Geographical diversification and bank performance: evidence from Indian banks

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Abstract

Purpose – Geographic diversification results in the improvement of firm value through an increase in scale and scope of economies, gains in synergy, reduction in cost and improved corporate governance, however, the capabilities of financial institutions get heavily affected due to information asymmetries, varied macro and microeconomic factors across economies. In this context, the purpose of this paper is to empirically analyze the impact of geographical diversification on the performance of Indian Banks.

Design/methodology/approach – For an unbalanced panel data set of Indian Banks over the period 2001–2016, fixed effect model (FEM) with a distributed lag is used and tested for firm and time fixed effects. Further, the study also examines the role of bank size and ownership on the above association.

Findings – Findings of the study suggests that geographical diversification helps in increasing bank returns for the overall sample but does not have any significant impact on bank risk. For foreign and public banks, geographical diversification helps in increasing bank returns but does not have any significant impact on bank risk. This indicates toward the adverse selection, poor monitoring incentives in new markets and suggesting a lack of managerial skills.

Originality/value – The study indicates that while formulating the policies regarding branching and expansion these findings can serve as a guiding tool for managers and regulators. Findings have important implications for financial institution and policymakers in globalized financial markets.

Keywords Concentration risk, Risk management, Ownership, Bank performance, Geographical diversification

Paper type Research paper

1. Introduction

Due to internationalization and globalization of the financial sector over the last two decades, a bank's performance does not restrict to the economy of one specific region. Owing to the changing environment, the banking industry has experienced a remarkable level of geographic expansion both in developed and developing economies through mergers, acquisitions and branch expansions (Bandelj, 2016). Geographic diversification results in the improvement of firm value through an increase in scale and scope of economies, gains in synergy, reduction in cost and improved corporate governance, largely owing to the increase in the number of potential acquirers (García-Herrero and Vázquez, 2013). However, the capabilities of financial institutions get heavily affected by macro and microeconomic factors of the domestic economy (García-Herrero and Vázquez, 2013). On the other hand, geographical diversification induces certain inefficiencies, due to information asymmetries, increasing learning costs and agency problems arising due to complex organizations (Deng and Elyasiani, 2008). In this context, this essay empirically analyses the impact of geographical diversification on the performance of Indian Banks. Further, it also examines the role of bank size and ownership on the above association.

Earlier researchers advocate the benefits of geographical diversification based on two competing theories. First, theory based on the delegated monitoring argument originates from

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the traditional banking literature (Boyd and Prescott, 1986) suggests that a well-diversified organization is an optimal one. As due to diversification cost of monitoring the borrowers reduces. Second theory originates from the corporate finance literature (Gomes and Livdan, 2004; Rajan *et al.*, 2000) suggests that in order to control the agency problems and to optimally utilize the core competencies of managers, an organization should diversify. Empirical studies across different geographies have reported mixed results and given alternate arguments on the optimal degree of geographical diversification, as discussed under.

Based on the proposition of portfolio theory, a geographically diversified bank is considered to be less risky as compared focused ones due to reduced exposure to changing local economic conditions (Bebczuk and Galindo, 2008). Supporting this stance, using empirical data of 105 Italian banks over six years (1993–1999), Acharya *et al.* (2006) recommended that the benefits of geographical diversification are high for banks with lower risk levels. They analyzed the effect of focus vs diversification on individual banks' loan exposure across different countries. Their findings explain the results of Berger *et al.* (2000), that mergers and acquisition which are concentrating on the benefits of geography and activity give superior economic performance as compared to the others that are diversifying income sources.

Aligning with the similar ideology Deng *et al.* (2007) recommended that higher yield spread associates with greater asset and geographical diversification. They studied the impact of geographical diversification on the cost of debt, using deposit dispersion for US bank holding companies over a 25 year period (1973–1998). Geographical diversification on its part improves the risk-return trade-off by providing better access to capital markets through various geographies, subsequently resulting in reduced cost of capital. Further to examine the relation between value, risk and diversification while controlling for the distance between branches and headquarters Deng and Elyasiani (2008) studied the US bank holding companies. They used a new diversification measure "distance-adjusted deposit dispersion index" taking into consideration number of operative locations, the amount of activity at each location and distance between locations and headquarters. They concluded that diversification associates with increased valuation and reduced risk, but as the distance between the headquarters and branches increased these benefits diminish. So, firms should cautiously decide on the optimal degree of geographical diversification. Further, Cotugno and Stefanelli (2010) reported a strong positive association between geographical diversification and corporate profitability along with greater stability for Italian banks over a five-year period (2005–2010). They also pointed to the fact that as the functional distance increased; it resulted in high monitoring costs, which in the long run raised the default probabilities of a loan portfolio. Thus, geographical diversification may induce inefficiency in an organization due to increased agency problems as the organization becomes more complex due to increased region specific diversity (Rajan *et al.*, 2000).

Greater geographical diversification permitted banks to reduce their dependency on the economic performance of a specific location. These benefits were more evident when there is a significant economic difference between the geographies where a branch is situated as suggested by Alessandrini *et al.* (2005) in their study based on 184 Italian banks. Their findings suggest that if the economic condition of different geographies across which a bank diversifies has low correlation among them, risk-adjusted performance should be more for a highly diversified bank. Therefore, as the distance between controlling office and branches increase, the monitoring cost increases simultaneously. This cost outweighs the benefits associated with the more geographically diversified organization.

On the contrary, as the organizations expand across geographies various new forms of risk arise, namely exchange and political risks (Miller and Parkhe, 2002). They called it "liability of foreignness" in global banking scenario which arises due to the changing operating environments of credit and financial markets across different countries. These liabilities have origins which are both revenue and cost based. Miller and Parkhe (2002) studied a global

sample of 1,300 banks which had foreign exposure over 13 countries over a period of seven years (1989–1996). Their findings suggest that for a foreign-owned bank's ability to survive and compete with its counterparts strongly depends on the competitiveness and environment of both countries of origin and host. Similarly, Berger and Deyoung (2001) concluded that apart from the US-based foreign banks, in all other countries (the UK, Germany, France and Spain), the efficiency of domestic banks was found to be higher than foreign banks while assessing the usefulness of cross-border associations of financial institutions.

While documenting the geographical diversification trends for US banks since 1994 Morgan and Samolyk (2003) analyzed how it relates to a bank's portfolio of choice and performance. Their findings suggest that there was a significant increase in the lending capacity of the bank and the banking system as a whole, but it did not have any significant impact on profits and risk reduction. Similarly, Hayden *et al.* (2007) recommended that geographical diversification was inclined to be linked with a decline in a bank's returns, even after adjusting for the risk element for 983 German banks over a period 1996–2002. Their results concluded that diversification (measured using Herfindahl index) did not have any significant impact on a bank's profitability (measured using ROA) and risk (measured using Value at risk). However, at moderate risk levels, the diversification results were found to be beneficial.

In a study based on 38 Global banks and its subsidiaries over a period of 1995–2004 García-Herrero and Vázquez (2013) investigate geographical diversification in terms of the assets of a bank's subsidiaries abroad, as compared to those of their parent banks. They analyzed the results by classifying the performance in the home country, other industrial countries and emerging market countries. Their findings suggest that higher risk-adjusted returns were found for banks with larger asset allocation to emerging markets. A significant home bias was also found for an international allocation of bank assets across geographies. Bandelj (2016) analyzed the tradeoff in the literature which says that geographical diversification creates economies of scale which improves bank efficiency through reduced risk and higher returns and thus creating a positive impact on bank valuation. On the contrary, the agency theory suggests that with geographical diversification, monitoring cost of manager rises, which increases agency cost. He examines the impact on the cost of equity of European banks due to geographical diversification. His findings reveal that geographically diversified banks, associate with a higher cost of equity as compared to more focused ones. Because of the increase in the agency problems, the diversified banks are hit badly by adverse market valuations.

The ambiguity of existing empirical literature on the economic consequences of geographical diversification does not provide any clear evidence as to whether geographical diversification generates net benefits or costs. Therefore, regulators and policymakers are a bit reluctant to advise banks to adopt diversification as an effective risk management tool. Especially when it comes to emerging economies the results of developed nations cannot replicate as it is since these economies are having a different set of macroeconomic and financial structure. Based on the mixed empirical results, across different countries across the world, it is becoming difficult to reach consent on the impact of geographical diversification on bank performance. This study examines the impact of geographical diversification on bank risk and return. We sample Indian banks panel data set over the period 2001–2016. We use the fixed effect model (FEM) with a distributed lag and test for firm and time fixed effects. Further, we also examine the role of bank ownership on the above association.

Our findings suggest that geographical diversification helps in increasing bank returns for the overall sample but does not have any significant impact on bank risk. In case of foreign and public banks, geographical diversification helps in increasing bank returns but does not have any significant impact on bank risk. This indicates toward the adverse selection, poor monitoring incentives in new markets and suggesting a lack of managerial skills. While formulating the policies regarding branching and expansion the findings of the study can

serve as a guiding tool for managers and regulators. These findings can have important implications for financial institution and policymakers in globalized financial markets.

The remainder of this paper is organized into following sections. Section 2 discusses the research methodology and the measurement of key variables used in the study. Section 3 describes the sample data and descriptive statistics, Section 4 analyzes the results of the study and finally, Section 5 concludes the study while discussing its possible implications.

2. Research methodology

As discussed in the earlier section, we use FEM with a distributed lag for an unbalanced panel of Indian banks for firm and time fixed effects. Researchers such as Stiroh and Rumble (2006), Baele *et al.* (2007), Sharma and Anand (2018) mention the problem of endogeneity while using OLS regression, where bank specific factors like the expertise of managers or geographical locality correlate with the observed explanatory variables. They observe that such models suffer from a high degree of correlation among explanatory variables, which may lead to inconsistent and bias estimators. This, in turn, may affect the decision to diversify by affecting a bank's performance. To address this problem Gujarati and Porter (2009) suggest FEM, as it controls this problem of endogeneity, as it does not require independence between regressor and error terms, which in turn controls the potential source of endogeneity. This simultaneously also controls the unobserved heterogeneity concerning time specific, firm invariant features (such as macro variables, interest level or regulations like Basel norms) and time invariant, firm specific features (such as ownership structure). The general relationship under examination is:

$$\mathrm{PER}_{jt} = \alpha + \beta \mathrm{GDIV}_{jt-1} + \delta \mathrm{Z}_{jt-1} + \varepsilon_{jt}, \tag{1}$$

where t refers to the time, j indicates the bank and β is the estimated coefficient of bank diversification. Here, we test the null hypothesis that there is no significant impact of geographical diversification on bank performance. If β is significant, then geographical diversification effect holds.

The description of variables is as follows: to measures the bank performance (PER), we calculate returns using ROA and ROE and riskiness with RISK (Berger *et al.*, 2010). ROA is calculated as return on assets (ratio of net income to TA)/standard deviation of return of assets for bank j at time t (Acharya *et al.*, 2006; Berger *et al.*, 2010). ROE is calculated as return on equity (ratio of net income to total equity)/standard deviation of return of equity for bank j at time t (Stiroh and Rumble, 2006; Tabak *et al.*, 2011). As a proxy to measure risk we calculate RISK as the ratio of net non-performing assets to net loans and advances similar to (Berger *et al.*, 2010; Sharma and Anand, 2017).

GDIV is used as a proxy for geographical diversification. We use two alternative measures of diversification Hirschman–Herfindahl Index[1] (HHI) and Shannon Entropy[2] (SE) in line with previous researchers (Stiroh, 2004; Acharya *et al.*, 2006; Bebczuk and Galindo, 2008; Tabak *et al.*, 2011). HHI and SE are calculated based on the proportion of income coming from the home country and abroad. We are using these HHI and SE rather than distance measures for measuring diversification as our study focuses on the aspect of domestic vs international diversification rather than the distance factor. Moreover, the Indian banks are still at a nascent stage in the extent of geographical diversification as compared to banks of developed countries like the US, the UK and Europe.

To capture the impact of exogenous variables which are bank specific, a set of control variables is used in our regression analysis denoted by vector Z. To capture the effect of bank size we use natural logarithm of year-end total assets (LTA) following the previous literature (Acharya *et al.*, 2006). We use capital adequacy ratio (CAR) calculated as total capital to risk weighted assets, as an indicator of the financial health of the bank, similar to

Acharya *et al.* (2006). We use equity ratio (EQR) calculated as the ratio of total equity to TA of bank, to capture the effect of capital structure on banks performance (Cheng *et al.*, 2014).

We further use the model to analyze the role of ownership on bank performance using interaction dummy. The motivation behind testing for bank ownership is that different banks have distinct objectives and product offerings. As a result in order to achieve their objectives, banks adopt different diversification strategies. We use additional dummy variables as public, private and foreign based on their ownership as shown in Equation (2). The dummy coefficients should be interpreted as the difference between the individual bank size captured by the respective dummy variable and the omitted group of other bank sizes.

Banks may encounter worse informational problem when the economy falls in crisis, which can greatly deteriorate firms' operation outcomes and obscure their business prospects (Wu *et al.*, 2010). As the study includes the 2007–2008 financial crisis period we have introduced a dummy variable – financial crisis in the model, to access its impact on banks performance. A dummy variable is constructed equal to 1, if the country experiences a systematic banking crisis, using the data in Laeven and Valencia (2013):

$$\mathrm{PER}_{jt} = \alpha + \beta_1 \mathrm{GDIV}_{jt-1} + \beta_2 \left(\mathrm{GDIV}_{jt-1} \times \text{Own dummy}_{jt-1}\right) + \delta \mathrm{Z}_{jt-1} + \beta_3 \text{Own dummy}_{jt-1} + \beta_4 \text{Financial crisis dummy} + \varepsilon_{jt}. \quad (2)$$

We also report the results of the Hausman test which is used to decide between random and FEMs. It tests the null hypothesis that random effect models are more appropriate against the alternative hypothesis of the appropriateness of fixed effects models (Green, 2008). It tests whether the errors correlate with the regressor. Researchers extensively use this test for testing endogeneity and instrument validity in panel data (Murphy and Topel, 2002; Hausman *et al.*, 2005).

3. Sample and descriptive statistics

Our sample consists of panel data of annual financial parameters on 14 Indian banks over a period spanning from 2001–2016. In 2001, the second generation economic reforms were introduced into the country with a special emphasis on fiscal restructurings, financial reorganizations, structural changes, labor law modifications, etc. As the period from 2001 onwards showed the impact of these reforms so we chose this period. We use CMIE Prowess database and RBI database for a bank's financial and macroeconomic variables. Only the banks, which are consistently in operation during the study period have been included in the sample. Those banks which merged with (or were acquired by) other banks during the study period are excluded from the sample, but on the other hand, banks which are incorporated during the study period are included. Banks which have at least three consecutive years of time series observations are also included in the final sample. In order to control the measurement errors, we have omitted extreme values in the bank year observations (3 percent highest and lowest values) for each computed variable. The final sample consists of 14 banks, dominated by public banks (9) followed by private banks (3) and foreign banks (2). The final sample consists of 154 bank years (69 percent of data sets from public banks; 13 percent of data sets from private banks and 16 percent of data sets from foreign banks).

Table I depicts the descriptive statistics of performance and diversification variables in our empirical model. The mean ROA for all banks over the period of 2001–2016 is 4.157. Its range varies from −0.298 to 12.217 indicating that the sample includes a wide range of both high performing and low performing banks. Similar trends are seen for the other two performance measures, i.e. ROE and RISK. However, there is no strong evidence for data

Variable		$\widetilde{ROA}$	$\widetilde{ROE}$	$\widetilde{RISK}$	HHI	SE
n		154	154	154	154	154
Mean		4.157	3.461	2.468	0.880	−0.090
Median		3.528	3.202	1.764	0.896	−0.050
SD		2.507	1.878	2.299	0.083	0.106
Skewness		0.951	0.921	1.634	−1.312	−2.109
Kurtosis		0.507	1.285	1.957	1.588	1.622
Minimum		−0.298	−0.258	0.220	0.516	−0.468
Maximum		12.217	10.102	8.775	0.987	−0.009
Percentiles	25	2.404	2.108	0.813	0.818	−0.085
	50	3.528	3.202	1.764	0.896	−0.050
	75	5.528	4.345	3.058	0.950	−0.028

Notes: $\widetilde{ROA}$, return on assets; $\widetilde{ROE}$, return on equity; $\widetilde{RISK}$, bank risk; HHI, geographical diversification measure using Hirschman–Herfindahl Index; SE, geographical diversification measure using Shannon Entropy

Table I. Geographical diversification: descriptive statistics of performance and diversification measures

being skewed toward either ends as there is not much difference between mean and median for most of the variables. The skewness and kurtosis statistics for different variables indicate normal univariate distribution as the values are between −2 and +2 which are considered acceptable (George and Mallery, 2010). The diversification measure indicates an existence of significant variation in the extent of diversification, across the sample.

Table II depicts the descriptive statistics of control variables used in the study. The bank size measured using log of total assets (TA) has a mean of 6.204 with a range of 4.348–7.311. This ensures that the results are not solely reflecting the benefits of diversification to large banks. Average CAR over the study period is 12.971. The mean deposit to total assets (DpTA) is 0.826 and ranges from 0.522 to 0.906 indicating variation in deposit patterns across the sample banks.

Table III represents a paired correlation among the dependent and independent variables used in our empirical model. Our two alternative measures of bank returns $\widetilde{ROA}$ and $\widetilde{ROE}$ have a positive correlation of 0.907 which is statistically significant. However, measures of bank risk i.e. $\widetilde{RISK}$ and bank returns are negatively correlated substantiating risk-return tradeoff. Some of the independent variable correlates at 5 percent level of significance. The results of the variance inflation tests suggest that no variable should be dropped from the regression. The average variance inflation factor statistics for regression models are within the specified range.

Variable		TA	CAR	EQR	NIM	OER	LnTA	DpTA	BPE
n		154	154	154	154	154	154	154	154
Mean		6.204	12.971	0.006	2.828	0.231	0.593	0.826	0.861
Median		6.279	12.655	0.003	2.753	0.237	0.608	0.854	0.924
SD		0.581	1.955	0.011	0.825	0.052	0.063	0.081	0.273
Skewness		−0.956	1.257	1.886	1.592	0.130	−1.499	−2.226	−0.493
Kurtosis		1.229	1.465	1.308	1.004	−0.965	2.086	4.710	−0.809
Minimum		4.348	9.750	0.000	1.508	0.128	0.366	0.522	0.212
Maximum		7.311	19.140	0.114	6.004	0.338	0.691	0.906	1.316
Percentiles	25	5.922	11.568	0.001	2.333	0.185	0.577	0.819	0.624
	50	6.279	12.655	0.003	2.753	0.237	0.608	0.854	0.924
	75	6.612	13.500	0.005	3.135	0.274	0.635	0.873	1.093

Notes: TA, log of total assets; CAR, capital adequacy ratio; EQR, total equity to total asset; NIM, net interest margin; OER, operating expenses to total expenses; LnTA, loan to total assets; DpTA, deposits to total assets; BPE, business per employee

Table II. Geographical diversification: descriptive statistics of control variables

Table III. Geographical diversification: correlation between variables

Var.	$\widetilde{ROA}$	$\widetilde{ROE}$	$\widetilde{RISK}$	HHI	SE	TA	CAR	EQR	NIM	OER	LnTA	DpTA	BPE
ROA	1												
ROE	0.907**	1											
RISK	−0.010	−0.025	1										
HHI	−0.127	−0.021	−0.012	1									
SE	−0.458**	−0.220**	0.150	0.662**	1								
TA	−0.402**	−0.308**	0.348**	0.038	0.447**	1							
CAR	0.267**	0.196*	0.540**	0.010	0.027	0.148	1						
EQR	−0.026	−0.089	−0.079	0.022	−0.236**	−0.267**	−0.056	1					
NIM	0.373**	0.254**	−0.042	−0.323**	−0.678**	−0.261**	0.145	0.360**	1				
OER	0.203*	0.394**	0.248**	0.024	0.189*	−0.034	0.242**	0.065	0.235**	1			
LnTA	0.077	−0.111	−0.184*	−0.132	−0.237**	0.116	−0.090	−0.054	−0.041	−0.034	1		
DpTA	−0.054	−0.059	−0.834**	0.136	−0.182*	−0.457**	−0.628**	0.169*	0.103	−0.287**	0.137	1	
BPE	−0.210**	−0.337**	0.108	0.037	0.114	0.519**	0.115	−0.177*	−0.315**	−0.593**	0.018	−0.130	1

Notes: $\widetilde{ROA}$, return on assets; $\widetilde{ROE}$, return on equity; $\widetilde{RISK}$, bank risk; HHI, geographical diversification measure using Hirschman–Herfindahl Index; SE, geographical diversification measure using Shannon Entropy; TA, log of total assets; CAR, capital adequacy ratio; EQR, total equity to total asset; NIM, net interest margin; OER, operating expenses to total expenses; LnTA, loan to total assets; DpTA, deposits to total assets; BPE, business per employee. *,**,***Statistically significant at the 90, 95 and 99 percent levels, respectively

4. Results and analysis

4.1 Bank returns and geographical diversification

Tables IV and V represent the empirical results for our fixed effect regression models measuring the impact of geographical diversification on bank performance using alternate measures of bank return. The study reports mixed results across different ownership categories. Table IV shows the results of the fixed effect regression models investigating the relationship between performance measure ROA and geographical diversification measures HHI and SE. Columns (1) and (4) represent the regression results for Equation (1) using alternate diversification measures. The estimated coefficients of diversification measure are negative and significant indicating geographical diversification to be beneficial for improving ROA. The impact of ownership under different categories interaction terms, pertaining to ownership dummies (public, private and foreign) are used in Columns (2), (3), (5) and (6) which in turn represent the regression results for Equation (2).

Coefficients of the interaction term are significant indicating the critical role of bank ownership in determining the diversification-return relationship. The coefficient of interaction

	$\widetilde{ROA}$					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
HHI	−1.253*	−1.368*	−1.366**			
SE				−0.563*	1.001*	−1.250**
Public×HHI		−1.369*				
Private×HHI		1.532*	0.901*			
Foreign×HHI			−0.369*			
Public×SE					−1.394*	
Private×SE					1.522*	0.433*
Foreign×SE						−1.348*
TA	−0.197	1.142*	1.142*	−0.196	1.454*	1.454*
CAR	0.075*	0.205*	0.205*	0.081*	0.209*	0.209*
EQR	−1.253*	−1.426*	−1.426*	−1.178*	−1.597*	−1.597*
NIM	0.890***	0.778**	0.778**	0.897***	0.436**	0.436**
OER	−0.890	0.639*	0.639*	−0.444	0.385*	0.385*
LnTA	1.152**	1.490**	1.490**	1.547**	1.334**	1.334**
DpTA	−1.232	−1.778*	−1.778*	−0.765	−0.840*	−0.840*
BPE	−0.545*	−0.555*	−0.555*	−0.335*	−0.701*	−0.701*
Public dummy		−1.010*			−1.898**	
Private dummy		−2.986***	0.409***		−3.102**	2.796*
Foreign dummy			4.412***			3.211**
Financial crisis dummy	−0.765*			−0.675*		
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	154	154	154	154	154	154
No. of cross-sections	16	16	16	16	16	16
R^2	0.294	0.337	0.337	0.292	0.320	0.320
Adjusted R^2	0.250	0.311	0.311	0.268	0.294	0.294
F-statistic	6.676***	15.163***	15.163***	6.609***	14.096***	14.096***
Durbin–Watson stat.	1.960	1.964	1.964	1.972	1.979	1.979
Hausman test (χ^2-statistic)	15.968**	40.019***	40.019***	17.388**	43.079***	43.079***

Notes: $\widetilde{ROA}$, return on assets; HHI, geographical diversification measure using Hirschman–Herfindahl Index; SE, geographical diversification measure using Shannon Entropy; TA, log of total assets; CAR, capital adequacy ratio; EQR, total equity to total asset; NIM, net interest margin; OER, operating expenses to total expenses; LnTA, loan to total assets; DpTA, deposits to total assets; BPE, business per employee. We do not present the coefficients of time dummies for the sake of brevity. All regressions include firm fixed effects for all banks over the study period and ownership dummy variables. Robust standard errors are reported in parentheses. *,**,***Statistically significant at the 90, 95 and 99 percent levels, respectively

Table IV. Geographical diversification and bank performance measured using $\widetilde{ROA}$

Variable	$\widetilde{ROE}$					
HHI	−0.666*	−1.124*	−1.251*			
SE				−1.029*	−1.877**	−1.468**
Public×HHI		−2.873*				
Private×HHI		1.318**	1.191*			
Foreign×HHI			−2.873*			
Public×SE					−1.409*	
Private×SE					0.391*	1.803*
Foreign×SE						−2.409*
TA	−0.926*	−0.596*	−0.596*	−1.023*	−0.784*	−0.784*
CAR	−0.016*	−0.108*	−0.108*	−0.013*	−0.095*	−0.095*
EQR	−1.221**	−1.741*	−1.741*	−1.149*	−1.830**	−1.830**
NIM	0.409*	0.736**	0.736**	0.427*	0.527*	0.527*
OER	1.491***	1.733***	1.733***	1.546***	1.322***	1.322***
LnTA	1.433	1.707*	1.707*	1.262	1.634*	1.634*
DpTA	−0.637	−0.878*	−0.878*	−0.589	−0.914*	−0.914*
BPE	−0.035*	−0.019**	−0.019**	−0.878*	−0.830*	−0.830*
Public dummy		−1.694*			−1.638**	
Private dummy		−2.299***	−3.605*		0.303*	2.942*
Foreign dummy			2.789**			2.823**
Financial crisis dummy	−0.329*			−0.456*		
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	154	154	154	154	154	154
No. of cross-sections	16	16	16	16	16	16
R^2	0.345	0.327	0.327	0.344	0.320	0.320
Adjusted R^2	0.324	0.291	0.291	0.323	0.294	0.294
F-statistic	8.428***	14.987***	14.987***	8.384***	15.624***	15.624***
Durbin–Watson stat.	1.978	1.981	1.981	1.971	1.979	1.979
Hausman test (χ^2-statistic)	31.339***	52.354***	52.354***	32.490**	53.922***	53.922***

Notes: $\widetilde{ROE}$, return on equity; HHI, geographical diversification measure using Hirschman–Herfindahl Index; SE, geographical diversification measure using Shannon Entropy; TA, log of total assets; CAR, capital adequacy ratio; EQR, total equity to total asset; NIM, net interest margin; OER, operating expenses to total expenses; LnTA, loan to total assets; DpTA, deposits to total assets; BPE, business per employee. We do not present the coefficients of time dummies for the sake of brevity. All regressions include firm fixed effects for all banks over the study period and ownership dummy variables. Robust standard errors are reported in parentheses. *,**,***Statistically significant at the 90, 95 and 99 percent levels, respectively

Table V. Geographical diversification and bank performance measured using ROE

dummy is negative for public and foreign banks indicating that as banks expand across geographical boundaries, it has a positive impact on ROA . However, in case of private banks, geographical diversification has an inverse relationship with ROA.

As for the other control variables: the coefficient of other explanatory variables like TA and EQR is negative and significant for ROA. CAR shows a direct relationship with performance measure ROA , which indicates sound financial health. The net interest margin and operating expenses also show a significant and positive relationship with ROA which is in line with prior literature. Our results indicate higher the ratio of loan to TA, more beneficial it is for improving bank returns. However, bank returns have an inverse relation with business per employee. Coefficient of dummy variable for financial crisis is negative indicating an adverse impact of crisis on the overall bank returns. This is in line with Mishkin (1990) who describes the nature of financial crisis as a disruption of markets in which the asymmetric information problems of adverse selection and moral hazard become much worse.

However, all the regressions reject the null hypothesis of the Hausman test, thus making the FEM well specified. In order to check for the problem of autocorrelation, we calculated

the Durbin–Watson statistics as reported in Table V. Its value ranges from 0 to 4, statistics close to 2 indicates that there is no problem of autocorrelation in our data set (Nerlove and Wallis, 1966).

Table V shows the results of the fixed effect regression models investigating the relationship between another performance measure ROE and geographical diversification measures HHI and SE. Similar results are reported as the estimated coefficients of diversification measure are negative and significant indicating geographical diversification to be beneficial for improving ROE. The coefficients of the interaction dummies are also significant for public and foreign banks indicating benefits from geographical diversification. The results for the control variables financial crisis dummy are also similar.

Our findings suggest that geographical diversification helps in increasing bank returns for the overall sample but does not have any significant impact when it comes to bank risk. These are similar to the findings of Bandelj (2016), which state that as banks expand across geographical boundaries, it gives rise to information asymmetries, in turn increasing agency costs. Further, as these costs dominate the positive traits of diversification like operational efficiency and economies of scale, inefficient risk-return tradeoff are created.

4.2 Bank risk and geographical diversification

Table VI represents the empirical results for our fixed effect regression models measuring the impact of geographical diversification on bank risk. It shows the results of the fixed effect regression models with RISK as the dependent variable and geographical diversification measured using HHI and SE as alternative models. The estimated coefficient of diversification measures HHI and SE are insignificant; this indicates there is no impact of geographical diversification on RISK for the overall sample. Column (3), (4), (6) and (7) represent the results for interaction ownership dummies. For all bank types (public, private and foreign), geographical diversification does not have any significant impact on bank RISK.

Other control variables, like TA, NIM, LnTA and EQR have a positive and significant relationship with RISK. CAR and operating expenses show an inverse relationship with performance measure RISK, which is an indicator of sound financial health. There is also an inverse relationship between RISK and ROA , which support the risk-return trade off. The financial crisis dummy has a direct impact on bank risk indicating toward the problems of adverse selection during crisis period.

The results for bank risk are in contradiction with (Shiers, 2002) who reported geographical diversification reduces bank risk by improving economic diversity in the portfolio. However, they also pointed out the branching restrictions faced by most of the foreign banks, which in turn may restrict the benefits of geographical diversification. The possible reason for our findings could be a problem of adverse selection due to different economic and political environment (Miller and Parkhe, 2002). As our sample belongs to a developing economy and most of the earlier studies are based on a sample of developed nations like the US, the UK or European nations which have more or less similar financial environment. When banks diversify across different geographies with significantly different macroeconomic conditions then managerial inefficiencies may creep into the system as managers go beyond their expertise resulting in increased bank risk (Deng and Elyasiani, 2008). The extent to which geographic diversification reduces risk depends largely on how economically diverse are the different geographic areas in which banks expand (Shiers, 2002).

Interestingly, geographical diversification results for private banks shows a decline in bank returns, which is indicative of the severity of the agency problem. This means that managers adopt a value reducing diversification strategy for their personal benefits at the expense of shareholders wealth. Managers might be driven by empire building motives (Jensen, 1986) given that they have a large part of their wealth invested in the corporation

Variable	$\widetilde{RISK}$ (1)	(2)	(3)	(4)	(5)	(6)
HHI_G	1.170	1.627	1.543			
SE_G				1.758	−1.146	1.213
Public×HHI_G		0.915				
Private×HHI_G		−2.561	−3.476			
Foreign×HHI_G			−0.915			
Public×SE_G					1.359	
Private×SE_G					−1.822	−0.181
Foreign×SE_G						−1.359
TA	0.322*	0.451**	0.451**	0.471*	0.895**	0.895**
CAR	−0.019**	−0.175**	−0.175**	−0.007**	−0.126***	−0.126***
EQR	0.565*	0.863*	0.863*	0.141*	0.614*	0.614*
NIM	0.253**	0.004**	0.004**	0.278**	0.277**	0.277**
OER	−1.868*	−0.823*	−0.823*	−1.612*	−1.627*	−1.627*
LnTA	0.817*	0.132**	0.132**	0.816*	0.231*	0.231*
DpTA	−0.719*	−0.241*	−0.241*	−0.485*	−0.559**	−0.559**
BPE	−0.507*	−0.705**	−0.705**	−0.226**	−0.119**	−0.119**
ROA	−0.787***	−0.887***	−0.887***	−0.897***	−0.961***	−0.961***
Public dummy		3.025**			0.929*	
Private dummy		1.101*	3.721**		0.955**	0.026**
Foreign dummy			1.696*			−0.229*
Financial crisis dummy	0.875**			0.786**		
Time dummy	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	154	154	154	154	154	154
No. of cross-sections	16	16	16	16	16	16
R^2	0.290	0.327	0.327	0.353	0.320	0.320
Adjusted R^2	0.278	0.291	0.291	0.333	0.294	0.294
F-statistic	4.201***	10.889***	10.889***	4.766***	11.096***	11.096***
Durbin–Watson stat.	1.912	1.900	1.900	1.945	1.903	1.903
Hausman Test (χ^2-Statistic)	16.072**	39.354***	39.354***	17.343**	43.079***	43.079***

Notes: $\widetilde{RISK}$, bank risk; HHI, geographical diversification measure using Hirschman–Herfindahl Index, SE: geographical diversification measure using Shannon Entropy; TA, log of total assets; CAR, capital adequacy ratio; EQR, total equity to total asset; NIM, net interest margin; OER, operating expenses to total expenses; LnTA, loan to total assets; DpTA, deposits to total assets; BPE, business per employee. We do not present the coefficients of time dummies for the sake of brevity. All regressions include firm fixed effects for all banks over the study period and ownership dummy variables. Robust standard errors are reported in parentheses. *,**,***Statistical significant at the 90, 95 and 99 percent levels, respectively

Table VI. Geographical diversification and bank performance measured using RISK

they run, they are interested in diversification, because by reducing firm risk, they will also reduce the risk of their individual investment portfolio (Amihud and Lev, 1981). For foreign and public banks, geographical diversification helps in increasing bank returns but does not have any significant impact on bank risk. This indicates toward the adverse selection, although it seems like these banks have controlled the agency problem.

5. Conclusion

This essay examines how geographical diversification across different political boundaries is associated with bank risk and return for Indian Banks. Past researchers have been examining the issue of benefits of geographical diversification based on alternate theories. Some theories based on the delegated monitoring argument (Boyd and Prescott, 1986) and advocate that in a well-diversified organization there is an overall reduction in monitoring cost. Another theory advocates that diversification helps in controlling the agency problems and help to optimally utilize the core competencies of managers (Gomes and Livdan, 2004;

Rajan *et al.*, 2000). Few theories suggest that the risk and uncertainty arising from the extent of related (Palich *et al.*, 2000) vs unrelated (Rumelt, 1982) diversification, geographical distance Alessandrini *et al.* (2005) also play a critical role in determining the impact of geographical diversification.

Extending the findings of the literature, our result suggests that geographical diversification helps in increasing bank returns for the overall sample but does not have any significant impact on bank risk. The results can be explained based on the theory that geographical diversification enhances banks' efficiency through economies of scale but the extent to reduce risk through risk diversification could not be achieved for the Indian sample. One possible explanation could be an increase in the agency cost with increasing geographic diversification, as it is more difficult to monitor the managers which further resulted in increasing risk. For foreign and public banks, geographical diversification helps in increasing bank returns but does not have any significant impact on bank risk. This indicates toward the adverse selection, poor monitoring incentives in new markets and suggesting a lack of managerial skills. During the financial crisis period the problem becomes more severe. The findings have important implications for financial institution policymakers and the globalized financial markets. While formulating the policies regarding branching and expansion our findings can serve as a guiding tool for managers and regulators. Interestingly, geographical diversification results for private banks show a decline in bank returns, which is indicative of the severity of the agency problem. This finding is consistent with the agency theory, internal capital market and investors' negative reaction to this banks' business strategy. As a scope of future research, the study can be extended to region specific diversifications within and outside the geographical boundaries of a country, taking into account the macroeconomic, social and political conditions.

Notes

1. The HHI of bank j at time t is defined as $HHI = \Sigma k_i^2$, where n are the various sources of revenue (income from domestic sources and income from international sources). As explained by Tabak *et al.* (2011) the lower limit of HHI is $1/n$ which represents a perfectly diversified portfolio, which means equal share of revenue from each, source n. If HHI $= 1$, it means all the revenue is coming from a single source, i.e. no diversification scenario.
2. SE is used as diversification measure and is an efficient tool to indicate multiple distributions at a given point of time. The SE of bank j at time t is $SE = -\Sigma k_i \times \ln (1/k_i)$. The value of SE is 0 for a highly concentrated sources, i.e. all the revenue is coming from the single source. As explained by Tabak *et al.* (2011) perfect diversification is expressed by SE equal to –ln (n).

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