

Final Project Report
On
Mechanism of Balance Sheet Channel of Monetary Policy Transmission in India

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Certificate

This is to certify that the project report entitled “Mechanism of Balance Sheet Channel of Monetary Policy Transmission in India” submitted by Mr. Harshavardhan Bapat (ID No 2015B3A30580H) in fulfilment of the requirements of the course ECON F266, Study Oriented Project Course, embodies the work done by him under my supervision and guidance.

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1. INTRODUCTION

The impact of monetary policy changes on the investment decisions, outputs and prices derived by the private market and firms has been theorised by various mechanisms as different channels of transmission of monetary policy. Since its proposal by Bernanke and Gertler (1989), the balance sheet channel as a category of credit channel transmission of monetary policy has received great attention. The argument for the existence of this channel lies in that the presence of asymmetric information leads to the fact that a firm's credit taking capacity, and thereby investment decisions, will be affected by its net worth. The balance sheet channel is proposed to work in two mechanisms, both indirectly affecting the output of the privatized economy by affecting balance sheets of banks and corporate firms. Contractionary monetary policy is expected to deteriorate a firm's net worth, while also making current financial commitments costlier. A drop in access to credit is expected to force at least a portion of corporate firms to cut down on production, thus negatively affecting output.

India, housing a semi strong financial market, is home to a large number of firms considered constricted either in terms of size or in terms of access to credit. As a developing economy, monetary policy is meant to be a useful tool for the government to monitor and control growth and economic output of the country. The objective of this research is to examine the existence of balance sheet channel of monetary policy transmission in India, and if found, the effectiveness and mechanism of the same.

2. LITERATURE REVIEW

Empirical studies on the balance sheet channel of monetary policy have mainly been approached by investigating firm balance sheets and bank balance sheets, either independently or in comparison. Bernanke and Blinder (1992), analysing bank balance sheet channels, Gertler and Gilchrist (1994), analysing firm balance sheets, and Bernanke and Gertler (1995), adopting a macro level approach, all proposed and established the theoretical existence of the balance sheet channel of policy transmission. Numerous empirical studies have been conducted to support the presence of this channel in different countries by analysing the effect of various factors believed to affect the relationship between money and output.

Bernanke and Blinder (1992) used autoregressions to examine the effect bank loans have on output. Bernanke and Gertler (1995), using the federal funds rate as a monetary policy indicator, analysed the effect of monetary shocks on the output of the US economy and resulting prices using vector autoregressions. The paper first analyses 4 facts of monetary policy theory, to describe the details of what takes place after an unanticipated monetary policy change. These facts are verified by performing a VAR including various macroeconomic variables and the federal funds interest rate. The results of the VAR indicate the behaviour of the economy is consistent with the conventional analysis of monetary transmission to some extent. On emphasising the impact of the credit channel, the paper goes on to present grounds for the establishment of the balance sheet channel. The balance sheet channel predicts that the external finance premium faced by a borrower should depend on the borrower's financial position, therefore, fluctuations in the quality of the borrowers' balance sheets should affect their

investment and spending decisions, as it affects their borrowing capabilities. The coverage ratio is taken as a measure of the firm's financial position, and a close graphical relation is observed between the coverage ratio of firms and the federal funds rate. The impact of monetary policy on the components of corporate cash flows is analysed, using the VAR technique as before. The results illustrate that corporate cash flows and profits decline following a monetary tightening. The paper provides two reasons for the same and goes on to establish that larger firms are better able to smooth the drop in cashflows by borrowing than smaller firms, or firms with poor access to credit markets, which must resort to cutting production and employment to deal with the cash crunch.

Following this theoretical set up by Bernanke and Gertler (1995), Shabbir (2012) analysed micro data on non-financial listed companies in Pakistan, over 1999-2010, to emphasize the effectiveness of balance sheet channel of monetary transmission mechanism in Pakistan. The paper suggests empirically that a period of monetary tightening deteriorates firm net worth and leads to a cash flow squeeze. The first part of the paper computes the impact of monetary tightening on corporate balance sheets through two sub channels, the net worth channel and cash flow channel. Shabbir classified firms into SMEs and large firms and observed that while both categories are negatively affected by a monetary tightening, SMEs are worse affected. Further, the study sheds light on how value erosion and a squeeze in cashflow hampers economic growth and how long these effect corporate balance sheets. The sample used consists of 213 companies covering almost 76 percent of industrial GDP. Empirical findings show that the impact of ONIR rise on the net worth of the firm is around 1-9 percent, affecting the short-term borrowing pattern of the firms and translates into increased

financial expenses of the firm. Also, contrary to balance sheet literature, the findings show no evidence of inventory accumulation by firms during the first year after monetary tightening. Coming to the cash flow channel, it is seen that SDA affects cash flow by 22 percent as compared to only 3 percent impact of LDA. The second part of the paper empirically analyses the impact of a period of monetary tightening over economic growth. The third part of the paper attempts to link the balance sheet channel with corporate profitability and establishes patterns which relate the balance sheet transmission to business cycle fluctuations.

A study conducted by Angelopoulou and Gibson (2007) examined the sensitivity of investment to cash flow, attempting to highlight the existence of the balance sheet channel and of the financial accelerator in the UK by analysing a panel of over 700 UK firms in manufacturing. The results reveal the extent to which investment in these firms was sensitive to cashflows, and the increase in the same during periods of monetary tightening. The authors have explained how cash flows are a better alternative to the shadow value of the firm as a measure to examine the investment behaviour of a company, as used in previous models such as Hayashi (1982). The significance of cashflow terms in investment regression reflects market imperfections, where under asymmetric information, the perfect substitutability of internal and external funds collapses. The firms in the sample space are classified as constrained and unconstrained based on the following characteristics, similar to previous studies: size, dividend policy, closeness with financial intermediaries, issuance of public debt and coverage ratios. The firms are divided into 4 quartiles, where the average size of a firm in the first quartile is about 100 times less than the average size of the firm in the fourth quartile. Variables analysed are gross investment, capital stock at replacement cost,

average Q and cash flow. Average Q is taken as a measure of investment of the company. Strong evidence is found that investment is more dependent on cashflow in terms of monetary tightening. When size is used to identify constrained firms, it is noticed that small firm investment is more sensitive to cash flow than in large firms, nearly three times as much. This indicated the potential existence of a balance sheet transmission mechanism of monetary policy. A similar result is obtained when dividend pay-outs and financial leverage are used to identify constrained firms.

Olowofeso et al (2014) assessed the existence of a balance sheet transmission mechanism of monetary policy in Nigeria. The official interest rate was taken as an indicator of monetary policy and it was examined whether the variation of the same eventually transmitted through to the deposit money banks' balance sheets and reflected in the prices and output. Credit to private sector and capital reserves from the banks' balance sheets was examined to establish the existence of a balance sheet channel in Nigeria, along with the effect of the 2008 crisis on prices and output. The impact of the crisis on segments of bank activities which were more exposed to counter party risk were first analysed. A VAR system analysis was conducted to evaluate the influence of monetary policy shocks on output and prices for the period under consideration. A non-significant impact of the global crisis was observed on the output and prices. However, the results pointed towards the existence of the balance sheet channel mechanism in Nigeria was established. A series of impulse response tests were conducted to verify the theoretical hypothesis that a shock to the monetary policy rate would lead to a rise in output and prices via the balance sheet channel. While there are notable effects of positive and negative shocks on the output and prices, it is observed

that the impact of rate changes is higher on prices than on output, and a positive shock to monetary rate gives a positive response on bank capital, but a negative response on the volume of loan to private sectors, demonstrating a shortage of credit as predicted in periods of monetary tightening. The results implied that monetary policy indirectly influences output and prices by affecting balance sheets of banks, which are the primary source of loanable funds to most firms. This means that a monetary tightening leading to reduction of loans will ultimately intensify investment decisions.

3. Data Description

3.1 Construction of panel data

Panel data was constructed from CMIE's Prowess Database for Indian Companies. The period ranges from 2005 to 2018, where estimation periods begin from 2006 due to the existence of lagged values. The sample consists of over 7500 Indian firms listed on the BSE and NSE. The dataset is unbalanced due to the delisting and merging of companies, as well as the gaps in timeseries data for a fraction of the sample. The first run of the study involves only contractionary monetary policy periods.

3.2 Size of firm

In accordance to Bernanke and Gertler (1995), firms with less net worth are expected to face more severe liquidity constraints. Large firms with a stronger financial position gain an advantage over small firms when it comes to raising external funds. This is explained due to several reasons. Firstly, from a creditor perspective, larger firms have better reputations in terms of creditworthiness. Secondly, smaller firms require to pay a higher external finance premium when raising funds from lenders or investors. Lower net worth means they lack collateralizable assets. This implies that firms' net worth not only affects the magnitude of external finance, but indirectly affects the investment decision

itself. The response of monetary policy shocks on firms based on net worth is analysed by using time lagged value of net worth as an independent variable.

3.3 Construction of dummy variables for monetary policy shocks

For the initial test, we focus merely on shocks in monetary policy, identifying episodes of monetary policy tightening and easing in the observed time frame. We employ a monetary policy dummy that captures such periods of policy tightness and easing during which we expect financial constraints to be more binding. Romer and Romer (1989) identifies policy episodes based on four basic characteristics:

- a) there is a large increase in central bank rates;
- b) the adjustment to a higher level of interest rates is gradual and long-lasting;
- c) additional restrictive policy measures are taken;
- d) there are statements by bank officials that the aim of the policy shift is to reduce inflationary pressures resulting from the domestic monetary situation or from exchange rate instability.

The same characteristics were used to identify monetary policy episodes in Angelopoulou and Gibson (2007) and Masuda (2015), and we shall follow the same methodology. We identify four episodes of monetary tightening in the observed timeframe: June 2006 – April 2007, June 2008 – August 2008, March 2010 – November 2011, and September 2013 – February 2014. We also identify

three episodes of monetary easing: July 2008 – May 2009, January 2013 – March 2013, and January 2015 – August 2017.

Our methodology for contractionary and expansionary monetary periods. We construct monthly dummies that take the value 1 in each month of the periods of contractionary monetary policy and value 0 otherwise as follows.

$$\text{MPtight} = \begin{cases} 1 & \text{contractionary monetary policy periods} \\ 0 & \text{otherwise} \end{cases}$$

Similarity for expansionary policy:

$$\text{MPexp} = \begin{cases} 1 & \text{expansionary monetary policy periods} \\ 0 & \text{otherwise} \end{cases}$$

To match annual firm level data to monthly dummies, we take the average of monthly dummies in each financial year to match annual data taken for firms at the end of the fourth quarter of each financial year.

Average.DCTight(it) and Average.DCExp(it) represent averages of monthly dummies of contractionary and expansionary monetary policy periods for firm 'i' in year 't'. These averages, obviously, take values between 0 and 1, depending on the number of contractionary monetary policy months in the financial year.

4. Test for Balance Sheet Channel

4.1 Regression Model

The first attempt at obtaining evidence of the balance sheet channel in Indian markets is performed by replicating the research and regression function performed by Masuda (2015) in the attempt to determine evidence of the balance sheet channel in Japanese markets. Here we use one year lagged values of net worth of company. The dependent variable chosen is Investment(i,t) / Total Capital ($i, t-1$).

Cash outflow from investment activities is taken as the proxy for investment. The independent variables include one year lagged values of net worth, current ratio and an interaction variable between current ratio and monetary policy dummy variable. Current ratio is taken here as a proxy for liquidity constraints, as it is expected that companies facing liquidity constraints should be more affected by a monetary policy squeeze than companies which are relatively liquid.

Based on the Hausman specification test results, we adopt the fixed effects model.

5. Results

Contractionary Monetary Policy:

Pooled OLS:

Coefficients				
Variable	Estimate	Std Error	t-value	Pr(> t)
Intercept	2.0679e+01	8.6642e+00	2.3868	0.01700*
n_w (i, t-1)	3.5961e-04	1.6513e-04	2.1778	0.02943*
c_r (i, t-1)	2.5450e-02	9.0180e-02	0.2822	0.77778
c_r(i, t-1) * AvgTight(i,t)	4.6999e-01	2.8943e-01	1.6238	0.10442

n_w = Net Worth of firm i for year t

c_r = Current ratio of firm i for year t

AvgTight = Average annual monetary tightening dummy variable

The net worth variable has a coefficient significant at 0.01 level.

Fixed effects:

Coefficients				
Variable	Estimate	Std Error	t-value	Pr(> t)
n_w (i, t-1)	0.00036963	0.00016542	2.2345	0.02546 *
c_r (i, t-1)	0.02675463	0.09017013	0.2967	0.76669
c_r(i, t-1) * AvgTight(i,t)	0.45440859	0.28938726	1.5702	0.11637

n_w = Net Worth of firm i for year t

c_r = Current ratio of firm i for year t

AvgTight = Average annual monetary tightening dummy variable

The net worth variable has a coefficient significant at 0.01 level.

Expansionary Monetary Policy:

Pooled OLS:

Coefficients				
Variable	Estimate	Std Error	t-value	Pr(> t)
Intercept	20.48790672	8.67197091	2.3625	0.01815*
n_w (i, t-1)	0.00036012	0.00016513	2.1808	0.02920*
c_r (i, t-1)	0.27019943	0.14557898	1.8560	0.06346.
c_r(i, t-1) * AvgExp(i,t)	-0.26457018	0.18585416	-1.4235	0.15459

n_w = Net Worth of firm i for year t

c_r = Current ratio of firm i for year t

AvgExp = Average annual monetary expansionary dummy variable

The net worth variable has a coefficient significant at 0.01 level.

The current ratio variable has a coefficient significant at 0.05 level.

Fixed effects:

Coefficients				
Variable	Estimate	Std Error	t-value	Pr(> t)
n_w (i, t-1)	0.00037009	0.00016542	2.2372	0.02528*
c_r (i, t-1)	0.26598793	0.14556515	1.8273	0.06767.
c_r(i, t-1) * AvgExp(i,t)	-0.25974781	0.18583566	-1.3977	0.16220

n_w = Net Worth of firm i for year t

c_r = Current ratio of firm i for year t

AvgExp = Average annual monetary expansionary dummy variable

The net worth variable has a coefficient significant at 0.01 level.

The current ratio variable has a coefficient significant at 0.05 level.

6. Observations and Conclusions

We observe that the coefficients of independent variables are not strongly significant in both regressions, for contractionary as well as expansionary monetary policy periods of observation. We may need to include firm effects and year effects, as well as control for other aggregate shocks such as changes in GDP growth, inflation, exchange rate etc.

It is necessary to prune this model further to get accurate results, hopefully providing evidence of existence of balance sheet channel in Indian markets.

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