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Monetary Transmission in Pakistan: The Balance Sheet Channel

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Abstract

Using data of non-financial listed firms over a period of 1999-2010, this paper investigates the effectiveness of balance sheet channel in monetary transmission mechanism in Pakistan. By classifying firms as SME and large, this paper finds a strong evidence for the existence of net worth channel in Pakistan. A tight monetary policy worsens the net worth of both the SME and large firms, with SME getting more hit thereby further affecting their cash flows, short-term borrowing, and revenues.

JEL Classification: E52, E50, H32, C33

Key Words: Monetary Policy, Monetary Transmission, Firm, Models with Panel Data

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I. Introduction

An effective use of monetary policy as a stabilization tool requires an understanding of the mechanisms through which it affects the economy. It is important for a central bank to assess the impact of various policy instruments, market expectations about inflation and the level of asymmetries in the economy. Degree of effectiveness of various channels of monetary transmission, not only ensures the level of success of monetary policy but also implicitly reflects the level of asymmetries in the market that help understand the behavior of various economic agents in the economy. Behavior of these economic agents varies across economies; and so does the degree of effectiveness of monetary policy through a certain channel. Every economy is unique; however, broader rules of monetary policy apply to most of the economies. Countries with fewer frictions in financial intermediation usually have strong credit channel. Though Pakistan is one of those developing countries that suffer from fiscal dominance, it still has an effective balance sheet channel. Following the theoretical groundings set by Bernanke and Gertler (1995), this paper attempts to empirically investigate the balance sheet channel in Pakistan with further quantifying the effects of tight monetary policy on the behavior of large and Small and medium enterprises (SME).

Liquidity is the key driving force behind every sound business. To run the business, most of the firms heavily rely on bank borrowing especially short term bank borrowing to finance their working capital. Theoretically, monetary tightening increases the interest rates (cost of capital) and directly reduces the volume of loanable funds for the business enterprises. Availability of limited volume of funds causes a competition among firms to tap these resources, whereas banks start readjusting their portfolios. According to Black and Rosen (2007), “during periods of tight monetary policy, banks reallocate loan supply away from small firms towards large firms”, implying that commercial banks consider large firms less risky than the small firms. Additionally, in case of liquidity crunch, large firms issue commercial papers, borrow from their sponsors as well as from their directors and somehow maintain their liquidity. While SMEs find it harder to manage their liquidity and borrow from the market that makes them relatively more vulnerable during credit crunch. Thus monetary tightening limits the volume of funds available for borrowing besides increasing the financial expenses of the firms that lowers their profit, asset prices as well as the value of their

collateral and hence erodes their net worth. Apart from that their cost of sales, administration and selling expenses, at top of other operating expenses do not adjust at the same time, causing a further deterioration in net profits of the firms leading to lower cash flows. Large firms, with their relatively better absorption capacity somehow manage to run the business and recover by tapping both the internal and external resources, however, small firms find no option but to reduce their production, support their net worth with surplus on revaluation of fixed assets, and yet face heavy losses that further deplete their net worth.

In case of Pakistan, several studies investigated the monetary transmission at the macro level. Agha et al (2005) observed fall in domestic demand accompanied by low investment as a result of tight monetary policy. They also found an evidence for an active interest rate channel and asset price channel in Pakistan. Alam and Waheed (2006) explored sectoral impact of monetary policy shocks and assessed the sector-specific variation in real effects of monetary policy, while Hussain (2009) used VAR to analyze the impact of monetary policy on real GDP and inflation. However, micro foundations of the monetary transmission mechanism remained unexplored. Therefore, this study is not only an addition to the existing empirical literature on account of balance sheet channel in various countries but also a first step towards investigating transmission mechanism at micro-level using firms' database in Pakistan.

Investigating the impact of monetary policy over non financial listed firms this paper finds out that an increase in overnight rate erodes the net worth of both SME and large firms, however, degree of erosion is relatively higher for SME. This phenomenon also holds for cash flow to asset ratio that depletes with a rise in financial expenses to sales ratio leading to lower net profit margin of the firms. Of the sample under consideration almost 7 percent of the enterprises closed their business activity and their output dropped to zero during the phase of monetary tightening. SME's using surplus on revaluation of fixed assets tried to back their net worth up to 24 percent and yet faced heavy losses. However, those who survived eventually adjusted to the trend.

The roadmap of the later sections of the paper is as follows. Section 2 presents the literature review on balance sheet channel of monetary policy transmission mechanism followed by section 3 that contains data description and variable definitions. Section 4 covers firms' classification and methodology used in this study, while section 5 holds discussion on the

broader monetary policy framework along with graphical representation of the core variables, and balance sheet channel. Section 6 provides empirical findings and finally, section 7 summarizes the study.

II. Literature Review

Literature on balance sheet channel of transmission mechanism has broadly focused on the theoretical underpinnings; however, a few studies explored the existence of balance sheet channel, often called net worth channel, using micro-database. This section reviews the empirical work on balance sheet channel of monetary policy.

Using quarterly data on manufacturing firms in US, Gertler and Gilchrist (1994) classified firms as small and large on the basis of their gross nominal assets. They treated firms below 30th percentile as small while the rest were classified as large to investigate borrowing behavior of small and large firms and its impact on their inventory accumulation. They found that tight monetary policy increased the short term borrowing for the large firms that was primarily meant for inventory accumulation. However, during the periods of recession, level of their inventories declined sharply. Contrary to that tight monetary policy left little space for the small firms to borrow in short run, but unlike large firms, their inventories declined steadily over time.

Bernanke and Gertler (1995) presented the in-depth analysis of the credit channel. They applied VAR technique using quarterly data for the period of 1965-1994 and discussed the role of bank lending channel and the balance sheet channel on housing market. They pointed out that tight monetary policy directly weakened the borrower's financial position through increase in their interest expenses, and reduction in their net cash flows. Among other factors, increase in interest rate caused asset prices to fall and therefore, lower the value of their collateral. Tight monetary policy also affects the aggregate demand in economy that resulted into a sharp decline in firms' revenues, cash flow squeeze and a rise in coverage ratio. They mentioned that banks, during this phase, reallocated their funds and lent to the large firms considering them less risky. Further evaluating the impact, they found that rise in interest rate caused revenues of corporate firms to fall quickly than rise in their expenses, leading to

almost 40 percent fall in their profits. However, following the tight monetary policy their cash flow squeezed in the 3rd quarter.

Using the quarterly data of more than 7000 manufacturing, mining and trade corporations in US over a period of 1973-1991, Oliner and Rudebusch (1996) emphasized on bank lending channel. They calculated the impulse response functions using VAR and concluded that monetary contraction redirected credit from small firms to large firms. To figure out the effectiveness of balance sheet channel of monetary policy on Austrian economy, Wesche (2000) utilized firm level micro-data of almost 2000 non-financial firms over the period of 1979-1998. The study found that tight monetary policy put a cap on the loanable funds, and thus affected the borrowing of the small firms. Additionally, the study observed that small and medium firms reacted more to the financial variables, and these firms had higher average interest expense and a lower investment-to-sales ratio.

Analyzing the broad credit channel of monetary policy in Ukraine, Zaderey (2003) observed that monetary contraction caused equity prices to fall and interest expenses to rise, leading to a squeeze in firms' net cash flows and depletion of net worth of the borrowers. Firms with limited access to the capital market depended on their internal funds to meet their liquidity requirements, finance their working capital and to invest further. Another attempt was made by Guariglia and Mateut (2006) to investigate the credit channel, trade credit channel and inventory investment in UK. They used a set of 609 firms over a period of 1980-2000 to estimate the error-correction inventory investment equation. Evidence proved that both the trade and credit channels operated side by side in UK, with trade channel predominating over the credit channel of monetary policy. While coverage ratio played stronger role in inventory investment and the small firms were observed financially constrained during the phase of tight monetary policy.

Further shedding a light over the mechanism of credit channel and differentiating between the bank lending channel and the balance sheet channel, Black and Rosen (2007) used data on individual loans, classified firms as small, medium and large on the basis of loan size. They found that during the phases of tight monetary policy, banks reallocated their short term supply of funds. They found small firms relatively riskier and thus more lending was made to

the large firms that made the small firms more vulnerable to the effects of tight monetary policy.

Most of the studies that worked on credit channel confined themselves to find the impact of financial constraints of small and large firms during monetary tightening. In this regard another attempt was made by Karim and Zulkefly (2010) who tried to pin down the impact of monetary policy on firms' fixed investment spending. Following the Blundell and Bond (1998), they used the dynamic GMM estimation technique to investigate the interest rate channel as well as the credit channel, and found that small firms were more financially constrained than the large firms.

Characterizing the firms as small, medium and large on the basis of employment level, and then further differentiating them by their export orientation, Özlü and Yalçın (2010) analyzed non-financial firms to explore the effectiveness of trade credit channel in Turkey. They found that SMEs with lower export share were more financially constrained during monetary contraction, while large and export orientated firms had more access to the funds. They explored that credit channel became ineffective, when firms held large trade credits.

To sum up, literature on balance sheet channel is confined to the impact of financial constraints that is availability of short term borrowing to different groups of firms and the reallocation of supply of credit by the banks. Therefore, the broader emphasis of the paper in terms of quantifying the impact of monetary contraction on net worth and cash flow of SME and large firms is a significant contribution to the existing literature.

III. Data Description and Definitions

This study uses firm level micro data of 160 non-financial companies listed at Karachi stock exchange over a period of 12 years (1999-2010). These companies broadly belong to textile, cement, fertilizer, chemical, sugar, oil, and automobile sector. The source of this micro-database is annual reports of these companies, which include information of audited accounts of the companies in the form of their financial statements i.e. balance sheet, profit and loss account, cash flow etc. Since the number of listed companies at Karachi stock exchange varied over time due to mergers and acquisitions, new listing, delisting and

renaming of companies, and the complete set of annual reports for all companies is not available; this micro-database is limited to 160 companies observed over a span of 12 years. Therefore, prime source of data for the key variables - shareholder's equity, surplus on revaluation of assets, bank and non-bank borrowing, short term and long term borrowing, fixed assets, inventories, cash and bank balance, net sales, cost of sales, operating profit, financial as well as administration and selling expenses, profit after tax are company's own annual reports and annual audited accounts. Further ratios are calculated using this basic database. However, data on real GDP, nominal GDP, and Inflation is collected from Economic Survey (2010-11) published by Ministry of Finance, Pakistan. While the source of data on overnight interest rate, money supply (M2), SLR and CRR is State Bank of Pakistan. The summary statistics of the variables is presented in table 1.

[Table 1 here]

Investigation of balance sheet channel required specifying certain variables. Definitions used for these key variables are as follows.

Net Worth: Due to inverse relationship between interest rate and the assets prices, monetary tightening directly affects the value of the borrower's collateral and erodes her net worth, while it indirectly hits her credit worthiness. Therefore, net worth plays a pivotal role in balance sheet channel. Bernanke and Gertler (1995) derived net worth of a firm by netting off her total liabilities from her assets, which is alternatively equal to the sum of a firm's shareholders equity and surplus on revaluation of its fixed assets. This paper follows the alternate method to calculate the net worth defined by Bernanke and Gertler (1995).

Cash Flow: With monetary tightening interest rate expenses of the firms rise, output drops while their quasi-fixed costs do not adjust immediately, resulting into cash flow squeeze and weak financial position of the firm. Therefore, effect on cash flow together with the affect of monetary tightening on net worth of the firm completes the balance sheet channel of the firm. Following Karim and Zulkefly (2010) this paper defines cash flow as the sum of a firm's profit after tax and the depreciation & amortization.

Coverage Ratio: Following Bernanke and Gertler (1995), this study defines coverage ratio as “the ratio of interest payments by nonfinancial corporations to the sum of interest payments and profits”. Coverage ratio is the most widely used indicator to measure the immediate impact of tight monetary policy on firms’ financial health and changes in the factor demands of the firm. Under tight monetary policy, according to Bernanke and Gertler (1995), “The coverage ratio rises because of both the direct and indirect effects of monetary policy on firms’ financial position”. Monetary tightening directly reduces the firms’ profit due to rise in interest expenses (the numerator) and indirectly affects firms’ revenues by fall in final demand, with firm unable to adjust its quasi-fixed costs, it results into lower profits of the firms (the denominator).

IV. Firms’ Classification and Methodology

Literature has classified firms as small, medium and large on the basis of employment level, loan size, turnover and assets. This study classifies firms on the basis of their total assets. Using percentiles, firms below 40th percentile are classified as SME, whereas rest is assumed as large. Therefore, 64 firms fall under the category of SME, while 96 are treated as large firms.

The basic estimation technique of random effect and fixed effect is used with linear panel data model. The baseline model of the linear panel data with random effect is specified as

$$Y_{it} = \alpha + X_{it} \beta + u_i + \epsilon_{it}$$

Where Y_{it} is the dependent variable that shows net worth to assets ratio of the firm i during period t , X_{it} is set of independent variables and u_i is within entity error and ϵ_{it} is between-entity error. While analyzing the cash flow aspect of the balance sheet channel, Y_{it} is considered as cash flow to asset ratio of the firm i during period t . To capture the effect of individual heterogeneity across the sample, fixed effect technique is used in this linear panel data model. The model is, therefore, specified as

$$Y_{it} = \alpha_i + X_{it} \beta + \epsilon_{it}$$

Where α_i captures firm’s fixed effect in the model.

V. Monetary Tightening in Pakistan: A Graphical Approach

Monetary tightening in Pakistan started during 2005 when average overnight interest rate rose from 1.9 percent in 2004 to 3.7 percent in 2005 and kept increasing until it touched the peak of 11.7 percent in 2010. During this phase when interest rates were rising, Pakistan economy also witnessed higher M2 growth – a relationship reversal between monetary aggregate and interest rates. Prime reason behind this relationship reversal turned out to be the heavy budgetary borrowing by the government. In 2008, to ensure further monetary contraction, State Bank of Pakistan (SBP) took some additional measures and raised Cash Reserve Requirement (CRR) and Statutory Liquidity Requirement (SLR) for the commercial banks. Consequently, in May 2008 the weekly average requirement of CRR rose from 5 percent to 9 percent, while SLR rose from 18 percent to 19 percent¹. Assessing the market conditions, in October 2008, SBP initially reduced CRR requirement from 9 percent to 8 percent² and then further dropped it to 6 percent³; maintaining SLR at 19 percent. Subsequently in November 2008, this requirement further reversed back to 5 percent⁴. These steps decelerated the M2 growth during 2008 and 2009, which once again surged in 2010. However, overnight interest rate kept increasing during this phase. This trend is demonstrated in figure 1.

[Figure 1 here]

Literature on monetary policy suggests that monetary tightening leads to sustained decline in real GDP and inflation. However, these linkages could not work properly in case of Pakistan. Monetary tightening during 2004-2008 translated into lower real GDP growth but followed by growing inflation. In 2009, despite tight monetary policy real GDP witnessed an upward swing that was mainly due to high growth in agriculture sector⁵ whereas large scale

¹ BSD Circular No. 11 dated May 22, 2008

² Effective from 11th October 2008, BSD vide Circular No. 21 dated October 08, 2008 SBP reduced the CCR requirement to 8 percent.

³ Effective from 18th October 2008, BSD vide Circular No. 25 dated October 17, 2008 SBP reduced the CCR requirement to 6 percent

⁴ BSD Circular No. 29 dated November 01, 2008

⁵ In 2009, Agriculture sector grew by 4 percent as compared to 1 percent in previous year that increased its share in GDP from 21.3 percent to 21.8 percent

manufacturing sector witnessed a dip⁶ during this period. The behavior of manufacturing sector is in line with theoretical groundings of the balance sheet channel that are graphically as well as empirically established in the later section of this paper. Behavior of monetary growth, overnight interest rate, real GDP and inflation are presented together in figure 2.

[Figure 2 here]

In the backdrop of this macroeconomic situation through a rise in overnight interest rates, effects of monetary tightening translated into balance sheet channel. Consequently, financial expenses of the firms rose while their production costs as well their operating expenses could not adjust immediately that lowered their profits and depleted their net worth. Since SME are more financially constrained, already have lower profits along with small equity, they find it harder to survive; the value of their collateral falls due to declining asset prices and their net worth deteriorates manifold than that of large firms who find it easier to generate funds from market by issuing commercial papers, borrowing from sponsors and banks and adjust their financial and operating expenses. Figure 3 reflects the impact of tight monetary policy on net worth of SME and large firms.

[Figure 3 here]

Falling profits squeeze the net cash flows of both SME and the large firms; it additionally affects the level of their inventories, cash and bank balances as well as their investment decisions. Since SME are more vulnerable to cash flow squeeze their cash flow to asset ratio fall more quickly than the large firms. This situation is presented in figure 4.

[Figure 4 here]

To capture both the direct and indirect effects of tight monetary policy on financial health of SME and large firms, we analyzed the behavior of coverage ratio over this period. Movements of overnight interest rate coincide with the movement in coverage ratio that is in line with the literature. As shown in Figure 5, sharp rise in overnight interest rate in 2005

⁶ The share of LSM fell from 19.2 percent to 18.2 percent whereas its growth rate dropped from 4.8 percent to – 3.6 percent.

immediately translated into high coverage ratio, while it fell sharply in 2006 and stabilized with deceleration in overnight interest rate. In later years, with continuous monetary tightening, the coverage ratio kept rising explaining the poor financial health of the non-financial enterprises.

[Figure 5 here]

To sum up, with tight monetary policy financial health of the firms deteriorated, their balance sheet weakened and net worth eroded that provides an evidence for the existence of balance sheet channel in Pakistan.

VI- Empirical Findings

Following the methodology in section IV, we have estimated the linear panel data models. To figure out whether using linear panel data model of random effects is a better fit or the fixed effect should be preferred, we conducted the Hausman test. The results of Hausman test for net worth channel turned out as 0.95 ($\text{Prob} > \chi^2 = 0.95$) while 0.53 ($\text{Prob} > \chi^2 = 0.53$) for the cash flow channel suggesting the use of random effects model of linear panel data. Therefore, estimates obtained from linear panel model with random effects for the SME are reported in table 2, while the behavior of large firms is quantified in table 3. As observed in the previous section through graphical representation, an effective balance sheet channel exists in Pakistan; therefore, basic results of the model are highly significant and are in line with the theory. Monetary policy contraction directly hits the balance sheets, cash flows as well as the profit and loss accounts of the firms and erodes their financial position. SME gets more hit and become more vulnerable to monetary policy shock than the large firms. Table 2 and table 3 shows that 1 percent increase in overnight interest rate deteriorates the net worth to asset ratio of SME by 4.3 percent, while it erodes large firms' net worth by 3.8 percent.

Financial expenses to sales are also negatively related to cash flow to assets ratio and show that 1 percent increase in financial expenses reduces the cash flow by 1.0 percent for the large firms, but reduces the cash flow of SME by 8.4 percent, explaining the liquidity crunch for SME. These results match with the literature on existence of balance sheet channel of

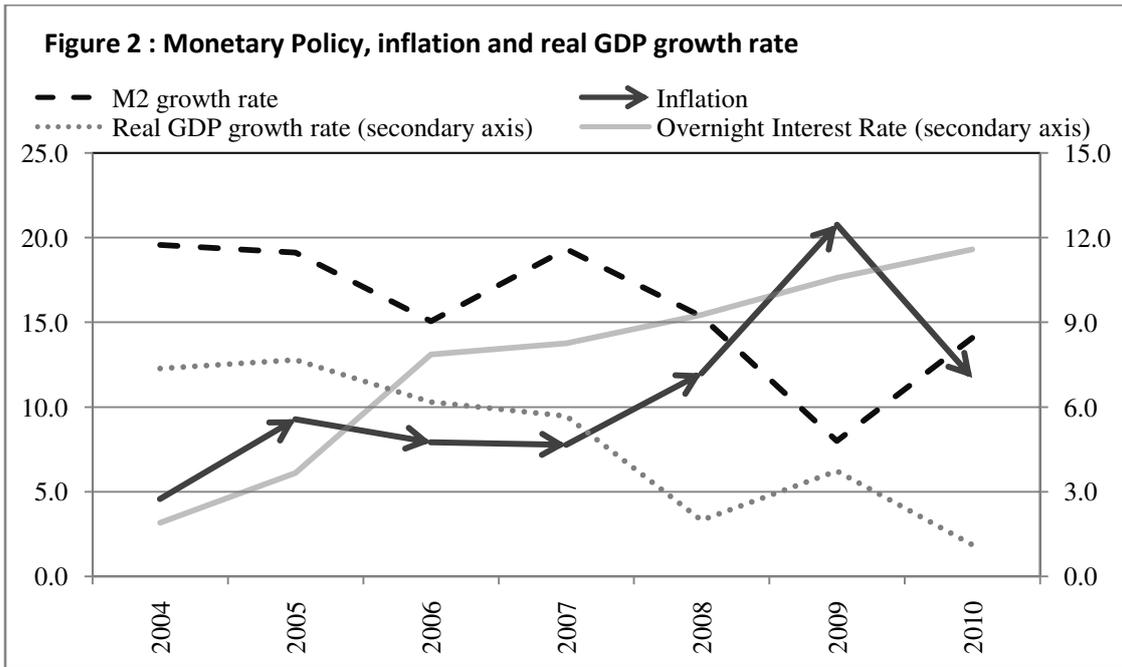
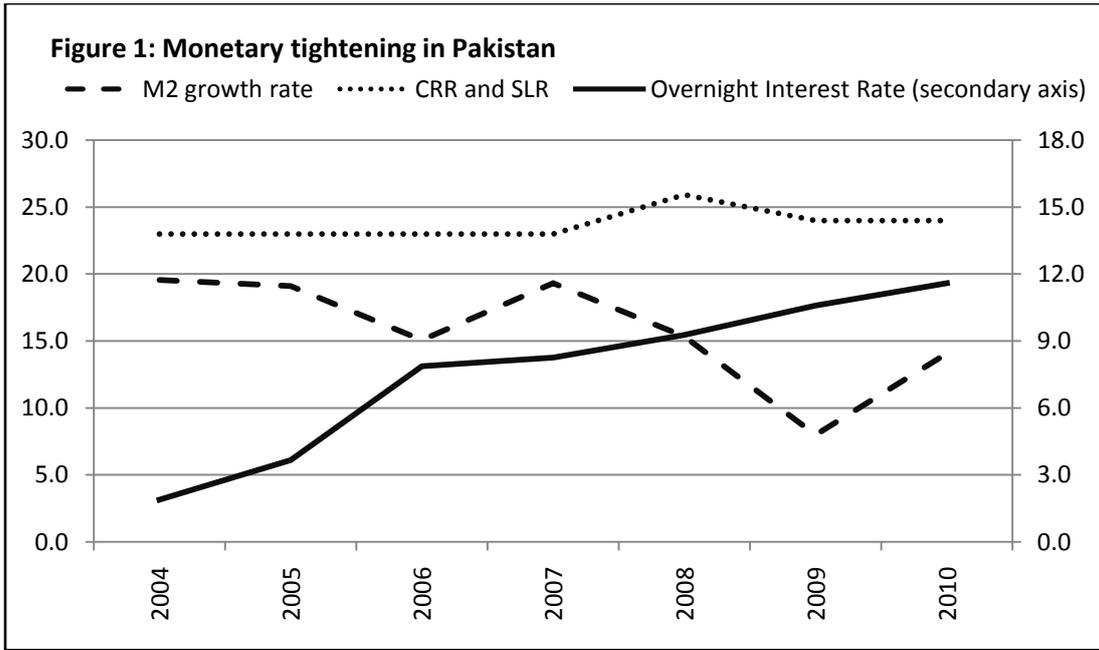
monetary policy. Further the reallocation of resources from SME to large can also be observed in table 2 and table 3. Short term borrowing to assets ratio for SME is negatively related to the cash flows, showing that with a credit crunch, short term borrowing of SME falls by 20 percent, whereas this drop is 15.9 percent for the large firms.

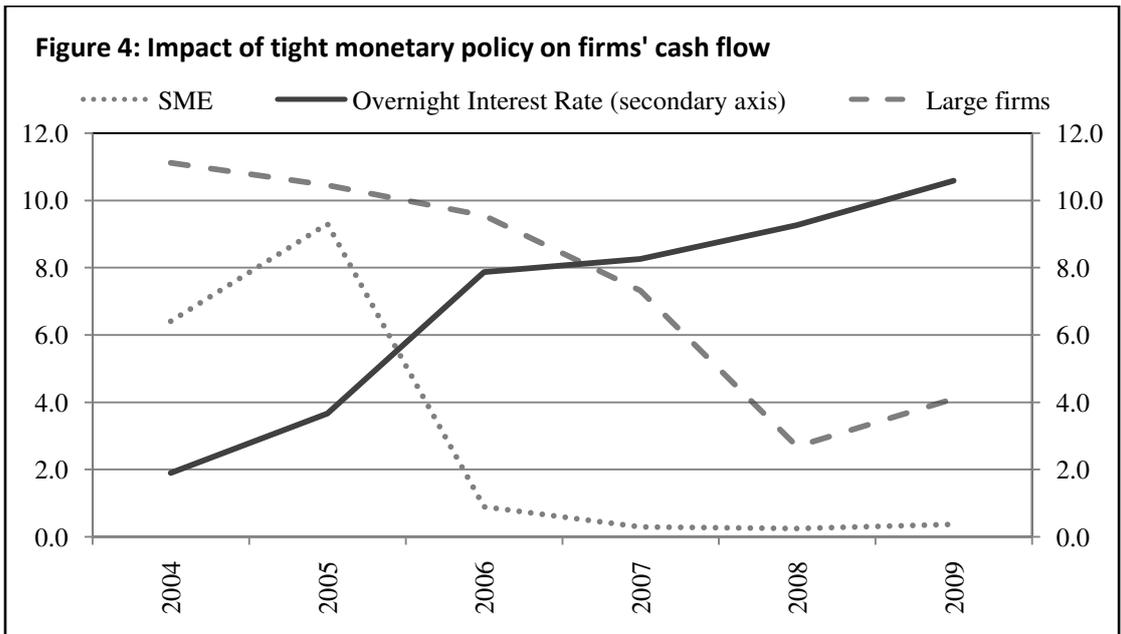
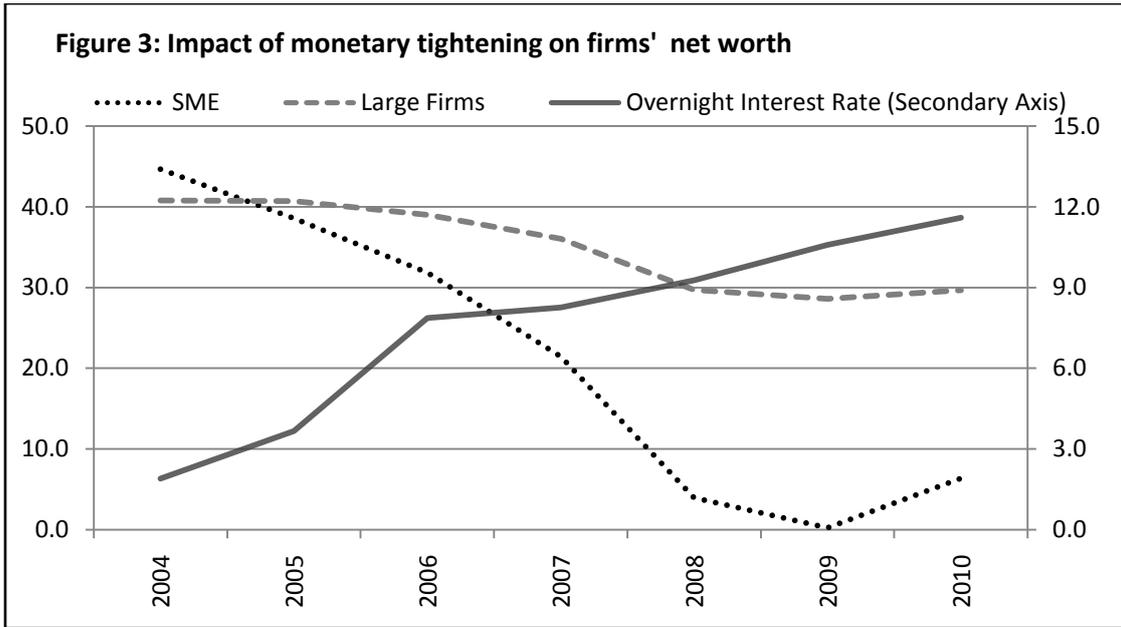
Findings of this paper also compliment Hussein et al (2011) that provided the evidence of the financial accelerator using countercyclical margins in Pakistan's banking sector.

VI. Conclusion

Using the data of 160 non-manufacturing listed companies this paper attempts to quantify the impact of tight monetary policy on SME and the large firms. This study finds a strong evidence for the existence of balance sheet channel in Pakistan.

Results obtained from linear panel model of random effects show that monetary contraction increases the financial expenses of the firms, reduces their profits and squeezes their cash flow. Large firms, somehow maintain to tap resources internally and externally, while SME fails to get access to the credit market, and get more hit. Though SME try to back their net worth with revaluation of surplus, their asset prices still fall quickly and their equity erodes manifold than that of large firms. Additionally, a slowdown in business activity was observed during this phase and almost 7 percent of businesses reduced their output to zero of which 1 percent are large firms while 6 percent belong to SME. This phenomenon is in line with the debate on the effects of monetary policy, however, the impact of fiscal policy in this scenario cannot be over looked, as both the direct and indirect taxes also affect the final demand and the business decisions of the firms. Furthermore, the scope of this paper is limited to find an evidence for the existence of the balance sheet channel, whereas measuring the strength of balance sheet channel require measuring the impact of monetary policy along with interaction of fiscal policy on economic growth that needs to be explored.





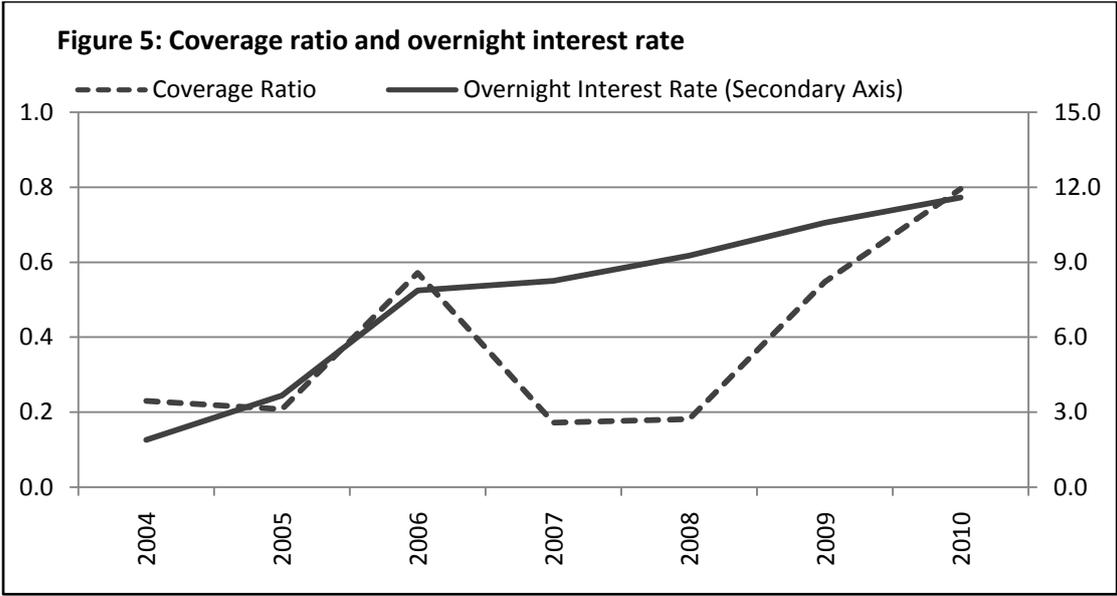


Table 1: Summary Statistics

Variable	Source	No. of Obs.	Percentage Available	Mean	Std. Dev.	Min	Max
Net worth to assets	Annual reports of firms'	1634	85.1	0.3	1.5	-37.7	2.4
Cash flow to assets	Annual reports of firms'	1593	83	0.1	0.2	-2.5	4.6
Financial expenses to assets	Annual reports of firms'	1597	83.2	0.5	10.7	-0.1	302.1
Short term borrowing to sales	Annual reports of firms'	1373	71.5	6.5	198.5	0	99.4
Overnight Interest rate	State Bank of Pakistan	1920	100	7.5	2.9	1.9	11.6
Sales to assets	Annual reports of firms'	1643	85.6	1.1	0.9	0	6.4
Inventories to assets	Annual reports of firms'	1700	88.5	0.2	0.2	0	2.5
Short term borrowing to assets	Annual reports of firms'	1418	73.9	0.2	0.2	0	1.6
Long term borrowing to assets	Annual reports of firms'	1421	74	0.2	1.3	0	34.9
Debt to Equity	Annual reports of firms'	1416	73.8	1.8	15.5	-128.5	314.8

Table 2: Balance sheet channel of monetary policy: Behavior of SME

	Net worth/Asset	Net worth/Asset	Net worth/Asset	Cash flow/Asset	Cash flow/Asset	Cash flow/Asset	Cash flow/Asset
Financial expenses to sales				-0.0843*** (0.0256)	-0.0930*** (0.0277)	-0.0932*** (0.0288)	-0.0889*** (0.0279)
Overnight interest rate	-0.0433*** (0.0049)	-0.0344*** (0.0038)	-0.0436*** (0.0048)				
Inventories to Assets					0.033 (0.0352)	-0.0516 (0.0335)	-0.0000036 (0.0000)
Borrowing to sales							
Short term borrowing to sales		0.0000147 (0.0000)					
Short term borrowing to assets					-0.215*** (0.0380)		-0.200*** (0.0350)
Long term borrowing to assets						-0.0523** (0.0243)	-0.0476** (0.0235)
Sales to assets			0.142*** (0.0265)				
Constant	0.536*** (0.0710)	0.559*** (0.0500)	0.393*** (0.0757)	0.0567*** (0.0080)	0.0971*** (0.0117)	0.0809*** (0.0118)	0.106*** (0.0113)
Observations	604	447	603	544	447	447	447
Number of id	63	60	63	61	60	60	60

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 3: Balance sheet channel of monetary policy: Large firms behavior

	Net worth/Asset	Net worth/Asset	Net worth/Asset	Net worth/Asset	Cash flow/Asset	Cash flow/Asset	Cash flow/Asset
Financial expenses to sales			-0.0997*** (0.0024)			-0.00165*** (0.0006)	-0.00172*** (0.0005)
Overnight interest rate	-0.0382** (0.0153)	-0.0175* (0.0095)		-0.0395** (0.0155)	-0.0103** (0.0045)		
Inventories to Sales							-0.0259* (0.0134)
Borrowing to sales		-0.00464*** (0.0002)					
Short term borrowing to assets							-0.159*** (0.0360)
Debt to equity			-0.000129 (0.0016)				
Sales to assets				0.0252 (0.1100)			
Inventories to Assets						0.00701 (0.0456)	
Long term borrowing to assets						-0.0364*** (0.0069)	-0.0364*** (0.0068)
Constant	0.478** (0.2100)	0.444*** (0.0758)	0.335*** (0.0207)	0.525*** (0.1820)	0.222*** (0.0356)	0.0826*** (0.0120)	0.114*** (0.0106)
Observations	1,020	921	921	1,010	917	908	908
Number of id	96	96	96	96	96	96	96

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

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