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Monetary Policy and the Credit Channel: Evidence from India

Sukanya Bose

I. Introduction

During the later half of the nineties beginning 1996-7, bank credit growth declined dramatically in the Indian economy. In the official circle, the credit crunch was attributed to weak *loan demand* typical of recessionary conditions. There were some voices that pinned the *supply rationing* by banks as having caused or at least aggravated the slump in bank credit. The arguments centred around regulations relating to capital adequacy and provisioning norms, which caused banks to shy away from credit in favour of risk-free assets. In neither case, was tight money policy held very much responsible for the credit crunch, which is surprising since the credit crunch had clearly followed an adverse monetary shock. There are four reasons for the neglect/ oversight. The first concerns the supposed weakening of quantity channels of monetary transmission mechanism and its replacement by rate variables. In recent years we see the Reserve Bank repeatedly emphasizing the exchange rate, interest rate and asset price channel as having substituted the traditional channels of monetary transmission. Thus credit aggregates, which in any case had never been explicitly targeted by the monetary authorities in India, were more conspicuously ignored. Secondly, the empirical studies on interest sensitive component of aggregate spending the world over have had a great difficulty identifying quantitatively significant effects of cost of capital (Blinder and Maccini, 1991; Chirinko, 1993; Boldin, 1994). Yet the money view, to which the mainstream economists subscribe, recognises only the cost of capital channel. It doesn't pay attention to the credit market and holds it secondary to the money market. Thirdly, the slump in the credit market occurred with a lag as did the slump in the real sector by which time the monetary tightening per se had begun to be reversed. Therefore, there was no apparent reason to relate the credit crunch to monetary shock. Fourthly, there were forces in the real sector and impulses other than monetary, which were acting simultaneously. An adverse monetary shock was perhaps only one of the forces that contributed to the credit crunch. Macroeconomic data, in this respect, is notorious for its fungibility.

The credit channel of monetary transmission mechanism (also known as the credit view) brings the credit market to the centre stage of monetary policy – by arguing that bank credit is a more relevant variable in relation to real output and real economic growth than money per se. As per Mazzoli (1998), the credit channel based on much solid micro-foundation of market imperfections provides a richer and more plausible account of the inextricable link between the real and financial sectors than the traditional cost of capital channel. This chapter examines the evidence of credit channel in the Indian economy in the context of an adverse monetary shock. Our focus would be the mid-nineties episode of monetary tightening mentioned above and the eventual credit slump witnessed in the Indian economy. The two specific questions that we will try to address are:

- Do banks constrain credit supply in a situation of monetary tightening?
- Is the impact of monetary tightening and banks reaction to it uniform across all variety of borrowers?

Section II reviews the principal arguments of the credit view and the empirical studies that have put to test the arguments. The next section (III) briefly notes the trends in bank credit

growth in the last few decades for the Indian economy. This serves to situate a short term movement like a monetary shock within the broader economy context. To test the transmission of monetary policy disturbance, innovations in monetary policy should be identifiable as independent monetary shocks. Section IV traces the trends in monetary policy instruments during the mid-1990s episode of monetary shock. The empirical analysis is carried out in two parts. Section V interprets various *aggregate* trends for evidence of credit channel. The more direct evidence on credit channel comes from *firm studies*. The pattern of external finance composition of firms provides important leads, which can be useful in identifying the credit channel. Section VI and VII analyses the behaviour of a sample of textile firms with reference to the bank credit market. Section VIII presents the conclusions.

II. Credit view: Review of the Theory and Empirical Evidence

In the money view, emphasis is put on the role played by the liabilities of the banking system, directly affected by monetary policy shocks and as a *consequence* affecting bank assets. For instance, a rise in interest rate following an adverse monetary shock reduces the demand for money, which implies that deposits with banks constituting the liability of the banking sector declines. The liquidity effect originating from the market for deposits causes the aggregate demand in the goods market to shrink as the interest rate rises. The dynamics thus originates on the liability side with automatic accommodation of asset side of bank balancesheet. The critical assumption behind de-emphasizing asset side is the perfect substitutability of all non-monetary assets; money view works with two classes of assets – money & all other assets and implicitly assumes all non-money financial assets to be perfect substitutes. Thus it becomes unnecessary to explicitly model the asset side of the banking system.

The credit view proposes that independent effects come from the asset side of the bank balancesheet especially from bank loans. According to this view, there are some borrowers for whom non-bank sources of credit do not represent a perfect substitute for bank loans. Bank lending is regarded as a special asset that might incorporate monitoring costs and long run contractual relationship between lenders and borrowers. Therefore when tight monetary policy shrinks the size of the banking sector, it reduces the overall supply of loans to these bank-dependent borrowers, who are not able to substitute bank finance with non-bank sources of finance. In other words, when the monetary authorities raise reserve requirements, loans would fall, spending by customers who depend on bank credit would fall and so would aggregate demand. This provides an additional channel of transmission for monetary policy to the real economy, over and above the usual liquidity effects emanating from the market for deposits.

An alternate way of looking at the credit channel is in terms of the concept of external finance premium. External finance premium is the difference in cost between funds raised externally (by issuing equity or debt) and funds generated internally (by retained earnings).¹ According to the credit channel theory, the direct effects of monetary policy on interest rates are amplified by endogenous changes in the external finance premium (Bernanke and Gertler, 1995). A change in monetary policy that raises or lowers interest rates tends to change the external finance premium in the same direction. Because of this extra effect, the impact of monetary policy on real spending and real activity is magnified.²

¹ Again it must be noted that the assumption of imperfect substitution between assets underlies the notion of external finance premium.

² The idea that there may be an important credit channel was first voiced, in its present form, by Bernanke and Blinder (1988) though two papers published earlier had strongly hinted at the importance of credit

Within the credit channel of monetary transmission, two alternate mechanisms – lending channel and balance sheet channel - can be distinguished. Both operate through their impact on bank credit. The transmission according to the lending channel originates from adjustment in monetary policy → banks' ability to create loans → actual lending by banks → aggregate demand. According to Bernanke and Blinder (1992; pg 901) "when the Federal Reserve reduces the volume of reserves, and therefore of loans, spending by customers who depend on bank credit must fall and therefore so must aggregate demand." The two necessary conditions that must be satisfied for a lending channel to operate are: (a) banks cannot shield their portfolios from changes in monetary policy; and (b) borrowers cannot fully insulate their real spending from changes in the availability of bank credit. The lending channel focuses more narrowly on the possible effect of monetary policy actions on the supply of loans by depository institutions. Tight monetary policy may create broader credit effects as *balancesheets* deteriorate in the aftermath of a tightening. By raising market rates, tight policy reduces cash flows for borrowers with short-term or variable rate debt. Reduced cash flow leads to increased borrowing, which aggravates agency problem and raises the premium on external funds. The increase in premium on external funds amplifies the effect on spending of a rise in interest rate (Gertler and Gilchrist, 1994).³

It is for the most part small and medium sized firms having relatively lower collateralizable networth and therefore lower creditworthiness that are likely to face a disproportionately larger premium for external finance. As the access to credit market worsens for the small firms due to monetary tightening, the small firms respond to deteriorated balancesheet positions principally by drawing down inventories and by cutting investment more than large firms. This shrinkage in investment provides an additional decline in investment than that would be predicted if the interest rate channel is operative subsequent to tight monetary policy.

The broader balancesheet mechanisms also operate on banks with different structure of portfolio. A positive interest rate shock, for instance, will lower the networth for banks with longer-term liabilities than assets. Lower networth tempts banks to take greater risks, since they have less at stake if they fail. This moral hazard leads outside investors with uninsured claims on banks (certificate of deposits) to charge a higher premium to compensate, and the higher external finance premium leads banks to reduce their lending

Empirical studies have kept pace with the theoretical developments on credit view. One can broadly identify two kinds of methodology used for testing credit channel.

- a) Vector autoregression methods have been employed to test the predictability of output in terms of loan versus money; and
- b) Panel studies using sample splitting methods have sought to exploit the differences in *relative* supply of bank credit across credit market.

market for monetary transmission. In an exploration of the possible causes of the Great Depression, Bernanke (1983) explained that the length of Great Depression can be thought of as a downward shock to credit supply stemming from the increased riskiness of loans and banks concern for liquidity in the face of possible runs. Blinder and Stiglitz (1983) had shown how an assumption of imperfect substitutability of loans for securities in bank portfolios could ensure that a decline in reserves leads to a decline in loans. Bernanke and Blinder's paper developed these ideas in deceptively simple models to illustrate powerfully the difference between credit view and the traditional money view.

³ The balancesheet channel has essentially emerged from financial theories of the business cycle that have emphasized the relationship between borrowers' balancesheets and the terms of credit - financial accelerator arguments (Gertler and Hubbard, 1988; Fazzari, Hubbard and Peterson, 1988).

- a) One of the first papers to address the importance of credit channel was by Stephen King (1986). Compared to both commercial and industrial loans and other bank loans, King found that monetary aggregates were superior in both statistical significance tests and variance decompositions in a standard VAR for GNP. Using a different VAR methodology Bernanke (1986) found that aggregate demand innovations depended significantly on shocks to total loans. Romer and Romer (1990) used dummy variables as indicators of monetary policy disturbances to ask which of the two polar views, only money or only credit is the best approximation of the data. In general they found money leads output during a monetary tightening, but that bank loans move contemporaneously with output. They concluded that the evidence is more consistent with the traditional money view of the monetary transmission mechanism. Bernanke and Blinder (1992) and Gertler and Gilchrist (1992) compared the trends in monetary aggregates with bank credit and found that money declines immediately while bank loans are slower to fall moving contemporaneously with output, a result similar to the one obtained by Romer and Romer (1990)⁴. Sluggish response of aggregate loans to tight policy, they explained, may partly reflect that many bank loans, business loans at any rate, are contractual commitments. It would be hazardous to infer a higher output predictability of broad money compared to bank credit based on these results.
- b) The main problem with discriminating between the money and credit channels from a reading of the aggregate data is that the two theories are observationally equivalent. In either theory, loans contract after a monetary tightening rendering it difficult to distinguish between supply versus demand-induced movements in credit. While the Bernanke and Blinder (1992) findings are consistent with the lending view, they also admit other interpretations. For example, one way to read their results is that tight monetary policy operates solely through the standard money channel to depress economic output and to reduce the demand for credit. Thus there can be induced correlations between monetary policy, bank lending and overall activity even if there is no lending channel.

To better identify changes in the supply of credit, other researchers have compared the impact of monetary policy shocks across credit markets and across firms. These tests exploit predictions of the credit view about changes in the *relative* supply of credit after tight money policy. While not free of identification problems, these at least limit the set of alternative interpretations.

Kashyap, Stein and Wilcox (1993) considered the relative fluctuations in bank loans and a leading substitute for bank loans, commercial paper. Their insight was, if a monetary contraction leads to a decline in the ratio of bank loans to the sum of commercial paper and bank loans, the supply of bank credit must be shrinking, since presumably the demand for both types of finance would roughly fall in the same proportion. They found that a monetary contraction was associated with a decline in this ratio and concluded that tight money leads to a reduction in the supply of business loans from banks, consistent with predictions of the lending view. The differential of a cash squeeze on different types of firms have been studied by Gertler and Gilchrist (1993,1994) who considered how a tightening of monetary policy affected the inventories and short-term debt of large and small manufacturing firms. They found striking difference in behaviour between large and small firms. Large firms who are more likely to have recourse to commercial paper and other sources of short-term

⁴ All these papers applied credit channel test to the US economy.

credit, typically respond to an unanticipated decline in cash flows by increasing their short-term borrowing. The inventories of large firms grow following a tightening of monetary policy. In contrast, small firms, respond to the cash flow squeeze principally by de-accumulating inventories. Apparently small firms are not able to increase short-term borrowing. Oliner & Rudebusch (1994) showed that analogous differences occur between size classes in the response of fixed investment to a monetary policy shock.

In the recent years, credit channel mechanism has been tested for several developing economies where imperfections in the credit market are much larger. Kim (1999) finds compelling evidence of credit supply shortage in the aftermath of the recent financial crisis in Korea caused essentially by a capital induced bank credit crunch rather than by a weak demand for loans. Kohli (1997) has studied the influence of size, age and availability of collateral on borrowers' access to bank credit for India. Her analysis confirms that these variables have a significant influence in determining the probability of a firm gaining access to bank finance in the Indian commercial bank market.

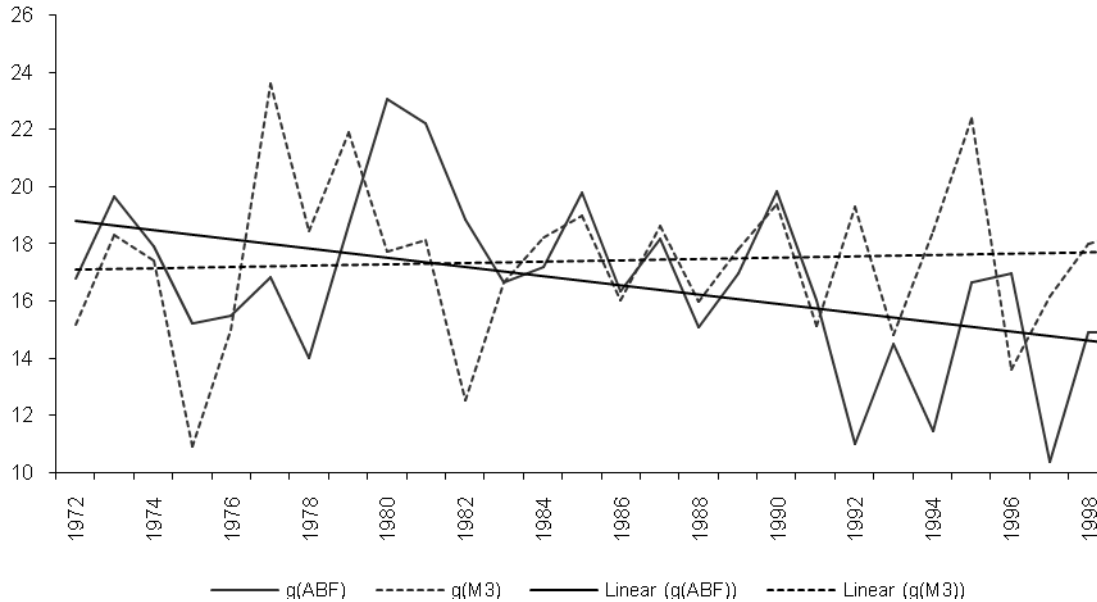
III Bank Credit in India

The emphasis on bank credit till the mid-eighties for its closer link with overall economic activity the same time that it served the distributional objectives has been widely acknowledged in the literature. Bank credit to the government, for the most part elicited in terms of statutory requirements, was to finance cheaply the state's development plans. We also noted how in the subsequent years the slant was reversed. Graph 1 plots the growth of aggregate bank finance for the three decades from 1970-1 to 1999-2000. Aggregate bank finance (ABF), is the composite of total finance available to the government and the commercial sector from the commercial banks and the Reserve Bank - it measures the total bank credit allocated to the domestic economy (Rakshit, 1997a). This series is plotted on the same axis as the growth of broad money. Growth of broad money has been maintained at an average level of 17% as shown by the trend curve. In contrast, growth in ABF has witnessed a sharp decline in the nineties compared to the eighties decade. ABF growth had risen to very high levels in the eighties; in the nineties the growth rate fell below the pre-eighties level. Observe the three troughs in growth in ABF during the nineties: never had ABF growth in all the three decades touched such low levels. Only in two years, 1994-5 and 1995-6, did ABF growth attain the eighties average.

Thus we see the change in the proximate target variable of monetary policy from bank credit to monetary targeting concurring with the decline in growth of aggregate bank finance. One might question the use of aggregate bank finance instead of more conventional measure of bank credit growth defined in terms of total commercial bank lending on non-food credit to the commercial sector. It could be argued that the decline in the public sector component of bank lending both from the central bank and commercial banks as a conscious decision of the liberalisers was responsible for the decline in the growth of ABF. In reality, the opposite is true. Financial liberalization supposed to rescue the financial system from the pre-emption by the government, actually raised the share of government sector in the ABF. The average share of government in aggregate bank finance during the nineties increased to 44.2 percent from 41.6 percent in the eighties. Table 1 shows the average annual growth of scheduled commercial banks credit for the three decades; both bank credit and non-food credit growth declined in the nineties compared to the previous two decades.

GRAPH 1

COMPARISON OF TRENDS IN GROWTH OF M₃ AND AGGREGATE BANK FINANCE (%)



Data Source: RBI, Handbook of Statistics, 2000.

Test of credit channel theory of monetary transmission mechanism for India is relevant in this context not just to prove or disprove an elegant theory. In view of the declining importance of bank credit in matters of monetary policy and its reflection on the trends, an assessment of the effects of monetary policy on bank credit and thereby on output is extremely important. One needs to ask whether credit planning can be subsumed within a monetary targeting/ interest rate targeting framework. Evidence suggesting the presence of credit channel would emphasize the need for serious rethinking on the growing neglect of bank credit in monetary policy formulation in India.

Table 1

ANNUAL GROWTH OF CREDIT OF SCHEDULED COMMERCIAL BANKS (AVERAGED)

	Bank Credit	Non-food Credit
1971-80	18.47	17.45
1981-90	16.79	17.75
1991-2000	15.86	15.43

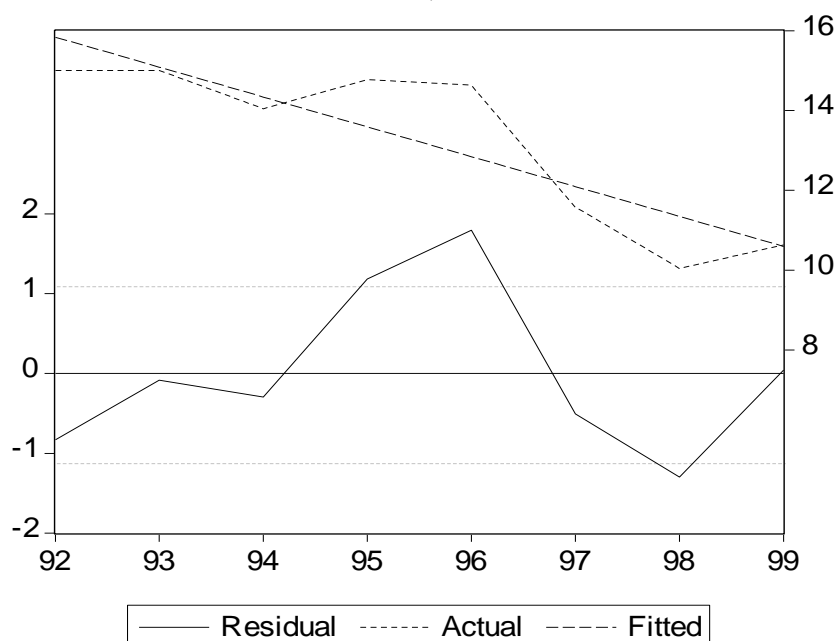
Source: RBI, Handbook of Statistics, 2000.

IV Monetary Tightening in the Mid-nineties

In 1994-5 the Reserve Bank of India gradually began to tighten monetary policy. Though many of the effects of monetary tightening were not manifest until much later, it was during 1994-5 that the monetary policy began to be tightened. This was done 'by raising the cash reserve ratio in three stages in 1994-5 and combining it with a large order of open market sale of government securities.'⁵ The tightening was further accelerated in 1995-6. The immediate need for monetary tightening as per the monetary authority was to prevent excess money supply from spilling over to inflation, and also to pre-empt a situation of excess credit supply. CRR was hiked from 14% in three steps between June-Aug 1994 and remained at 15 percent till Nov'1995 (see Graph 2). This should be seen against the proposed reduction in CRR levels in the economy recommended by the Narasimham Committee Report (1991).⁶ Short-term rates shot up during the second half of 1994-5 and liquidity was at a premium throughout 1995-6 indicated by the average call money rate. Repo rate rose to 7 percent in Oct 1994 from an average of 6 percent for the previous six months. More significant is the decline in repos volume. Number of bids received and total face value of bids received dwindled such that for several fortnights during Sep'94 to Jan'95, no bids were accepted and no price emerged. Broad money growth declined during the first half of 1995-6. Year on year M3 growth rate at 13.57 percent in 1995-6 was much below the trend growth rate of 17 percent. The deposit and lending rates of banks and term lending institutions increased progressively from 1993-4 to 1994-5 and then further in 1995-6.

GRAPH 2

CASH RESERVE RATIO: ACTUAL, FITTED AND RESIDUAL SERIES



Was the monetary tightening an independent monetary shock? Romer and Romer (1990) in listing the episodes of monetary shock in the financial history of the US have suggested certain guidelines useful in identifying monetary shocks. Through a study of Federal Reserve

⁵ RBI, Report on Currency and Finance, 1998-8, pp. VI-16

⁶ Graph 2 also plots the residual CRR series after eliminating the trend, which gives a clearer picture of the monetary shock during 1994-5 and 1995-6.

records, they identify six such episodes since World War II when the Federal Reserve appears to have in effect decided to create a recession in order to reduce the rate of inflation. They write, 'because the decisions were motivated mainly by concern about inflation, they were relatively independent of contemporaneous real development. By considering only episodes in which the Fed Reserve sought to lower inflation rather than times when it acted to prevent increases in inflation that it believed would have otherwise occurred, or times when it responded to other economic developments, we hope to ensure that there is no systematic factor at work other than monetary policy that might be affecting the behaviour of financial variables and real output.' (pp.160-1) The stress is on eliminating *any other* systematic factor. Episodes representing independent shifts in monetary policy can then serve as experiments for isolating the channels through which monetary shock affect the real economy.

The monetary shock of the mid nineties in the Indian economy was a typical Romer type shock in that the monetary policy was wielded to cool what was perceived as an overheated economy, an economy with high inflation rate. RBI Annual Report 1994-5 notes in concern,

'One of the disturbing aspects of the economic development during 1994-5 was the persistence of strong inflationary pressure almost throughout the year...*The resurgence of inflationary pressure since middle of November emanated essentially from monetary expansion during the first half of 1994-5 which in fact pushed the inflation rate to a peak of 12.2% by the middle of Jan'1995.* The annual average rate of inflation during the first five years of the nineties works out to 10.6%, which was well above the annual average inflation rate ...in the eighties. *This phenomenon should be seen in the context of sharp increases in money supply expansion in (18.1%) in the nineties against a 4% growth in GDP.*'⁷ pp.66-67.

The declared objective of controlling inflation was achieved by raising the cash reserve ratio of banks, by increasing the yields on government securities to unprecedented levels and thereby exerting an upward pressure on the interest rate structure and by successfully engineering a reduction in the growth of broad money (M3) in 1995-6.

What was the exact timing of the monetary shock? This issue is extremely crucial for, as we have seen in Section II, much of the quarrel between money view and credit view is fought on the basis of leads and lags. The cash reserve ratio was raised to 15% in Aug'1994 and was maintained at that level till Nov' 1995. For all purposes, *end of the 2nd quarter of 1994-5* can be considered as the benchmark for dating the monetary shock. It is to be emphasized here that other variables reacting to the monetary shock adjusted gradually – so that contemporaneous changes in these variables are mostly not visible. For instance, though monetary stance signalled tightening in 1994-5, growth of broad money was very high in 1994-5. The acceleration in the rate of growth of broad money had militated against all attempts by the authorities to keep it in control during 1994-5. Failure to control broad money growth was due to: (a) the external capital inflows adding to the rise in high-powered money; and, (b) the inability to sterilize the growth in base money on the part of the authorities due to low demand for government bonds in the face of a rising demand for credit from the private sector. Also the bank credit growth or the slump in real activity was seen only in 1996-7. We will discuss this further in the next section.

V. Preliminary Evidence on Credit Channel: Interpreting the Trends

V.1 MONEY VERSUS CREDIT VIEW

The underlying strategy for identifying credit channel as distinct from the money channel involves tests of *whether bank loans help forecast spending, given some measure of money.*

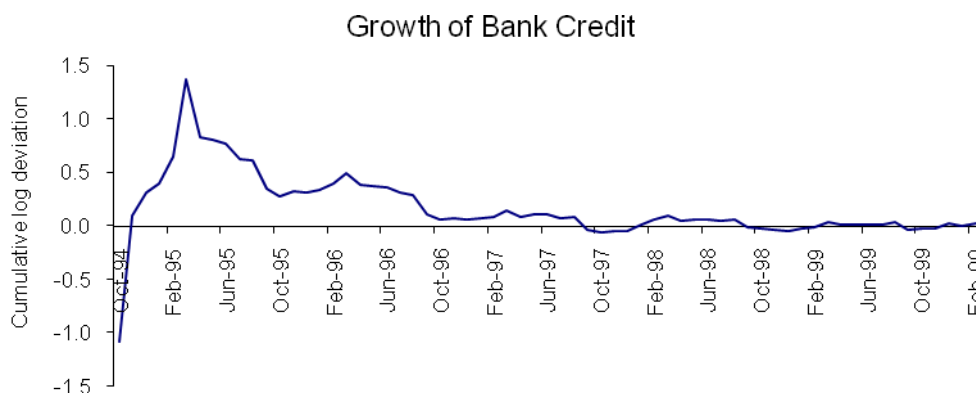
⁷ The claim that the inflation in the nineties, in general, and during 1994-5, in particular, was the outcome of monetary expansion can be contested.

Alternately one may simply compare the relationship between money and output vis-à-vis credit and output.

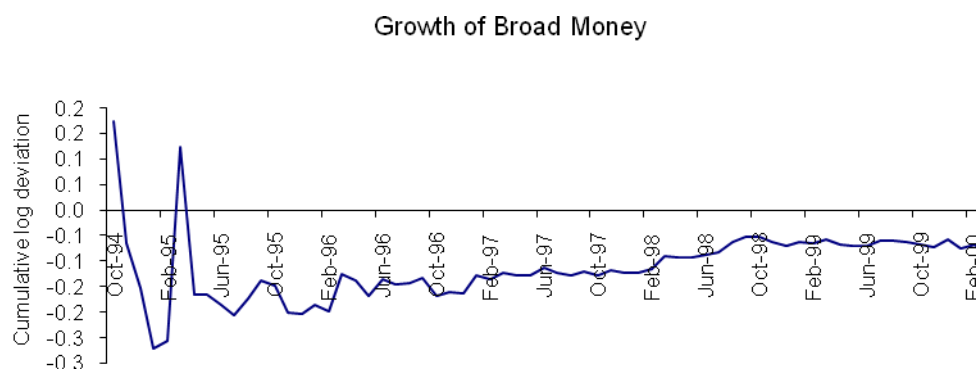
From the monthly series of growth rates for broad money, bank credit and industrial production, we construct the cumulative deseasonalized series which is in turn used to plot log deviations of the variable from their respective value at the time of monetary shock, relative to trend. Graph 3(a) - (c) presents the plots. We have used Oct'1993 to Sep'1994, the full year preceding monetary shock, as the reference year with respect to which the deviations are calculated. For the broad money growth, a constant growth rate equivalent to 17 % annual growth is used as the reference series.⁸

GRAPH 3 (a)-(c)

GROWTH OF BANK CREDIT, BROAD MONEY AND INDUSTRIAL PRODUCTION

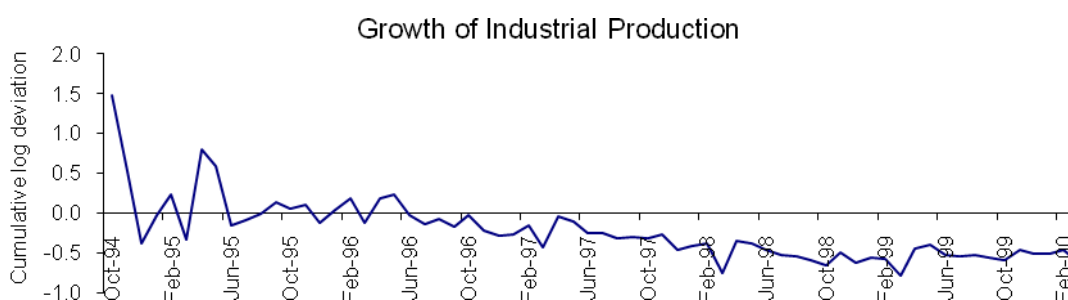


(a)



(b)

⁸ . The steps involved in calculating cumulative log deviations for a variable, X, are the following:
 Step 1: Calculate the growth rate of X, $g(X)$.
 Step 2: Seasonally adjust $g(X)$.
 Step 3: Obtain the cumulative value of the seasonally adjusted $g(X)$.
 Step 4: Find the log of cumulative seasonally adjusted $g(X)$, which becomes series A.
 Repeat step (1) – (4) for the reference series, which is the value that X takes between Oct 1993 and Sep 1994.
 Let this series be called series B.
 Step 5: Subtract series B from series A.



(c)

Source: RBI, Handbook of Statistics, 2000.

Bank credit rises markedly following the monetary shock. The increase is sharp relative to the pre-Oct'1994 levels. However the spurt in credit growth is short-lived, which is typical of countercyclical credit behaviour. After the trend is reversed, we see a steady decline in growth rate especially evident beginning the second quarter of 1996-7. Till the end of the period, Mar'2000, credit growth does not witness a turn around.

Money growth almost immediately plummets after the monetary shock. In the latter half of 1994-5 and 1995-6 we see M3 growth bottoming out. Since then the broad money growth has been increasing at a steady rate.

During the later half of 1993-4 till Sep 1994, which coincides with our reference year, industrial growth had seen a turnaround from the low rate of growth in the early nineties. The acceleration continued for several periods after the monetary shock (indicated by the initial hump). Beyond Jun'1996, the cumulative log deviation in the growth of industrial production has been less than zero; even by Mar'2000 we don't see any definite sign of a turnaround.

A comparison of the money growth and bank credit growth indicates that the negative disturbance in money growth precedes the slump in bank credit growth by several periods. There is a high degree of similarity in the pattern of growth of bank credit and industrial production – both rise for several months following the monetary shock before declining. Both these observations are in conformity with what has been obtained extensively in the empirical literature. Due to the contractual nature of bank loans, bank credit is observed to decline with a lag compared to money growth. Bank loans are quasi-contractual arrangements, which take time to adjust; in the interim banks sell off securities. Eventually banks decrease loans and this has an immediate and dramatic effect on real activity.

Time series methods, which utilize the lag structure, would reject the lending view for the traditional money view. It is worth emphasizing that the results based on such tests can lead to errors in judgements and caution is advised in drawing inferences based on such evidence.⁹

⁹ The possibility of such an error can be illustrated using the following description from the Report on Currency and Finance, RBI (1998-9).

the correlation coefficient between the current period IIP growth and four quarter lag non-food credit growth declines to 0.20 from the one-quarter lag of 0.71 giving evidence of credit being a poor leading indicator of industrial growth. On the other hand, the correlation coefficient between the current period

V.2 IS THE CREDIT CRUNCH SUPPLY OR DEMAND DRIVEN?

Mihir Rakshit's 1997b paper 'Recent Monetary Trends: Understanding the Linkages' addresses this question. Conceptually, he makes a distinction between bank advance to the commercial sector and bank credit to the government sector since the government borrowing is autonomous while the demand for credit by the commercial sector is a function of the business sentiments. An increase in the bank credit to the government and a fall in bank credit to the commercial sector along with a decline in the interest rate on government securities with no change in the interest rate on bank advances would then indicate a situation of excess supply in the loan market. Only in a situation of excess supply in the loan market does one observe banks switching from advances to G-secs in the face of a fall in their yield to maturity. With the pattern of bank lending and the behaviour of interest rates in 1996-7 closely resembling the above scenario, Rakshit goes on to describe the 1996-7 credit crunch as demand driven.

While there is truth in Rakshit's arguments, the relative rise in government securities investments along with a decline in yield to maturity also admits other interpretations. Deteriorating quality of loan portfolio plus capital induced shifts towards government securities are factors that can explain the asset switching of the kind observed by Rakshit. In such an event a decline in loans vis-à-vis investment in public debt by banks even if accompanied by a declining yield on public debt cannot be attributed to a demand crunch alone.

Rakshit's main interest is to challenge the crowding-out hypothesis of bank lending by government borrowing which is why he divides the banks' portfolio as credit to government and lending to the commercial sector. Instead of comparing loans with investment in treasury securities, what would have been more appropriate in this context is a comparison between bank loans and other assets in the banks' portfolio, which are closer substitutes for loan advances. A still more direct confirmation on supply versus demand crunch comes from the adjustments in the financing options of the borrowers (say, firms) rather than relative movement of banks' assets.

V.3 COMMERCIAL PAPER AND BANK CREDIT

The identification problem with time series tests has led researchers to look across different credit aggregates for evidence of credit effects. The first such test was by Kashyap, Stein and Wilcox (1993), who studied the mix of bank loans and commercial paper (CP). Consistent with a lending channel, they discovered that CP as a share of the mix of short-term credit (loans plus commercial paper) increased after tight policy.

For the Indian economy, we observe not only has the share of commercial paper but also the volume of commercial paper (CP) outstanding had *fallen* drastically following Oct'94 monetary tightening. Graph 6.4 traces the CP outstanding as well as the ratio of CP to loans outstanding. By March'96 the amount outstanding was less than Rs.100 crore. Effective discount rates on commercial papers rose in tandem with other interest rates in the economy.

non-food credit growth and one quarter lag industrial growth is 0.89 (for two quarter lag it is 0.74). From this preliminary evidence it seems that industrial growth leads credit growth rather than the other way round.'

Interestingly, if we replace non-food credit (in the above comparison) by bank credit, which includes food, as well as non-food credit, we see the peaking of bank credit growth occurred before the peaking of industrial output (see graph 1), which can completely turn the result around. However, we know that this is no more conclusive than the RBI arguments.

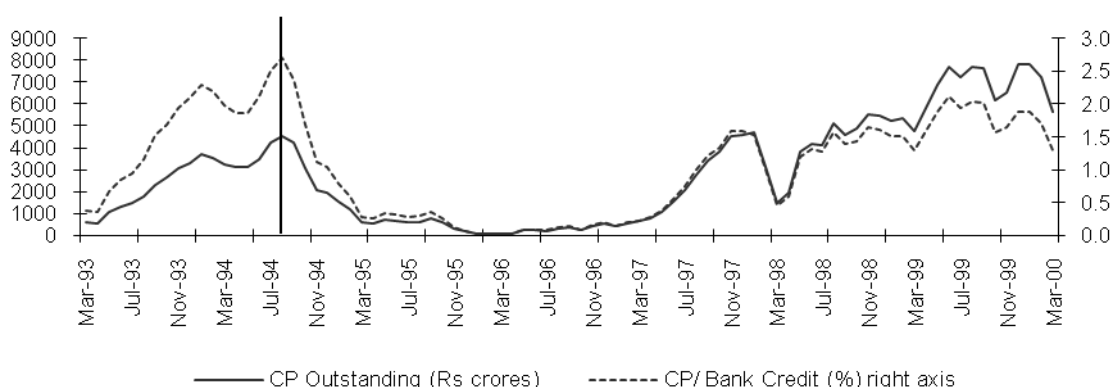
The clue to this anomaly lies in commercial banks being the single largest subscriber to commercial paper in India, in comparison to developed economies where the non-bank public or other corporates pick up a large share of CP. Commercial banks' investments in CP declined from Rs.2,680 crore as on March 18, 1994 to Rs.469 crore as on March 17, 1995 – a decline of 82.5 per cent. As a percentage of total CP outstanding, banks' share was as much as 75.66 percent in (March, 1994) and 72.82 (March, 1995) percent respectively.

Why did the commercial banks reduce their investment in CPs? The answer lies in Bernanke and Blinder's characterization of loans as quasi-contractual arrangements, which take time to offload. On the other hand, CPs like securities can be easily liquidated in conditions of liquidity crisis. Surely there was no demand constraint as the bank credit growth was rising at a rapid pace during 1995-6.

This forms the first set of evidence in favour of the lending channel – the banks' investments in certain forms had to be cut back in order to satisfy the credit demand. There was a pressure on supply of credit by banks. Beyond Mar'1997, CP outstanding began to rise and by the end of the year it had attained its former level.

GRAPH 4

COMMERCIAL PAPER & BANK CREDIT



Source: RBI, Handbook of Statistics, 2000.

V.4 SUBSTITUTION BY FIRMS AMONG ALTERNATE SOURCES OF FINANCE

The first half of the nineties saw some major shifts in the financing pattern of firms. Firstly, there was a significant rise in the use of external sources of funds such that its share vis-à-vis the internal sources of finance increased substantially. Secondly, the abolition of capital issues control and the introduction of free pricing of issues led to unprecedented upsurge of activity in the primary capital market as the corporates mobilized huge resources. Resource mobilization from the primary capital market by non-government public limited companies rose from Rs.6,193 cr. in 1991-2 to Rs.26,417 cr. in 1994-5, an increase by 3.26 times.¹⁰ Thirdly, this boom in the Indian primary capital market during 1992-3 to 1994-5 raised the share of capital market in the total sources of funds. Table 2 provides the pattern of financing of a sample of non-government non-financial public limited companies, based on a survey

¹⁰ Source: RBI, Handbook of Statistics, 2000.

conducted by the Reserve Bank of India.¹¹ Aggregating all sources of finance from the capital markets, capital market financing is seen to be particularly important during the period from 1991-2 to 1994-5; it reached a peak of 36.5% in 1993-4. The share of paid-up capital was 30 per cent in 1993-4. The rise in the share of capital market funds was at the cost of borrowings whose share declined steeply in 1993-4 and 1994-5.

From the mid-nineties there was a reversal in several of these trends. One of the main precipitating factors was the collapse in the capital market. From Rs.26,417 cr. in 1994-5, new capital issues by non-government public limited companies declined to Rs.3138 cr by 1997-8. The relative share of capital market in external sources of funds, which had been rising so far, reversed itself. The share of paid up capital in total sources of funds fell from 26.8% in 1994-5 to 7.6% in 1997-8 (table 2), while the *share of borrowings began to increase*.

TABLE 2

PATTERN OF FUNDING OF NON-GOVERNMENT NON-FINANCIAL PUBLIC LIMITED COMPANIES (IN PER CENT)

		1990-1	1991-2	1992-3	1993-4	1994-5	1995-6	1996-7	1997-8
A	Internal sources	37.6	28.1	26.1	28.9	28.9	36.6	35.9	33.4
B	External sources	62.4	71.9	73.9	71.1	71.1	63.4	64.1	66.6
a)	Capital markets	15.2	19	29.5	36.5	29.6	17.4	15.5	19.8
	Of which:								
	- Paid up capital	8.7	6.8	22.3	29.6	26.8	13.9	10.1	7.6
	- Debentures	6.5	12.2	7.2	6.9	2.8	3.5	5.4	12.2
b)	Borrowings	21.6	23.1	25.8	17.1	16.3	23.8	23.5	20.2
	Of which:								
	- From Banks	9.7	8.8	12	9.5	12.4	17.7	13.3	10.1
	- From FIs	11.9	14.3	13.8	7.6	3.9	6.1	10.2	10.1
c)	Other Liabilities	20.3	23.6	14	17.5	16.7	18.1	8.4	13.1
C	Total (= A +B)	100	100	100	100	100	100	100	100

Source: RBI Report on Currency and Finance, 1998-9: pp. VIII-28.

The borrowings as per Table 2 comprises of borrowings from banks and financial institutions (FIs). In 1995-6, there was a massive increase in the share of borrowing from banks. In the two subsequent years, however, the share of bank borrowing declined and the share of FIs rose. If we now compare the pattern of financing emerging, with the trends predicted by the

¹¹ The relevant data are collected from the articles on 'Finances of Public Limited Companies' as published in various issues of the RBI Bulletin. The sample of companies varies from 1720 to 1948

credit channel, we see the expected pattern following an adverse monetary shock. The share of bank borrowing after a counter cyclical spurt in 1995-6 has declined. What is more, this happened in a situation of a capital market slump, where investors were turning away from equity finance towards institutional lending.

Thus the preliminary picture seems to suggest the presence of a credit channel of monetary transmission. There was a supply constraint functioning in the bank loan market. We will study in detail the external fund use pattern of firms at greater level of disaggregation for more conclusive evidence.

V.5 INTEREST COSTS AND BANKS' BALANCESHEETS

A great deal of evidence of credit effects comes from panel data studies. While tight money policy may weaken balance sheet of firms of all sizes, these studies confirm the resulting decline in the supply of credit to be more pronounced at firms with the most severe agency problems, typically smaller firms (see Kashyap and Stein (1994, 1995)). Capital market imperfections extend to banking firms such that the impact of monetary tightening might be harder on smaller bank than the larger well-capitalized bank.

For the 27 public sector banks the interest expense as a percentage of total assets increased from 5.79% in 1994-5 to 6.25% in 1995-6, and to 6.66% in 1996-7, as a result of monetary tightening. Table 3 reports the correlation between net profit to total assets of the banks and interest expended as a proportion of total assets each year between 1991-2 and 1999-2000. The net profit to total assets ratio indicative of the health of the bank is an important measure of the balance-sheet position. A bank with a lower net profit ratio is expected to have higher interest expenses to total asset as it needs to pay a higher premium for its liabilities. The correlation coefficients in Table 3 conform to this pattern.

In essence, there is a two-way relation between the variables here. Higher interest expense impinge on the profitability of banks such that the net profit to assets ratio is low.¹² Simultaneously, a lower profit and worse balance sheet position means that the cost of funds and therefore the interest expenses are high. We will encounter the reflexive problem again later in the chapter. What is significant is that the correlation coefficient is the highest for 1994-5 and 1995-96 (significant at 5% level), the years of monetary shock. Banks with lower profitability had to pay a higher premium for external funds compared to firms that had a stronger balance sheet position. Beyond 1996-7 the correlation coefficient remains negative but is no longer significant.

¹² For the relation from interest expenses ratio to profitability, a more relevant variable is the interest spread rather than interest expenses.

TABLE 3

CORRELATION BETWEEN INTEREST EXPENDED AS A % OF TOTAL ASSETS AND NET PROFIT AS A % OF TOTAL ASSETS FOR PUBLIC SECTOR BANKS¹³

	$r_{(NPFT/TA, INTEXP/TA)}$
1991-92	-0.298
1992-93	-0.189
1993-94	-0.395*
1994-95	-0.398*
1995-96	-0.438*
1996-97	-0.343**
1997-98	-0.234
1998-99	-0.130
1999-00	-0.116

* significant at 5% level.

** significant at 10% level.

Data Source: Trends and Progress of Banking in India, 1999-2000.

The various sets of evidence examined so far indicate:

1. There are signs of credit constraint acting from the supply side.
2. Lending channel was operative during the years when monetary policy was actually tight. The banks capacity to disburse funds (creation of assets) was compromised to which they adjusted by switching from certain types of investment. As the monetary policy reversed itself, this constraint was released.
3. The balancesheet channel is observed to be operating for banks in the context of monetary shock, which shows up in differential effects of monetary shock for various types of borrowers.

VI Test of Credit Channel at the Firm Level: Empirical Framework and Data Description

One of the main criticisms of the empirical studies of credit channel is that despite the clear microeconomic foundations of the existence of an additional channel for the transmission of monetary policy most evidence stems from aggregate analysis. Even the papers that have studied the differences in the financing pattern across firms have done so by contrasting the effects of monetary policy on firm subtotals classified according to size (see Gertler and Gilchrist (1993, 1994), Oliner and Rudebusch (1994)). Nadine Watson's paper published in 1999 is one of the very few papers that test bank-lending channel at the firm level.

¹³ We have dropped the State Bank of Travancore, which was an outlier for most of the years, with the highest interest to asset ratio among the public sector banks and a moderate profitability ratio. The nature of the conclusions does not change significantly by including this observation.

According to Watson (1999) by allowing for firm heterogeneity including technological diversity, a differential response to monetary policy can be more clearly imputed to financial differences in case of firm level studies. The identifying criterion behind sub-group comparisons assumes that the only factor distinguishing firms is the degree to which they face credit constraints. The use of firm level data allows other differences between small and large firms to be taken into account explicitly.

For the Indian economy, there is no published information on financing pattern available according to the size classes of firms' categories on the lines used by Gertler and Gilchrist (1994). A firm level enquiry is therefore the only way to examine differences, if any, in response across firm sizes to monetary shock. However, there are four limitations of using firm level data.

1. In respect to the firms' financing pattern there are severe fluctuations from year to year as part of firms' normal portfolio decisions/ adjustments. For instance, a firm could borrow from banks in 1994 and for the next two years record zero or negative growth of bank borrowing as the firm repays its loans. Therefore, unlike aggregate series, individual firm data on financial aggregates show wide gyrations, which make application of certain standard techniques difficult.
2. It is difficult to obtain balanced samples for firm level data. For years, $t = 1, \dots, T$ and $n = 1, \dots, N$ it is impossible to get $T \times N$ observations. Also, samples are typically short and broad.
3. Typically, the periodicity of the data is annual. The data being consolidated over the year, it cannot capture intra-year movements.
4. A sample of firms however scientifically selected cannot be fully representative.

VI.1 EMPIRICAL FRAMEWORK

Oliner and Rudebusch (1993) criticised the use of commercial paper to total short-term lending by Kashyap, Stein and Wilcox (1993) (KSW henceforth) on the following grounds: KSW achieve identification of the loan supply effects under the implicit assumption that monetary policy shocks affect the demand for funds in a homogenous fashion. But suppose declines in aggregate demand fall disproportionately on the shoulders of small firms. In this case, small firms demand for credit may fall *more* than large firms demand for credit. Hence commercial paper volume, which largely reflects large firms borrowing, may rise relative to bank loans, even in the absence of movement in bank loan supply.

More generally the criticism by Oliner and Rudebusch (1993) is directed at the aggregative framework of KSW. It is possible to attack (and defend) any movement in the ratio by a sufficiently creative story on differential aggregate demand. The following points suggest certain modifications to KSW framework that is applied to empirical testing.

1. The use of commercial paper to total short-term lending by KSW, is based on the nature of close substitutability between CP and bank loans. In India, as most firms do not yet tap the commercial paper market, such a measure cannot be applied. Instead we compute the ratio of bank borrowing to total external fund use and interpret it in a similar way as the KSW variable. The variable is called MIX here. A fall in the MIX following monetary shock would be indicative of the working of lending channel.

2. A change in the MIX variable can be attributed to forces of credit supply originating from a monetary policy change, only under the assumption that the other components of the external finance of the firms continue to grow at a constant rate and remain unaffected by monetary policy changes. Substitution among alternate sources of external finance could arise as a result of variation in the relative cost and availability of funds due to factors independent of monetary policy. For instance, consider a boom in the capital markets caused by a spate of newly introduced institutional measures. Firms respond by shifting away from bank credit to capital markets and the MIX of external finance shifts from loans to bond-equity finance. A decline in credit growth as a result of monetary policy shock, in this case would be combined with the underlying shift in trend towards non-bank avenues of external finance. Alternately, consider a situation where an adverse monetary policy shock coincides with capital market slump. The MIX variable could witness a rising trend, as the growth of bank borrowing relative to the growth of funds raised from the capital markets remains higher even after the monetary shock.

In addition to movements in capital markets caused by factors exogenous to monetary policy changes, an interest rate shock could itself induce movements in asset prices in the capital market and thereby alter firms' external finance choices. Where monetary policy shocks affect both the major financial markets – capital market and credit market, one has to identify and decompose the trend in the MIX variable as arising from the capital market and credit market.

Thus the use and interpretation of the MIX variable comes with a rider. Depending on whether there is a contemporaneous disturbance in any of the other financial markets that impinge significantly on the firms financing options the MIX variable would need to be suitably modified. Alternatively, one has to control for 'the other effects' that could impact the share of bank borrowing, apart from the monetary policy variable.

3. The essential underpinnings of credit view centres around the idea that the markets are imperfect. The impact of monetary policy is felt disproportionately on firms with smaller access to capital markets - it is the small firms that are likely to face a disproportionately larger premium for external finance. Capital market access is defined in terms of the actual volume of funds raised in the capital market. If the firms are divided into three categories $k = 1, 2, 3$ in increasing order of capital market access, the credit channel predicts a greater decline in the MIX variable for category 1 firms compared to category 2 and 3 in response to an adverse monetary shock.
4. The balancesheet channel is based on the theoretical prediction that the external finance premium facing a borrower should depend on borrower's financial position. In particular, greater is the borrower's net worth – defined operationally as the sum of the liquid assets and marketable collateral – the lower the external finance premium should be. A tight money policy weakens the borrowers' balance sheet as the cash flow is squeezed. The cash squeeze and the consequent decline in net worth will cause banks to reduce lending to the firms. The converse is true as well. The cash squeeze and decline in networth will be particularly severe for firms that are unable to borrow due to credit market imperfections (chicken and egg problem).¹⁴

¹⁴ George Soros notes a similar reflexive relationship between the act of lending and the value of the collateral in his book The Alchemy of Finance, 1987.

VI.2 DESCRIPTION OF DATA

Selection of Industry and the Data Source

The textile industry comprising cotton yarn, fabrics, jute products and other textile products such as carpets is the largest amongst sectors in the Indian manufacturing industry. The industry is vastly heterogeneous with varying technology and scales of production.

Since 1996-7, the textile industry witnessed a slump in production. Except for silk textiles experiencing a sales growth rate of 17.9 per cent per annum during the three years 1996-7 to 1998-9, the textile industry fared badly with several products experiencing a negative sales growth rate. Textile machinery witnessed a negative growth of (-) 12.3 per cent per annum between 1996-7 and 1998-9, which is indicative of the extent of slump in the textile industry (CMIE, 2000). *The textile industry has therefore mirrored the trends in Indian industry.* Being a large widespread industry with a great deal of heterogeneity and dispersion, it would be considered an appropriate choice for the study of the credit channel of monetary transmission.

In the absence of firm level information from the official sources, we have used Centre for Monitoring Indian Economy (CMIE) prowess database that provides company level statistics compiled from Annual Reports of companies. We use data from a variety of financial statements presented in the prowess database giving annual company level data on financial aggregates and ratios. The data on textile firms lists more than 800 textile firms, but the data is not consistently reported for all the firms over the years, a problem common to most panel datasets. 455 textile firms are selected depending on the availability of complete information and judged by the number of years data is available for a particular firm. Thus drawing the subsample is purely on practical considerations. The data covered is for eight years from 1992 to 1999. We select firms that have at least four years of data: the year 1995 is the benchmark year and has complete coverage, viz., all the 455 firms have reported information in 1995. The firms belong to private, public, joint and cooperative sector.

There are two/three limitations of the CMIE data set that need to be noted.

1. The selection of companies is not strictly based on a scientifically selected sample. Coverage is limited to companies for which sufficient data is available under the disclosure norms. However, the coverage in most cases has been satisfactory, judged against known benchmarks – the official estimates of production published by annual survey of industries.
2. The dataset excludes unorganized sector as also some private limited companies whose annual reports are not regularly available. Thus it has a built-in bias against small and medium firms.
3. Warning: Several of the firms considered here are multiproduct firms, also manufacturing products in addition to textiles. Production, sales and the financial transactions derived from these activities are in respect to the entire firm and not product specific. This is a point to be kept in mind though for our purpose the exact identity of the industrial firm is not vital.

Sample Splitting

To facilitate analysis, we split the sample of firms in terms of the amount of funds raised in the capital market. Funds raised from the capital markets include: fresh capital (excluding bonus issues) of equity and preference shares, share premium, debentures, bonds and fixed

deposits. The asset-liability statement of firms gives the stock of funds raised through the capital market at a point of time. The corresponding flow statement can be constructed by differencing the data for successive years. The following definitions on the firm categories make use of the flow as well as the stock of funds.

- *Non-capital market dependent category I (NCMD I) or firms with low capital market access*

Firms raising less than Rs.20 lakhs on an average from capital markets in the sample years. Predominantly these are also the firms with low stock of capital market funds.

- *Capital market dependent category (CMD) or firms with high access to capital markets*

Firms raising more than Rs.20 lakhs on an average from capital markets and the share of capital market funds in total external sources of funds (average of sample years) is *more* than 25%.

- *Non-capital market dependent category II (NCMD II) or firms with medium access to capital markets*

Firms raising more than Rs.20 lakhs on an average from capital markets and the share of capital market funds in total external sources of funds (average of sample years) is *less* than 25%. These are firms with limited dependence on capital markets but can tap it when required. An increase in capital market funds is matched by increase in funds from other sources such that the share of capital market funds remains moderate. Also the average as well as maximum amount of funds raised by the category is lower than the firms defined by CMD category.¹⁵

A few comments are in order in respect to the proposed classification.

There could be objections to the use of capital market dependence and non-capital market dependence when what is relevant theoretically is the access to capital market. However, note that the data we have relates to actual capital raised, which differs (at least conceptually) from the potential capital that *can* be raised. What we observe is a degree of dependence while the potential refers to access. This, however, is a finer point and for all practical purposes we will use capital market access and dependence synonymously. Also the size of the firm being a good approximation to the capital market access, we sometimes use small, medium and large for the three categories.

The benchmark of Rs 20 lakhs and 25 per cent is subjective; it is what we thought as reasonable cut off. There is hence an element of arbitrariness in the classification. Company credit rating and historical (long term) debt-equity ratio of the firms would be better measures of capital market access than the measures we have used.¹⁶ Table 4 gives the number of firms in every category in each of the sample years.

¹⁵ Medium access to capital markets is not the most appropriate label for this category. It is only to distinguish from the other categories that we have used this name.

¹⁶ Debt-equity ratio unless averaged over the length of the business cycles is determined endogenously and therefore suffers from similar drawbacks as the measures we have used.

TABLE 4

DISTRIBUTION OF FIRMS ACCORDING TO FIRM TYPE

	NCMD I firms	NCMD II firms	CMD firms	TOTAL	Cumulative Observations
1992	75	94	116	285	285
1993	87	110	167	364	649
1994	102	120	231	453	1102
1995	103	120	232	455	1557
1996	103	119	230	452	2009
1997	85	115	224	424	2433
1998	74	101	198	373	2806
1999	37	60	129	226	3032

Source: CMIE, Prowess database.

The year 1992 refers to the financial year 1991-2, year 1993 refers to the financial year 1992-3 and so on. Both end points (1992 and 1999) have fewer observations than the intervening years. For the analysis we have dropped the end points wherever it was felt necessary.

VII Monetary Policy and Debt Mix: Firm Level Analysis

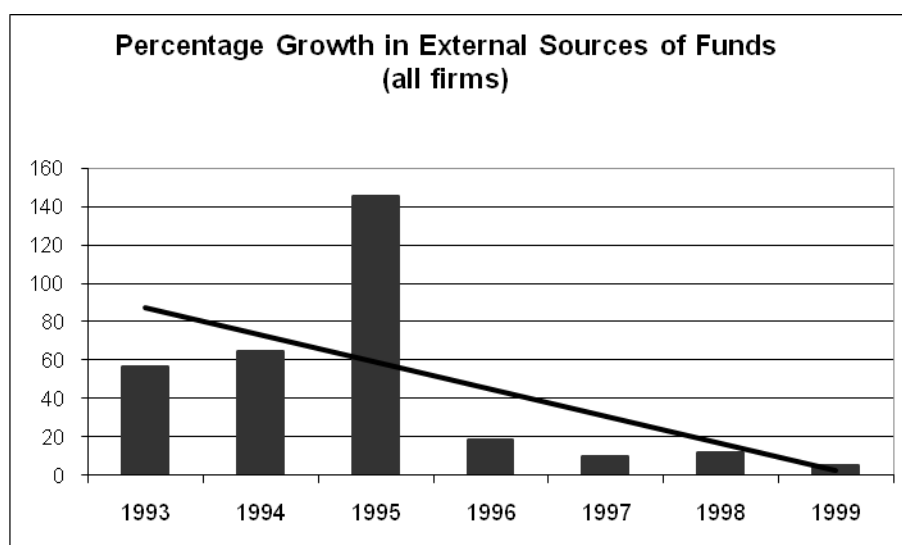
The empirical tests of credit view have been done using two techniques alternately. Mostly, simple averages aggregated across firms are computed to analyse the data. At other places, we have employed regression techniques. Given the nature and span of data, both these methods have their limitations. Yet several powerful results are obtained, as we shall see below.

VII.1 TOTAL EXTERNAL FUND USE (ES)

Graph 5 gives the year-on-year increase in external use of funds (ES) between 1993 and 1999. The most striking feature of the graph is the precipitous decline in growth of ES by companies since 1996. This followed an enormous growth of ES observed in 1995, a year of high real economic growth and stock market boom. The accompanying table 6.5 presents average increase in external financing for the three firm types separately.

Between 1993 and 1995, there has been an increase in growth rate of ES across all firm categories. CMD firms experience very high growth rates of external finance in all three years, no doubt encouraged by the capital market boom. Similarly, NCMD II firms experience acceleration in the growth rate of ES in this period. NCMD I category, where the entire small firms belong, record moderate growth of external finance in 1994 and 1995 (no spurt in 1995). Obviously, upswings in the capital market bypassed these firms.

GRAPH 5



Source: CMIE, Prowess database.

Starting 1996 there was a drop in external finance growth across all firm categories. Compared to pre-1995 levels, the decline is most significant for CMD firms, which directly correlates with the capital market conditions. NCMD(II) firms' external sources of funds growth has fallen, but remains above that of the other two categories in all the years. The growth of external finance for NCMD(I) rises at very low rates.

TABLE 5

GROWTH OF EXTERNAL SOURCES OF FUNDS (%)

	NCMD I Firms	NCMD II Firms	CMD Firms
1993	6.19	16.24	120.26
1994	14.61	35.87	108.27
1995	15.74	46.51	254.68
1996	9.95	22.10	20.44
1997	1.83	15.53	10.14
1998	6.75	13.58	13.04
1999	1.19	6.17	6.12

Source: *ibid.*

VII.2 BANK BORROWING AND OTHER SOURCES OF EXTERNAL FINANCE

The external sources of funds for the corporates consists of: (a) capital market funds raised through equity, bonds and debentures, (b) bank borrowing, (c) borrowing from financial institutions (FIs), (d) loans from other corporates, and (e) other sundry credit. For the organized sector of the Indian industry, the first three components comprise the majority of external sources of funds raised by the firms.

In Table 6 we report separately the growth of bank borrowing (BB) and growth of funds raised through the capital markets (K). In addition, we compute the growth of non-bank non-

capital market external sources of fund (NBNK ES). The second part of Table 6.6 reports the ratio of bank borrowing to funds raised through (i) the capital market, (ii) NBNK ES, (iii) total ES. Both the ratios and the growth rates are calculated for the three firm types separately. The following observations are drawn on the basis of trends emerging from Table 6.

Aggregate trends (for all firms)

1. Growth in bank credit (used synonymously with bank borrowing) increased steadily between 1993 and 1995. The year 1995 witnessed the peaking of BB growth. There was a slight deceleration in 1996, however the growth of BB was still high. In the last three years of the period studied, growth of BB dipped substantially. To a large extent the growth of NBNK ES mimics the trend in BB.
2. The high point of external financing through capital market sources was 1994 and 1995, the years of capital market boom.
3. The ratio of BB/ K has declined markedly from 1993 to 1994 and then again in 1995. This is attributable to the buoyant growth of capital markets.
4. The ratio of bank borrowing to external sources except bank and capital market finance increased sharply in 1995 and thereafter has steadily been rising.
5. Finally, the ratio BB to ES, which corresponds to our MIX variable, has tended to decline during 1992 to 1993 and then again in 1994. This trend is reversed in 1995 and increases thereafter and the rising trend has been maintained till 1999.

How do we interpret these trends?

The proof of the lending channel is based on whether bank loans decrease relative to the other forms of liabilities of the borrower in response to an adverse monetary shock. After the monetary shock, dated second half of 1994-5, the mix variable (BB/ES) has steadily increased. Thus the aggregate firm level evidence based on the sample of textile firms shows that the lending channel is not operative. In this case, the ratio of bank to non-bank sources of finance as well as the ratio of bank loans as a proportion of total external sources of finance has increased emphatically 1995 onwards, which puts into doubt the operation of a bank-lending channel.

For banks' behaviour it might be said that the banks did not reduce lending in response to tightening of monetary policy by the monetary authorities.

Since in this period there were major upheavals in the capital market, first the boom and then the slump, the ratio of BB/ NBNK ES is used to separate the exogenous shocks originating in the capital markets. A higher BB/ ES post 1995 *could* also arise as the share of capital market sources to external sources drops, without any real accommodation by the banks. BB/ NBNK ES removes the effect of independent innovations in the capital market. The rising trend in BB/ NBNK ES confirms the absence of supply rationing (in an aggregate sense) by banks of the type implied by the lending channel of credit view.

Trends for the three firm types

6. For all the three categories of firms, growth of BB peaked in 1995. The deceleration in growth of bank borrowing also occurred in all three types of firms from the year 1996 onwards. However, the degree of deceleration varies across firm types, it is the strongest for the NCMD I firms. In certain years beyond 1995, the growth in bank borrowing for the NCMD I firms is almost negligible.

7. Growth in capital market sources of funds was extremely high in the three years 1993 to 1995 for the CMD and NCMD II firms. For the NCMD II and CMD firms, bank borrowing growth accompanied the extensive tapping of the capital markets in these years, whereas for NCMD I firms, the capital market conditions were (directly) irrelevant, BB and NBNK ES being the major sources of external finance.
8. For the NCMD I firms, BB/K declined in the years 1992 to 1994, rose sharply in 1995 and has thereafter declined in most years. For the NCMD II firms, the BB/K has declined continuously, except in 1998. In contrast for the CMD firms, the decline in the ratio BB/K is limited to the years 1994 and 1995 – the years of capital market boom. Beyond 1995 the ratio is seen to climb up steadily. Notice the difference in the levels of BB/K across the three firm types.
9. The two ratios of BB/ ES and BB/ NBNK ES broadly move together.
 For NCMD I firms, the ratios increased between 1993 and 1995. However, thereafter the ratio of BB/ ES is either non-increasing or declining in most years. BB/ NBNK ES increased marginally in 1996 and has thereafter fluctuated around the 1996 level.
 For NCMD II firms, there is an unambiguous rise in both the ratios throughout the period. The rise is particularly significant after 1995.
 For CMD firms, except for 1994 when BB/ NBNK ES declined and 1993 and 1994 when BB/ ES declined, there has been a steady increase in both the ratios.
10. By the end of the nineties decade, there has been a significant change in the external finance composition as compared to the early and mid nineties. In 1992 the share of bank borrowing as an external fund source was the highest for NCMD I or the bank dependent firms. In 1999, NCMD II firms have a much higher share of BB (as a proportion of ES). The CMD firms have increased the share of BB to ES over the period whereas only for the NCMD I has the ratio declined marginally.

How do we interpret these trends?

The disaggregated picture for certain firm types is in variance with the aggregate story. Whereas for medium and large firms there clearly was no supply strain as the external finance composition was shifting in favour of bank credit all the time, for the small bank dependent firms there *might* have been a supply shock operating. These firms were only able to maintain the share of bank borrowing attained in the high growth year '1995'. The trends observed for NCMD I firms should be interpreted in view of our earlier finding (preliminary evidence) of supply constraint acting on banks in the years of monetary tightening, and the easing of the constraint in the subsequent years.

Note that it is not necessary for the share of bank borrowing to decline to prove supply rationing for small firms (NCMD I). As observed by Timberg and Aiyar (1980), the trend in growth of NBNK ES follows the pattern of bank lending growth for small firms.¹⁷ The terms of loan as well as the probability of loan application being accepted by non-bank financial institutions (say for instance, the informal sector borrowing) are often dependent on bank borrowing. The refusal of banks to lend is accompanied by inability to substitute bank borrowing by other sources of finance, such that the ratio BB/ ES or BB/ NBNK ES would not reflect the loan rationing by banks. Thus while it not obvious that the banks constrained supply of loans to the NCMD I firms, the trend in the ratios do allow such a possibility. The

¹⁷ Timberg and Aiyar (1980) in a survey of the urban informal credit markets find that being a bank borrower facilitates borrowing of informal credit.

pattern of MIX witnessed over the years clearly distinguishes this category of firms from the rest.

For medium and large firms, the latter especially, are able to substitute one source of external finance for another depending on relative costs and attractiveness of the alternatives. In 1994-5 when the interest rates were rising with monetary tightening, the fortuitous circumstances created by capital market boom allowed the firms with capital market access to move out of bank borrowing towards new issues market. When the conditions in the capital markets reversed itself, the firms that were heavily tapping the capital market were now borrowing from the banks. Again happily for them, this overlapped with a period of gradual easing of monetary policy.

What emerges clearly is the possibility of the effect of supply rationing as felt disproportionately by bank dependent firms whereas medium and large firms escape supply restrictions in response to a monetary policy shock. In the aftermath of monetary tightening growth of bank lending did not decline for reasons such as inability to raise lendable resources or high reserve requirements. The evidence seems to indicate the likelihood of supply rationing via the balancesheet channel with only certain class of borrowers suffering from supply shortages. The next sub-section tests the balancesheet channel of credit view.

TABLE 6

COMPARISONS OF VARIOUS EXTERNAL FINANCE SOURCES

	Growth in			Bank Borrowing Ratios (Outstanding)		
	BB	K	NBNK ES	BB / K	BB/ NBNK ES	BB/ ES
	All firms					
1992				2.47	0.38	0.20
1993	37.96	156.13	60.52	2.31	0.43	0.18
1994	66.82	829.04	60.69	1.53	0.42	0.17
1995	111.26	397.85	221.07	1.42	0.51	0.19
1996	77.54	17.19	41.87	1.39	0.54	0.20
1997	22.59	15.64	12.81	1.27	0.55	0.20
1998	54.22	9.32	15.28	1.34	0.60	0.21
1999	15.45	4.54	6.49	1.10	0.63	0.22
	Non-Capital Market Dependent I firms					
1992				3.33	0.45	0.23
1993	5.98	8.68	8.51	3.09	0.41	0.21
1994	56.58	2.64	18.51	2.95	0.46	0.21
1995	67.17	4.45	110.04	3.24	0.50	0.23
1996	15.69	1.26	15.45	3.10	0.51	0.22
1997	0.83	2.00	5.96	2.76	0.49	0.21
1998	16.84	2.65	12.08	2.97	0.51	0.22

1999	5.70	-0.73	1.21	2.14	0.49	0.22
Non-Capital Market Dependent II firms						
1992				2.94	0.35	0.21
1993	20.51	60.24	13.28	2.67	0.35	0.21
1994	38.31	111.09	32.20	2.24	0.41	0.21
1995	66.78	135.34	51.28	1.80	0.41	0.22
1996	37.66	31.99	25.53	1.69	0.45	0.23
1997	20.94	40.55	12.58	1.62	0.47	0.23
1998	37.01	17.89	12.27	1.70	0.52	0.25
1999	8.12	11.61	5.58	1.56	0.55	0.26
Capital Market Dependent firms						
1992				1.56	0.36	0.17
1993	73.85	322.88	129.87	1.68	0.49	0.15
1994	94.80	1707.24	99.73	0.58	0.40	0.14
1995	157.99	704.91	357.79	0.43	0.57	0.16
1996	124.29	16.60	61.93	0.49	0.60	0.17
1997	31.10	7.74	15.55	0.53	0.61	0.18
1998	75.78	7.33	17.98	0.59	0.66	0.19
1999	21.22	2.76	8.27	0.61	0.69	0.20

Source: *ibid*

VII.3 THE IMPACT OF MONETARY SHOCK ON THE SHARE OF BANK BORROWING: ECONOMETRIC TESTS

In the above analysis we have averaged over sample firms for each set of variables. As a result, a great deal of individual information is lost. Also for a highly heterogeneous sample, one might argue, averages might not be the most appropriate indicator. An econometric analysis in this case can make the best use of the available information.

The major practical constraint in applying econometric tools to the above data set is the shortness of the time period or the frequency of data, which is only available at annual intervals, precludes the use of lags. This is particularly felt since the impact of monetary policy continues well after the monetary shock. In the absence of sufficient time observations there is no way we can include lags.

Determinants of Financing Mix of the Firms: Panel Estimation

The credit channel postulates a negative relationship between monetary policy and financing mix of the firms, MIX, measured as BB/ES. A tight monetary policy (MP) is expected to cause the MIX to fall as the decline in reserves reduces banks' ability to lend (lending channel).

Monetary policy affects the financing mix indirectly via the balance sheet of the firms (balance sheet channel). A tight money policy weakens the borrowers' balance sheet as cash flow is squeezed. The cash squeeze and the consequent decline in net worth cause banks to reduce lending to the firms. If the position of the balance sheet is measured as the ratio of

net-worth to gross fixed assets (NW/GFA), higher the NW/GFA, ceteris paribus, higher would be the MIX.

Other than monetary policy, the other macro variable that directly affects MIX is the capital market condition. A buoyant capital market would cause the larger firms to substitute intermediated finance by market-based finance.

The other firm specific factor, which influences the MIX, is the capital market access. Larger the access of the firm to capital market smaller would be the dependence on banks and therefore smaller the MIX.

The equation for MIX can then be written as,

$$MIX_{it} = \alpha + \beta_1 \left(\frac{NW}{GFA} \right)_{it} + \beta_2 (KMKT)_{it} + \beta_3 MP_t + \beta_4 DV94 + \beta_5 DV96 + u_i + \varepsilon_{it} \quad (I)$$

The monetary policy, MP, is measured as the cash reserve ratio.¹⁸ The capital market access is indicated by the stock of capital market liability outstanding of the firm, KMKT. The general condition of the capital market is captured in terms of the two dummies, DV94 and DV96 for the two years 1994 and 1996 when the capital market boomed unprecedentedly and then slumped, respectively.

Equation (I) represents the Random Effects Model with the standard assumptions on the errors.

$$\begin{aligned} E(u_{it}) &= 0, \text{Var}(u_{it}) = \sigma_u^2 \\ \text{Cov}(\varepsilon_{it}, u_i) &= 0 \\ \text{Var}(\varepsilon_{it} + u_i) &= \sigma^2 = \sigma_\varepsilon^2 + \sigma_u^2 \\ \text{Corr}(\varepsilon_{it} + u_i, \varepsilon_{is} + u_i) &= \rho = \frac{\sigma_u^2}{\sigma^2} \end{aligned}$$

The equation is estimated by random effects generalized least square method, which takes care of individual cross-sectional heterogeneity not captured by the explanatory variables, viz. it allows controlling for heterogeneity bias.¹⁹ We have dropped the end years on either side, 1992 and 1999 with fewer observations. The estimation results are presented in Table 6.7. The Hausman test reported in Table 7 supports the use of Random effects model over the Fixed effects one. The Breusch Pagan test indicates the presence of heteroscedasticity, which is corrected by the generalized least square method.

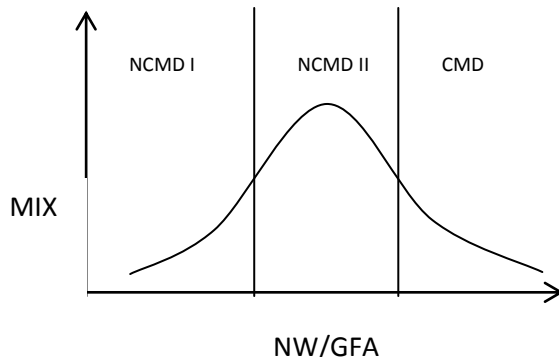
In the first estimated equation MIX is regressed on NW/GFA, monetary policy, capital market access (KMKT) and the two-year dummies, DV94 and DV96 as in equation (I) above. Except for NW/GFA all the other variables are significant with the expected signs. A tighter monetary policy implies a lower mix and vice-versa. Firms with larger capital market access would have smaller financing MIX than compared to firms with smaller access to capital markets. The two dummy variables DV1994 and DV1996 are both significant with the respective signs indicating that the capital market boom and slump alternately encouraged firms to shift from banks to non-bank sources and back again.

¹⁸ For purpose of estimation, we also tried the detrended CRR series as the monetary policy variable (Graph 2), which didn't make much difference to the overall result.

¹⁹ Greene (1995)

FIGURE 1

RELATION BETWEEN MIX AND NW/GFA



The reason for the insignificance of NW/GFA variable in explaining the MIX in Equation (1), Table 7, is the underlying non-linearity in the relation such that a linear specification rejects the variable. More specifically, the relation between MIX and NW/GFA can be expected to resemble a hill (refer to figure 1). For low levels of NW/GFA, as the NW/GFA rises so does the MIX since the banks willingness to lend increases as NW/GFA rises. For very high levels of NW/GFA, MIX declines with NW/GFA as the firms prefer non-intermediated finance to bank finance. For medium levels of NW/GFA, the relationship is indeterminate.

A crude but simple way of capturing the non-linearity within the linear regression framework is to split the sample into three divisions – small, medium and large and re-estimate equation (I) above. Equation (2) in Table 7 re-estimates equation (I) using our threefold classification: NCMD I, NCMD II and CMD firms. The first three regressors are the interactive terms multiplying NW/GFA to the three dummies with the three dummies, DV(NCMD I), DV(NCMD II) and DV(CMD). DV(NCMD I) equals 1 for NCMD I firms and takes on the value zero otherwise. DV(NCMD II) and DV(CMD) are defined similarly.

TABLE 7

REGRESSION RESULT

Dependent Variable: MIX	n = 2463 (Number of groups = 453)	
	Random Effects Estimation	
	(1)	(2)
NW / GFA	-0.035 (0.270)	
NW/GFA x DV (NCMD I)		0.826 (0.000)
NW/GFA x DV (NCMD II)		-0.000 (0.990)
NW/GFA x DV (CMDI)		-0.071 (0.063)
KMKT	-0.022 (0.000)	-0.023 (0.000)
MP	-0.658 (0.000)	-0.069 (0.000)
DV 1994	-1.66 (0.000)	-1.685 (0.000)
DV 1996	1.37 (0.002)	1.44 (0.001)
Constant	28.98	29.527
R-square	0.0384	0.0613
Hausman Statistics	1.58 (0.904)	5.57 (0.591)
Breusch-Pagan LM test	1880.53 (0.000)	1788.58 (0.000)

Notes: Figures in the brackets are p-values. R-square for RE estimation relates to overall R-square.

NW/GFA so defined is significant in two out of three cases. The results indicate that for NCMD I firms a higher networth to gross fixed asset ratio representing a healthier balance sheet means that banks willingness to lend and therefore the financing mix of the borrower is higher corresponding to the upward sloping segment of the curve in figure 1. On the other hand, for medium and large firms NW/GFA doesn't have similar impact on MIX. For the medium size firms, the relationship is negative though insignificant while for the large firms the coefficient is negative and significant at 10% level. What this implies is that as the capital market access of the firms rise, higher NW/GFA reflecting better balance sheet positions will imply greater recourse to non-bank sources of finance. To the extent, an adverse monetary policy shock causes NW/GFA to decline it would mean an increase in the MIX for medium and large firms, whereas banks respond to deteriorating balance sheets of small firms by reducing lending, which gets mirrored in a lower MIX for the small firms. We will look at the impact of MP on NW/GFA next. Note that the rest of the variables in equation (2) in Table 7 are all significant with the same interpretation as in equation (1). Equation (2) has a slightly improved fit than equation (1), though both have low overall R^2 .

TABLE 8
BIVARIATE REGRESSION RESULT

	OLS Estimation	R-square
(1)	$(NW/GFA)_{NCMD I} = 0.44 + 0.024 MP$ (0.128)	0.0009
(2)	$(NW/GFA)_{NCMD II} = -0.2 + 0.031 MP$ (0.471)	0.0002
(3)	$(NW/GFA)_{CMD} = -0.52 + 0.114 MP$ (0.074)	0.0013
(4)	$(NW/GFA)_{NCMD I} = 63.3 - 0.032 YR$ (0.068)	0.0013
(5)	$(NW/GFA)_{NCMD II} = 67.7 - 0.034 YR$ (0.487)	0.0002
(6)	$(NW/GFA)_{CMD} = 190.53 - 0.095 YR$ (0.181)	0.0007
(7)	$MIX_{NCMD I} = 0.027 + 0.002 MP$ (0.224)	0.0006
(8)	$MIX_{NCMD II} = 0.078 - 0.0013 MP$ (0.323)	0.0004
(9)	$MIX_{CMD} = 0.157 - 0.0053 MP$ (0.000)	0.007

Figures in brackets are p-values.

How has the NW/GFA varied vis-à-vis the monetary policy? Equation (1)-(3) in Table 8 estimates the impact of monetary policy on NW/GFA for each of the three categories separately. All the equations show the coefficient on monetary policy as positive. Only for the CMD firms, the MP variable is significant at 10% level. Equation (4)-(6) reflects the trend in NW/GFA over the years. This has been declining for all categories with the trend being significant for NCMD I firms (at 10% level).

Correlating the two sets of results (equation (1)-(3) and (4)-(6)) with the timing of monetary shock, we draw the following observations:

- NW/GFA has witnessed a declining trend for the NCMD I firms over the years. Considering that the adverse policy shock occurred around the third year of the sample period would imply that NW/GFA was declining in the years of monetary tightening, viz. when money was tight and interest rates were high and rising. The declining trend continued even after the monetary policy had reversed itself. This is because the balancesheet channel is expected have a lagged effect as well.
- In contrast for the CMD firms, the movement of NW/GFA with monetary policy as per equation (3) reflects that the NW/GFA was high in years of tight monetary policy and it declined only in the years following the monetary shock. The decline in NW/GFA in this case is most likely to have been due to the slump in the real sector, rather financial constraints.

Thus, in case of small firms (NCMD I) the balancesheet channel was operating by transmitting the monetary shock to the networth, which as per the MIX equation would cause

a shift in the pattern of borrowing away from bank finance. For the large firms (CMD), the decline in networth witnessed could have been for reasons other than monetary shock. With the decline in NW/GFA, the MIX would rise, as argued before (refer to Fig. 1).

It is important to note here the reverse causality that would be working simultaneously from MIX to networth. It is not only that better balance sheet positions urge banks to lend which can raise banks' share in external finance, higher MIX would also have a feedback leading an improved networth position. There is, hence, a circularity involved. It is likely that the declining MIX for the small firms reinforced the initial deterioration in NW/GFA, which would have been smaller otherwise.

Finally, equation (7)-(9) in Table 8 regress the MIX on monetary policy for the three firm classes. In case of CMD firms, the regressor is significant with a negative sign. Higher monetary policy has been reflected in a shift away from bank loans to other sources of finance and vice-versa. For the NCMD II firms the relationship is negative but insignificant. For the NCMD I firms the coefficient is positive and insignificant. It suggests the possibility of the MIX being high when monetary policy was tight, which declined with the easing of monetary policy. This is the same trend noted in the previous section on the basis of averages for the firm categories.

VII.4 ECONOMIC BEHAVIOUR

Before concluding we reflect briefly on the real behaviour of the firms. Graph 5 plots the (gross) sales growth, inventory growth and profit to sales ratio for the three firm classes. The trends reflect:

- Beyond 1995 there was a slide in growth of sales for all the firm types;
- No countercyclical trend in inventory growth in the year following the monetary shock is observed;
- There is huge deceleration in the sales growth of the CMD firms in 1996 and 1997;
- From 1998 onwards, the declining trend in sales growth reverses itself for the CMD firms, though the sales growth continues to be low. Whereas for NCMD I and NCMD II firms the deceleration in sales continues and turns negative;
- A reflection of the profitability of these firms is seen in the trend in profit to sales ratio. Profitability defined as Profit after tax to net sales ratio has been the lowest for NCMD I firms and the highest for CMD firms even in the years preceding the monetary shock. Over the years as profitability has fallen for all firm types, the gap has increased.

What is significant in the above noted trends is that the differential demand effects were not observed for small versus large firms. In other words, it was not that the small firms suffered a huge squeeze in sales growth relative to medium and large firms, which could have caused it to cutback demand for bank credit. If anything, the contraction in demand as captured by growth in sales was much larger for the CMD firms around 1996 and 1997, the years immediately following the monetary shock. Demand effect could not have influenced the choice of external source of finance anymore adversely for small firms than the large firms.

VIII Conclusion

An important aspect of financial liberalization entails that the supply side tools of economic management are given up. Innovations to monetary policy then become an essential part of

the demand management apparatus for the economy. The credit view emphasizes the effect of an independent monetary shock on banks' ability and willingness to lend, over and above the transmission to aggregate demand through the traditional cost of capital channel.

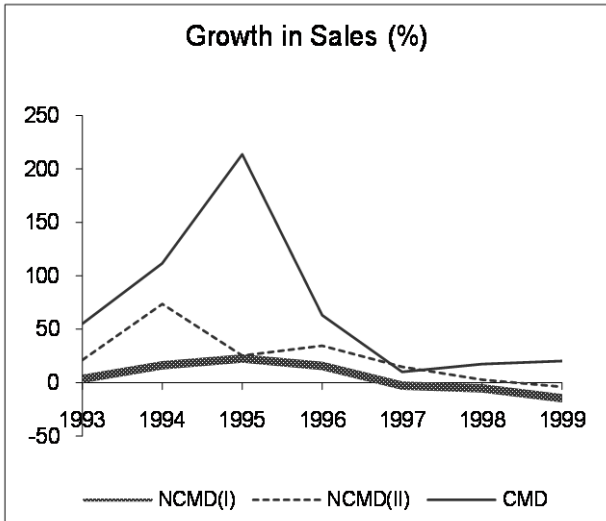
Our findings support the operation of the credit channel for India in the context of the mid-nineties episode of monetary tightening. The evidence in respect to the lending channel indicates that banks felt the pinch of monetary tightening, to which they adjusted by switching away from investment, especially short-term investment. That banks did not cutback on loan advances during monetary tightening was clearly emphasized by most of the evidence examined. In respect to the discriminatory effect of monetary tightening on the different borrower types, we find evidence to suggest that the effects of monetary tightening were felt disproportionately by the small banks and small firms, with less financial leverage. The differential effects work its way through the balancesheet channel that can have a prolonged and extended effect due to its reflexive nature. A tight monetary policy by worsening the balancesheet position (reflected in the networth) of small borrowers without access to capital markets reduces the banks' willingness to extend credit, which is reflected in the composition of external finance. On the other hand, the large borrowers with capital market access are free to enter and exit the bank credit market as per their needs.

A serious limitation of the study is the exclusion of unorganised sector. In the absence of similar data on unorganised sector, where mostly the small firms belong, our sample is biased in favour of medium and large firms. Our benchmarks for the threefold categorization had to be pegged at high levels, as there were few firms at the lower end of the spectrum. The contrast would certainly be sharper when we include groups of 'red-lined' borrowers.

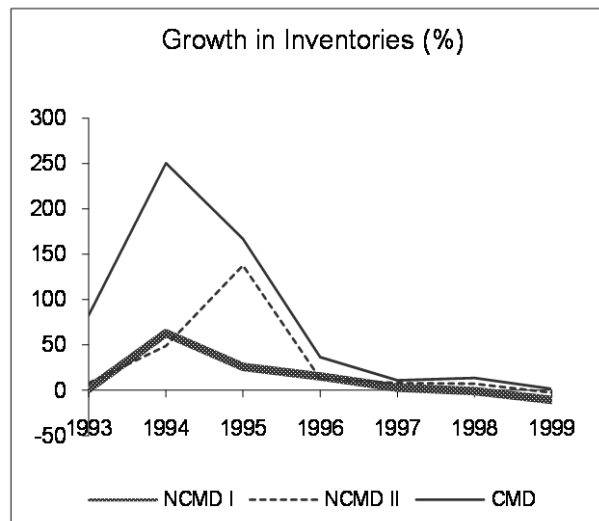
GRAPH 6

TRENDS IN SALES GROWTH , INVENTORY GROWTH AND PROFIT TO SALES RATIO

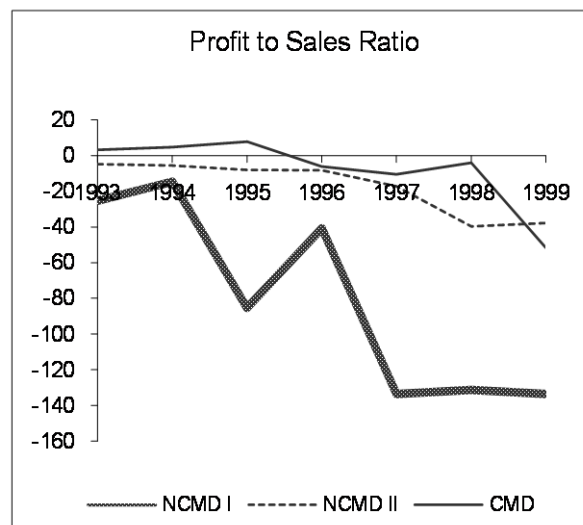
(a)



(b)



(c)



Notes: Profit to Sales Ratio is measured as profit after tax to net sales.

Sales growth refers to the growth in gross sales.

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