The Risk Aversion of Banks in Emerging Credit markets: Evidence from India

Sumon Kumar Bhaumik

Queen's University Belfast,
CNEM, London Business School, and
William Davidson Institute, Ann Arbor

Jenifer Piesse

King's College London, and
University of Stellenbosch, RSA

Corresponding author:

Sumon Kumar Bhaumik
School of Management and Economics
Queen's University Belfast
25 University Square
Belfast BT7 1NN
UK
Phone: 44 28 9097-3273
Fax: 44 28 9097-5156
Email: s.bhaumik@qub.ac.uk.

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Abstract:

Using bank-level data from India, for nine years (1995-96 to 2003-04), we examine banks' behavior in the context of emerging credit markets. Our results indicate that the credit market behavior of banks in emerging markets is determined by past trends, the diversity of the potential pool of borrowers to whom a bank can lend, and regulations regarding treatment of NPA and lending restrictions imposed by the Reserve Bank of India. Finally, we find evidence that suggest that credit disbursal by banks can be facilitated by regulatory and institutional changes that help banks mitigate the problems associated with enforcement of debt covenants and treatment of NPA on the balance sheets. On the basis of these results, we speculate on some possible policy recommendations.

JEL classification: G21, O16
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1. Background

Much of the literature on banking in emerging markets focuses on either the broad relationship between ownership and financial performance (e.g., Sarkar, Sarkar and Bhaumik, 1998) or the agency aspect of ownership, i.e., the impact of separation between management and ownership on the performance of banks (e.g., Gorton and Schmid, 1999; Hirshey, 1999). The focus on the relationship between ownership and financial performance of banks in emerging markets stems from concern about both the possibility of inefficient allocation of scarce financial resources in the presence of dominant public sector banks that often manifest McKinnon-Shaw type financial repression, and also from the concern about the possible fiscal impact of banking sector fragility in an environment where directed credit, political patronage, and severe moral hazard on the part of public sector bank officials can lead to significant accumulation of non-performing assets (NPAs).

While the focus on ownership is not completely unjustified in the context of banks in emerging markets, it has drawn attention away from the fact that, unlike a manufacturing or services sector firm, a bank helps mobilize domestic savings for subsequent investment in various on-going and new projects, and thereby is also the conduit for the transmission of monetary policy, and the facilitator of economic growth. Indeed, it is now stylized in the literature that the intermediary role of banks plays an important role in encouraging growth, even though in some countries a well-functioning credit market has added the unwelcome effect of increasing debt accumulation rather than improving total factor productivity (Gertler and Gilchrist, 1993; Ketkar, 1993; Ma and Smith, 1996; Bulir, 1998; Acemoglu, 2001; Bell and Rousseau, 2001; Da Rin and Hellman, 2002; Jeong, Kymn and Kymn, 2003). Thus, not only are allocative efficiency and financial performance of banks important, but so also is the amount of credit disbursed by these financial intermediaries.

The fallacy of analysis that emphasizes bank ownership, with the prior that private ownership is

better than public ownership, is evident. While private ownership may improve allocative efficiency in the credit market, at least so long as the market is not subjected to financial repression, there is evidence to suggest that it may be detrimental to credit disbursal, if the risks associated with this are significantly high. For example, the International Monetary Fund (2000) noted that subsequent to privatization of banks in Bulgaria, following the banking-currency crisis of 1996-97, the banking sector was reluctant to lend in the high-risk environment, resulting in a ratio of private sector credit to GDP of about 12 percent. This is compared to the optimal value of this ratio for a country with Bulgaria's per capita GDP of around 30 percent. Latin American evidence suggests that foreign banks are especially risk averse and that significant market penetration by these banks in a developing economy context might adversely affect credit disbursal to small and medium enterprises (Clarke, Cull, D'Amato and Molinari, 1999; Clarke, Cull, and Peria 2001; Clarke, Cull, Peria and Sanchez, 2002).

However, Banerjee and Duflo (2002) have argued that credit rationing on account of risk averseness is not specific to domestic and foreign private banks. Using Indian data, they show that public sector or government owned banks can also exhibit such risk averseness, albeit more on account of the political economy of blame sharing in the event of poor bank performance than profit motives. That is, the behavior of banks in emerging economy credit markets may not be a monotonic function of ownership; credit disbursal by banks in inherently high risk markets may be depend on a host of other factors. Hence, it is worthwhile exploring the credit market behavior of banks in an emerging market context.

The main problem in extending the Banerjee and Duflo approach to a larger proportion of the banking sector in India, or indeed any other developing country, is that it requires data on *all* credit related transactions of the banks. Indeed, the data used by Banerjee and Duflo itself is very limited, restricted to the activities of one Indian public sector bank that accounted for about 5 percent of banking sector assets when the analysis was undertaken. Therefore, in this paper, we propose to address this important issue using an alternative methodology for which time series data is available for all banks operating in India.

Banks in India have the choice of investing resources in safe government bonds, or risky credit instruments. *Ceteris paribus*, a bank has to choose the allocation of resources between the riskless and

risky assets, and this choice is manifested in the credit-to-deposit ratio (CDR). We then define and estimate a model that expresses CDR as a function of the credit risk associated with the banks' potential borrower pool, and the risk averseness of the banks. As in the literature (Banerjee and Duflo, 2002), we also use a lagged dependent variable in the specification, to allow for persistence in the CDR. The estimation uses a fixed effects model, in keeping with the test statistics generated by Hausman tests that enable choice between fixed and random effects models. The robustness of our results is verified by measuring CDR in two different ways, and by using two different samples, firstly the domestic banks and second domestic and foreign.

The choice of India is justified as the Indian banking sector has a multiple ownership structure, comprising public sector banks, incumbent and *de novo* private domestic sector banks, and foreign banks. In addition, significant reforms and liberalization has taken place since the early 1990s (Sarkar, Sarkar and Bhaumik, 1998, Shirai and Rajsekaran, 2001; Bhaumik and Mukherjee, 2002), thereby granting all banks effective operational autonomy. Recent literature has found evidence of convergence among these different types of Indian banks in terms of financial performance (Bhaumik and Dimova, 2004), indicating that they have taken advantage of the reforms to compete with each other, and learn from each other sufficiently to be able to invade each other's market niches. However, the existing literature does not indicate whether there has also been a convergence in the credit market behavior of the different types of banks, with respect to credit disbursal. At the same time, despite a large market capitalization by developing country standards, banks remain the main source of capital for most micro, small and medium enterprises. Hence, Indian banking provides an ideal setting for further analysis.

Our analysis confirms that of Banerjee and Duflo (2002), suggesting there is a strong persistence in the CDR, whether due to the relationship nature of the business, or the inability of a large proportion of the banks to assess credit risk associated with individual loan applications effectively. Our results also indicate that Reserve Bank of India (RBI) regulations regarding commercial banks' obligatory exposure to the priority sector and those concerning treatment of non-performing assets (NPA) have significant impact on the CDR of banks. Specifically, they render banks risk averse, and less willing to lend. Finally, we find

that the second generation of reforms, which largely involved resolution of the NPA-related problems of the Indian banks, and which coincided with the end of the legal disputes over the functioning of debt recovery tribunals (DRTs), encouraged banks to increase disbursal of credit.

The rest of the paper is organized as follows. Section 2 develops the theoretical basis for the model used and states the model specifications. The data are discussed in Section 3 and the result in Section 4. Section 5 concludes.

2. Modelling bank behavior in credit markets

A bank is a multi-product firm, with a portfolio consisting of non-securities loans, as well as securities issued by non-government entities and federal, state and local governments. In addition, a bank generates revenues from fee-based contracts and speculation/participation in the market for off-balance sheet items. In developing countries, the choices facing the banks are usually fairly limited, partly because of government regulations, but also because of missing or underdeveloped markets for assets and instruments such as equity and financial derivatives. For example, in India, equities accounted for less that 1 percent of the bank assets in both 1996-97 and 2000-01. At the same time, while states, regions and local bodies in developing countries have different degrees of credit worthiness, the political economy of most of these countries ensure that all government securities carry the implicit or explicit guarantee by the federal government. That is, it is possible to think of banks in developing countries having two broad choices; they can either invest their resources, net of the cash reserve ratio and other regulatory caveats, into safe government securities, or disburse them as credit to the non-government sector, where all such credit is inherently more risky.

Let the following be true: the return on the risk-free government bonds is r_f, the expected return on the risky credit-related assets is $E(r_p)$, and a bank invests y proportion of its resources in the latter and $(1 - y)$ proportion in the former. Then, the expected returns arising out of this asset allocation is given by

$$E(r) = r_f + y[E(r_P) - r_f] \tag{1}$$

Now let the utility function of the bank be given by

$$U = E(r) - A\sigma^2 \tag{2}$$

where σ is the risk associated with the asset allocation strategy, and A is the extent of risk averseness of the bank. The optimization program of the bank is then by $\underset{y}{Max}U$ resulting in y^* as a function of $E(r_p)$, r_f, σ and A.

If an empirical analysis is limited to a single country, with limited capital account convertibility, then, for any year, r_f (i.e., some average of the returns on government securities of different maturities) is similar across all banks. Hence, cross-sectional variation in y^* (i.e., CDR) across banks can be explained by variations in the returns on the non-government assets, the risks associated with these assets, and the degrees of risk aversion of the individual banks. The CDR of a bank would be expected to increase with the expected return on the non-government assets, and decrease with the risk associated with such assets and also the degree of risk averseness. Asset pricing theory suggests that risk and return are positively related.[ii] Alternatively, since a bank loan is similar to a coupon bond held until maturity, the risk associated with a bank loan is a credit risk, not an interest rate risk, and it can be argued that the expected returns from a bank loan is simply a linear function of the credit risk. In other words, the inclusion of both a measure of risk and expected returns in the specification is likely to give rise to collinearity. Therefore, the specification can be further reduced to a functional relationship between the CDR and both the credit risk associated with loan disbursals and the risk averseness of the banks.

Given that banking is a relationship-based activity, the borrower pool for any bank is usually restricted by the geographical coverage of its branch network, and its regions of operation. In this study, geographical coverage is measured by the number of branches.[iii] Further, it is important to consider that the policy legacies of Indian banks that led to large rural networks (see Bhaumik and Mukherjee, 2002), and treat Indian as being comprised of broadly two large regions, rural and urban. This is taken into account by using the proportion of the branch network that is in rural areas. Since a large branch network enables a bank to minimize the risk associated with its portfolio by diversification across a large number

of borrowers, it is expected that the CDR increases with the size of the branch network (BRANCHES). On the other hand, given the reasonable assumption that inadequate collateral, missing secondary markets for collateral, and higher transactions costs associated with contract enforcement in areas that are not well connected to urban centers, plus the political economy of loan forgiveness, make credit disbursal in the rural market more risky than the urban credit market. Thus, it is expected that CDR is inversely related to the proportion of branches in the rural areas (RURAL).

The risk averseness of a bank can arise from two different sources. Firstly, a bank may be innately risk averse, but may also be reluctant to take risk on account of factors such as, the impact of past behavior with respect to credit decisions. In India, the degree of innate risk averseness bank is not difficult to measure, and initially, it can be argued that banks with different ownership patterns (OWNERSHIP) have different levels of innate risk averseness. However, it is difficult to predict *a priori* the exact relationship between ownership and risk averseness. For example, in principle, it can be argued that a foreign bank may be more risk averse than a domestic bank due to less knowledge of local credit markets and fewer informal options with respect to enforcing contracts. On the other hand, it can also be argued that the Indian assets account for a very small proportion of the overall asset base and therefore a foreign bank would be willing to take risk to capture market share.

The second measure of innate risk averseness in banks is likely to have a predictable relationship with the choice of CDR. All banks in India are required by the Reserve Bank of India (RBI) to maintain 25 percent of deposits in the form of safe and liquid assets, mostly in the form of government securities. However, since the mid 1990s, most banks have voluntarily invested much more than 25 percent of their assets in government securities, behavior that in Indian policy circles as "lazy banking". The rationale for lazy banking is the risk associated with credit disbursal in a developing country with attendant economic cycles and underdeveloped legal institutions to enforce contracts, and also awareness of the responsible banks that they may not have the necessary expertise to screen potential borrowers. Thus, lazy banking is a manifestation of risk averseness. Therefore the ratio of banks' exposure to government securities, as a percentage of deposits, in excess of the required 25 percent, to the median exposure of all the banks in the

sample, is used as a measure of risk averseness (ExGOV securities).[iv] Clearly, a high value for this variable would indicate a high degree of risk averseness. In order to avoid endogeneity problems, the risk aversion variable is lagged one period.

Legacy may also have an impact on the risk averseness of a bank in two different ways. Given that the Indian banks are expected to abide by the prudential norms laid down by the RBI, if past lending of a bank results in accumulation of non-performing assets, it imposes a cost on the bank in the form of both higher capital requirements and higher cost of capital. This cost of capital might then cause a bank to restrict its lending activities so as to reduce further the capital requirement. Conversely, a bank with a large stock of bad or doubtful assets may wish to expand operations rapidly to make up for past losses and/or to become too big to fail (see, e.g., Randall, 1993). Hence, in this study, past evidence of NPA is used as a measure of regulation and/or legacy induced risk averseness (NPA).

The RBI also requires banks to reserve a stipulated minimum share of disbursed credit for the priority sector, which is comprised largely of agriculture and small firms. Banerjee, Cole and Duflo (2003) have noted that the average risk associated with priority sector lending is high, thereby giving banks an incentive to not fulfil their priority sector obligations, if possible. Cognizant of this agency problem, the RBI imposes a statutory penalty on banks that fail to meet their priority sector obligations; a "defaulting" bank is required to invest the difference between its required and actual exposures to the priority sector in government bonds yielding below-market rates of return. Despite the penalty, however, data suggest that in any given year some banks are unable to meet the RBI regulation on priority sector lending. This raises the possibility that either the penalty is not well enforced or that the penalty is not commensurate with the gains accruing to a bank that does not expose itself significantly to the risky priority sector. In other words, if a bank does not meet the minimum required exposure to the priority sector in year *t-1*, there are two possible outcomes in year *t*. The bank can either decide that the RBI's priority sector lending norms are not well enforced, or it braces for a RBI-imposed penalty and hence compensates for its errant past by increasing its exposure to priority sector lending. In the former case, the risk averseness of the bank in period *t* is likely to decline while, in the latter case, its risk averseness in that period is likely to increase.

As with investment in government securities, a proxy for this risk aspect of aversion is the ratio of a bank's *distance* from the RBI mandated lower limit for priority sector exposure to the median distance of all the banks in the sample (PRIORITY). Risk averseness would increase or decrease with this measure depending upon the effectiveness with which the RBI enforces priority sector lending requirements. As above, possible endogeneity is avoided by using a lagged value in the estimation.

Further, as discussed earlier, it may be important to take account of the possibility of persistence, that is, whether CDR in time period *t* is significantly dependent on the CDR in time period *t-1*. This outcome may be due to the relationship-based nature of banking, or is evidence of the inability of banks to assess credit risk associated with individual loan applications effectively (Banerjee and Duflo, 2002). Thus, from the above discussion, we get the following two specifications of the model:

$$CDR_{i,t} = f(Branches_{i,t}, Rural_{i,t}, Ownership_{i,t}, ExGOV\ securities_{i,t-1}, NPA_{i,t-1}, Priority_{i,t-1},) \quad (3a)$$

and

$$CDR_{i,t} = f(CDR_{i,t-1}, Branches_{i,t}, Rural_{i,t}, Ownership_{i,t}, ExGOV\ securities_{i,t-1}, NPA_{i,t-1}, Priority_{i,t-1},) \quad (3b)$$

Finally, we have to take into account the impact of the overall state of the economy (that drives the demand for credit), and regulatory changes on the impact on the CDR of banks. The rationale for controlling for the demand for credit (DEMAND) remains in the significant volatility in India's industrial and overall growth rates since the mid 1990s (see Figure 1). It is evident from Figure 1 that there is little correlation between the GDP and industrial growth rate in India, which is not surprising given that services accounted for a significant proportion of the GDP during this time period, eventually accounting for over 50 percent of the GDP by 2003-04. Further, the agricultural sector continues to account for nearly a quarter of India's GDP, and this sector has witnessed significant fluctuations since 1995-96, witnessing booms and negative (or near zero) growth rates in rapid succession. Hence, we separately use both the GDP and industrial growth rates (GDP and INDUSTRY, respectively) in the specification, without any prior as to which would be a better control for the demand for credit. Our interest lies in examining whether the impact of the other variables change significantly once these controls are included in the specification.

Figure 1

The inclusion of a control for changes in banking regulations – broadly defined, the environment under which lending was undertaken – lies in the post-1990 history of banking reforms in India,[v] where such reforms were kicked off in 1992 by the RBI, by way of adoption of the key recommendations of the Narasimham Committee I. Specifically, the RBI deregulated entry into the banking sector and removed restrictions on branch expansion by domestic and foreign banks alike. At the same time, banks were asked to maintain risk weighted capital adequacy ratio of 8 percent, mark assets to market, identify problem loans on their balance sheet, and make provisions for bad loans. This phase of reforms was completed by the end of the 1998-99 financial year. In 1998, the RBI initiated the second generation of banking reforms, in keeping with the recommendations of Narasimham Committee II. The most important recommendation of the Committee was the creation of asset reconstruction companies (ARCs) to simultaneously improve the quality of the balance sheets of the banks and to facilitate recovery of loans. In a separate development, after a prolonged period of legal disputes, debt recovery tribunals (DRTs) began functioning in India, in earnest, by 1999 (Visaria, 2005). As we shall see later, the initiation of the second round of banking sector reforms, and the removal of legal barriers to the functioning of the DRTs lies in the middle of the data period, and hence the need to control for this regulatory change We use as the control a dummy variable (RCHANGE) that takes the value 1 for 1999-00 and all subsequent years, and value zero for all years prior to 1999-00. After taking into consideration these two controls, our specification is as follows:

$$CDR_{i,t} = f(CDR_{i,t-1}, Branches_{i,t}, Rural_{i,t}, Ownership_{i,t}, ExGOV\ securities_{i,t-1}, NPA_{i,t-1}, Priority_{i,t-1}, Demand_t, Rchange) \quad (3c)$$

3. Data

The model has been estimated largely using data obtained from the *Indian Banks' Association*. The data on NPAs were obtained from various issues of *Trends and Progress of Banking in India*,

published by the RBI annually, and the GDP and industrial growth rates of India were obtained from the 2003-04 pre-budget *Economic Survey* published by the Government of India. The empirical analysis involves the use of data from nine financial years: 1995-96 through 2003-04. However, the use of lagged values in the specification results in the use of data from only years 1996-97 through 2003-04 for the regression analysis. The data suggests that although there were 36 foreign banks registered in India during the period, the largest 12 banks accounted for nearly 90 percent of the deposit and asset base of this group. Foreign banks with less than two branches were removed as these were considered to located in India to trade credit and services related to cross-border transactions and were not involved in the credit market. The final sample is comprised of 27 public sector banks, 24 incumbent domestic private sector banks which had been in operation prior to liberalization of the banking sector, 8 *de novo* domestic private sector banks which started operation after liberalization, and 12 foreign banks. Together, they account for approximately 98 percent of the deposits and assets of the Indian banking sector.

Table 1

The summary statistics for the data are in Table 1. Two measures of CDR are reported, the ratio of non-securities advances to deposits (CDR1), and the ratio of the sum of non-securities and securities loans to deposits (CDR2). The descriptive statistics indicate the following: (a) the CDR of the foreign banks are noticeably higher than those of the domestic banks, and (b) over time, the unlikely duo of public sector banks and foreign banks have expanded their exposure to the Indian credit market much more rapidly than the incumbent and *de novo* private banks. An explanation for the former is that, as wholly owned subsidiaries of overseas banks, foreign banks often make loans within India using deposits raised abroad and resources mobilized through the money market, which means that the credit disbursed in India is high as a proportion of deposits collected in India. The interesting aspect of this observation is that *a priori* public sector banks and foreign banks in India can be expected to have very different attitudes towards credit risk in a rapidly growing emerging market with mixed record of GDP and industrial growth in the

recent past (see Figure 1).

The public sector banks are prone to moral hazard, on account of their ownership, on the one hand, and, on the other hand, face the spectre of political pressures to keep their balance sheets clean (Banerjee and Duflo, 2002). The foreign banks face a different type of dilemma. On the one hand, they risk accumulating doubtful assets on their consolidated balance sheets by exposing themselves too much to India, and, on the other hand, they are comforted by the fact that for most of these banks their Indian operations constitute a small fraction of their worldwide consolidated balance sheet such that accumulation of doubtful assets in India is not likely to have a significant impact on their own creditworthiness or financial health in general. The fact that these two very different types of organizations exhibited similar behavior in the Indian credit market lends further validity to our empirical exercise, which seeks to unravel the determinants of credit market behavior of banks in an emerging market.

The data on the exposure of the banks to government securities suggests that public sector banks buy government securities over and above the Statutory Liquidity Ratio (SLR) requirement. The figures reported in Table 1 (ExGOV securities) suggest that, in 1996-97, the excess holding of government securities by an average public sector bank, over and above the SLR floor, was 14.63 times higher than the excess holding of such securities by the median bank. Foreign banks too are over-exposed to the government securities, but the extent of their over-exposure is modest, especially in comparison with the exposure of the public sector banks. Even though the exposure of public sector banks to these securities has declined over time, relative to the other/median bank(s), as indicated by the multiple of 7.57 in 2003-04, it still remains a significantly large multiple, providing *prima facie* evidence about the so-called "lazy banking" (at least) among banks that control about 80 percent of the deposits mobilised in India, and a similar proportion of the country's banking sector assets.

The data also indicates that the average Indian bank does not meet the regulatory obligation with respect to priority sector lending during the period of analysis. The figures reported in Table 1 (PRIORITY) suggest that, ironically, the public sector banks are more in default of their priority sector

obligations, relative to the median banks, than the other types of banks. Given the multiple of 1.18, the median bank in 1996-97 was very likely a foreign bank. The extent of default of the public sector banks increased marginally between 1996-97 and 2003-04, relative to the median bank, which, by the latter year, was an incumbent private bank. The passage of time also witnessed a significant increase in the extent of default by *de novo* private banks and foreign banks, once again relative to the median bank. Widespread default with respect to the RBI's priority sector norms raises the question as to whether the penalty imposed by the central bank on errant commercial banks has any effect on the latter's behavior. However, this cannot be addressed on the basis of the descriptive statistics, and would have to await formal regression analysis.

Finally, four different measures of NPA are reported, reflecting those disclosed by the RBI; the ratio of gross NPA to total assets (NPA1), the ratio of net NPA to total assets (NPA2), the ratio of gross NPA to total advances (NPA3) and the ratio of net NPA to total advances (NPA4). Not surprisingly, the public sector banks had more NPA on their balance sheets in 1996-97, but they were able to reduce this considerably over time, even though there was an increase in NPAs on the balance sheet of the *de novo* private banks and the foreign banks. The increase in the NPA exposure of these two categories of banks was probably inevitable, given the expansion of business following liberalization. However, it is remarkable that the old private banks were unable to reduce their exposure to NPA, unlike those in the public sector. This is consistent with the earlier discussion of the performance of the public sector banks, which has improved significantly over time. The old private banks have emerged as the new laggards (Bhaumik and Dimova, 2004).

4. Results and Discussion

The regression results are reported in Tables 2 and 3. Both tables report the coefficient estimates, with columns 1-4 showing the sample of domestic banks, and columns 5-8 all banks. Coefficient estimates were obtained separately for the two (overlapping) samples because, unlike the domestic banks, foreign banks can use deposits from outside India, and a substantial part of their resources from the money

market. Hence it is not obvious that a domestic bank and a foreign bank operating in India are similar. In Table 2 CDR is the ratio of nonsecuritized advances to deposits, while in Table 3 CDR is the ratio of the total securitized and non-securities loans to deposits. Columns (1) and (5) in both tables are generated from specification (3a), columns (2) and (6) report coefficient estimates for specification (3b), and columns (3), (4), (7) and (8) are derived from specification (3c). We estimate the models using different measures of NPA but the measures are highly correlated and hence choice of any one measure over the others does not affect the results. In Tables 2 and 3, therefore, we report on the specifications that include gross NPA as a percentage of total assets (NPA1).

We estimate the specifications using both fixed effects and random effects models, and determine the choice between these two types of models using the stylized Hausman test. The test statistics reject random effects in favor of fixed effects. Hence, only fixed effects models are reported in the aforementioned tables. Since the ownership of Indian banks did not change during the period for which the sample is constructed, despite events like the significant acquisition of (incumbent private) Vysya Bank shares by (foreign) ING, the OWNERSHIP variable drops out of the specifications used to estimate the fixed effects model. We make the additional assumption that in the event of acquisition of bank *i* by bank *j*, we can treat banks separately prior to the acquisition, and treat the merged entity simply as bank *j* thereafter. This assumption, which is consistent with the literature on M&A, simply suggests that banks *i* and *j* have different risk appetites and, in general, different credit market behavior prior to the acquisition and that, subsequent to the acquisition, the behavior of the merged entity will be the same as that of the acquiring bank. Further, even the acquisition of relatively large banks in India – e.g., Madura Bank and ANZ Grindlays by ICICI and Standard Chartered, respectively – have involved target banks that together accounted for very small fractions of the deposit and credit markets. Indeed the deposit and asset base of the banks acquired by ICICI, HDFC and Standard Chartered together accounted for less than 0.5 percent of the overall deposit and asset base of the banks included in the sample, and the missing values generated for the target banks in the post-M&A years account for less than 0.5 percent of the observations. Hence, we are confident that our approach, which gives rise to an unbalanced panel, with the acquired banks

dropping out of the sample after the year(s) of acquisition, does not affect the results in any way.

The F statistics for each of the models is significant at the 5 percent level, with almost all significant at the 1 percent level. Further, the results are remarkably robust to the choice of both specifications and samples. Collectively, they suggest that our specifications are a good fit for the data. However, it is evident from the F statistics that specifications (3b) and (3c) fit the data much better than does specification (3a), irrespective of the definition of CDR and irrespective of the choice of sample.

Tables 2 and 3

The results indicate that, to begin with, there is a strong persistence in the CDR of Indian banks. While such correlation between the dependent and the lagged dependent variable is not unusual in time series and panel data, it is, nevertheless, is consistent with the findings of Banerjee and Duflo (2002). As noted above, this could simply be a consequence of the nature of banking which is a relationship-based activity but could also indicate that Indian banks are not skilled at evaluating the credit worthiness of potential debtors, thereby rewarding the moribund yet stable businesses at the expense of new or dynamic enterprises that have an expected flow of income that is more volatile. While we would prefer to be conservative about the interpretation of this result, at the very least, it suggests that the credit application evaluation procedures of Indian banks deserve a careful scrutiny.

Secondly, banks with larger branch networks lend a greater proportion of their resources. Since the fixed effect model controls for ownership, which did not change for any of the banks during the sample period, the BRANCHES variable is clearly not picking up ownership effects. Further, since we control for past lending by the banks using a lagged dependent variable (in columns 2-4 and 6-8 of both tables), BRANCHES is not picking up lending relationships of the banks either. In other words, there is support for our prior that if a bank has access to a wide pool of potential borrowers, such that it both has a better choice of the latter and can spread its credit risk across a larger borrower pool, it is likely to lend more. This result clearly has implications for the size of the bank, and brings into focus the possible

macroeconomic gains arising out of consolidation of the small incumbent private banks (or their takeover by *de novo* private or foreign banks) through M&A.

Thirdly, both the priority sector norms of the RBI and prudential norms with respect to NPA on a bank's balance sheet have a significant (and negative) impact on the CDR of the banks. The former suggests that the penalty imposed by the RBI on banks that do not meet their priority sector obligations are significant. If a bank does not meet its priority sector obligation in period *t*, it faces penalty. This, in turn, reduces the bank's willingness to lend in period *t+1*, given that a fixed proportion of its lending has to be allocated to the priority sector and that it will face further penalties if it defaults on its obligations once again. Given that an average Indian bank is in default of its priority sector obligations in all the years in the sample suggests that these banks do not find lending to this sector profitable. At the same time, the RBI's penalty for defaulters is significant such that such default is not costless, and this has a negative impact on the willingness of the banks to lend. It is perhaps time for the RBI to initiate a debate about the possible impacts of allowing commercial banks a free hand in credit allocation, and development of an alternative institutional framework along the lines of the National Bank for Agricultural and Rural Development (NABARD) for credit delivery to the priority sector.

The negative coefficient of NPA suggests that NPA accumulation on the balance sheet of an average Indian bank is more likely to make it conservative in its credit allocation decisions, rather than encourage it to take more risk in a bid to become too-big-to-fail. This is consistent with the ownership pattern of banks in India where about 85 percent of bank assets are either with public sector banks that cannot fail by definition, or with incumbent private sector banks that are closely held, and likely to have risk averse managers making active decisions on credit assessment. To the extent that prudential norms were introduced to make the banks lend more prudently, and thereby avoid unnecessary risk, therefore, the RBI's regulatory strategy is clearly working. But this result also suggests that, in keeping with the recommendations with Narasimham Committee II, the government will have to develop and consolidate institutions that would enable the banks to clean their balance sheets of NPA in order to facilitate further deepening of the credit market. Visaria (2005) has demonstrated that DRTs, that facilitate enforcement of

the debt covenant in the event of a default by a borrower, have encouraged greater lending on the part of an Indian bank.[vi] This can potentially be supplemented by introduction of financial instruments (e.g., credit derivatives) and the development of an institutional framework (e.g., Ginnie Mae, Freddie Mac) that can enable banks to hedge against credit risk, or completely remove risky assets from their balance sheets.

Finally, the positive sign of the RCHANGE variable indicates that the banks' role as financial intermediaries was facilitated by the second generation of reforms. Given that the second generation of reforms were largely aimed at reducing the NPA burden of the banks, and given that the resultant emergence of ARCs coincided with the removal of legal barriers on the functioning of DRTs across the country, this result is not surprising, and is consistent with our result concerning the impact of NPA on a bank's willingness to lend.

5. Concluding Remarks

This paper focuses on the behavior of banks operating in emerging markets where they have the choice of disbursing resources collected through deposits either as credit to commercial borrowers or as investment into sovereign securities. Commercial credit in these countries carry credit risk as well as liquidity risk, given the high cost of liquidating collateral for such credit, and the absence of markets for hedging these risks. Sovereign securities, on the other hand, carry near zero default risk, and a relatively low level of liquidity risk. The paper highlights three aspects of bank behavior in the context of such emerging markets that are not captured by the literature that focuses on the relationship between ownership and performance of banks.

Our results indicate that the credit market behavior of banks in emerging markets is influenced largely determined by past trends, presumably limiting significantly the ability of new and dynamic firms and sectors to grow rapidly. There is also evidence to support the hypothesis that prudential regulations have a significant impact on bank behavior with respect to credit disbursal, by making these decisions sensitive to the prevailing stock of NPAs. Regulations also have an impact on bank-lending in India by way of the priority sector norms of the RBI; these norms make banks less willing to disburse credit.

Finally, we find evidence that the second generation of reforms in India, the thrust of which was the enablement of banks to clear NPA off their balance sheets, had a positive impact on the credit disbursal of the banks.

The results are instructive, and consistent with our priors about bank-behavior in the context of lending in an emerging market. They also raise some policy issues like, e.g., the efficacy of the priority sector norms. But while decisions on issues like priority sector lending are likely to be made in the political arena, and while consolidation of incumbent private banks by way of M&A can hardly be a policy objective, the results indicate that, given that the Indian banks are demonstratively risk averse, there is a politically neutral policy issue that can and should be addressed with immediate effect.

Figure 2

Indian banks are already in a position to mitigate credit risk by way of securitisation of debt, i.e., they can lend by way of commercial paper (CP) rather than through conventional credit agreements. The CPs are mandatorily rated by accredited credit rating agencies, and, to the extent that the banks invest in only high grade CPs, lending by way of these financial instruments can reduce the capital adequacy requirement. Banks investing in corporate CPs also benefit from the fact that since it is technically an investment, it is not subject to the priority sector norms of the RBI. However, while these two aspects of CPs is widely discussed in Indian policy circles, much less attention is paid to the fact that CPs have a fairly liquid secondary market, and hence liquidity risk (and therefore the overall risk) associated with them is lower than the risk associated with non-securitised or conventional lending. Figure 2 suggests that the proportion of bank credit disbursed by way of CPs and other corporate securities was particularly higher during the years of economic uncertainty (1998-2000) than in the other years, especially among foreign banks. In the light of our results, therefore, it is reasonable to suggest that the development of the market for corporate bonds in India, which remains mired in a number of problems (Bhaumik, Bose and Coondoo, 2003), should remain a priority of the government.

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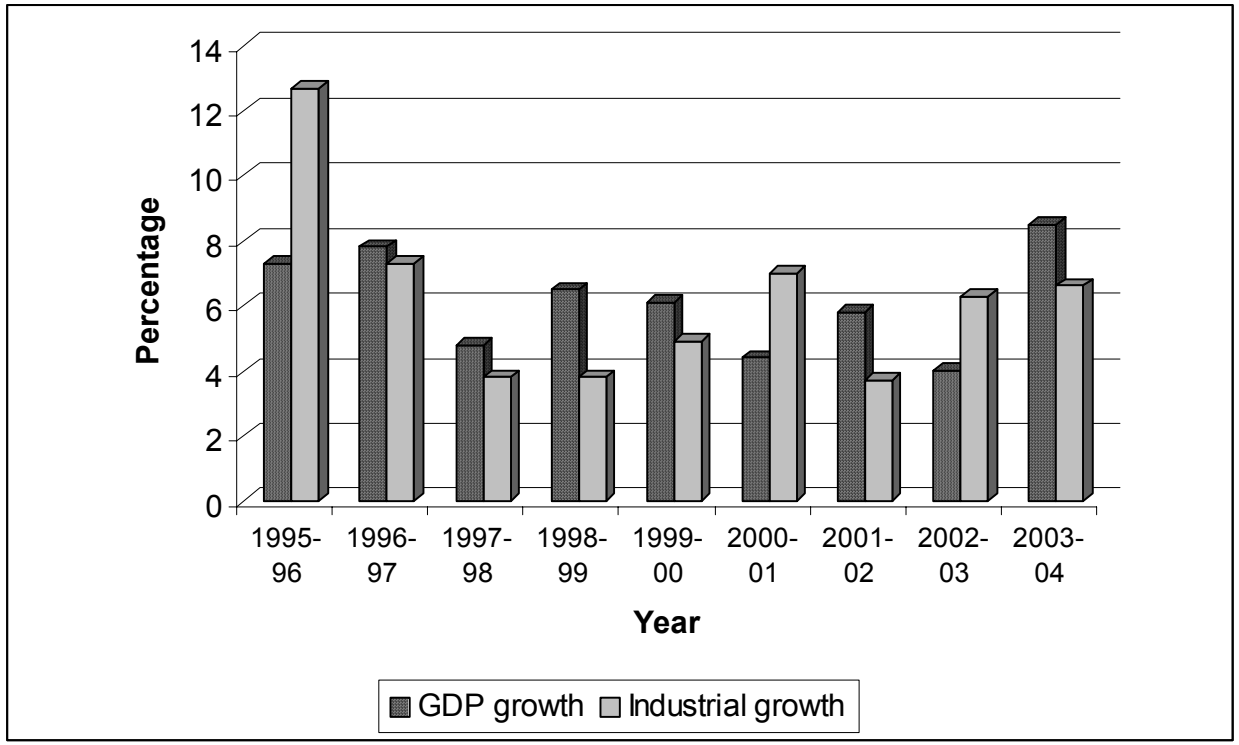
Figure 1
GDP and industrial growth in India: 1996-97 to 2003-04



Source : Economic Survey, Government of India, 2004-05

Table 1: Descriptive statistics

	1996-97				2003-04			
	Public	**Old private**	**New private**	**Foreign**	**Public**	**Old private**	**New private**	**Foreign**
CDR1	0.4651	0.5220	0.5666	0.8002	0.5141	0.5078	0.5901	0.9453
	(0.0786)	(0.1142)	(0.1037)	(0.2038)	(0.1196)	(0.0981)	(0.1695)	(0.4156)
CDR2	0.5153	0.5738	0.6528	0.8324	0.5698	0.5789	0.6485	1.0141
	(0.0770)	(0.1195)	(0.0818)	(0.2034)	(0.1174)	(0.1070)	(0.1835)	(0.3961)
BRANCHES	1652.9260	173.4000	15.1250	11.9166	1703.4810	220.2500	159.5556	16.4166
	(1672.7790)	(115.6525)	(3.8706)	(15.5648)	(1672.9500)	(134.6422)	(143.0123)	(20.0656)
RURAL	64.8714	58.4732	13.7325	0	61.8748	55.1125	23.9333	0
	(7.7677)	(17.9232)	(16.9906)	(0)	(6.6014)	(13.1328)	(10.5404)	(0)
ExGOV Securities	14.6317	0.0181	0.0632	1.8009	7.5722	0.3660	2.1721	0.7758
	(24.7834)	(1.4047)	(0.6446)	(1.5349)	(14.3349)	(0.2630)	(4.1512)	(1.4996)
PRIORITY	4.7358	0.4751	0.5475	1.1858	5.1327	1.2033	9.4376	4.0039
	(6.6319)	(0.4976)	(0.3280)	(0.8521)	(21.4612)	(1.9739)	(16.0672)	(5.0986)
NPA1	7.9940	4.7758	1.1150	2.8516	3.4292	4.223	3.8866	3.3300
	(3.3547)	(2.3078)	(1.1845)	(4.4147)	(1.4651)	(1.9024)	(5.6829)	(3.2431)
NPA2	3.8388	2.6566	0.7950	1.6425	1.2062	2.3115	1.8366	1.8050
	(1.6875)	(1.1796)	(0.8053)	(3.1369)	(1.0199)	(1.2978)	(2.7033)	(2.5491)
NPA3	18.5285	10.9250	2.6550	5.0383	7.5803	9.0280	8.8255	6.6741
	(7.7544)	(5.3247)	(2.2409)	(5.9733)	(3.3842)	(3.7701)	(14.0006)	(6.6584)
NPA4	9.9381	6.5279	1.7487	2.8641	2.7559	4.7490	4.9344	3.6275
	(4.5796)	(2.6007)	(1.6462)	(4.7996)	(2.4716)	(2.5382)	(8.8062)	(5.2512)

Notes: The numbers within parentheses are standard deviations.

Table 2: Determinants of credit allocation
LHS variable = Advances/Deposits

	Domestic banks				All banks: domestic and foreign			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
BRANCHES	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***
	(0.00006)	(0.00005)	(0.0006)	(0.00006)	(0.00008)	(0.00007)	(0.00008)	(0.00008)
RURAL	0.00007	- 0.00002	0.00008	0.00007	0.00005	- 0.00004	0.0002	0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
ExGOV securities	0.00001	0.0001	0.0002	0.0002	0.0001	0.0001	0.0003	0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
PRIORITY	0.0003	- 0.0064 ***	- 0.0065 **	- 0.0065 ***	0.0003	- 0.0065 ***	- 0.0066 ***	- 0.0066 ***
	(0.0003)	(0.0009)	(0.0009)	(0.0009)	(0.0004)	(0.0007)	(0.0007)	(0.0007)
NPA	- 0.0052 **	- 0.0038 **	- 0.0033 *	- 0.0033 *	- 0.0064 ***	- 0.0054 ***	- 0.0047 **	- 0.0047 **
	(0.0020)	(0.0019)	(0.0019)	(0.0019)	(0.0021)	(0.0019)	(0.0019)	(0.0019)
CDR1(-1)		0.4440 ***	0.4504 ***	0.4523 ***		0.4467 ***	0.4525 ***	0.4551 ***
		(0.0610)	(0.0613)	(0.0617)		(0.0433)	(0.0431)	(0.0434)
RCHANGE			0.0123	0.0121			0.0302 ***	0.0309 ***
			(0.0080)	(0.0081)			(0.0302)	(0.0098)
GDP			0.0005				0.0002	
			(0.0024)				(0.0029)	
INDUSTRY				- 0.0002				- 0.0011
				(0.0024)				(0.0029)
Constant	0.3098 ***	0.0416	0.0391	0.0431	0.4076 ***	0.1248 *	0.1291 *	0.1365
	(0.0612)	(0.0682)	(0.0694)	(0.0690)	(0.0719)	(0.0703)	(0.0714)	(0.0713)
F-statistic	4.57 ***	13.16 ***	10.18 ***	10.17 ***	3.44 ***	21.21 ***	17.42 ***	17.45 ***
Sample size	444	444	444	444	535	535	535	535

Notes: 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels of significance, respectively.
2. The numbers within parentheses are standard errors.

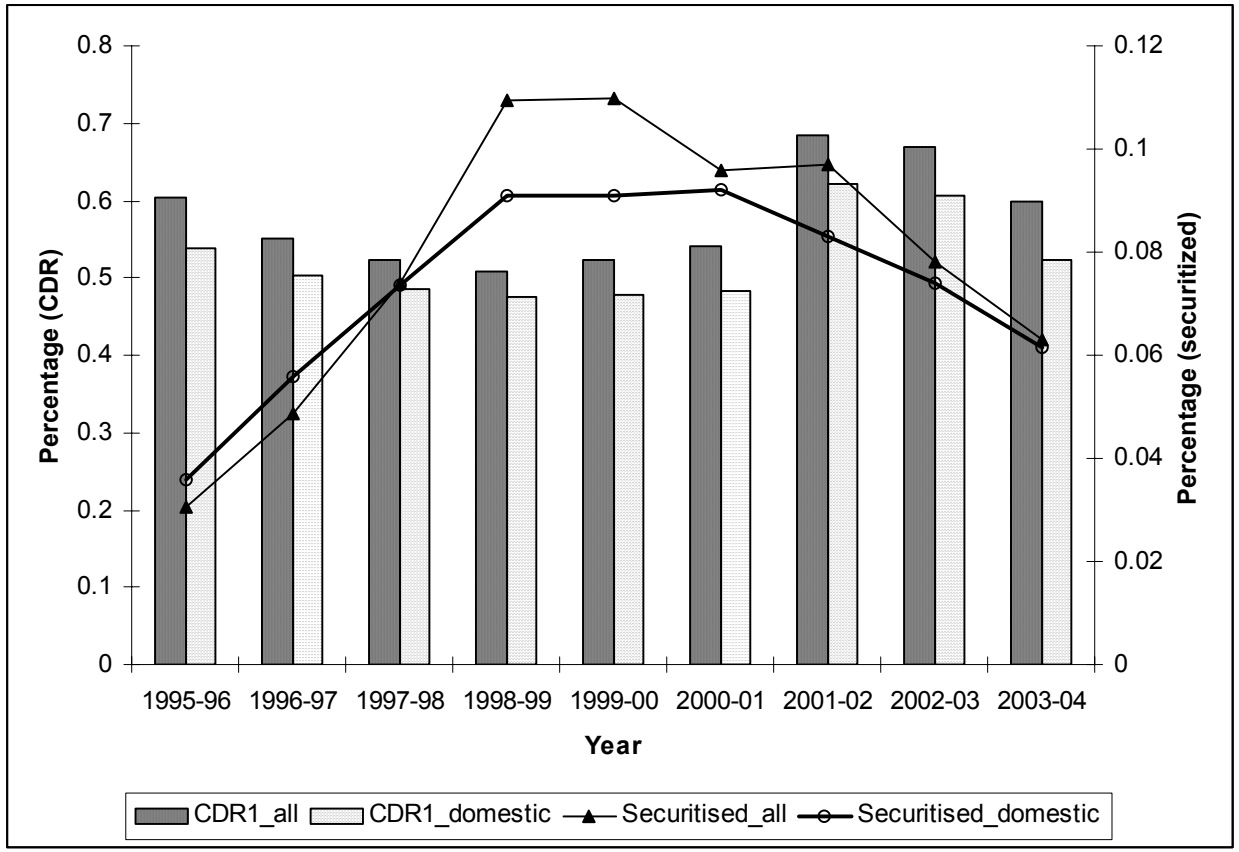
Table 3: Determinants of credit allocation

LHS variable = (Advances + Corporate debt securities)/Deposits

	Domestic banks					All banks: domestic and foreign		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
BRANCHES	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 ***	0.0002 **	0.0002 ***	0.0002 ***	0.0001 **
	(0.00006)	(0.00006)	(0.00006)	(0.00006)	(0.00009)	(0.00008)	(0.00008)	(0.00008)
RURAL	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0003	0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.00006)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
ExGOV securities	- 1.69e-06	0.00009	0.0001	0.0001	- 0.00005	0.00007	0.0002	0.0003
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0005)	(0.0003)	(0.0003)
PRIORITY	0.0003	- 0.0067 ***	- 0.0066 ***	- 0.0066 ***	0.0003	- 0.0066 ***	- 0.0062 ***	- 0.0063 ***
	(0.0003)	(0.0010)	(0.0010)	(0.0010)	(0.0004)	(0.0008)	(0.0008)	(0.0008)
NPA	- 0.0057 ***	- 0.0035 ***	- 0.0033 *	- 0.0033 *	- 0.0060 **	- 0.0049 **	- 0.0044 **	- 0.0046 **
	(0.0021)	(0.0019)	(0.0020)	(0.0020)	(0.0023)	(0.0021)	(0.0021)	(0.0021)
CDR2(-1)		0.4595 ***	0.4526 ***	0.4542 ***		0.4482 ***	0.4279 ***	0.4325 ***
		(0.0627)	(0.0632)	(0.0632)		(0.0465)	(0.0469)	(0.0468)
RCHANGE			0.0060	0.0091			0.0253 **	0.0319 ***
			(0.0083)	(0.0083)			(0.0109)	(0.0110)
GDP			- 0.0019				- 0.0033	
			(0.0024)				(0.0032)	
INDUSTRY				- 0.0026				- 0.0064 *
				(0.0024)				(0.0033)
Constant	0.3981 ***	0.0925	0.1128	0.1158	0.4977 ***	0.1844 **	0.2290 ***	0.2445 ***
	(0.0631)	(0.0723)	(0.0747)	(0.0744)	(0.0789)	(0.0792)	(0.0820)	(0.0813)
F-statistic	4.44 ***	13.16 ***	10.02 ***	10.10 ***	2.61 **	18.06 ***	14.65 ***	15.07
Sample size	444	444	444	444	531	528	528	528

Notes: 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels of significance, respectively.
2. The numbers within parentheses are standard errors.

Figure 2
Exposure of Indian banks to corporate debt instruments



Endnotes

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[ii] In India, for example, a bank is allowed to charge up to 400 basis points over and above its prime lending rate to account for increasing levels of risk.

[iii] It is stylized in the literature to control for the size of the bank in the specification, in a variety of contexts. The usual measures of a bank's size are it's the stock of its deposits and the stock of its assets. However, the number of branches of a bank are, not surprisingly, highly collinear with both the deposit base and the asset size of the bank. For our sample, the correlation coefficient was greater than 0.95 for all the years in the sample. Hence, we did not include deposits or assets as a control variable in our specification.

[iv] Suppose that a bank has invested 32 percent of its deposits into government securities. In that case, its excess holding of such securities over and above that required by the RBI is 7 percentage points. If the median of this excess for all banks is 10 percent, then our measure of risk averseness for this bank is 0.7.

[v] See Bhaumik and Mukherjee (2002) for details about banking sector reforms in India.

[vi] Like Banerjee and Duflo (2002), Visaria (2005) also uses multi-year contract-level data from one Indian (private sector) bank.