Stability of Lending Rate Stickiness: A Case Study of India

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Abstract

The paper postulates that in an environment of continuous financial reforms, the lending rate stickiness in an economy could be changing over the period. The financial reforms (of which deregulation of interest rates formed a major part) during the 1990s and the early 2000s and the changing role attributed to different policy rates during the reforms make India an interesting case study. The paper finds evidence of diminishing lending rate stickiness in case of India. During the major part of the study, Indian policymakers used the discount rate for policy signaling. The paper observes that as a result, the long-term rates like the lending rates did not react sufficiently to the changes in the short-term rates (e.g., repo rate) in this period unless the discount rate was also changed. Such behavior changed when policymakers started to use short-term rates like repo rates for policy signaling. Results in this paper suggest that when the impacts are added together, a change of 100 basis points in all policy rates towards the end of the reference period could change the lending rate in India almost by similar magnitude. These findings help to reconcile some of the contrasting findings on lending rate stickiness in case of India. Among possible factors still responsible for lending rate stickiness, the study identifies inelastic credit demand in India as an important factor. From policymaking perspective, however, it is postulated that as demand for personal and housing loans in India are likely to increase in future due to demographic factor, it is likely that such increase could tend to increase inflexibility in loan rates.

Keywords: Lending Rate Stickiness, Discount Rate Addiction, Monetary Policy Transmission
JEL Classification: E4, E5, E6

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1 Introduction

The current paradigm in monetary policy postulates that the changes in the short-term central bank rates would translate towards the longer end of the yield curve, leading to changes in the rates offered by the banking sector and hence, in aggregate demand. However, in reality, when the short-term official interest rates in an economy change, long-term rates like lending rates may or may not respond by the same amount. Further, the change – if at all it takes place – may not be contemporaneous, but lagged. This problem of "stickiness" of lending rate has received considerable attention in recent years (Hannan and Berger, 1991; Lowe and Rohling, 1992; Cottarelli and Kourelis, 1994; Cotttarelli et al, 1995; Moazzami, 1999; Mahadeva and Sinclair, 2001; Berstein and Fuentes, 2004).[1]

Empirical estimates of lending rate stickiness vary across countries. A major factor is the extent of use of discount rate as policy signals in addition to the use of short-term official rates (e.g., repo rates) by the monetary authorities (Cottarelli and Kouleris, 1994). In countries where an active discount rate policy is pursued, the so called 'discount rate addiction' by the banking sector has been found to be responsible for the stickiness of lending rate.[2] The stickiness could also be due to inelastic loan demands because higher the elasticity, higher is the opportunity cost of keeping loan rates in disequilibrium. Some other structural determinants of lending rate stickiness are: (i) competition in the banking system, (ii) state of development of financial markets and, (iii) banking system ownership, (iv) adverse selection, (v) borrowers' preference for stable interests, (vi) switching costs leading to market segmentation and (vii) consumer irrationality (Lowe and Rohling, 1992; Cottarelli and Kouleris, 1994; Mahadeva and Sinclair, 2001).

Despite progress in understanding, a major problem that has not been addressed in sufficient detail in the literature is the stability of lending rate stickiness. Given that during the 1990s many countries progressed towards market oriented economies, this issue assumes further significance. Structural reforms in these countries might have led to changes in the process of monetary policy transmission. Important aspects of these reforms were to move away from direct to indirect monetary policy measures and also to rely more on central bank interest rates to signal policy changes (Van't dack, 1999). It is likely that

[1] The word "stickiness" in the context of interest rates has two different connotations. The first implies that changes in the long term rates (e.g., deposit or lending rates) charged by banks are relatively less than changes in money market rates. The second indicates that the rates charged by banks are relatively inelastic with respect to shifts in demand for bank loans and deposits. In this paper, we use both connotations, initially the first one and then the second.

[2] Discount rate addiction reflects the situation where the banking sector reacts more strongly to changes in the discount rate rather than the official short-term rate. Cross-country estimates of Cottarelli and Kourelis (1994) reveal that if a change in money market rates is not accompanied by a change in the discount rate, the stickiness of the lending rate increases by 10 to 15 basis points.

stickiness in lending rates in such countries would not be constant, but stabilize gradually over time as the journey towards market determined economy nears culmination.

This paper examines the behavior of lending rate stickiness in India. We not only examine how quickly and to what extent lending rates changed following a change in the central bank interest rates in India, but also the stability of such movements. India would be a useful case study because interest rate structure in India experienced a radical change during the 1990s. Prior to the 1990s, the financial markets in India were segmented and lacked depth. The interest rates were administered and had multiple layers. Interestingly, the first attempt to free the interest rate structure in India during the early 1980s was not successful, and a common view on its failure was that it was not done in conjunction with much needed reforms in the other sectors of the economy (Malhotra, 1997).[3] In contrast, the interest rate reforms during the 1990s were adopted slowly but steadily in a sequential manner along with other reforms that focused on the overall development of money, government securities and foreign exchange markets.[4] The vision was to move away from the use of direct instruments of monetary control to indirect measures such as open market operations and market related interest rates. The first stage of interest rate reforms in India culminated in the reactivation of the Bank Rate (BR) in April 1997, when in a sweeping change, the BR was linked to all other interest rates, including the Reserve Bank's refinance rate.

In view of these reforms, from the Indian perspective, an examination of lending rate stickiness assumes significance. Earlier studies like Mahadeva and Sinclair (2001) that examined this problem separately for many countries questioned the effectiveness of the interest rate channel in case of India. The reference period in case of India in Mahadeva and Sinclair (2001), however, included data from the 1980s, when interest rates in India were administered. Recent India-specific studies of Prasad and Ghosh (2005b), in contrast, highlight the increasing role of interest rate in corporate performance. Interestingly, these apparently contradictory findings would be consistent if it can be demonstrated that lending rate stickiness in India has been decreasing gradually over time.[5] This paper

[3] The genesis and the early road map of interest rate reforms in India could be attributed to the "Report of the Committee to Review the Working of the Monetary System" chaired by Professor Sukhamoy Chakravarty in 1985 [henceforth referred as Chakravarty (1985)]. This was followed by the "Report of the Working Group on Money Market" in 1987 and the "Report of the Committee on the Financial System" in 1991 (popularly known as Vaghul Committee and Narasimham Committee respectively, henceforth referred as Vaghul (1987) and Narasimham (1991)].

[4] On the lending side, the deregulation began in 1994. Banks were given freedom to set their own Prime Lending Rates (PLR) and to devise their own lending policies. On the liabilities side, the entire gamut of deposit rates – except on savings deposits – were deregulated and banks were given freedom to offer different interest rates for different maturities/size-groups. The interest rates on government papers were also made market related. Further, the Reserve Bank's refinance facility was rationalized and the sector specific refinance facilities were de-emphasized.

[5] The 'signal rate' was changed from the Bank Rate (i.e., the discount rate) to the repo rate in 2005.

examines these problems. It also attempts to assess the importance of some other factors that could potentially influence the stickiness in lending rate in India.

The plan of the paper is as follows: Section 2 of the paper presents the analytical framework. Section 3 empirically examines the nature and the extent of lending rate stickiness prevailing in India. The underlying factors behind lending rate stickiness in India have been addressed in Section 4. Finally, Section 5 summarizes the main findings and analyzes the policy implications of these findings.

2 The Analytical Framework

The studies that examine the relationship between official and market related rates could be of different types, depending on whether the focus is on more than one country or a single country. Multi-country models like Cottarelli and Kourelis (1994) are panel data models that attempt to identify country-specific structural factors by including measures pertaining to them as explanatory variables in the models. However, sometimes despite using cross-country observations, separate models for countries have also been specified (Lowe and Rohling, 1992; Moazzami, 1999; Mahadeva and Sinclair, 2001). In contrast, when the focus is on a single country, the choice is generally restricted to time series models (Cottarelli et al, 1995; Heffernan, 1997).[6] The analytical framework adopted is consistent with the time series approach.

In a time series framework, analysis of lending rate stickiness can be carried out using a vector autoregression (VAR) framework. If the different rates are cointegrated then, vector error correction models (VECMs) may also be specified (Heffernan, 1997).[7] The cointegrating relationship helps to identify the "long-run" or the "equilibrium" relationship between the short and the long-term rates. In addition, the error correction equation in the VECM helps to estimate short-term or impact multipliers as against the long-term or full equilibrium multipliers. These models also estimate the speed of adjustment of lending rates.

The behavior of lending rate in a single country can also be analyzed through single equation autoregressive distributed lag (ADL) models (Cottarelli et al, 1995; Moazzami, 1999). To allow for the presence of lags in the adjustment of lending rates to changes in the money market rates, in this paper we specify the following ADL model:

[6] Recently, attempts have been made to examine lending rate stickiness with micro-level banking data for a single country, e.g., Bernstein and Fuentes (2004) for Chile.
[7] Focus of these models is more general as they examine the relationship among an array of interest rates.

$$(1) \qquad r_t = \alpha + \sum_{i=1}^{k} \beta_i r_{t-i} + \sum_{j=0}^{m} \gamma_j m_{t-j} + u_t$$

where r_t and m_t are lending rate and the money market rate at time t and u_t is the error term. Cottarelli and Kourelis (1994) used a similar model and derived sets of multipliers reflecting the adjustment of the lending rate at different time lags. Equation (1) may also contain a set of other variables. For example, if discount rate is perceived as an important determinant of the lending rate, changes in the discount rate and its lags may be included (Cottarelli and Kourelis, 1994). Similarly, if the empirical analysis is carried out over a long time span, some other variables incorporating structural changes may also be considered.

In equation (1), the coefficient γ_0 measures the short-run or impact effect of changes in the money market rates on lending rates. The long-run or full equilibrium effect of changes in the money market rates on lending rates is equal to:

$$(2) \qquad \theta = \left(\sum_{j=0}^{m} \gamma_j \right) / \left(1 - \sum_{i=1}^{k} \beta_i \right)$$

Estimating equation (1), one can obtain short-run and long-run effects of changes in money market rates on lending rates. The presence of lending rate stickiness can be examined by testing the hypothesis that the short-run impact coefficients are less than unity. The extent of long-run adjustment of lending rates to the money market rates can be examined by testing the null hypothesis of H_0: $\theta = 1$.

Empirically, the model described in equation (1) can be estimated through ordinary least squares (OLS). To have parsimony, the insignificant lags in equation (1) may be dropped from the model. In fact, the empirical estimation procedure can be based on a general to specific modelling approach as in Clements and Hendry (1998).

Testing the long-run hypothesis based on the OLS estimate of model in equation (1) is, however, computationally inefficient since we not only have to calculate the long-run coefficient θ, but also have to compute its standard error in order to test the null hypothesis of no lending rate stickiness. Clearly, it would be better if we can estimate θ along with its standard error directly. This can be done by writing (1) in a form proposed by Wickens and Breusch (1988):

$$(3) \quad \Delta r_t = \alpha - \sum_{i=1}^{k-1} \left(\sum_{j=i+1}^{k} \beta_i \right) \Delta r_{t-i} + \gamma_0 \Delta m_t - \sum_{i=1}^{m-1} \left(\sum_{j=i+1}^{m} \gamma_i \right) \Delta m_{t-i} - \left(1 - \sum_{i=1}^{k} \beta_i \right) (r_{t-1} - \theta m_{t-1}) + u_t$$

Here, equation (3) is an extended version of the error correction model popularized by Hendry (1986), suggesting that changes in the lending rates over time are from two sources. First they respond to a lag to changes in the official interest rates. Second, they respond to deviation from their long-run relationship. Here, (3) is in the error-correction form and suggests that $(1 - \Sigma\beta_i)$ of the disequilibrium between lending rates and money market rates is adjusted for in each period. Estimating equation (3), we can directly obtain the short-run impact multiplier γ_0 along with the long-rum multiplier θ and the speed of adjustment as revealed by $(1 - \Sigma\beta_i)$.

Finally, in this paper, stability in the estimated coefficients is examined in a rolling regression framework. The rolling regressions have been carried out with a moving window (i.e., number of observations in each regression has been kept constant by deleting and adding one observation each). Series corresponding to the relevant coefficients have been constructed from these regressions. A few equations pertaining to important sub-periods have also been reported.

3 The Relationship between Official Rates and the Lending Rate in India

The reference period considered in this study is: April 1997 to March 2006. The beginning of our reference period roughly coincides with the completion of the first stage of monetary policy reforms in India. Further, April 1997 also coincides with the reactivation of BR. Based on the relative importance attached to different policy rates, the entire period may be divided into three sub-periods. During the first sub-period (April 1997 to May 2000), BR was the most important policy rate. This period could be considered as an early stage in the second generation of monetary policy reforms in India. At this stage, attempts were being made to create appropriate corridors for the short-term money market rates.

The next sub-period (June 2000 to March 2005) is the period in which the corridor for short-term money market rates was well established through Liquidity Adjustment Facility (LAF). The RBI used both the short-term reverse repo rate (RREPO) and the BR actively during this period. While the first was used to stabilize the financial markets, the second reflected the medium to long-run perspective of the central bank. Subsequently, with the sharp decline in recourse to central bank refinance (at rates linked to BR), there was a shift in emphasis on managing short-term liquidity. During the later half of 2004, RBI observed that the repo / reverse repo rates had become "potent tools for signaling the stance of monetary policy and defining an informal corridor of short-term interest rates" (Reserve Bank of India, 2004, Box III.1, p. 108).[8] One of the internal studies in RBI also suggested around this time that "it would be desirable to de-emphasise the passive sterilization attribute of the LAF repo facility so that it could emerge

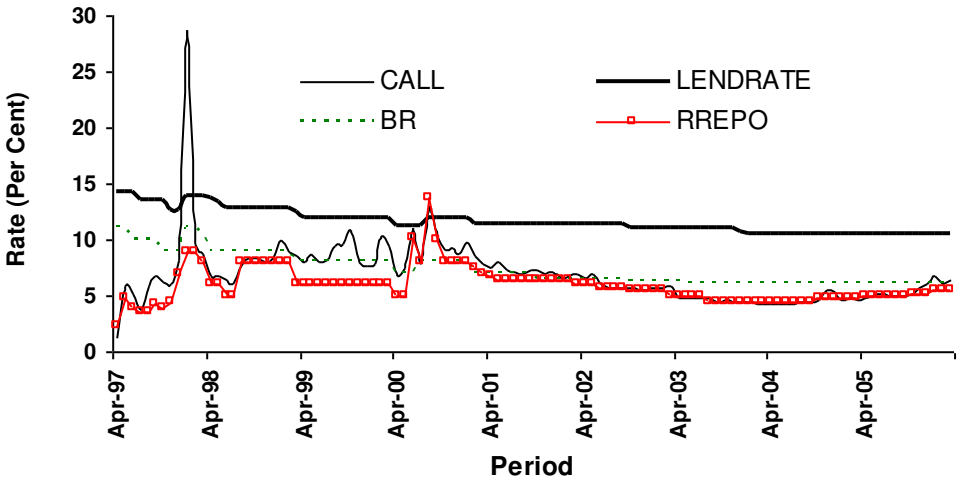
[8] Till October 2004, Repo (Reverse Repo) conducted by the central bank meant liquidity absorption (injection) in India. It may be noted that this was opposite to international convention. RBI changed to international convention in October 2004 after suitable notifications in its policy documents. Throughout this paper, international convention has been followed.

as the exclusive policy signaling rate" (Para 69, Mid-Term Review, Reserve Bank of India, October 26, 2004). Subsequently, in April 28, 2005, RBI explained that

> "On Balance of considerations, the Reserve Bank raised CRR and the reverse repo rate moderately *to signal* its strong commitment to price stability"
> (Annual Policy Statement for the Year 2005-06, Para 48, emphasis added)

Thus, from April 2005, the dichotomy of the twin policy rates was somewhat removed as RREPO was explicitly used to signal the central bank's policy stance. This could be the third and the final sub-period in our reference period. In the subsequent empirical analysis, however, we have combined the second and the third period as the number of observations in the third period is too small to be analyzed separately.

Figure 1: Movements in Reverse Repo Rate, Bank Rate, Call Money Rate and Lending Rate



In the subsequent empirical analysis, we have considered four interest rates. Among these, RREPO and BR are central bank rates and LENDRATE is the average of the minimum and the maximum prime lending rates (PLR) reported by banks. As a significant part in our study includes the period in which attempt to construct appropriate corridors for short-term interest rates was going on in India, we have also included call money rate (CALL) in the domain of our analysis. As call money rate in India was volatile sporadically, monthly average figures for them were considered. All other three rates in the study are, in contrast, rates on the last working day of a month. All data used in this study are published by RBI on regular basis. Figure 1 presents the movements of RREPO, CALL, BR and lending rate (LENDRATE) in India during the reference period.

Figure 1 reveals a close association between BR and LENDRATE for the entire period. After the introduction of LAF in June 2000, LENDRATE appears to have a close association with RREPO as well. In Table 1, we examine the nature and

the extent of change in LENDRATE after a change in either of these policy rates. Table 1 reveals that the initial change of LENDRATE in response to a change in BR was generally carried out within the next month. Similar relationship with RREPO, however, was not very clear from Table 1.

Table 2 presents the relationship of all other rates with LENDRATE in further details. In Table 2, contemporaneous and lagged correlations of all the other rates with LENDRATE are presented. Table 2 reveals that the contemporaneous correlation between LENDRATE and CALL is 0.41. Correlations of the first three lags of CALL with LENDRATE also vary within a range of 0.38–0.41. Two major factors for the low correlations between LENDRATE and CALL are possibly (i) the trend in LENDRATE and, (ii) the high volatility of CALL during the reference period. Between April 1997 and March 2006, LENDRATE generally experienced a downward trend, while CALL fluctuated over a wide range between 1.22 and 28.70. The high value of 28.70 was in January 1998 – during the South-East Asian crisis that led to a sudden change in monetary tightening by the RBI. Excluding that outlier, CALL moved in and around BR and was generally lower than the LENDRATE. In fact, between April 1998 and March 2006 – a period that excludes the outlier – the contemporaneous and cross-correlations between LENDRATE and CALL were in the range of 0.60–0.70.

Interestingly, the contemporaneous correlation of ΔLENDRATE with ΔCALL is also moderate at 0.51, while cross-correlations of ΔLENDRATE with lags of ΔCALL are negligible. This is probably because of a moderate degree of correlation between LENDRATE and CALL *at the change points* of LENDRATE. Correlations of LENDRATE with RREPO and ΔRREPO are also modest.

The contemporaneous and lagged correlations between LENDRATE and BR are, however, very high and decrease from 0.97 to 0.82. Contemporaneous correlation between ΔLENDRATE and ΔBR is moderate at 0.56. The same for first lag of ΔBR is also moderate (0.39), but that with higher lags of ΔBR are small.

Figure 1, Table 1 and Table 2 together reveal a certain degree of lending rate stickiness along with discount rate addiction in the Indian economy. Simple calculations also reveal that between April 1997 and March 2006, BR has decreased by 500 basis points. Such a change, however, has brought a 375 basis point change in LENDRATE, implying that a 100 basis point change in BR ushers about 75 basis point change in LENDRATE in the long-run.

ADF tests for the presence of unit root in RREPO, CALL, BR and LENDRATE reveal some interesting features. The results presented in Table 3 reveal that both BR and LENDRATE may be characterized as an I(1) series based on the data for the entire period. For RREPO, the evidence is not as strong, though it may still be considered as an I(1) series at 5.0 per cent level of significance. Interestingly, the series CALL strongly displays characteristics of an I(0) series

for the entire period, as well as for the period April 1997 to May 2000. This result is, in fact, somewhat contrary to international evidence. Internationally, money market rates have been found to be I(1) series (Heffernan, 1997), leading to a specification of appropriate VECM models. The stationarity could be due to the outlier in January 1998, when call shot up to 28.70 per cent in January 1998, but the change was not persistent. Still, as we find evidence that the series CALL may be an I(0) series, modelling strategy in the Indian context will have to be somewhat different. Table 3 also reveals that sub-period specific tests of stationarity of the series, in many cases, are conflicting.

Table 1: Changes in Official Rates and the Lending Rate

Changes in Official Rates			Changes in Lending Rate			
Month	BR	RRepo	Month 0	Month 1	Month 2	Month 3
(1)	(2)	(3)	(4)	(5)	(6)	(7)
May-97	0	+235	0	0	-75	0
Jun-97	-100	-75	0	-75	0	0
Jul-97	0	-40	-75	0	0	0
Sep-97	0	+75	0	0	-75	0
Oct-97	-100	-35	0	-75	0	+125
Nov-97	0	+50	-75	0	+125	0
Dec-97	0	+250	0	+125	0	0
Jan-98	+200	+200	+125	0	0	-25
Mar-98	-50	-100	0	-25	-37	-50
Apr-98	-150	-100	-25	-37	-50	0
Jun-98	0	-100	-50	0	0	0
Aug-98	0	+300	0	0	0	0
Mar-99	-100	-200	-38	-50	0	0
Apr-00	-100	-100	-75	0	0	0
Jun-00	0	+525	0	0	+75	0
Jul-00	+100	-225	0	+75	0	0
Aug-00	0	+575	+75	0	0	0
Sep-00	0	-375	0	0	0	0
Oct-00	0	-200	0	0	0	0
Feb-01	-100	-50	-50	0	0	0
Mar-01	0	-50	0	0	0	0
Apr-01	0	-25	0	0	0	0
May-01	0	-25	0	0	0	0
Oct-01	-50	0	0	0	0	0
Mar-02	0	-50	0	0	0	0
Jun-02	0	-25	0	0	0	0
Oct-02	-25	-25	-38	0	0	0
Mar-03	0	-50	0	0	-13	0
May-03	-25	0	-13	0	0	0
Aug-03	0	-50	0	0	0	0
Oct-04	0	+25	0	0	0	0
Apr-05	0	+25	0	0	0	0
Oct-05	0	+25	0	0	0	0
Jan-06	0	+25	0	0	0	-

Notes: The changes are reported in basis points. Here Month 0 is the contemporaneous month. Similarly, Month 1, Month 2 and Month 3 reflect the changes in LENDRATE after one, two and three months respectively.

Table 2: Contemporaneous and Lagged Correlations

Correlations / Lags (1)	Lag 0 (2)	Lag 1 (3)	Lag 2 (4)	Lag 3 (5)
LENDRATE with				
RREPO	0.27	0.29	0.28	0.26
CALL	0.41	0.41	0.40	0.38
BR	0.97	0.93	0.88	0.82
∆LENDRATE with				
∆RREPO	0.39	0.18	0.15	-0.01
∆CALL	0.51	0.04	0.04	0.03
∆BR	0.56	0.39	0.09	-0.12

Table 3: Results of ADF Tests

Series (1)	Min. Lag (2)	ADF t-test (3)	ADF z-test (4)	Joint Test Unit Root& No Trend (5)
Apr-97 to May-00				
CALL	9	-7.07 #	9.73 #	26.12 #
RREPO	1	-2.27	-11.87	2.74 @
BR	5	-4.38 #	27.35 #	9.63 #
LENDRATE	4	-3.71 @	68.73 #	6.96 @
Jun-00 to Mar-06				
CALL	1	-1.39	-5.99	1.16
RREPO	4	-3.63@	-42.85 #	6.66 @
BR	7	-0.56	-1.60	0.59
LENDRATE	4	-2.77	-24.50 @	3.95
Apr-97 to Mar-06				
CALL	1	-5.83 #	-60.38 #	17.12 #
RREPO	4	-3.89 @	-31.55 #	7.99 @
BR	14	-1.02	-2.49	3.55
LENDRATE	8	-0.93	-2.32	2.45

Note : Here #, @ and $ denote significance at 1%, 5% and 10% level respectively. Minimum lag has been chosen by the AIC criterion.

To tackle the problem of stationarity, all equations in this section have been estimated in an ADL framework. The estimated equations of LENDRATE (on its own lag, CALL and lagged CALL) for different sub-periods are presented in Table 4. It may be noted that CALL had an outlier in January 1998 that severely distorted the empirical relationship between April 1997 to May 2000. In column (2) of Table 4, the coefficient of LENDRATE(-1) was more than unity, rendering any calculations for multipliers and speed of adjustment coefficients meaningless. Excluding the outlier period, a separate equation from April 1998 to May 2000 has also been reported in Table 4. It may be noted that all the equations in Table 4 can be written in error correction form as described in Section 2. The long-run stickiness coefficients and the speed of adjustments for different models have also been calculated and reported in Table 4.

Table 4 reveals that while CALL affects LENDRATE significantly, the immediate impact is small and not more than 10 basis points on average. Expectedly, only persistent liquidity problems lead to an increase in LENDRATE. The steady state impact for different periods in columns (3) to (5) are moderate and within 40 to 80 basis points. The estimated equation in column (2) and hence the long-run stickiness coefficient have been clearly affected by the outlier in CALL in January 1998 that occurred due to extraneous factors.

So far as the estimated relationships between (i) LENDRATE and RREPO and (ii) LENDRATE and BR are concerned, the estimated equations in the ADL framework have been presented in Table 5.

Table 4: Relationship between LENDRATE and CALL

Variables / Period (1)	Apr-97 to May-00 (2)	Apr-98 to May-00 (3)	Jun-00 to Mar-06 (4)	Apr-97 to Mar-06 (5)
Constant	-0.7479 (-1.22)	0.2328 (0.24)	0.8477 (2.24)@	0.5537 (3.26)#
LENDRATE(-1)	1.0144 (22.63)#	0.9434 (14.63)#	0.9032 (23.41)#	0.9253 (59.71)#
Call	0.0656 (6.53)#	0.0914 (2.44)@	0.0745 (6.06)#	0.0561 (9.20)#
Call(-1)	-0.0075 (-0.79)	-0.0466 (-1.31)	-0.0397 (-2.81)#	-0.0147 (-2.35)@
Impact Multiplier	---	0.09	0.07	0.06
Long-run Stickiness Coefficient	---	0.79	0.36	0.55
Speed of Adjustment Coefficient	---	0.06	0.10	0.07
No of Observations	38	26	70	108
R-Square	0.94	0.92	0.96	0.98
R-Bar Sq	0.93	0.90	0.96	0.98
D-W Statistics	2.09	1.95	1.68	1.77

Note: The bracketed terms are t-statistics. Here, #, @ and $ indicate significance at 1.0, 5.0 and at 10.0 per cent respectively. X(-k) indicate the value of X at the k-th lag. All subsequent tables and equations follow similar convention.

As per Table 5, the impact multiplier of RREPO is small and less than 20 basis points. The impact multiplier for BR is somewhat larger and varies between 35 and 45 basis points for different periods. As an illustration, consider the equation in column (7) of Table 5. The impact multiplier and the long-run multiplier of this equation work out to be 0.35 and 0.71 respectively. Thus a 100 basis point change in BR is likely to bring an average contemporaneous change in LENDRATE by 35 basis points, while the long-run adjustment is about 71 basis

points. The result appears to be consistent with our earlier descriptive analysis. The result is also close to Mahadeva and Sinclair (2001), who arrived at an estimate of about 70 basis points long-run adjustment of the lending rate in response to 100 basis points change in the official rates for the Indian economy.

Table 5: Relationship of LENDRATE with RREPO and BR

Variables / Period (1)	Apr-97 to May-00 (2)	Jun-00 to Mar-06 (3)	Apr-97 to Mar-06 (4)	Apr-97 to May-00 (5)	Jun-00 to Mar-06 (6)	Apr-97 to Mar-06 (7)
Constant	0.0366 (-0.35)	1.0534 (3.12)#	0.3766 (1.87)$	3.8423 (5.14)#	0.7739 (2.15)@	2.1518 (5.61)#
LENDRATE(-1)	0.9495 (16.80)#	0.8758 (25.42)#	0.9379 (52.90)#	0.3215 (2.95)#	0.8527 (17.54)#	0.6652 (11.69)#
RREPO	0.1930 (3.87)#	0.0732 (6.58)	0.1057 (5.92)#			
RREPO(-1)	-0.1081 (-2.34)@	-0.0197 (-1.56)	-0.0530 (-3.02)#			
BR				0.4261 (7.20)#	0.2618 (3.70)#	0.3534 (7.86)#
BR(-1)				0.1125 (1.23)$	-0.1300 (-1.63)	-0.1155 (-1.99)@
Impact Multiplier	0.19	0.07	0.11	0.43	0.26	0.35
Long-Run Stickiness Coefficient	1.68	0.43	0.85	0.79	0.89	0.71
Speed of Adjustment Coefficient	0.05	0.12	0.06	0.68	0.15	0.33
No of Obs.	38	70	108	38	70	108
R-Square	0.90	0.96	0.97	0.96	0.96	0.98
R-Bar Sq	0.89	0.96	0.97	0.95	0.95	0.98
D-W Statistic	2.44	1.74	2.15	2.35	2.27	2.04

It may be noted that the specification in Section 2 also enables us to examine the effect of RREPO and BR together. The estimated equation in ADL form for the entire period is presented in equation (4) below:

$$\underset{}{\text{LENDRATE}} = \underset{(4.22)\#}{1.6820} + \underset{(12.43)\#}{0.73}\ \text{LENDRATE}(-1) + \underset{(3.33)\#}{0.06}\ \text{RREPO} + \underset{(6.28)\#}{0.29}\ \text{BR} - \underset{(-1.91)\$}{0.03}\ \text{RREPO}(-1) - \underset{(-1.91)\$}{0.11}\ \text{BR}(-1) \quad (4)$$

R Square = 0.98, R-Bar Square = 0.98, D-W Statistic = 2.08

The long-run stickiness for RREPO and BR in equation (4) work out to be 0.11 and 0.67, with impact multipliers 0.06 and 0.29 respectively. Together, these figures work out to be 0.78 and 0.35, implying a 100 basis point increase in both RREPO and BR would usher a near immediate increase of 35 basis points in LENDRATE. In the long run, the change is expected to be about 75–80 basis points. Interestingly, the above equation reveals the importance of BR during the reference period. The Indian example, therefore, is a classical case of discount rate addiction. It may however be noted that the explicit move to make RREPO the policy rate might have led to another important structural change circa late 2004. However, the number of observations in our reference period is not yet long-enough to propose a rigorous test for this change.

To examine this change, a rolling regression framework may, however, be specified. For this purpose, the specification in equation (4) was estimated with a moving window of 90 observations (e.g., the first regression was based on data from April 1997 to October 2004, the next from May 1997 to November 2004 etc.). Figure 2 presents the 18 long-run and the short-run multipliers plotted along the end-points of these regressions. It may be noted that the time period in the X-axis of Figure 2 roughly coincides with the period in which the move towards signaling through RREPO was initiated. In Figure 2, LONGMUL and IMPMUL are the long-run and short-run multipliers, respectively indicating the long and immediate impact of a 100 basis points simultaneous rise in RREPO and BR.

In Figure 2, both LONGMUL and IMPMUL rise – first gradually and then sharply – till April 2005. From May 2005 onwards, however, both the coefficients display stability. Although it is too early to come to a firm conclusion, at least, it is possible to hypothesize that the stability of the two coefficients in Figure 2 could be due to possible culmination of interest rate reforms in India.

Incidentally, the cross-country panel study of Cottarelli and Kourelis (1994) points out that the degree of stickiness, on average, is relatively high for a number of countries. In three-fourth of the cases, the long-run multiplier obtained by Cottarelli and Kourelis (1994) was between 0.75–1.25. The impact multiplier was typically one-third of the long-run multiplier. The long-run multipliers for India obtained from different equations are on the lower side of the general international standard. Cross-country experiences also reveal that the speed of adjustment of the lending rate is slow. On average, after one and two quarters, about one-third and one-fourth of the adjustments remain to be completed. The estimated relationships in case of India appear to be consistent with earlier findings. Empirical results in case of India, however, suggest the weakening of the stickiness in recent years.

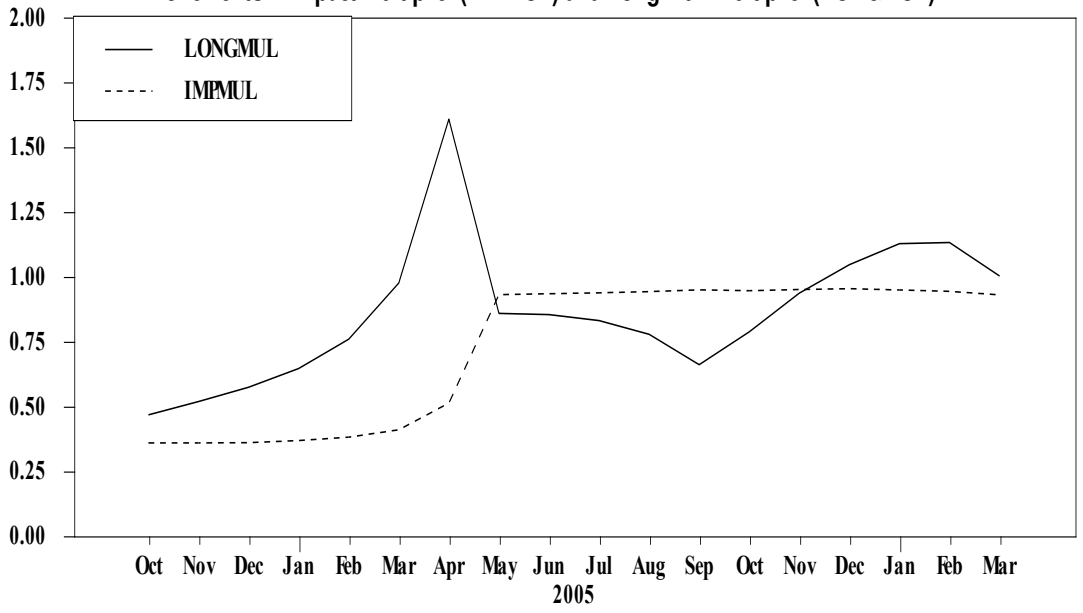
4 Underlying Factors behind Lending Rate Stickiness in India and Policy Implications

It is not easy to assess the relative importance of the factors behind lending rate stickiness in an economy from a small time series data. Most of the structural

factors identified by researchers change slowly in the short-run and their real impact can only be assessed from a long time series, which is not available. The discussions that follow in this section, therefore, need to be interpreted with caution.

Figure 2

Movements in Impact Multiplier (IMPMUL) and Long-Run Multiplier (LONGMUL)



In the Indian context, some of the factors behind lending rate stickiness could be (i) lack of sufficient competition in the banking sector, (ii) lack of sufficient development of the financial markets, (iii) ownership structure of the banks, (iv) downward rigidity of the deposit rates and the resultant pressure on the spread and profitability of the banking sector and, (v) inelastic credit demand. In what follows, we analyze the potential contributions of these factors.

4.1 The Lack of Sufficient Competitiveness in the Banking Sector

The lack of sufficient competition among the banks is likely to lead to lending rate stickiness. An environment characterized by the monopolistic structure may not induce the banks to reduce the lending rate in response to the changes in official rates. Similarly, in cases of oligopoly, smaller banks may not be willing to initiate an interest rate cut. Internationally, to what extent the degree of competition affects lending rate stickiness is debated. For example, while Cottarelli and Kouleris (1994) did not find market concentration a significant factor behind lending rate stickiness, a key factor attributed by Moazzami (1999) for an explanation of the different degrees of lending rate stickiness in the US and Canada is market concentration.

The degree of competition within the banking system is either measured by the market shares of a few large banks and the number of bank branches per population. In the Indian context, market concentration is perceived to be high due to the large size of the State Bank of India (SBI) and its associates. However, market concentration measures are generally not good proxies for the actual degree of competition if there is no barrier in entry of new competitors at the macro level or at the branch level. In India, the regulatory framework provides no barrier as in some countries like the US (Moazzami, 1999). Also, the number of different banks as well as bank branch penetration in India is high compared to many developing economies implying lack of competition may not be that relevant in the Indian context.

In the Indian context, there is evidence that during the 1990s and early 2000s, competitiveness of the banking sector has increased. For example, Bhattacharya and Das (2003) have observed a clear downward trend in the HHI of bank assets during the 1990s. So far as competitive pressure is concerned, different measures of spreads of banking sector also show a clear decreasing trend in the 1990s. Further, results in Prasad and Ghosh (2005b) pertaining to the period 1996–2004 suggest that the Indian banks had operated during that period under competitive conditions. The banking market structure identified in this study resembled monopolistic competition. Although we do not address the relative contribution of this factor empirically, it is possible to hypothesize that the change in banking market conditions was an important factor behind the recent reduction in lending rate stickiness in India in recent years.

4.2 Lack of Sufficient Development of Financial Market

In the literature, a standard approach to measure the overall degree of financial development is to examine the trends in the ratio between financial assets and GDP. As the data on aggregate financial assets in a country are not readily available, some other measures used are (i) the ratio between broad money and GDP and (ii) the ratio between broad and narrow money. Increases in these ratios over time indicate increase in financial innovations during the period.

In the Indian context, the ratio between broad money (M_3) and nominal GDP was 0.52 in 1990-91, 0.56 in 1996-97 and 0.85 in 2005-06. Similarly, the ratio between broad money (M_3) and narrow money (M_1) was 2.86 in March 1991, 2.89 in March 1997, but increased to 3.31 in March 2006. The growth of these ratios indicates increase in financial innovations. This suggests that, in case lending rate stickiness is on account of lack of development of financial markets, then over the period response of lending rate to the changes in policy rates should improve.

4.3 Downward Rigidity of the Deposit Rates

If the banks are not in a position to effect cut in their deposit rate, this may lead to rigidities in lending rate movements. Keeping other aspects aside, prime lending rate should be equal to the deposit rate plus (minimum) margin essential to meet operational expenditure. Thus, once the margins are squeezed to the minimum level, further reductions in the lending rate may not be feasible unless the deposit rate also changes by similar magnitude. The dependence of the banks to adjust lending rate as a response to the changes in official short-term interest rate would also depend upon the magnitude of the refinance window available to them.

In this context, it may be noted that despite moving towards a market determined interest rate regime, a minimum floor on the interest rate on savings deposit in India has been maintained during the reference period. A related factor that could also influence the behavior of the lending rate in India is the behavior of the administered rates on small-scale savings. The rates of interest offered on these instruments compete directly with the banking sector instruments. The study of Bhattacharya and Singh (2001) reveals that a 100 basis point change in these rates typically leads to about 40 basis point change in the deposit rates of the banking sector. Thus, whenever the administered rates on small-scale savings change, the spread between the deposit and the lending rates also change. It may be noted that it is this spread that generates net interest income of the banking sector and could be an important determinant of the lending rate.

4.4 Inelastic Credit Demand

The transaction and information costs facing banks affect their willingness to respond to policy impulses. Banks favor changing the lending rate when they are certain that the change in the official rate is a permanent one. However, as this can not be decided instantaneously, a simpler way is to adopt a 'wait and watch' policy. A major factor that determines the response time is the cost of making the wrong choice. Whenever a bank reacts to a change in the overnight rate, it incurs adjustment costs. The degree to which these adjustment costs delay the response of lending rates to changes in money market rates depends on the elasticity of demand for bank loans (Cottarelli and Kourelis, 1994, p. 590).

Elasticity of demand for credit with respect to the interest rate may also be one of the factors affecting the stickiness of lending rate. In case demand for credit is inelastic, banks will not be tempted to change lending rate immediately with the change in BR, since it does not affect their borrower’s behaviour. On the contrary, in case of high elasticity (of demand for credit with respect to lending rate), banks would be inclined to switch lending rates, more frequently.

To find out the elasticity of demand for credit in India, a demand for credit equation has been specified. The log of real credit (ROBCCS) is used as a dependent variable in the equation. To obtain real credit, nominal credit – measured in terms of other bank credit to commercial sector in the monetary series – has been deflated by the WPI. In the specification, logarithm of IIP (LIIP) and LENDRATE have been used as explanatory variables. A rise in IIP would lead to a rise in real credit while an increase in interest rate would act as an impediment. Thus the signs of the two coefficients are expected to be positive and negative respectively. The estimated equation is presented below:

(5) ROBCCS = 1.8853 + 1.4306 LIIP – 0.0728 LENDRATE
(3.39)# (17.27)# (–5.91)#
R-SQ = 0.95, R-BAR SQ = 0.95, DW-STATISTIC = 0.97

Equation (5) reveals a good fit. However, the DW-Statistic appears to be not very satisfactory, indicating some inappropriateness in the equation, in terms of its specifications. The important point to note is that lending rate reveals the desired impact, through its effect is relatively very small.

5 Conclusion

The paper explored the nature, extent and stability of lending rate stickiness in India. The paper found evidence of lending rate stickiness, but also observed that in an environment of continuous financial reforms, such stickiness could be changing over the period. During the major part of the reference period, the Bank Rate has been used by the Indian monetary authorities to signal its intention and the practice – even after the introduction of LAF. As a result, the long-term rates like the lending rate did not react sufficiently to the changes in the reverse repo rates unless the Bank Rate was also changed, at least during the initial years. The Indian experience, therefore, is a good example of discount rate addiction.

So far as the changes in The Bank Rate is concerned, results based on the post-April-1997 data revealed that a 100 basis point change in the Bank Rate on an average led to 25–45 basis points contemporaneous change and 70–90 basis points long-run change in the lending rate. Historical data suggest that a similar change in Reverse Repo Rate alone ushered changes that were much smaller. During the major part of our reference period, however, both the rates were used simultaneously by the monetary authorities for different purposes. When the impact of both the rates are studied together, our study reveals that during the recent period the stickiness in lending rate seems to have decreased, as a change of 100 basis points each of both these rates could change the lending rate almost by similar magnitude.

These results have serious implications for the transmission of monetary policy in India. Cross-country studies like Mahadeva and Sinclair (2001) noted earlier that

the modest coefficients of the policy rates point to the possibility of deliberate long-run rate smoothing by the banks and remarked that the monetary transmission channel that ran from loan rates to private sector investment and consumption spending would not be very strong in countries like India. Prasad and Ghosh (2005a), in contrast, had obtained an increasing role of interest rates in the monetary policy transmission mechanism in India in recent years. Our study could explain this puzzle through a demonstration of decrease in lending rate stickiness in India. Our analysis, however, suggests that the low elasticity of credit demand in India could be an impediment in further decline of lending rate stickiness. As due to demographic factor, demand for personal and housing loans in India are likely to increase in future, it is likely that such increase could tend to increase inflexibility in loan rates.

Incidentally, a limitation of this study is the brief time span over which the analysis is based. As the journey to a market determined interest rate regime is a relatively new development in India, such limitations can not be avoided. Further, as the change in signal mechanism through Reverse Repo Rates (in place of Bank Rate) is a recent development, it is likely that currently lending rate stickiness is going through another important structural change in India. It is difficult to hypothesize to what extent the stickiness would change in the coming years, but the new paradigm could usher important changes in relative contributions of the discount rate and the Reverse Repo Rate in affecting the lending rate. So far as policies are concerned, the results reported in this paper, therefore, need to be interpreted with caution and monitored on continuous basis.

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