

Monetary policy transmission: Balance sheet channel and investment behavior of firms in Pakistan

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Article Info

Article history:

Received : 6 January 2021

Accepted : 8 March 2021

Published : 1 April 2021

JEL Classification Code:

E42, E44, E52

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DOI: 10.20885/ejem.vol13.iss1.art1

Abstract

Purpose — This study investigates the relevance of the balance sheet channel of monetary policy transmission concerning non-financial firms at the Pakistan Stock Exchange (PSX), a firm-level data.

Methods — This paper estimates a family of panel data regression models and constructs a dummy variable for monetary policy tightness.

Findings — The result indicates a positive relationship between cash flows and investment during periods of monetary tightness. The impact on cash flows is visibly more pronounced than that of the quantitative effect of an increase in capital cost, which gives rise to a balance sheet channel. Three financial constraints, namely size, leverage, and dividend policy, are used to segregate firms into financially constrained and unconstrained firms.

Implication — The results highlight the balance sheet channel impact on smaller firms' cash. The cash flows of highly leveraged firms were impacted more during the tight monetary policy periods and thereby were more prone to decline in investments. Results on constraints of dividend policy are, however, inconclusive.

Originality — The paper contributes to the literature by investigating the relevance of the balance sheet channel of monetary policy transmission concerning non-financial firms using firm-level data. It also contributes to the literature by constructing a dummy variable to measure monetary policy tightness.

Keywords — Monetary policy transmission, monetary tightness, constrained firms' investments.

Introduction

Central banks use monetary policy to maintain price stability and growth. The Central bank's change in its policy rate affects all the interest rates in an economy. These changes affect the aggregate demand, which subsequently affects inflation. Economic behavior and inflation are influenced by current monetary policy and the expected future stance. Many monetary transmission channels also affect output. The significant channels are interest rate, exchange rate, asset price, credit, and expectations channels. An economy's aggregate response to the monetary policy shock will be incorporated through a combination of these channels. The effectiveness of these channels depends on the economic structure and the independence and depth of the financial sector.

The interest rate channel affects the supply of deposits and demand for credits by influencing firm investment decisions and household spending—the credit channel supplements the interest rate channel. The credit channel affects the economy by fluctuating the supply of credit available to firms and households. The credit channel can be further subdivided into bank lending channels and balance sheet channels. According to the bank lending channel, monetary tightening influences lenders to raise lending standards due to moral hazards and adverse selection problems. On the other hand, the balance sheet channel propounds that with monetary tightening, the net-worth of collateral decreases, which leads to higher leverage and higher risk premiums, eventually restricting credit. The balance sheet channel becomes relevant because the change in monetary policy affects the financial position of firms as changes in interest rates affect the cash flows and net worth of companies.

An increase in interest rates has a twofold effect on a firm. The first is direct, i.e., interest payments on outstanding floating rate debt will increase, and secondly, the worth of the firm's collateral will decrease due to a reduction in discounted value of the firm's assets. There is an indirect consequence, i.e., due to a decrease in the net-worth of the firms. The constraint on their cash flows reduces the demand for their products, resulting in a decline in their revenues without a reduction in short-run fixed cost, which also decreases firms' net worth over time.

The purpose of this research is to examine the existence of the balance sheet channel in Pakistan. The study theorizes that external finance premium is subject to the net worth of the firms, which is because higher net worth firms have more collateral, so there is less risk for lenders. This mechanism emphasizes the role of asymmetric information in lending decisions. The informational advantage exists because the borrower is more familiar with industry dynamics and prospects (Leland & Pyle, 1977). The quality of borrowers' financial positions tends to affect the terms of their credit agreement, which means that changes in a firm's financial situation can influence their investment decisions (Dennis, Nandy, & Sharpe, 2000). This implies that investment decisions of higher net worth firms are less affected by monetary policy.

Majeed, Hashmi, and Qamar (2017) explored the effects of monetary policy on firms' fixed investment and found the relevance of interest rate and credit channels of monetary transmission in Pakistan. They concluded that the average financial conditions of the firms should be considered while devising monetary policy. The study tests whether investment decisions of manufacturing firms become increasingly sensitive to cash flows during monetary tightness based on their size and financial policy. Non-financial firms (particularly manufacturing firms) are relevant to the study because they constantly need to update their technology and facilities to grow. They require further new investments to capture markets and cater to increased demands (Brynjolfsson & Hitt, 1995; Cleary, 1999).

Previous studies have focused on the impact of monetary transmission mechanism at the aggregate level. In contrast, this study analyzes firm-level data to understand and interpret investment decisions in times of monetary tightness. The objective of the study is to see the impact of monetary policy and cashflows on firm investment. The study evaluates the effectiveness of the monetary policy. It serves as a guideline to take steps to mitigate the effects of tight monetary policy, principally for the small and medium industry.

There is a considerable debate about the effectiveness of various channels. Taylor (1995) found strong evidence for interest rate channels by analyzing the effects of interest rates on consumer spending. Bernanke and Gertler (1995) seem to contradict this assertion and state that studies have not substantiated the significance of interest rate channels and advocate the existence of credit channels. They argued that small changes in interest rates could cause an enormous impact on economic aggregates. Still, investment does not respond to these changes immediately and only fluctuates when the interest rate effect has already passed. They argued that the credit channel amplifies the impact of tight monetary policy.

The credit channel can be described as a manifestation of Lemon's problem which was coined by Akerlof (1970). The problem arises due to information asymmetry where even the firms with less risky projects might be charged a higher than the average interest rate. Bernanke and Gertler (1989) argued that due to external finance premium, the cost of external finance is always

more than internal finance if the external financing is not fully collateralized. According to Stiglitz and Weiss (1981), asymmetric information may lead banks to ration loans and even deny lending to borrowers willing to pay a higher interest rate.

Mishkin (1996) pointed out a significant feature of the balance sheet channel, i.e., it is the nominal interest rates that affect a firm's cash flows and not the real interest rates. He further argued that short-term interest payments have the most significant impact on a firm's cash flows. Oliner and Rudebusch (1996) used data from 7000 manufacturing firms in the US to investigate the relationship between internal funds and investment. They concluded that monetary shocks shift all kinds of financing from small to large firms. According to them, this also results in declining aggregate bank loans because larger firms rely less on borrowing. Kashyap and Stein (2000) argued for an increase in the balance sheet channel's relevance and diminishing importance of the lending channel due to more developed financial markets and institutional changes.

Zhang and Zheng (2020) analyzed the determinants of financial investment of non-financial firms in China. They found that monetary policy is one of the significant determinants of firms' financial investments. They also concluded that the relationship between monetary policy and firms' investment is not linear and depends on the firms' nature. This study considers the heterogeneity of the firms while analyzing the impact of monetary policy on the firms' financial investment.

The same arguments have been made by Gertler and Gilchrist (1994), where they found that small firms account for a comparatively larger share of manufacturing decline during the period of monetary tightness. They attribute this decline to the size of the balance sheet of those firms, thereby indicating the existence of the balance sheet channel. Bernanke, Gertler, and Gilchrist (1996) and Bougheas, Mizen, and Yalcin (2006) found that small firms were susceptible to periods of monetary tightening compared to larger firms. Durante, Ferrando, and Vermeulen (2020) also concluded that the reaction of firms' investment to a monetary policy shock is heterogeneous. They concluded that young firms are more sensitive to the monetary policy shock than large firms. This study also considers the firms' heterogeneity while checking the impact of monetary policy transmission on firms' investment.

Kahle and Stulz (2011) suggested that US firms with more substantial balance sheets are less likely to curtail capital expenditure or change investment decisions due to monetary tightening. Crisóstomo (2012) argued that size inhibited the firm from investing in R&D. Bryson (2009) also concluded that large firms only reacted towards growth in sales, while the investment behavior of small firms is more sensitive to the cost of capital. Moreover, the balance sheet channel comes into play as smaller firms have less collateral to guarantee credits.

Ciccarelli, Maddaloni, and Peydro (2010) concluded that the bank lending channel's impact had been diminishing because of unconventional monetary policy by the US and Euro Zone while the impact of credit channel had amplified. Contrary, Łyziak, Przystupa, and Wróbel (2008) argued that reactions of various types of loans to monetary policy shocks varied greatly in Poland. The investment loans responded differently in comparison to other classes during monetary tightening. Özlü and Yalçın (2012) found similar results in Turkey. The firm size and export performance affect the composition of external finance during monetary tightening. Small firms, particularly those having fewer exports, are likely to be financially constrained (have less bank finance) during monetary tightening, so move towards trade credits aggressively, which implies that trade credit channels can subdue the traditional credit channel. In Pakistan, the prevalence of such practice cannot be overruled due to an export finance scheme by SBP that provides trade credit at subsidized rates to the exporters.

Methods

Investment is positively dependent upon cash flows of financially constrained firms, while there is no effect on unconstrained firms (Fazzari, Hubbard, & Petersen, 2000). Based on the theoretical work of Bernanke et al. (1996), Chatelain (2003), Prasetyantoko (2007), and Angelopoulou and Gibson (2009), it is expected that investment declines with monetary tightness. Further, it is also

likely that the decline is more pronounced for financially constrained firms as their cash flows inhibit them from the investment during such periods.

Following Fazzari, Hubbard, and Petersen (1988), the following equation is used in the study, which has already been used by Prasetyantoko (2007) and Crisóstomo (2012).

$$Gross\ Investment_{it} = \beta_0 + \beta_1(Average\ Q_{it}) + \beta_2(Cash\ Flows_{it}) + \beta_3(Cash\ Flows * MPDdummy_{it-1}) + \epsilon_{it}$$

The study uses secondary data of 217 manufacturing firms registered in PSX from the period 1999 – 2015. The manufacturing firms must regularly update their technology and facilities to grow, so their investment decisions are more sensitive to cash flows. The financial statement data are obtained from reports published by the State Bank of Pakistan, whereas stock market information is obtained from PSX.

Gross investment (investment behavior) is computed by calculating the difference between the book value of assets in two consecutive periods (Fazzari et al., 2000). The difference is normalized by total assets at replacement cost averaged across period's $t-1$ and t .

A dummy variable for monetary policy tightness is constructed, where it is measured using a change in policy rates. For identifying monetary policy episodes, monetary policy statements (MPS) of all periods from 1999 to 2015 were taken. Based on the above characteristics, four periods have been identified as policy episodes in the period under review: (i) 1999 – Oct 2001, (ii) Oct 2001 – July 2007, (iii), July 2007 – Oct 2014, and (iv) Oct 2014 – 2015.

A dummy is constructed for the years during which monetary policy stance is analyzed and given a value of 1 in case of a tight episode of monetary policy and a value of 0 otherwise. However, the monetary policy dummy is monthly, and firm-level data is annual for Cash flows and gross investment. Therefore observations are averaged across the whole financial year and will be given the value of 0 or 1 based on the number of months (Gertler & Gilchrist, 1994; Rondi, 1998; Haan & Sterken, 2000; Jimenez, 2012). Finally, the cash flows are calculated by the ratio of cash flow from operations minus interest payments and total assets at replacement cost averaged over periods t and $t-1$. (Fazzari et al., 1988; Lang, Ofek, & Stulz, 1996).

Average Q (market value of a firm to the replacement cost of assets) is the firm's stock market value divided by total assets at replacement cost averaged over periods t , and $t-1$ is average Q.

Constrained Firm and Unconstrained Firms

The study will use three classification criteria and apply descriptive statistics to distinguish financially constrained firms from others. Firstly, the sample is divided into large and small firms based on net worth. The firms that lie in the bottom 33% quartile will be considered small. Secondly, companies are classified as financially constrained based on dividend announcement, where non-paying firms are classified in the financially constrained category. The third criteria use the leverage ratio, where the firms with relatively high leverage ratios are expected to be financial.

Variables Measurements

The variables are measured hereunder:

Average Q = Market Value/Total Assets at Replacement Cost

Cash Flows = (Cash flows from Operations – Interest Payments)/Total Assets at Replacement cost

CF*MPD = Cash Flows under Monetary Tightness

Results and Discussion

Table 1 shows the descriptive analysis of the variables under the tight monetary policy. The average gross investment in fixed capital is 3.5%, even without discounting for tighter monetary policy. The median value shows that more than half of the companies have positive investment figures. The standard deviation of the data indicates that without accounting for periods or size, the investment rate of firms has a low degree of variation. Tobin's Q means on the lower side (between

0 and 1), which implies that the cost to replace a firm's assets is greater than the value of its stock. On the other hand, cash flows are more than Gross investment, i.e., 6.8%, which means that all excess cash flows are not utilized in investment as some portion goes into retained earnings or dividends. Further, the cash flows and cash flows under tight monetary policy relationship is observable as cash flows are nearly half during periods of monetary tightness.

Table 1. Descriptive Statistics

	Gross Investment	Average Q	Cash Flows	CF*MPD
Mean	0.036	0.338	0.068	0.034
Median	0.026	0.197	0.046	0.000
Std. Dev.	0.196	0.411	0.138	0.081
Skewness	-1.803	3.133	-6.355	2.668
Kurtosis	22.025	16.795	200.873	24.391
Observations	3472	3472	3472	3472

Correlation Matrix

In table 2, the correlation coefficients of the variables are provided, the matrix shows the low correlation among the variables, so there is no chance for multicollinearity. Furthermore, Average Q and Cash Flows are positively correlated with Gross Investment, whereas cash flows under the tight monetary policy are negatively correlated with Gross Investment.

Table 2. Correlation Matrix

	Gross Investment	Average Q	Cash Flows	CF*MPD
Gross Investment	1			
Average Q	0.045	1		
Cash Flows	0.074	0.269	1	
CF*MPD	-0.001	0.076	0.481	1

Regression Results

The estimation of the basic model, which is our first empirical exercise, is presented in Table 3 below.

Table 3. Fixed Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.023	0.006	4.115	0.000***
Average Q	0.028	0.012	2.317	0.021**
Cash Flows	0.1085	0.031	3.499	0.001***
CF*MPD	-0.127	0.048	-2.645	0.008***
Weighted Statistics				
R-squared	0.073		Adjusted R-squared	0.011
F-statistic	1.170		Prob(F-statistic)	0.049**
Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.				
Number of Observations: 3472			Period: 2000 – 2015	

The Average Q is positive and statistically significant at a 5% level of confidence, suggesting that investment decisions are sensitive to investment opportunities. The Q value is a significant determinant of investment. The cash flows are also positive and statistically significant at a 1% level of confidence, which implies that companies with more internal resources tend to invest more than firms with limited internal resources. These results align with Myers and Majluf (1984) and Kashyap, Stein, and Wilcox (1993). The cash flows under the tight monetary policy are negatively related to gross investment, which implies that during periods of monetary tightness, the firm's cash flows are reduced, thereby requiring external financing to maintain the level of investment. In

times of monetary tightness, financial constraints can increase significantly; however, it cannot be assumed that it would affect the relationship between cash flows and investment. The balance sheet channel can be observed from the above relationship, thereby establishing a negative relationship between cash flows and investment during monetary tightness. To check the sensitivity of cashflows to investment, the sample is split using three criteria i.e., size, dividend policy and leverage.

Regression Results: Firms Constrained by Size

When firms are separated based on their size and separate regression is run based on constrained and unconstrained firms, the results signify a balance sheet channel. However, products of unconstrained firms (Table 4) are somewhat like those of constrained firms concerning coefficients; however, the Average Q's significance concerning investment falls below 10%. For unconstrained firms' same level of investment can be arranged to require a lower level of cash flows. The impact of tight monetary policy is visible on investment in unconstrained firms, which is quite like the aggregate data. In constrained firms (Table 5), the average Q is insignificant. However, the coefficient of cash flows under tight monetary policy reduces significantly from -10.8% in unconstrained firms to -26.3% in constrained firms.

Table 4. Fixed Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.012	0.008	1.521	0.128
Average Q	0.029	0.018	1.595	0.111
Cash Flows	0.087	0.038	2.307	0.021**
CF*MPD	-0.109	0.061	-1.792	0.073*
Weighted Statistics				
R-squared	0.063		Adjusted R-squared	-0.006
F-statistic	0.920		Prob(F-statistic)	0.746
Hausman specification test				
Chi-Sq. Statistic	21.851		Prob	0.000***

Table 5. Random Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.060	0.008	7.897	0.000***
Average Q	0.008	0.011	0.676	0.500
Cash Flows	0.116	0.050	2.350	0.019**
CF*MPD	-0.264	0.069	-3.828	0.000***
Weighted Statistics				
R-squared	0.015		Adjusted R-squared	0.012
F-statistic	5.424		Prob(F-statistic)	0.001***
Hausman specification test				
Chi-Sq. Statistic	5.364		Prob	0.147

Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.

Number of Observations: 1072

Period: 2000 – 2015

The results are consistent with our hypothesis as smaller firms' cash flows are more constrained than larger firms requiring more financing from external resources. This explains the two-fold impact of tight monetary policy, i.e., the smaller firms are more impacted by tight monetary policy than larger firms in terms of both access to finance and cost of finance and will need to put up more collateral to finance investments. The results corroborate the findings of Gertler and Gilchrist (1994), Bougheas et al. (2006), and Crisóstomo (2012). The results also support the hierarchy of finance theory as pronounced by Oliner and Rudebusch (1992). It is concluded that in times of monetary tightness, the cash flows of a firm become an important determinant of investment, particularly for smaller firms. On the one hand, the policy reduces the

company's cash flows as a result of increasing cost of capital, while on the other side net worth of the firms decline making it harder for them to raise external finance.

Regression Results: Firms Constrained by Leverage

Tables 6 and 7 show regression results for firms unconstrained and constrained by leverage. The results of unconstrained firms are again similar to those of the main regression equation. Unconstrained firms have free cash flows to benefit from investment opportunities available to them; however, the results are not significant. Average Q is not a significant explanatory variable for either constrained or unconstrained firms as the results are insignificant for both and even more for constrained firms. Cash flows explain the level of investment reasonably well for both classes as the results are significant. The results on firms' cash flows constrained by leverage in times of tight monetary policy are even more striking (Table 7). Firms constrained by the leverage (Highly leveraged) require even higher cash flows during regular periods to finance investment, i.e., 45.9% (Table 7) compared to 9.6% (Table 6). This is mainly because these firms have a lesser ability to raise more external finance. In periods of monetary tightness, the impact of leverage on cash flows seems much pronounced, i.e., the cash flows coefficient reduces from -10.3% to -38.8%. This implies that it becomes even harder for firms constrained by leverage to raise external finance, particularly in periods of monetary tightness. During tight monetary policy, a firm is already constrained by falling sales revenues and increasing cost of capital, where falling revenues also reduces the value of collateral, thereby reducing the firm's ability to carry out investment, propagating the existence of a balance sheet channel. It becomes even hard for the firm to maintain the production capacity of its existing machinery due to a lack of finance. These results support the findings of Lang et al. (1996) and Gedajlovic (2005) and conclude that investment by firms financially-constrained by leverage suffers more during periods of monetary tightness.

Table 6. Random Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.033	0.006	5.862	0.000***
Average Q	0.012	0.009	1.333	0.183
Cash Flows	0.097	0.030	3.237	0.001***
CF*MPD	-0.104	0.050	-2.086	0.037**
Weighted Statistics				
R-squared	0.006		Adjusted R-squared	0.005
F-statistic	5.217		Prob(F-statistic)	0.002***
Hausman specification test				
Chi-Sq. Statistic	7.449		Prob	0.059

Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.
Number of Observations: 2608 Period: 2000 – 2015

Table 7. Random Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.017	0.008	2.071	0.039**
Average Q	-0.017	0.030	-0.574	0.566
Cash Flows	0.455	0.110	4.192	0.000***
CF*MPD	-0.388	0.153	-2.530	0.012**
Weighted Statistics				
R-squared	0.021		Adjusted R-squared	0.017
F-statistic	6.010		Prob(F-statistic)	0.001***
Hausman specification test				
Chi-Sq. Statistic	7.045		Prob	0.071

Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.
Number of Observations: 864 Period: 2000 – 2015

Regression Results: Firms Constrained by Dividend Policy

Tables 8 and 9 show regression results of unconstrained firms and firms constrained by dividends. The results of unconstrained firms are in line with the normal regression equation, with all coefficients being significant. However, the results of constrained firms are more interesting as they do not correspond to the results of either the main equation or other constrain variables (size and leverage). Average Q has a negative relationship with gross investment, while cash flows under the tight monetary policy have a positive relationship. Although the results of Average Q are significant, the results are not significant for cash flows under the tight monetary policy. The results of unconstrained-firms support existing literature; however, the results of constrained-firms do not correspond with the literature. This could be due to several reasons, i.e., the data is limited in the sense as we have only ascribed those firms as constrained that have not given dividends throughout the period. At the same time, firms that announce dividends one year may have remained constrained during the rest of the periods. Further, the number of observations might below have results as per the existing empirical evidence.

Table 8. Fixed Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.028	0.006	4.917	0.000***
Average Q	0.032	0.012	2.723	0.007***
Cash Flows	0.101	0.030	3.356	0.001***
CF*MPD	-0.142	0.047	-3.021	0.001***
Weighted Statistics				
R-squared	0.067		Adjusted R-squared	0.004
F-statistic	1.066		Prob(F-statistic)	0.257
Hausman specification test				
Chi-Sq. Statistic	10.535		Prob	0.015**

Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.
Number of Observations: 3168 Period: 2000 – 2015

Table 9. Random Effect Model Results

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	0.002	0.023	0.076	0.940
Average Q	-0.158	0.073	-2.168	0.031**
Cash Flows	0.396	0.187	2.120	0.035**
CF*MPD	0.065	0.247	0.262	0.794
Weighted Statistics				
R-squared	0.033		Adjusted R-squared	0.022
F-statistic	3.142		Prob(F-statistic)	0.026**
Hausman specification test				
Chi-Sq. Statistic	4.044		Prob	0.257

Note: ***, **, * denote the level of significance at 1%, 5% and 10% respectively.
Number of Observations: 285 Period: 2000 – 2015

Some papers such as Oliner and Rudebusch (1992), Myers and Majluf (1984), and Cleary (1999) have enforced the idea that firms prefer internally generated financing for investments which builds an argument that a reduction in investments during monetary tightness is not necessarily related to increases in the cost of capital, as firms can continue to keep investing using internal sources. However, many studies have found a definite decline in firms' investments during periods of tight monetary policy (Fazzari et. al., 1988; Bougheas et al., 2006; and Bryson, 2009). This impact of monetary policy on investment is visible and persistent across sectors and firms of different sizes. However, this study mostly focused on the balance sheet channel's existence and how it amplifies the impact of tight monetary policy on firms based on different financial constraints.

The study results indicate a positive relationship between cash flows and investment, which is in line with study of Kaplan and Zingales (1997). The results further indicate that during periods

of monetary tightness, the cash flows available to the firm reduce significantly, thereby having an impact on investments of the firm. The impact on cash flows is visibly more pronounced than the quantitative impact of an increase in the cost of capital, which gives rise to the notion of the balance sheet channel's existence as theorized. The results are in line with the findings of Zhang and Zheng (2020). However, the endogeneity of the quantity of credit makes it difficult to establish that only balance sheets are channeled to those. To further substantiate the results, three financial constraints, i.e., size, leverage, and dividend policy, are used to segregate firms into financially constrained and unconstrained firms. It is assumed that constrained firms will show a stronger reaction to tight monetary policy than unconstrained firms. The balance sheet of these firms inhibits them from raising finance externally or even internally, thereby exerting pressure on their investments. Even in the presence of viable investment opportunities, the investors may be unwilling to place their money in these firms (Bernanke et al. (1996) due to the firm's inability to provide adequate collateral. The size of the firm may be a better proxy (Fazzari et al., 1988; Crisóstomo, 2012) to assess the balance sheet channel's impact as it directly correlates to a firms' ability to arrange collateral to generate funds for investments. The results highlight the balance sheet channel's existence as the impact on smaller firms' cash flows, and thereby investments are much more pronounced compared to larger firms. The results of firms constrained by leverage also show the same conclusion as cashflows of highly leveraged firms is impacted more during tight monetary periods, so these firms are more prone to decline in investments than unconstrained firms. These results are in line with the findings of Lang et al. (1996) and support a balance sheet channel. The different results based on a different level of constraints corroborate Durante et al. (2000).

Conclusion

This study has investigated the relevance of the balance sheet channel of monetary policy transmission concerning Pakistan using firm-level data. Further, normative indicators have been used to identify sustained periods of tight monetary policy in Pakistan, which has not been attempted previously in Pakistan. The research has also tried to contribute to the literature on financial constraints and investment decisions by integrating firm-level data with macro-economic information and analyze the linkage between investment and finance. The balance sheet channel is considered relevant mainly because firms are constrained by credit channel or interest rate channel as most studies have advocated. A balance sheet channel exists because credit is not provided without collateral. The value of such collateral is directly related to the amount of financing available to a firm. Banks are only willing to finance the percentage of collateral provided by a firm. During periods of tight monetary policy, the value of a firm reduces due to several factors, i.e., a decrease in aggregate consumption resulting in declining sales, increasing cost of sales due to increased costs (not just financing cost but also increase in the price of raw materials).

Finally, the dividend policy of the firm has also been used as a financial constraint. The results are, however, inconclusive concerning the Pakistani firms. However, the decline in cash flows of constrained firms is visible; however, the results are not significant. This may be due to very few observations for firms that were constrained by the inability to give dividends. Another reason could be that firms are classified as unconstrained even if they paid a dividend in only one period, which may have led to inconclusive results. However, evidence for the balance sheet channel's existence is substantial considering the results of other financial constraints, i.e., size and leverage.

The study has some strong implications for the policymakers to identify if rate subsidies (to support exports) have any positive impact during periods of monetary tightness. SBP also offers rate subsidies on long-term financing facilities, which could also be studied in conjunction with other rate subsidies. The existence of cash flows and investment relationships suggests that corporate managers must consider cash flows while devising the investment strategies. The monetary transmission channel's impact must also be studied to develop strategies for the investment behavior, as the transmission channels play a key role in the change in behavior of cashflows and investment.

References

- Akerlof, G. A. (1970). The market for “Lemons”: Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500. <https://doi.org/10.2307/1879431>
- Angelopoulou, E., & Gibson, H. D. (2009). The balance sheet channel of monetary policy transmission: Evidence from the United Kingdom. *Economica*, 76(304), 675–703. <https://doi.org/10.1111/j.1468-0335.2008.00710.x>
- Bernanke, B., Gertler, M., & Gilchrist, S. (1996). The financial accelerator and the flight to quality. *Review of Economics and Statistics*, 78(1), 1–15. <https://doi.org/10.2307/2109844>
- Bernanke, B. S., & Gertler, M. (1989). Agency costs, net worth, and business fluctuations. *The American Economic Review*, 79(1), 14–31. <https://doi.org/10.2307/1804770>
- Bernanke, B. S., & Gertler, M. (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9(4), 27–48. <https://doi.org/10.1257/jep.9.4.27>
- Bougheas, S., Mizen, P., & Yalcin, C. (2006). Access to external finance: Theory and evidence on the impact of monetary policy and firm-specific characteristics. *Journal of Banking and Finance*, 30(1), 199–227. <https://doi.org/10.1016/j.jbankfin.2005.01.002>
- Brynjolfsson, E., & Hitt, L. (1995). Information technology as a factor of production: The role of differences among firms. *Economics of Innovation and New Technology*, 3(3–4), 183–200. <https://doi.org/10.1080/10438599500000002>
- Bryson, T. (2009). *Firm investment and monetary transmission in Jamaica: An investigation of the balance sheet channel with micro-level firm data*. Corpus ID: 54954131, Bank of Jamaica. http://www.boj.org.jm/uploads/pdf/papers_pamphlets/papers_pamphlets_Firm_investment_and_Monetary_Transmission_in_Jamaica__An_Investigation_of_the_Balance_Sheet_Channel_with_Micro-level_Firm_Data.pdf
- Chatelain, J.-B. al. (2003). Monetary policy transmission in the Euro Area: New evidence from micro data on firms and banks. *Journal of the European Economic Association*, 1(2–3), 731–742. <https://doi.org/10.1162/154247603322391350>
- Ciccarelli, M., Maddaloni, A., & Peydro, J.-L. (2010). *Trusting the bankers: A new look at the credit channel of monetary policy* (ECB Working Paper Series No. 1228). <https://doi.org/10.2139/ssrn.1767969>
- Cleary, S. (1999). The relationship between firm investment and financial status. *Journal of Finance*, 54(2), 673–692. <https://doi.org/10.1111/0022-1082.00121>
- Crisóstomo, V., López-Iturriaga, F., & Vallengado, E. (2012). Firm size matters for financial constraints: Evidence from Brazil. *Sistemas e Gestão*, 7(3), 490–501. <https://doi.org/10.7177/sg.2012.v7.n3.a16>
- de Haan, L., & Sterken, E. (2000). *Capital Structure, Corporate Governance, and Monetary Policy: Firm-Level Evidence for the Euro Area* (Research Memorandum WO&E No. 637).
- Dennis, S., Nandy, D., & Sharpe, I. G. (2000). The determinants of contract terms in bank revolving credit agreements. *Journal of Financial and Quantitative Analysis*, 35(1), 87–110. <https://doi.org/10.2307/2676240>
- Durante, E., Ferrando, A., & Vermeulen, P. (2020). *Monetary Policy, Investment and Firm Heterogeneity*. Working Paper Series 2390, European Central Bank. <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2390~f6688df85d.en.pdf>

- Fazzari, S., Hubbard, G., and Petersen, B., (1988). *Financing constraints and corporate investment*. Brookings Papers on Economic Activity, (1), 141–206.
https://www.jstor.org/stable/2534426?seq=1#metadata_info_tab_contents
- Fazzari, S., Hubbard, G., and Petersen, B., (2000). Investment-Cash Flow Sensitivities are Useful: A Comment on Kaplan and Zingales. *The Quarterly Journal of Economics*, 695–705.
https://www.jstor.org/stable/2587007?seq=1#metadata_info_tab_contents
- Gedajlovic, E. (2005). Ownership structure, investment behaviour and firm performance in Japanese manufacturing industries. *Organization Studies*, 26(1), 7–35.
<https://doi.org/10.1177/0170840605046346>
- Gertler, M., & Gilchrist, S. (1994). Monetary policy, business cycles, and the behaviour of small manufacturing firms. *The Quarterly Journal of Economics*, 109(2), 309–340.
<https://doi.org/10.1017/CBO9781107415324.004>
- Jimenez, G., Ongena, S., Peydro, J. L., & Saurina, J. (2012). Credit supply and monetary policy: Identifying the Bank-Balance sheet channel with loan applications. *American Economic Review*, 102(5), 2301–2326. <https://doi.org/10.1257/aer.102.5.2301>
- Kahle, K., & Stulz, R. (2011). *Financial policies, investment, and the financial crisis: Impaired credit channel or diminished demand for capital?* (Fisher College of Business Working Paper No. 2011–3). *Fisher College of Business Working Paper*. <https://doi.org/10.2139/ssrn.1754660>
- Kaplan, S. N., & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112(1), 169–215.
<https://doi.org/10.1162/003355397555163>
- Kashyap, A. K., & Stein, J. C. (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90(3), 407–428.
<https://doi.org/10.1257/aer.90.3.407>
- Kashyap, A. K., Stein, J. C., & Wilcox, D. W. (1993). Monetary policy and credit conditions: Evidence from the composition of external finance. *American Economic Review*, 83(1), 78–98.
- Lang, L., Ofek, E., & Stulz, R. M. (1996). Leverage, investment, and firm growth. *Journal of Financial Economics*, 40(1), 3–29. [https://doi.org/10.1016/0304-405X\(95\)00842-3](https://doi.org/10.1016/0304-405X(95)00842-3)
- Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The Journal of Finance*, 32(2), 371–387.
https://www.jstor.org/stable/2326770?seq=1#metadata_info_tab_contents
- Łyziak, T., Przystupa, J., & Wróbel, E. (2008). *Monetary policy transmission in Poland: A study of the importance of interest rate and credit channels*. SUERF - The European Money and Finance Forum
- Majeed, A., Hashmi, S.M., & Qamar, R. (2017). "Monetary Policy Transmission and Firms' Investment: Evidence From the Manufacturing Sector of Pakistan," *Romanian Economic Journal*, 20(66), 2-34
- Mishkin, F. (1996). *The channels of monetary transmission: Lessons for monetary policy* (NBER Working Paper Series No. 5464). <https://doi.org/10.3386/w5464>
- Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187–221.
[https://doi.org/10.1016/0304-405X\(84\)90023-0](https://doi.org/10.1016/0304-405X(84)90023-0)
- Oliner, S. D., & Rudebusch, G. D. (1992). Sources of the financing hierarchy for business investment. *Review of Economics and Statistics*, 74(4), 643–654.
<https://doi.org/10.2307/2109378>

- Oliner, S. D., & Rudebusch, G. D. (1996). Is there a broad credit channel for monetary policy? *FRBSF Economic Review*, 1996(1), 1–13.
- Özlu, P., & Yalçın, C. (2012). The trade credit channel of monetary policy transmission: Evidence from nonfinancial manufacturing firms in Turkey. *Emerging Markets Finance and Trade*.
<https://doi.org/10.2753/REE1540-496X480406>
- Prasetyantoko, A. (2007). Financing constraint and firm investment following a financial crisis in Indonesia. In *23rd International Symposium on Banking and Monetary Economics*.
- Rondi, L. (1998). Firms' financial and real responses to monetary tightening: Evidence for large and small Italian companies. *Giornale Degli Economisti e Annali Di Economia*, 57(1), 35–64.
https://www.jstor.org/stable/23248162?seq=1#metadata_info_tab_contents
- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with rationing credit information imperfect. *The American Economic Review*, 71(3), 393–410.
https://www.jstor.org/stable/1802787?seq=1#metadata_info_tab_contents
- Taylor, J. B. (1995). The monetary transmission mechanism: An empirical framework. *The Journal of Economic Perspectives*, 9(4), 11–26. <https://doi.org/10.1257/jep.9.4.11>
- Zhang, C., & Zheng, N. (2020). Monetary policy and financial investments of non-financial firms: New evidence from China. *China Economic Review*, 60.
<https://doi.org/10.1016/j.chieco.2020.101420>