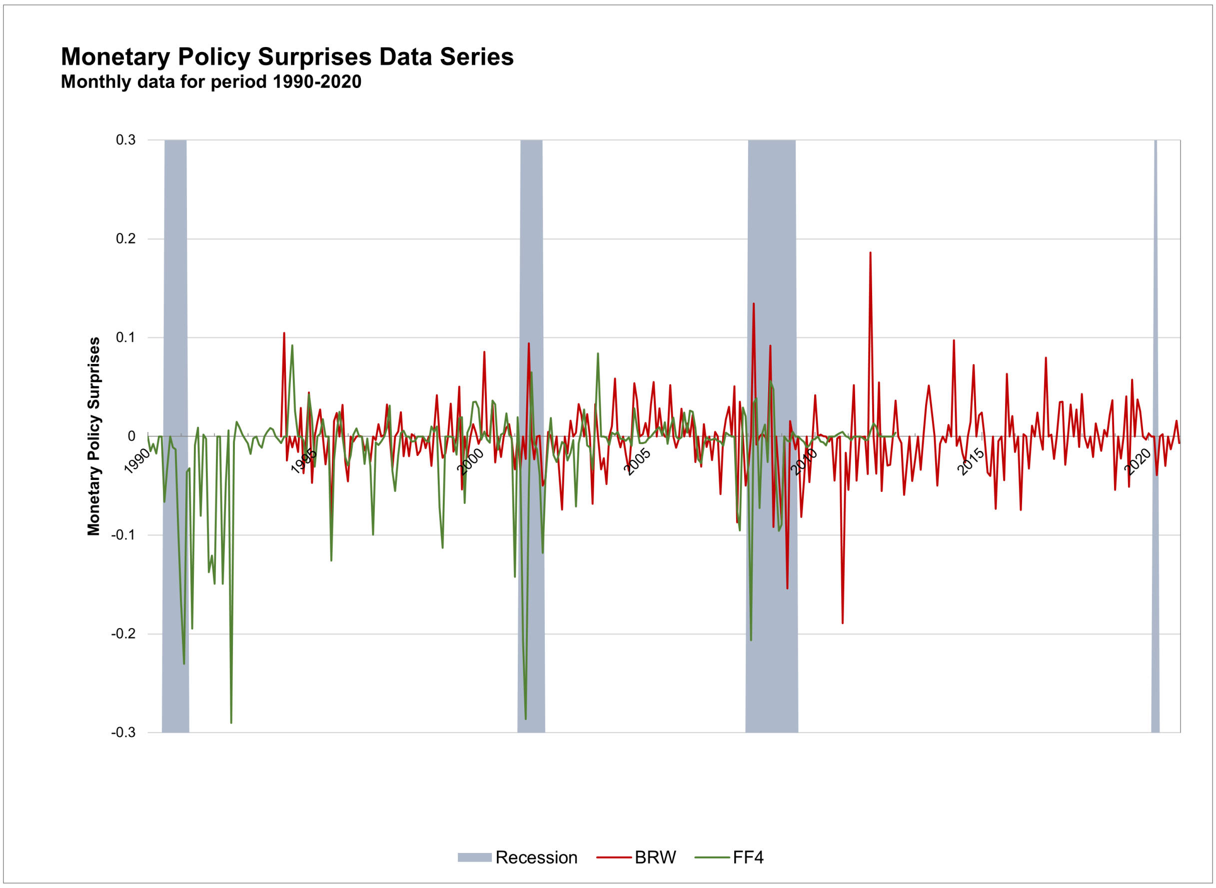


Figure 1: Monetary Policy Surprises Data Series (BRW and FF4)

2.3 Binning variables

We use 3 firm-level variables to better gauge the impact of monetary policy surprises on excess returns: age, size and debt. All three variables were extracted and/or computed from the Compustat database. We built the age series for each firm as the number of months since the first time the company showed up in the dataset, regardless of whether the firm was public or

Table 1: Summary Statistics

	Mean	Std. Dev.	P25	P75
Size	834.3	4,361.8	21.7	362
Age	187.7	145.5	74.0	268.1
Leverage	0.55	0.99	0.32	0.77
Returns	-0.004	0.177	-0.064	0.062
Excess Returns	0.027	2.411	-0.096	0.077
BRW	-0.002	0.034	-0.017	0.005
FF4	-0.014	0.049	-0.011	0.004
VIX	19.52	7.68	13.72	23.51
EPU	122.8	59.9	85.1	144.0
CPI (yoy)	0.024	0.013	0.017	0.031
PPI (yoy)	0.019	0.048	-0.007	0.050

Notes: This table presents the summary statistics for all variable for the entire sample period. Statistics for the first (P25) and the third (P75) quartiles are also given in third and fourth columns respectively.

not. We measure size for each company by its total assets at each data point, while for debt, we resorted to the debt over assets ratio as a measure for indebtedness of each firm. The average number of months for all firms in our sample is of 188 (or 15 years and eight months), with an average of total assets across firms worth USD 834.3mn, and mean debt to assets of 55%.

2.4 Control variables

We resort to several control variables to accurately isolate the impact of monetary policy shocks. First, to account for the effect of financial market uncertainty on stock returns, we used the benchmark VIX series for the US market as a proxy for volatility. The series is monthly, it was extracted from the Chicago Board of Exchange (CBOE) and starts in February 1990. Simultaneously, to control for the impact of inflation on asset prices, we used the monthly series of CPI and PPI, both of which were extracted from the Bureau of Labor Service (BLS) database. We also made use of the economic policy uncertainty index (EPU) for the US (available at www.policyuncertainty.com) to control for the impact of policy measures on the valuation of firms. The series is monthly and starts in January 1985, thus we employed this control variable for the whole sample period. De Pooter et al., 2021 shows that policy uncertainty plays an important role for the transmission mechanisms for monetary shocks.

3 Methodology: Impulse Responses by Local Projection

We use the local projection technique introduced by Jordà, 2005 to construct impulse response functions to monetary 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 unanticipated or unconventional monetary policy innovation. The baseline specification is as follows:

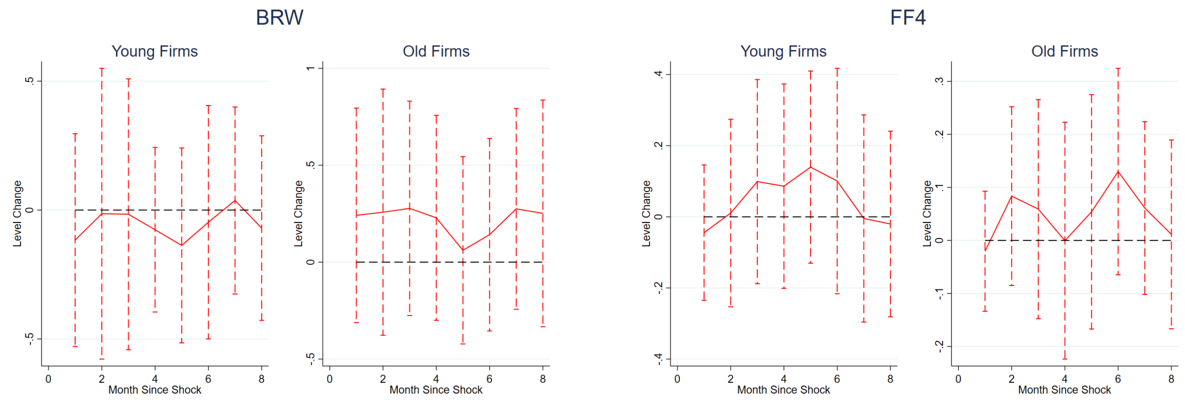
$$\Delta y_{i,t+k} = \alpha_k + X_{i,t-1}\beta_k + NS_t\gamma_k + \epsilon_{i,t+k} \tag{1}$$

where $\Delta y_{i,t+k}$ is the stock returns and i, k are periods after a reference period t. 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, or, monetary policy shocks. We consider two alternative measures of monetary shocks from Bu et al., 2021 and Gertler and Karadi, 2015, as mentioned earlier. The matrix $X_{i,t-1}$ includes various sets of control variables including firm-specific age, size and debt along with VIX, as a proxy for global financial markets uncertainty, inflation rate, and seasonal fixed effects. We consider asymmetric effects, in turns, by firm size, age and debt level. For instance, letting $s \in \{small, large\}$ denote firm size class – divided at the median of total asset value – we consider the following specification:

$$\Delta y_{i,t+k} = \alpha_{s,k} + X_{s,i,t-1}\beta_{s,k} + NS_t\gamma_{s,k} + \epsilon_{s,i,t+k} \tag{2}$$

which allows unrestricted asymmetric responses to monetary innovations by firm size class. The same approach is used for firms age and indebtedness. The impulse response function results give responses in stock returns (excess returns) to a monetary policy shock in $t = 0$. All impulse responses are changes in an outcome variable compared to time zero. The impulse responses we calculate are average responses across all firms. Firms enter and leave the sample at different times, therefore 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 entries[7] These two approaches eliminate the problem of firm selection into and out of the sample in response to monetary shocks.

4 Results



(a) Using the BRW measure of Monetary Policy Shocks

(b) Using the FF4 measure of Monetary Policy Shocks

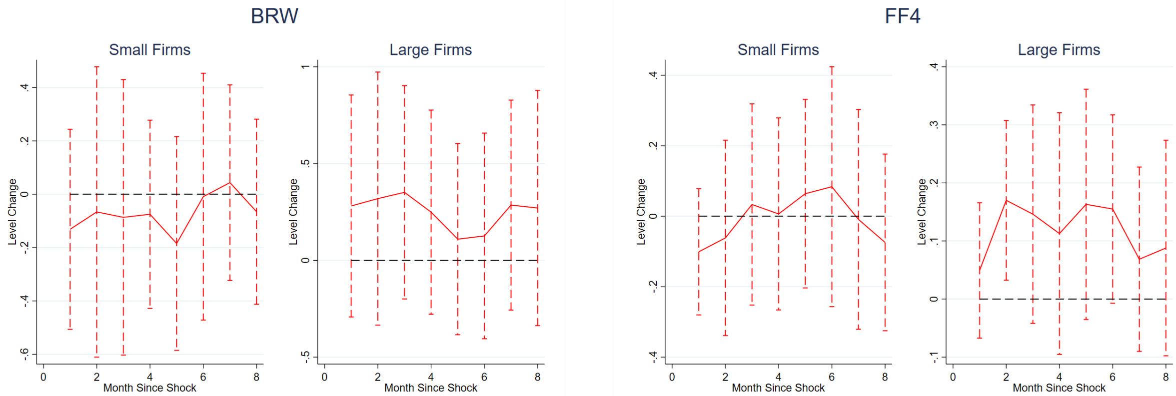
Figure 2: Impulse Responses of Excess returns by Age

This section presents the results of the impulse response functions using local projections based on our firm identification criteria. We begin by presenting the results based on firm age. We use the Bu et al., 2021 measure (BRW) of monetary policy as a main indicator of monetary policy shocks to account for "unconventional" monetary policy shocks.We report the responses for each group in eight months following a monetary policy shock.We assert that if the responses are not statistically significant (i.e. a zero response is included in the 95% confidence interval), then the distinction of firms by that measure does not yield valid results that highlight underlying firm-level characteristics for cross-firm variation in responses to monetary policy shocks. On the other hand, if there is a significant response within one of the two groups, this would suggest that the particular factor plays a vital role in determining the effects of monetary policy. The same would be true if significant responses exist in both sub-samples, but are different either in

[7]In 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.

timing, magnitude or direction. We confirm the validity of our findings by also reporting the results based on the FF4 measure (Gertler and Karadi, 2015).

Figure 2 shows the impulse responses of the sub-samples produced based on firm age, as suggested by Cloyne et al., 2018. We can see that there are no significant responses to monetary policy shocks based on the BRW measure. We observe similar responses to the FF4 measure, as well, suggesting that firm age does not play a significant role in explaining the cross-firm variation in financial responses to both unanticipated and unconventional monetary policy shocks.



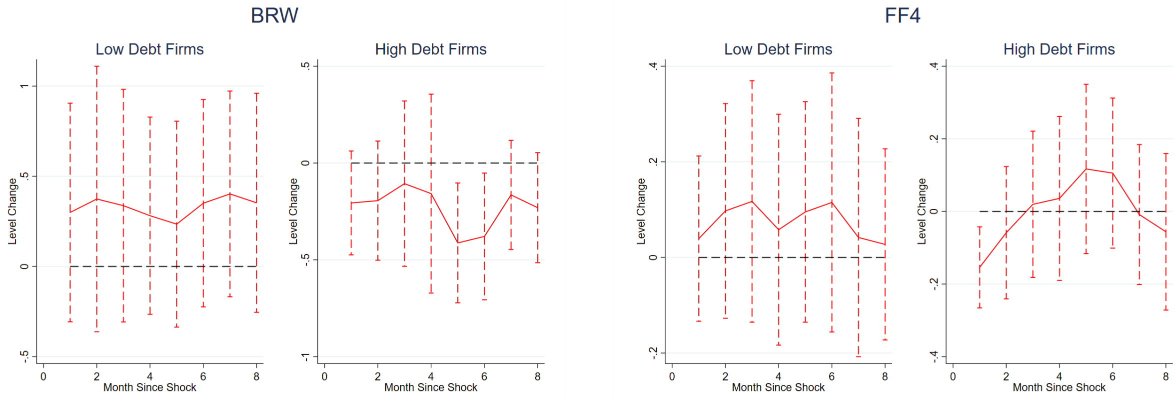
(a) Using the BRW measure of Monetary Policy Shocks

(b) Using the FF4 measure of Monetary Policy Shocks

Figure 3: Impulse Responses of Excess returns by Size (Total Assets)

We continue our investigation with another potential firm-vel variable: size as suggested by Gertler and Gilchrist, 1994 and Crouzet and Mehrotra, 2020. When we split the firms by size (the natural logarithm of their total assets as the binning variable), we do not observe any significant impulse response functions (Figure 3). We note the absence of significant responses on both sub-samples, also suggest that size is not a crucial underlying variable explaining the financial market responses of firms to monetary policy shocks. The aforementioned result is robust to the use of the FF4 measure as well.

Finally, Figure 4 demonstrates the results of the local projections when building sub-samples based on the level of indebtedness.We use the Debt-To-Assets ratio to proxy the level of indebtedness.Here, we note that while low-debt firms do not register significant responses to monetary policy shocks, high-debt firms register a significant negative response in excess re-



(a) Using the BRW measure of Monetary Policy Shocks

(b) Using the FF4 measure of Monetary Policy Shocks

Figure 4: Impulse Responses of Excess returns by Debt (Debt to Assets ratio)

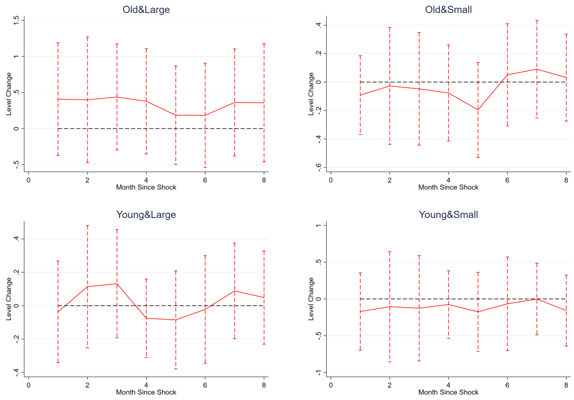
turns five to six months after the shock.We observe that this is the only sub-sample that registers a significant response.The FF4 measure confirms the previous finding, however; with the FF4 measure, the impulse response is more immediate, becoming swiftly significant one month after the shock[8].This is also evident in Figure 1).

This finding shows that monetary policy affects firms asymmetrically, leaving low-debt firms relatively unscathed while reducing excess returns for high debt firms only within the first six months after the shock.The reduction of excess returns may be transmitted through two channels: investor expectations or credit constraints.A closer look into the results reveals that only one of the two channels is valid. More specifically, in principle, a positive monetary policy shock represents an unexpected increase in interest rates, and it sends a signal to markets that the economy is entering a recessionary phase and thus leads investors to expect reduced asset prices. However, this would be true for all firms in the sample and not specific to high-debt firms.Since the impulse response function is significant for high-debt firms only, we conclude that the increase in interest rates leads to higher financial costs and (possibly) more hardship in achieving new financing which is is more relevant for high-debt firms.Given the importance of debt financing in these firms' capital structure, the previously mentioned adverse effects cause a negative reaction to their excess returns, as they may tend to squeeze net income and possibly reduce revenue as well. As a side note, however, we believe that investor reactions to a change

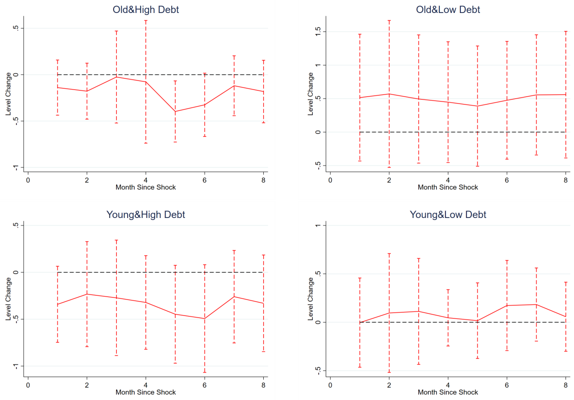
[8] One should keep in mind that While the BRW measures changes to the spot interest rate, FF4 is based on the three-months-ahead Federal funds futures

towards contractionary monetary policy may be asymmetrically more pronounced towards high-debt firms, when compared to low-debt firms.This could be due to the higher perceived risk of high-debt firms, which is exacerbated during recessionary periods.

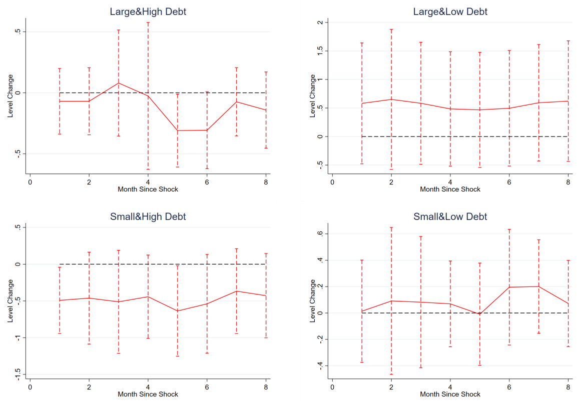
Further to pointing to indebtedness as the determining factor on the effects of monetary policy, this outcome also defines the policy lag between the action and outcome: a change towards restrictive monetary policy will require six months to yield results. This is also an important finding that needs to be considered in policymaking decisions.



(a) Age and Size



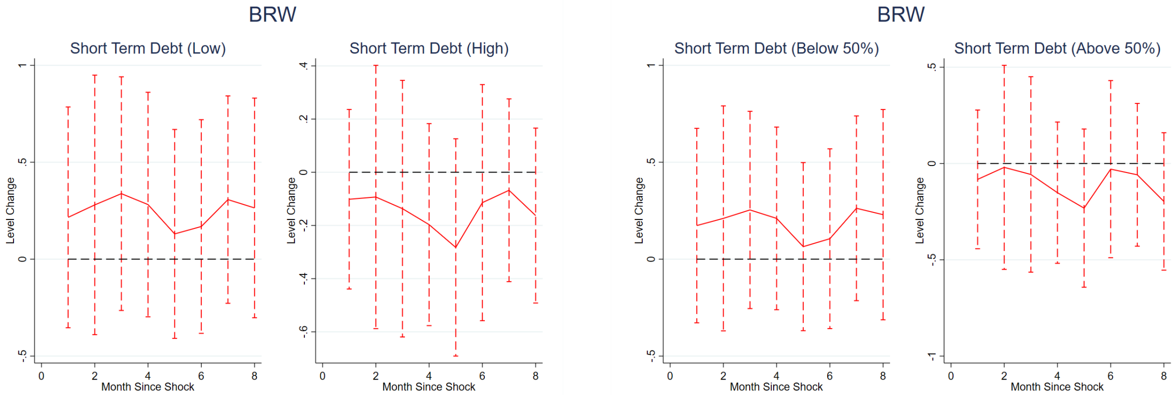
(b) Age and Debt



(c) Size and Debt

Figure 5: Impulse Responses of Excess Returns using Combined Criteria (BRW Measure)

We perform two further sets of local projections for robustness. First, we examine whether the combined effect of two criteria determines firm-level responses. Earlier, we demonstrated that higher levels of indebtedness make firms more responsive to monetary policy surprises. However, this effect could be driven by a combination of debt and other unobserved factors. Hence, we split the firms into three sets of four sub-samples, by combining our binary classification criteria in pairs, as demonstrated in Figure 5. The importance of debt remains. We can see that the combination of age and size (Panel 5a) does not produce any significant responses. Using debt, on the contrary, we show that a combination of older and high-debt firms provide a significant impulse response to monetary shocks (Panel 5b) The same is true for all high-debt firms, regardless of their size (Panel 5c). In addition, the pattern of response (a negative response in excess returns approximately five to six months after the shock) is similar to the pattern shown when using debt as the switching variable. Consequently, we conclude that debt drives the combined effect as well and that age and size would only produce a significant impact when combined with the level of indebtedness.



(a) Short Term Debt/Total Debt above/below median

(b) Short Term Debt/Total Debt above/below 50%

Figure 6: Impulse Responses of Excess Returns by Short Term Debt (Short Term Debt to Total Debt) using the BRW Measure

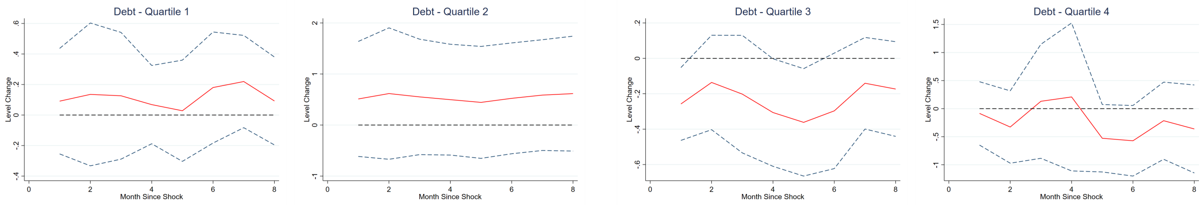
In the next step, we use the level of short-term debt as the switching variable and report the results (using the BRW measure) in Figure 6. The value of short-term debt over the total debt was employed as the selection variable, and we split the sample into sub-samples by selecting (a) companies whose ratio value was above/below the median and (b) companies whose ratio value was above/below 50%[9].Therefore, we examine both the relative importance of short-term debt (*vis-à-vis* the companies in the sample) and the absolute importance (i.e. whether short-term debt makes up more than half of total debt). We can see that neither switching variables related to short-term debt contribute to the explanatory power of our approach, thus suggesting that it is the total level of debt that is the determining factor here. The composition of the debt (short-

[9]We note that by examining short-term debt, we also examine the level of long-term debt, since $ShortTermDebt + LongTermDebt = TotalDebt$ and thus $\frac{ShortTermDebt}{TotalDebt} + \frac{LongTermDebt}{TotalDebt} = 1$

or long-term) does not help deduce the firm-level responses.

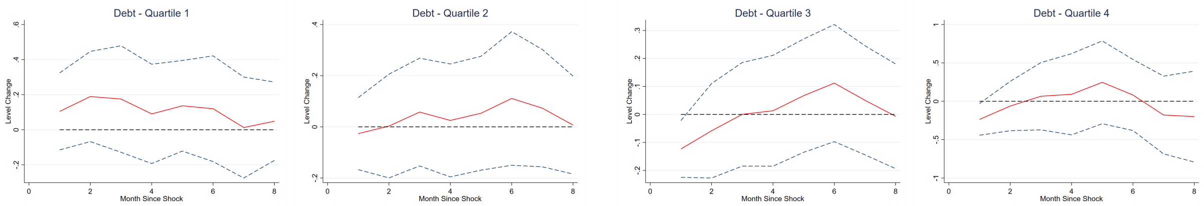
5 Impulse Responses by Quartiles

So far, our analysis has shown us that indebtedness/leverage is the main culprit in explaining the cross-firm variation in stock price responses of firms. However, we have separated our universal sample into two parts only: below and above the mean indebtedness. We take our analysis a step further and re-run our local projections by dividing our firms into quartiles using their level of debt, as we did before. The results are presented in Figures 7 and 8. The new results show that the firms in the third quartile drive our previous results. While the timing of the response differ based on whether we use the "unanticipated" or the "unconventional" monetary policy shocks, the impulse response functions are significant only for the firms in the third quartile.



(a) Q1 (b) Q2 (c) Q3 (d) Q4

Figure 7: Impulse Responses of Excess Returns by Quartiles using the BRW Measure



(a) Q1 (b) Q2 (c) Q3 (d) Q4

Figure 8: Impulse Responses of Excess Returns by Quartiles using the FF4 Measure

This approach serves two purposes. First, it confirms that monetary policy shocks affect only firms with above-median levels of indebtedness. This is an outcome that adds to the robustness of our earlier findings. Second, the finding that firms at the third quartile of indebtedness drive the responses to monetary policy shocks opens up a new strand of discussion regarding the nature of firms in this quartile, which we believe could be the subject of further research. An interesting question here would be to examine if there are further qualitative characteristics in Q3 firms that make them more responsive. Another question would be to study Q4 firms and determine the reasons why they are unresponsive, which is a somewhat unexpected findings, given that monetary policy shocks would have a strong effect on these companies' financial costs.

6 Implications

Firm behavior, as measured by investment, is the most volatile component of GDP. Previous literature suggests several firm-level variables that are important for understanding major macroeconomic aggregates. For instance, Clymo and Rozsypal, 2022 suggests that both size and age are important firm-level variables for firm cyclicality, on the real side of the economy. We also show that policymakers need to gauge the demographics of the underlying firms, when evaluating monetary policy decisions on the *financial side*. Our results, however, highlight the importance of *debt* rather than age or size for understanding financial market responses to monetary shocks. Nevertheless, since indebtedness ratios are dynamic, company balance sheets need to be monitored continuously and taken into account when forecasting the impact of policy changes on economic activity.

References

Anderson, E., Inoue, A., & Rossi, B. (2016). Heterogeneous consumers and fiscal policy shocks. *Journal of Money, Credit and Banking*, *48*(8), 1877–1888.

Bernanke, B. S., & Gertler, M. (1999). Monetary policy and asset price volatility. *Economic Review*, *84*(Q IV), 17–51.

Bjorrnland, H. C., & Leitemo, K. (2009). Identifying the interdependence between us monetary policy and the stock market. *Journal of Monetary Economics*, *56*(2), 275–282.

Black, B. S., Jang, H., & Kim, W. (2006). Predicting firms' corporate governance choices: Evidence from korea. *Journal of Corporate Finance*, *12*(3), 660–691.

Bouakez, H., Essid, B., & Normandin, M. (2013). Stock returns and monetary policy: Are there any ties? *Journal of Macroeconomics*, *36*, 33–50.

Bredin, D., Hyde, S., Nitzsche, D., & O'reilly, G. (2007). Uk stock returns and the impact of domestic monetary policy shocks. *Journal of Business Finance & Accounting*, *34*(5-6), 872–888.

Bu, C., Rogers, J., & Wu, W. (2021). A unified measure of fed monetary policy shocks. *Journal of Monetary Economics*, *118*, 331–349.

Caines, C., & Winkler, F. (2021). Asset price beliefs and optimal monetary policy. *Journal of Monetary Economics*, *123*, 53–67.

Caporale, G. M., Cipollini, A., & Demetriades, P. O. (2005). Monetary policy and the exchange rate during the Asian crisis: identification through heteroscedasticity. *Journal of International Money and Finance*, *24*(1), 39–53.

Chodorow-Reich, G. (2014). Effects of unconventional monetary policy on financial institutions. *Brookings Papers on Economic Activity*, 155–204.

Christiano, L., Motto, R., Rostagno, M., & Ilut, C. (2008). *Monetary policy and stock market boom-bust cycles* (Working Paper Series No. 955). European Central Bank.

Cloyne, J. S., Ferreira, C., Froemel, M., & Surico, P. (2018). *Monetary policy, corporate finance and investment* (Working Paper No. 25366). National Bureau of Economic Research.

Cloyne, J. S., Ferreira, C., & Surico, P. (2019). Monetary Policy when Households have Debt: New Evidence on the Transmission Mechanism. *The Review of Economic Studies*, *87*(1), 102–129.

Cloyne, J. S., & Surico, P. (2016). Household Debt and the Dynamic Effects of Income Tax Changes. *The Review of Economic Studies*, *84*(1), 45–81.

Clymo, A., & Rozsypal, F. (2022). *Firm Cyclicality and Financial Frictions*.

Crouzet, N., & Mehrotra, N. R. (2020). Small and large firms over the business cycle. *American Economic Review*, *110*(11), 3549–3601.

De Pooter, M., Favara, G., Modugno, M., & Wu, J. (2021). Reprint: Monetary policy uncertainty and monetary policy surprises. *Journal of International Money and Finance*, *114*(100).

Gertler, M., & Gilchrist, S. (1994). Monetary policy, business cycles, and the behavior of small manufacturing firms. *The Quarterly Journal of Economics*, *109*(2), 309–340.

Gertler, M., & Karadi, P. (2015). Monetary policy surprises, credit costs, and economic activity. *American Economic Journal: Macroeconomics*, *7*(1), 44–76.

Gilchrist, S., & Leahy, J. V. (2002). Monetary policy and asset prices. *Journal of Monetary Economics*, *49*(1), 75–97.

Ioannidis, C., & Kontonikas, A. (2008). The impact of monetary policy on stock prices. *Journal of Policy Modeling*, *30*(1), 33–53.

Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, *95*(1), 161–182.

Kim, S., & Shin, H. S. (2021). Offshore EME bond issuance and the transmission channels of global liquidity. *Journal of International Money and Finance*, *112*(100).

Kuttner, K. N. (2001). Monetary policy surprises and interest rates: Evidence from the fed funds futures market. *Journal of Monetary Economics*, *47*(3), 523–544.

Li, E. X., & Palomino, F. (2014). Nominal rigidities, asset returns, and monetary policy. *Journal of Monetary Economics*, *66*, 210–225.

Li, Y. D., Iscan, T. B., & Xu, K. (2010). The impact of monetary policy shocks on stock prices: Evidence from canada and the united states. *Journal of International Money and Finance*, *29*(5), 876–896.

Loughran, T., & Ritter, J. R. (1997). The operating performance of firms conducting seasoned equity offerings. *The Journal of Finance*, *52*(5), 1823–1850.

Patelis, A. D. (1997). Stock return predictability and the role of monetary policy. *The Journal of Finance*, *52*(5), 1951–1972.

Rigobon, R., & Sack, B. (2004). The impact of monetary policy on asset prices. *Journal of Monetary Economics*, *51*(8), 1553–1575.

Strebulaev, I. A., & Yang, B. (2013). The mystery of zero-leverage firms. *Journal of Financial Economics*, *109*(1), 1–23.

Thorbecke, W. (1997). On stock market returns and monetary policy. *The Journal of Finance*, *52*(2), 635–654.