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**Ownership, risk-taking and performance of banks in emerging economies: evidence from
India**

Faizul Haque (Corresponding Author)¹
Heriot-Watt University Dubai Campus
PO Box: 294345, Dubai, UAE.
Tel: +971 4 4358732 / +971 4 4358700
Email: F.Haque@hw.ac.uk.

&

Rehnuma Shahid
Adjunct Faculty
Heriot Watt University Dubai Campus
PO Box: 294345, Dubai, UAE
Email: R.Shahid@hw.ac.uk
Tel: +971 50 5517115

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Ownership, risk-taking and performance of banks in emerging economies: evidence from India

Abstract

This paper examines the effect of ownership structure on bank risk-taking and performance in emerging economies using India as a case study. We use generalised method of moments (GMM) estimation technique to analyse an unbalanced panel dataset covering 217 bank-year observations from 2008 to 2011. Overall, our study results suggest that government ownership is positively associated with default risk, and negatively related to bank profitability. Interestingly, we find foreign ownership having a positive effect on default risk, and a negative effect on profitability among the listed commercial banks. The effect of ownership concentration on bank risk-taking and profitability appears to be statistically insignificant. This study is likely to have implications for policymakers in undertaking regulatory reforms relating to ownership, risk management and banking sector stability.

Key Words: Government ownership; foreign shareholding; bank risk-taking; bank performance; India.

JEL Classifications: G21, G32, L25

1. Introduction

The financial crisis of 2007-08 highlighted a number of weaknesses in corporate governance (CG) and risk management practices of banks in both developed and emerging economies. Claessens and Yurtoglu (2013) observe that effective corporate governance practices in emerging and developing economies are critical to improve investors' confidence and to enhance financial sector development. In particular, ownership structure is an effective mechanism in reducing the agency problems in developing economies, as their legal infrastructure is weak to protect the rights of the investors (Berger *et al.*, 2005).

Recognizing the significance of corporate governance, a number of recent studies (for example, Forssbäck, 2011; Chen and Chen, 2012) address the influence of ownership on bank risk-taking. However, most studies appear to be either global or Europe-specific, with a little focus on emerging economies². As Agoraki *et al.* (2011) argue, the empirical results obtained from developed countries may not apply to the transition or emerging economies, primarily because of quantitative and qualitative differences in regulatory efforts and institutional settings. Moreover, Laeven and Levine (2009) observe that the same regulation has different effects on bank risk-taking, depending on the comparative power of shareholders within each bank's corporate governance structure. To the best of our knowledge, no studies to date consider how ownership influences both risk-taking behaviour and performance of a bank in an emerging economy setting. Given the endogenous nature of relationships among ownership, risk and performance (see Laeven and Levine, 2009), it is also important to investigate how ownership influences bank

² Among others, Berger *et al.*, (2005) investigate ownership and bank performance in Argentina without taking into consideration the risk factors.

performance both directly and indirectly (through risk-taking). In addition, very few studies use advanced regression framework such as Generalized Method of Moments (GMM) in explaining these complex relationships³.

This paper aims at examining the influence of ownership on risk-taking and performance of banks in India. We use an unbalanced panel dataset covering 217 observations from 55 commercial banks in India over a period of 4 years (2008-2011). We use generalized method of moments (GMM) estimation technique to provide empirical assessments of the following research questions from the perspective of an emerging economy:

- (i) Does ownership concentration have an effect on the risk-taking behaviour of a bank?
- (ii) How are government and foreign ownerships associated with bank risk-taking?
- (iii) How do ownership concentration, government and foreign ownerships influence bank profitability?

The key motivations of this study are as follows: Firstly, the political, economic and regulatory institutions of emerging economies are different from those in developed economies. Therefore, the theories or evidence based on developed economies may not be applicable to an emerging economy such as India. Secondly, given a dearth of country-specific study, it would be interesting to examine whether empirical evidence from a single emerging economy complements numerous cross-country studies in this area. Finally, this study is among the first to examine how ownership structure influences both bank risk-taking and performance in an

³ Agoraki et al., (2011) use GMM approach to study bank regulation and risk-taking in Central and East European countries, but they do not consider bank-specific ownership variables.

emerging economy setting. Thirdly, we consider the study period (2008-2011) to be important, since it captures bank level data during the financial crisis and post-crisis period. This is particularly important, given that Indian banking sector appeared to have less affected by the financial crisis. Finally, banking reform initiatives started taking place in India in the 1990s in order to promote banking sector stability and to enhance banking efficiency and productivity. Among others measures, diversification of state-ownership of banks (through privatisation and stock exchange listing) and liberalisation of foreign bank entry were undertaken (see Das and Ghosh, 2009). This study is likely to have implications for the policymakers in relation to the success of the banking reforms initiatives.

This paper is structured as follows: Following this introduction, the next section reviews related theoretical and empirical literature, followed by empirical specifications and data. Section four provides estimation results and analysis, and section five concludes the paper.

2. Literature review

2.1. Ownership and risk-taking behaviour

Agency theory suggests that ownership structure influences risk-taking behaviour of a firm, even though there is no consensus on the sign of this relationship. Laeven and Levine (2009) and Saunders *et al.*, (1990) support the prediction of the agency theory in that large shareholders with greater cash-flow rights have stronger incentives to increase risk than non-shareholding managers and debt holders. Haw *et al.*, (2010) also find that concentrated control exhibits greater

return volatility and higher insolvency risk of a bank in East Asia and Western Europe. On the contrary, Iannotta *et al.*, (2007) find that ownership concentration is associated with better loan quality, lower asset risk and lower insolvency risk. In a global study, Shehzad *et al.*, (2010) also find that ownership concentration reduces bank risk at lower levels of shareholder protection rights and supervisory control.

The empirical evidence on the relationship between different types of ownership and bank risk appears to be mixed. Shliefer and Vishny (1997) observe that government ownership of banks might be justified from the perspective of social welfare arguments and the need to address monopoly power, externalities and distributional concerns. Otchere (2005) also argues that government ownership in the financial sector is beneficial in countries with underdeveloped institutions. However, Haw *et al.*, (2010) find that state control is subject to greater agency conflicts in countries with weak legal and regulatory institutions. Accordingly, Cornett *et al.*, (2010) and Angkinand and Wihlborg (2010) find government-owned banks having greater credit risks in Eastern Europe and Asia. Berger *et al.*, (2005) also find similar evidence. Iannotta *et al.*, (2007) find that public sector banks in the European countries have poorer loan quality and higher insolvency risk. Moreover, Chou and Lin (2011) find that higher government ownership is associated with higher overdue loans and lower capital adequacy ratio among Taiwanese banks.

Foreign shareholders face liabilities of foreignness (LOF)⁴, which includes additional operating costs in overseas markets, and the difficulties in adopting host country norms and practices (see

⁴ Zaheer (1995: 342-343) defines 'liabilities of foreignness' (LOF) 'all additional costs a firm operating in a market overseas incurs that a local firm would not incur'.

Kobeissi and Sun, 2010). The additional costs related to LOF can cause foreign banks to have poor performance and greater risks. For example, Leye and Micco (2007) find foreign banks having higher risks than domestic banks in Latin American countries. Angkinand and Wihlborg (2010) find that foreign ownership increases default risk in countries with low explicit deposit insurance coverage. However, ‘global advantage hypothesis’ suggests that foreign banks might benefit from more advanced technologies, highly skilled labour force, better risk management, superior information and greater transparency (Lensink et al.,2008; Angkinand and Wihlborg, 2010). This can help foreign banks to exploit bank-specific advantages and overcome the LOF in less competitive host countries (Kobeissi and Sun, 2010). Boubakri *et al.*, (2005) and Patibandla (2006) argue that foreign ownership reduces agency costs of a bank. Accordingly, Agoraki *et al.*, (2011) and Chou and Lin (2011) find that foreign ownership is inversely associated with bank risk-taking in emerging economies.

Barry *et al.*, (2011) posit that banking institutions encourage relatively conservative risk taking strategies in their subsidiaries, possibly because of reputation concerns. They find that higher stakes of banking institutions in publicly held banks are associated with lower credit and default risks. In addition, institutional investors impose the riskiest strategies when they hold higher stakes in privately owned banks. In contrast, Chou and Lin (2011) argue that institutional investors are in a better position to absorb and process information and to monitor and discipline managers’ risk-taking behaviour.

2.2. Ownership, risk-taking and performance

Agency theory suggests that higher cash-flow ownership of controlling shareholders reduce agency costs and improve firm performance (La Porta et al., 2002). However, Haw *et al.*, (2010) argue that agency problems can be severer in the banking sector, partly because of concentrated shareholding, which would lead to connected lending and relationship banking. A large number of studies address the influence of the types of ownership on bank performance. Among others, Shliefer and Vishny (1997) argue that government ownership brings inefficiency because of the conflicts between social objectives and political interests, bureaucracy and corruptions, and interest group politics. Accordingly, Micco *et al.*, (2007) find that state-owned banks are less profitable and less cost efficient than private and/or foreign owned banks in developing economies. Related studies (e.g. Chen and Liao, 2011; Lin and Zhang, 2009) also find similar evidence in the context of emerging economies.

As discussed above, ‘global advantage hypothesis’ suggests that foreign ownership improves bank performance. Taboada (2011) argues that foreign banks improve capital allocation efficiency by mitigating the agency problems associated with government or concentrated shareholding. Accordingly, many studies (for example, Micco et al., 2007) observe that foreign banks outperform domestic banks in terms of profitability, cost efficiency and competitiveness in developing and emerging economies. However, in support of the hypothesis of ‘liabilities of foreignness’ (as discussed above), Das and Ghosh (2009) find that average profit efficiency of state-owned banks is much higher than private and foreign banks in India. In a global study,

Lensink *et al.*, (2008) also find that foreign ownership has a negative effect on bank efficiency, and this evidence is more pronounced in countries with poor institutional quality.

According to Modern Portfolio Theory (MPT), as proposed by Harry Markowitz, an efficient investment portfolio of risky assets attempts to maximise expected return for a given level risk, or equivalently minimise risk for a given level of expected return (Bodie *et al.*, 2014: 222). This theory also assumes that rational (risk-averse) investors would prefer less risky investment for a certain amount of return, and that they will require higher returns to pursue risky investment opportunities. Therefore, this theory assumes a positive relationship between risk-taking and expected return. The MPT might also be relevant in the context of banking, where banks try to pursue a risky investment portfolio in order to maximise expected return⁵. However, based on the experience of the recent financial crisis, one can argue that risky investment strategies might result in lower actual return or performance of a bank.

Considering the significance of the risk-return relationship, several studies address the relationship between risk taking and bank performance. For example, Das and Ghosh (2009) find that higher credit risk and greater portfolio risk have inverse effects on profit efficiency among Indian banks. According to the 'bad management hypothesis' (see Fiordelisi *et al.* 2011), poor credit monitoring and inefficient control of operating expenses and reputational problems tend to cause higher costs and increased risk of a bank, leading to a decline in bank performance. Accordingly, they find an inverse relationship between risk-taking and profit efficiency in European banks.

⁵ Acknowledging the significance of MPT in the risk-return relationship, we use Z-score (default risk) and *npl2tl* (credit risk) as endogenous variables in the specifications of profitability. We also add a number of control variables that represent the asset side of a bank's balance sheet. Since the aim of this study is to examine the effect of ownership structure on bank risk-taking and profitability, rather than measuring the risk-return relationship, the MPT does not seem to be an appropriate theory for this study.

Manlagñit (2011) also finds similar evidence in the context of the Philippines. However, Naceur and Omran (2011) find that bank capitalization and credit risk have positive effects on banks' net interest margin, cost efficiency and profitability in the Middle East and North Africa (MENA) countries.

3. Data and empirical specifications

We use an unbalanced panel dataset covering 55 commercial banks in India for a period of four years (2008-2011), thereby creating a total of 217 bank-year observations. We obtain ownership, risk and other financial data from the Bankscope database provided by Fitch/IBCA/Bureau Van Dijk, together with the annual reports and websites of the banks. In order to address the first two research questions on the relationship between ownership and bank risk-taking, we specify the following empirical model:

$$\begin{aligned}
 Risk = & \alpha + \beta_1 *(Ownership\ concentration) + \beta_2 *(Government\ ownership) + \beta_3 *(Foreign \\
 & ownership) + \beta_4 *(Capitalisation) + \beta_5 *(Liquidity) + \beta_6 *(Growth) + \beta_7 *(Size) + \\
 & \beta_8 *(Intermediation) + \beta_9 *(Lending) + \beta_{10} *(Year\ Dummies) + \varepsilon_t \dots\dots\dots(1)
 \end{aligned}$$

In measuring the risk-taking behaviour of a bank, we use two of the widely used measures of bank risk-taking such default and credit risks⁶. The default risk is measured through Z-score, whereas credit risk is measured by the ratio of non-performing loans to total loans. The Z-score

⁶ Note that none of these measures capture a bank's willingness to engage in risk-taking behaviour. Whilst it is important to use risk measures based on the perception and attitudes of the managers or shareholders towards bank risk-taking, it requires a separate survey or interview-based methodology or content analysis (See also Gewald et al., 2006 and Sachse et al., 2012). This is beyond the scope of this paper.

is defined as $Z = (ROA+EA)/\sigma ROA$, where ROA is the return on assets and EA is the ratio of equity to assets. In order to calculate σROA , we follow among others Agoraki *et al.*, (2011) in using the ROA data for four years starting from year_{t-3} to year_t. Angkinand and Wihlborg (2010) argue that a Z-score is an appropriate proxy for a bank's overall risk, since it captures both asset side risk and equity capital buffer.

Our aim is to measure the impact of ownership, which is an important element of corporate governance⁷. Accordingly, we use two ownership variables such as the concentration of ownership (e.g. percentage of shareholding of the largest shareholder) and the types of ownership (e.g. government and foreign ownerships). Among others, Iannotta *et al.*, (2007) and Shehzad *et al.* (2010) use ownership concentration, and Barry *et al.*, (2011) use various types of ownership as important determinants of bank risk-taking. Table 1 provides a detailed description of these variables, along with other control variables.

Insert Table 1 about here

We follow related literature in using a number of control variables that capture both assets and liabilities of a bank's balance sheet. From the perspective of liability (e.g., the capital structure of a bank) we follow most of the related literature in using a bank's capitalisation as measured by the ratio of equity to total assets. From the asset side of the balance sheet, we use bank size (measured by the natural logarithm of total assets), liquidity (ratio of liquid assets to total assets), financial intermediation (loans to deposit ratio), bank lending (ratio of net lending to total assets)

⁷ This paper does not address the impact of overall corporate governance quality or other aspects of corporate governance such as the structure and independence of the board and management.

and average asset growth of a bank. In order to control for the time effects, we also use year dummy variables in every specification. Iannotta *et al.*, (2007) argue that large banks can reduce risk and improve performance through lower cost of funding, more diversified asset portfolio and greater economies of scale. Das and Ghosh (2009) observe that higher liquid assets indicate poor cash management and lower interest income, leading to a decline in bank profitability. They also mention that higher loan ratio implies a rise in risk-weighted assets, even though this can increase the interest income and profitability of a bank. Naceur and Omran (2011) argue that higher loan to asset ratio increases a bank's exposure to bad loans, which in turn leads to lower profitability. Das and Ghosh (2009) further argue that asset growth is likely to be a result of an over-extension of credit by banks, leading to higher profitability.

Whilst debt finance provides a firm with tax-shield benefits, it increases financial risk of a firm due to the cost of financial distress. According to the static trade-off theory, a firm attempts to balance between the tax benefit of debt and expected bankruptcy costs in order to determine an optimal capital structure (Melicher and Norton, 2007: 426-427). This theory also argues that an increase in debt beyond the optimal level of capital structure would bring additional financial risks, leading to higher cost of capital and lower valuation of a firm. In other words, an increase in equity finance can reduce the financial risk of a firm, although it involves agency costs of equity. Due to the unique nature of a bank's capital structure, most of the bank-related studies use capitalisation as the banks' capital structure. For example, Fiordelisi *et al.*, (2011) argue that better capitalised banks have less moral hazard incentive for managers, leading to greater efficiency. Brissimis *et al.*, (2008) and Manlagñit (2011) argue that higher equity capital acts as a safety net against portfolio losses and provides risk management incentives to safeguard equity,

which in turn reduces bank risk and enhances bank performance. Angkinand and Wihlborg (2010) argue that increased equity reduces risk-taking incentives of bank shareholders and managers.

In order to examine the effect of ownership on bank profitability (e.g. the third research question), we estimate the following equation, where return on assets (ROA) and return on assets (ROE) are used as alternative measures of profitability⁸:

$$\begin{aligned}
 \text{Profitability} = & \alpha + \beta_1 * (\text{Bank risk-taking}) + \beta_2 * (\text{Ownership concentration}) + \\
 & \beta_3 * (\text{Government ownership}) + \beta_4 * (\text{Foreign ownership}) + \beta_5 * (\text{Leverage}) + \beta_6 * (\text{Liquidity}) \\
 & + \beta_7 * (\text{Growth}) + \beta_8 * (\text{Size}) + \beta_9 * (\text{Intermediation}) + \beta_{10} * (\text{Lending}) + \beta_{11} * (\text{Year} \\
 & \text{Dummies}) + \varepsilon_t \dots \dots \dots (2)
 \end{aligned}$$

We use all ownership as well as control variables and time dummies that are included in Eq.(1). A number of recent studies (such as Agoraki *et al.*, 2011; Forssbäck, 2011) address concerns about potential endogeneity among ownership, risk-taking and performance. In order to resolve this problem, we use Z-ratio (default risk) as an endogenous variables in the specification of ROE, whilst np12tl (credit risk) is used as an endogenous variables in the specification of ROA. We also estimate Eq.(2) without using these risk variables. We replace capitalisation with leverage (debt-equity ratio) in all specifications of profitability, because of potential multicollinearity problem between capitalisation and risk variables. Forssbäck (2011) argues

⁸ When Eq.(2) is estimated using Z-score as an endogeneous variable, we use ROE as the dependent variable, since Z is largely based on ROA and hence, it is inappropriate to regress ROA against Z. Otherwise, we use ROA as the dependent variable. We are thankful to one of the anonymous reviewers for identifying this methodological problem.

that the effects of corporate governance variables are likely to be conditioned by the leverage of a bank.

We use two-step generalized method of moments (GMM) panel estimator with heteroskedasticity-robust standard errors introduced by Hansen (1982). Baum *et al.*, (2003) suggest that GMM makes use of the orthogonality conditions to produce consistent and efficient estimates in the presence of heteroskedasticity of unknown form. In order to address endogeneity, we follow among others, Forssbæk (2011) in using heteroskedasticity-robust version of Hausman test for every specification. This has led us to identify capitalisation, and size as potentially endogenous variables in the specifications of Z-score and npl2tl. We use lags of these endogenous variables, along with listed_dummy as instruments. As mentioned above, we also use Z-ratio or npl2tl as potentially endogenous variables in the specifications of profitability. We use lags of these endogenous variables, along with the (first)lag values for all of the independent and control variables and listed_dummy as their instruments. The validity of the instruments is tested (test of overidentifying restrictions) using Hansen J statistic. The Hansen J statistics of all specifications indicate that we cannot reject the null hypothesis of overidentifying restrictions. This suggests that the instruments are valid, since they are appropriately uncorrelated with the disturbance process.

4. Empirical results and analysis

This section reveals descriptive statistics and regression results, together with an analysis of the findings.

Insert Table 2 about here

4.1. Descriptive statistics

Table 2 shows mean values and standard deviations of the dependent, explanatory and control variables. It is shown that government and foreign shareholders own around 24% and 22% shares in of the sample banks, respectively. The table also shows a higher concentration of ownership in Indian commercial banks, with the largest shareholder owning around 57% shares. Table 3 shows correlations among ownership, risk and other financial variables. It is evident that government ownership has a positive association, whereas foreign ownership has a negative association with the default risk. The table further shows that both default and credit risk variables are inversely related to bank profitability.

Insert Table 3 about here

4.2. The regression results

Table 4 shows GMM regression results with z-score (default risk) and npl2tl (credit risk) as dependent variables. Columns 1 through 3 of the Table show that government ownership has a positive association with default risk, and that this relationship holds for the sub-samples of listed and domestic banks. Interestingly, foreign ownership shows positive association with default risk, and this result holds for the sub-sample of listed commercial banks. However, the effect of ownership concentration on default risk appears to be statistically insignificant.

Columns 4 through 6 of Table 4 show that government ownership has a positive association with credit risk of a bank, even though it becomes insignificant for the sub-samples. In addition, most of the ownership variables are statistically insignificant in the specifications of credit risk.

Insert Table 4 about here

Table 5 shows GMM regression results of Eq.(2). Columns 1 through 3 show estimation results with return on equity (ROE) as the dependent variable, and columns 4 through 9 show results of the regression of return on assets (ROA). Overall, government ownership shows a statistically significant negative association with profitability, and this relationship holds for the sub-samples of listed and domestic banks. In addition, foreign ownership is inversely associated with both measures of profitability only among the listed commercial banks. The estimation results of ownership concentration remain inconclusive. Importantly, the results of government and foreign ownerships hold with or without the inclusion of default and credit risks as endogenous variables. Surprisingly, none of the risk variables shows statistically significant results. .

Insert Table 5 about here

4.3. Robustness tests

We perform a number of robustness tests. First, we estimate Eq. (1) for both risk variables by using the first (lag) values of the endogenous and all independent variables as instruments. The results (not reported) show no significant qualitative differences with the reported findings.

Second, we also estimate Eqs. (1) and (2) by introducing ownership variables one by one, along with the control variables. Overall results appear to be roughly similar. Third, in order to address potential reverse causality issue e.g., the effect of profitability on risk-taking, we estimate Eq. (2) by replacing the profitability with z-score or npl2tl as dependent variables, whilst using ROA as endogenous variable. We also use the (first) lag values of ROA and the independent variables as instruments. The specification results (not reported) show either a poor explanatory power of the model (negative R^2 values) or insignificant result of ROA. This evidence seems to suggest that causation runs from risk-taking to performance, rather than vice-versa. We also estimate Eqs. (1) and (2) without bank lending as an additional control variables, and find that the results are similar to the reported findings.

4.4. Analysis

Overall, our study results suggest that government ownership has a positive effect on default risk, and a negative effect on bank profitability. Our evidence supports related literature (e.g., Micco et al., 2007; Chen and Liao, 2011) that finds dampening effect of government ownership. As Das and Ghosh (2009) argue, an over-extension of credit and poor risk-management practices of government-controlled banks are likely to cause greater bank-risk and lower profitability among Indian banks. Moreover, our evidence partly supports Iannotta et al., (2007) and Berger et al., (2005), in that government ownership is inversely related to credit risk, although this relationship does not hold in the estimation of the sub-samples.

Our evidence suggests that ownership concentration is not related to bank risk-taking and profitability, a finding that contradicts the predictions of agency theory. Contrary to the prediction of ‘global advantage hypothesis’, we find foreign shareholding having a positive effect on default risk, and a negative effect on profitability only among the listed commercial banks. This evidence is partly in support of Angkinnad and Wihlborg (2010), Leye and Micco (2007) and Lensink et al., (2008), even though it contradicts with Chou and Lin (2011), Berger et al., (2005) and Patibandhla (2006). This evidence partly corroborates with the evidence of Zhao et al., (2010), who find that foreign banks in India showed improved efficiency in a deregulated environment, but their efficiency advantage was short lived due to increased competition, technological adaptation by local banks and higher cost of prudential regulations.

Among the control variables, we find bank capitalisation having an inverse association with default risk, and thus support the observation of Manlagñit (2011) in that higher financial capital reduces portfolio losses, which in turn decrease the chances of insolvency risk. In addition, leverage has a negative relationship with a bank’s return on assets. We also find asset growth and bank size having inverse effects on both default and credit risks, and positive effects on bank profitability. Das and Ghosh (2009) also find positive effect of growth on profitability. Our evidence supports the notion (see Iannotta et al., 2007) that large banks enjoy economies of scale in diversifying their asset portfolio and overall banking activities, leading to an improvement in bank profitability and a decline in overall bank risk. Interestingly, this evidence is in line with ‘too big to fall hypothesis’, which has been widely criticised by many policy makers in the developed economies after financial crisis. We also find liquidity having an inverse association

with bank profitability among the listed commercial banks. Finally, we find bank lending having an inverse effect on credit risk of a bank.

5. Conclusions

This paper investigated the effect of ownership on bank risk-taking and performance in emerging economies using India as a case study. We use generalised method of moments (GMM) estimation technique to analyse an unbalanced panel dataset covering 217 bank-year observations over a 4-year period (2008-2011). Overall, our study results suggest that government ownership of bank has a positive effect on default risk, and a negative effect on bank profitability. Interestingly, our evidence shows foreign ownership having a positive effect on default risk, and a negative effect on profitability only among the listed commercial banks. Finally, our estimation results do not support agency theory in relation to the effect of ownership concentration on bank risk-taking and profitability.

Our study results have several important policy implications. First, banking reform initiatives do not appear have enhanced efficiency of the state-owned banks through improving financial performance and reducing insolvency risks. Second, whilst financial deregulation enhanced foreign bank presence as well as foreign shareholding in domestic banks in India, our evidence suggests that foreign ownership among the listed commercial banks does show positive effect on banking sector stability. The positive effect of foreign ownership might be constrained by intense competition in the banking sector, together with the technological adaptation by the local banks, and excessive regulatory compliance costs in the post-financial crisis period. Overall, the

policymakers should undertake into a comprehensive assessment of performance and risks of the state-owned as well as foreign controlled banks. Third, our estimation results further suggest that large banks tend to maintain lower insolvency and credit risks and improved profitability by taking advantage of greater diversification benefits and economies of scale. This suggests the possibility of consolidation of smaller banks that seem to be struggling to cope with intense competition in the Indian banking sector.

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Table 1. List of all the variables and their descriptions

<i>Variables</i>	<i>Symbol</i>	<i>Descriptions</i>
Ownership types	govt	Total equity ownership of government
	foreign	Total equity ownership of Foreign
Ownership concentration	highest	Equity ownership of the highest shareholder
Default Risk	Z-score [Higher values imply lower default risk]	$Z = (ROA+EA)/\sigma ROA$, where ROA is the return on assets and EA is the ratio of equity to assets. σROA is based on the ROA data from t-3 to t years (See Agoraki et al. 2011)
Credit Risk	npl2tl	Non-performing loans to total loans.
Profitability	roa	Return of assets
	roe	Return of equity
Size	size	Logarithm of total assets
Liquidity	la2ta	Liquid assets to total assets
Growth	asstgr	Average growth in total assets over the last five years
Leverage	tl2te	Total liabilities to total equity
Capitalization	te2ta	Equity to total assets
Intermediation	loan2dep	Total loans to total deposit
Lending	nl2ta	Net loans to total assets

Table 2. Summary statistics

Variables	Obs	Mean	Std. Dev.
Z	211	-5.99	5.48
npl2gl	164	0.03	0.04
roa	211	0.89	1.03
govt	208	0.24	0.31
foreign	213	0.22	0.29
highest	200	0.57	0.35
tlte	217	15.48	12.09
teta	211	0.07	0.07
asstgr	206	24.97	26.21
lata	217	0.10	0.06
tloanstd	217	0.71	0.59

Table 3. Correlation matrix

	Z	npl2gl	roa	govt	foreign	highest	tlte	teta	asstgr	size
npl2gl	-0.32*	1								
roa	-0.69*	-0.24*	1							
govt	0.18*	-0.15	-0.03	1						
foreign	-0.37*	0.05	0.17*	-0.31*	1					
highest	-0.06	0.14	0.01	0.22*	-0.05	1				
tlte	0.27*	0.12	-0.18*	0.31*	-0.30*	0.13	1			
teta	-0.99*	0.37*	0.60*	-0.19*	0.38*	0.06	-0.27*	1		
asstgr	-0.39*	-0.23*	0.11	-0.05	0.28*	-0.03	-0.20*	0.39*	1	
size	-0.03	-0.45*	0.27*	0.48*	0.11	0.04	0.00	-0.01	-0.04	1
lata	-0.13	0.40*	0.05	-0.18*	-0.04	0.17*	0.10	0.13	0.01	-0.52*

Notes: This correlation matrix is based on the entire sample of 217 observations. ** and * indicate statistical significance at 1 and 5 levels, respectively.

Table 4. GMM regression results of default and credit risks against ownership variables

Variables	Default risk (Z-Score)			Credit risk (npl2tl)		
	(1)	(2)	(3)	(4)	(5)	(6)
	All	Listed	Domestic	All	Listed	Domestic
Govt. Own.	0.00232*** (0.000850)	0.00215*** (0.000802)	0.00259*** (0.000697)	0.0134** (0.00676)	0.00273 (0.00377)	0.0113 (0.00695)
Foreign Own.	0.00392* (0.00227)	0.00468*** (0.00172)	-0.00516 (0.00461)	-0.0192 (0.0126)	0.00219 (0.00595)	-0.0761** (0.0301)
Ownership Concentration	0.00150 (0.00105)	-0.000874 (0.000836)	-0.000100 (0.000979)	0.00350 (0.00714)	-0.000730 (0.00326)	-0.00665 (0.00795)
Growth	-0.00730** (0.00321)	-0.0117*** (0.00253)	-0.00866** (0.00363)	-0.110*** (0.0271)	-0.0746*** (0.00947)	-0.134*** (0.0478)
Liquidity	-0.00694 (0.00764)	0.0157** (0.00729)	-0.00934 (0.00793)	0.0586 (0.102)	-0.0311 (0.0266)	0.0765 (0.112)
Intermediation	-0.00131* (0.000721)	0.000422 (0.000313)	-0.00125* (0.000689)	-0.00658 (0.00429)	-0.000508 (0.000988)	-0.00723* (0.00409)
Size	-0.142*** (0.0381)	-0.126*** (0.0383)	-0.145*** (0.0306)	-0.563*** (0.187)	-0.463*** (0.161)	-0.548** (0.236)
Capitalisation	-0.769*** (0.0269)	-0.830*** (0.0112)	-0.770*** (0.0284)	0.547*** (0.178)	0.0159 (0.0480)	0.679*** (0.191)
Lending	0.0131*** (0.00436)	-0.00226 (0.00367)	0.0126*** (0.00459)	-0.150*** (0.0532)	-0.134*** (0.0198)	-0.159*** (0.0524)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.979	0.989	0.983	0.665	0.626	0.710
F Statistics	887.53***	2314.12***	772.42***	4.81***	15.79***	2.58***
Hansen J stat. (p-value)	2.091(0.148)	1.618(0.203)	1.033(0.309)	0.091(0.763)	0.037(0.846)	0.292(0.589)
n	170	130	137	132	96	103

Notes: This table presents results based on two-step generalized method of moments (GMM) panel estimator introduced by Hansen (1982). To facilitate interpretation, Z-value is entered with negative a sign in the regression model. Hansen is a test of over-identifying restrictions. The test results indicate that we fail to reject the null hypotheses over-identifying restrictions. ***, ** and * indicate statistical significance at 1, 5 and 10% levels, respectively. The figures in parentheses are the heteroskedasticity-adjusted robust standard errors. All specifications also include a constant.

Table 5: GMM regression results of bank profitability against risk and ownership variables

Variables	Return on Equity (ROE)			Return on Assets (ROA)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	Listed	Domestic	All	Listed	Domestic	All	Listed	Domestic
Default risk	0.198 (0.457)	0.513 (0.425)	0.571 (0.460)						
Credit Risk				-0.0163 (0.0467)	-0.169*** (0.0532)	0.0171 (0.0458)			
Govt. Own.	-0.0304** (0.0150)	-0.0381** (0.0151)	-0.0298** (0.0144)	-0.00788*** (0.00212)	-0.00649** (0.00270)	-0.00718*** (0.00174)	-0.00246** (0.00103)	-0.00339*** (0.000951)	-0.00210** (0.000904)
Foreign Own.	-0.0929** (0.0376)	-0.0996*** (0.0272)	-0.0302 (0.0810)	-0.00102 (0.00411)	-0.00747** (0.00308)	0.00827 (0.00593)	-0.00750** (0.00326)	-0.00814*** (0.00223)	0.00269 (0.00570)
Ownership Concentration	0.00845 (0.0171)	0.0227 (0.0167)	0.0177 (0.0200)	0.00675*** (0.00235)	0.00395* (0.00229)	0.00731*** (0.00183)	0.00110 (0.00117)	0.00209** (0.00105)	0.00176 (0.00122)
Growth	0.0859** (0.0418)	0.182*** (0.0376)	0.125*** (0.0413)	0.0117** (0.00496)	0.0901** (0.0412)	0.0143*** (0.00445)	0.0105*** (0.00363)	0.0148*** (0.00363)	0.0110*** (0.00343)
Liquidity	0.0539 (0.111)	-0.575*** (0.136)	0.138 (0.121)	0.000175 (0.0143)	-0.0489*** (0.00967)	0.00563 (0.0156)	0.00607 (0.00971)	-0.0442*** (0.00902)	0.000549 (0.00720)
Intermediation	-0.00163 (0.00327)	-0.00782 (0.00533)	-0.00115 (0.00339)	0.000162 (0.000603)	-0.000673* (0.000384)	0.000151 (0.000550)	0.000479 (0.000562)	-0.000158 (0.000330)	0.000284 (0.000485)
Size	1.638*** (0.497)	2.513*** (0.468)	1.475*** (0.449)	0.140*** (0.0523)	0.229*** (0.0478)	0.142*** (0.0496)	0.125*** (0.0427)	0.198*** (0.0436)	0.0884*** (0.0341)
Leverage	0.0718 (0.195)	-0.163 (0.182)	-0.0678 (0.192)	-0.0490*** (0.00804)	-0.0587*** (0.00595)	-0.0436*** (0.00837)	-0.0528*** (0.00963)	-0.0586*** (0.00583)	-0.0462*** (0.00826)
Lending	-0.0922* (0.0554)	0.0186 (0.0692)	-0.0760 (0.0558)	-0.00679 (0.00888)	-0.0130 (0.0112)	-0.00116 (0.00961)	-0.0127*** (0.00423)	-0.00536 (0.00486)	-0.00942** (0.00379)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	167	128	134	119	87	92	167	128	134
R-squared	0.270	0.470	0.227	0.221	0.770	0.275	0.287	0.581	0.303
F Statistics	16.06***	14.16***	16.01***	6.10***	15.51***	8.84***	10.27***	19.73***	10.42***
Hansen J stat. (p-value)	10.533(0.104)	9.169(0.103)	6.614(0.358)	7.121(0.310)	10.437(0.107)	3.644(0.725)	5.761(0.330)	6.241(0.284)	2.837(0.725)

Notes: This table presents results based on two-step generalized method of moments (GMM) panel estimator introduced by Hansen (1982). To facilitate interpretation, Z-value is entered with negative a sign in the regression model. Z (default risk) is used as an endogeneous variable in the estimations of columns 1-3, whereas NPL2TL (credit risk) is used as an endogeneous variable in the estimations of columns 4-6. Hansen is a test of over-identifying restrictions. The test results indicate that we fail to reject the null hypotheses over-identifying restrictions. ***, ** and * indicate statistical significance at 1, 5 and 10% levels, respectively. The figures in parentheses are the heteroskedasticity-adjusted robust standard errors. All specifications also include a constant.