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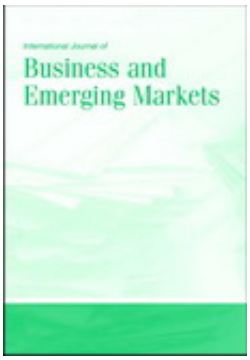

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Ajit Karnik, Sudipa Majumdar

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Income diversification and bank profitability: exploring the importance of macroeconomic factors in India

Ajit Karnik

School of Business,
Middlesex University Dubai,
Block 17, Dubai Knowledge Park, UAE
Email: A.Karnik@mdx.ac.ae

Sudipa Majumdar*

Symbiosis School of Economics,
Symbiosis International University,
Pune, India
Email: sudipa.majumdar@sse.ac.in
*Corresponding author

Abstract: Financial reforms in India intensified competition between bank ownership groups, resulting in narrowing of interest margins and forcing banks towards non-interest income (NII). Surging non-performing loans (NPLs) also pushed banks to diversify their incomes. This study employs panel data analysis to investigate the impact of income-diversification strategies of public, private and foreign banks in India during 2005–2020. Trends in NII have been explored, along with bank-specific and macroeconomic variables to study their impact on bank profits. Finally, inclusion of monetary and fiscal policy variables highlighted the importance of inflation on the banking sector, but its impact varied across ownership groups.

Keywords: non-interest income; NII; bank profitability; diversification; bank; ROA; ownership; GMM; India.

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Biographical notes: Ajit Karnik is a Professor of Economics at Middlesex University Dubai. He was previously a Professor of Political Economy at the Department of Economics, University of Mumbai before assuming the role of Director of the Department. He has also served as a Professor of Economics at the University of Wollongong in Dubai. He has been Indo-American Fellow at the University of Texas at Austin (USA), Overseas Visiting Fellow at St John's College (Cambridge University, UK), Fulbright Scholar at the Haas Business School, University of California (USA) and Smuts Fellow at Wolfson College (Cambridge University, UK). His research interests cover public economics, political economy, economic growth and banking.

Sudipa Majumdar is a Professor at the Symbiosis School of Economics, Pune, India. She is a Fellow of the Higher Education Academy, UK. She completed her Bachelors in Economics from Presidency College Kolkata; Masters in Economics from JNU, New Delhi and PhD in Economics from IGIDR Mumbai. Sudipa also holds a Post-Graduate Certificate in Advanced Statistical Learning from Stanford University, USA and a Post-Graduate Certificate in Higher Education from Middlesex University, UK. Her research has been featured extensively and she has won multiple academic awards at international conferences.

1 Introduction

The financial sector reforms in India since the early 1990s have been aimed at higher efficiency and profitability of the banking industry. The reforms resulted in financial deregulation and intensified competition between ownership groups. The consequent narrowing of interest margins due to fierce competition pushed down interest incomes and drove banks towards noninterest revenue sources. Falling interest rates have also resulted in a drastic decline in asset quality with a massive burden of non-performing loans (NPLs). Banks were further compelled to diversify their revenue streams to compensate for these losses from the NPLs. Consequently, an important trend in the past decade has been the shift away from traditional lending-based interest revenues (Bapat, 2018; Haubrich and Young, 2019) in favour of noninterest sources of income (Heffernan, 2005).

The theoretical case for income diversification is supported by the Markowitz portfolio theory of combining different types of income-earning activities to diversify risk (Markowitz, 1952). Gamra and Plihon (2011) and DeYoung and Torna (2013) explained that the global financial crisis of 2008-09 played a significant role in the upward trend of non-traditional businesses in banks owing to dwindling incomes from lending activities. In the aftermath of the COVID-19 pandemic, demand for loans suffered drastically, which is expected to spur noninterest income sources for banks in the coming years.

In the existing empirical literature, however, there is no consensus on the impact of income diversification on profitability of banks and therefore warrants further empirical investigation. On the one hand, income diversification is expected to help reduce bank risk (Demsetz and Strahan, 1997) by reducing volatility in profits (Hidayat et al., 2012), generate income by engaging in different businesses (Stiroh and Rumble, 2006; Chiorazzo et al., 2008) and reduce costs through economies of scope (Tan and Floros, 2012). On the other hand, income diversification might also increase volatility of profits (DeYoung and Roland, 2001; Acharya et al., 2006), increase risks and reduce risk-adjusted returns (Stiroh, 2004; Lepetit et al., 2008). 1996–2002. Berger et al. (2010) found that diversification reduced profits and increased costs for Chinese banks while contrasting results were revealed for Italian banks by Brighi and Venturelli (2014); for Asian banks by Lee et al. (2014), and for commercial banks in the Philippines by Meslier et al. (2014). Moreover, Zhou (2014) and Mercieca et al. (2007) found no significant relationship between diversification of income and bank profits, while Gambacorta et al. (2014) confirmed a U-shaped relationship between income diversification and bank profitability.

There were also conflicting results for India, whereby Ahamed (2017) found that diversification was beneficial only for banks with low NPLs, while Chavan and Gambacorta (2016) showed income diversification resulted in higher NPLs. Pennathur et al. (2012) confirmed an improvement in profitability for public sector banks, while Trivedi (2015) found a positive impact for all banks whereas Nguyen and Nghiem (2016) found no such impact.

The dynamics between income diversification and bank performance remain inconclusive and the main objective of the present study is to examine the effect of noninterest income on the profitability of Indian banks. This paper further investigates differences in trends of income diversification across the ownership groups of the banks. The effect of macroeconomic variables on bank performance is also studied in the context of monetary and fiscal policies in India. The focus on India is particularly relevant since India has the largest number of banks in Asia after China (Capital IQ, undated) and ranks amongst the top ten banking hubs in the world (Helgi Library, 2021). Further, the Indian banking structure, with its mix of public, Indian private and foreign banks, makes it an interesting case to study.

The study contributes to the past literature by exploring the role of bank-specific variables on profitability trends and the differences, if any, across ownership groups. The research also highlights a dimension that has not received attention in earlier literature on bank profitability, namely the impact of macroeconomic variables and monetary and fiscal policy variables. The inclusion of policy variables has important implications for policymakers and stakeholders.

The format of the paper is as follows. Section 2 discusses the Indian banking system. Section 3 presents a review of the extant literature. In Section 4, the research model and variables have been discussed. Section 5 explains the dataset and presents the analysis. Section 6 concludes the paper with policy implications and highlights the scope for further research.

2 Banking sector in India

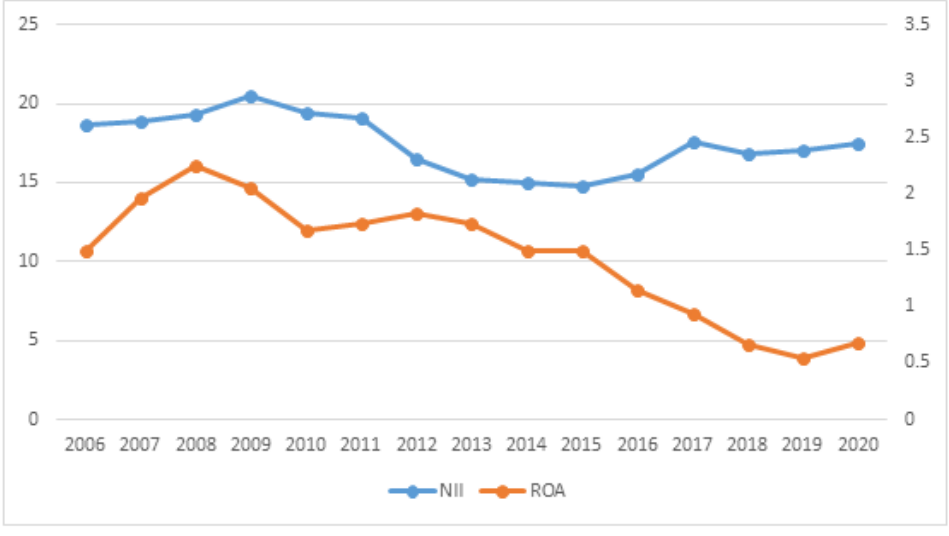
Commercial banks constitute almost 95% of total banking operations in India (Sarkar and Sarkar, 2018). For decades, the Indian banking system operated under the domination of government-owned banks, resulting in high operating costs, low asset quality and inefficiencies in resource allocation (Ahamed, 2017). However, the ownership structure of banks started to change after the economic reforms of 1991.

In 1992, RBI started the liberalisation process through multiple financial reforms and introduced noteworthy changes in the market structure, operations and ownership within the Indian banking sector. Further path-breaking reforms were introduced in 2002–03 when foreign banks were allowed to operate in India either as a branch of the overseas parent banks or a wholly owned subsidiary or a subsidiary with aggregate foreign investment up to a maximum of 74% in a private bank (Pennathur et al., 2012). Since then, the sector comprised private Indian and foreign-owned banks along with public sector banks (Trivedi, 2015; Ghosh, 2016), wherein the public sector accounted for the majority share of total assets (Sarkar et al., 2019). Bank ownership data from RBI confirms that the percentage of assets of public sector banks declined from a high of 76.3% in 2005 to 67.2% of the total market in 2020. While foreign banks have been operating in India for many years, recent developments suggest that they are facing

difficulties (Kumar, 2023) and the attractiveness of foreign markets may be waning (Al Sayyah et al., 2020).

The Narasimham Committee report of 1998 encouraged banks to undertake commercial and investment activities, opening up banking incomes through nontraditional sources, especially trading-based activities. Figure 1 shows the initial upward trend in non-interest income (NII) along with return on assets (ROA) up to 2008. In the aftermath of the 2008 financial crisis, the performance of the Indian banks declined due to a slowdown in the domestic economy and growing concerns about non-performing assets (NPAs), especially in the public sector banks. The sharp deterioration in asset quality prompted the RBI to introduce drastic increases in provisioning for NPAs, further deteriorating net profits (ROA) during 2012–2018. Since 2018, commercial banks enjoyed a turnaround, owing to the recovery of delinquent loans, recapitalisation of public sector banks and the authorisation of electronic trading platforms for financial market instruments, which increased their share of trading incomes (Figure 1).

Figure 1 Noninterest income (NII) and risk-weighted ROA (see online version for colours)



Notes: NII has been taken as a percentage of total income,
ROA is the risk-weighted returns (%) on assets.

Source: Authors' calculations based on data from the Reserve Bank of India

Earnings from noninterest sources remained steady between 15 to 20% throughout the study period as earnings from commission, exchange and brokerage were significant across all ownership groups. According to RBI reports, improvements in information technology and economic liberalisation facilitated banks to derive diversification gains by extracting incomes from fees for value-added products and financial services (Aspal et al., 2019).

3 Literature review

Markowitz (1952), in his Portfolio Theory, introduced the concept of income diversification strategies such that firms could improve their financial performance. It was also argued that managers might seek diversification of business to enhance their gains which could go against the company's valuation and lead to agency costs (Jensen and Meckling, 1976). In the face of liberalisation and competition, the global banking sector adopted strategies to diversify its revenues through nontraditional channels (Amidu and Wolfe, 2013).

3.1 Banks in developed economies

Past literature investigating the effect of NII on profitability found contrasting results for developed countries. Elsas et al. (2010), studying a panel of nine developed countries, confirmed efficiency gains of diversification through economies of scale and scope, superior resource allocation through internal capital markets, and bank-specific competitive advantage. The positive relation between NII and ROA was also confirmed by Hahm (2008) for 662 commercial banks from 29 OECD countries and by Köhler (2015) for the European Union banks, where significant diversification benefits accrued to retail-oriented banks. Country-wise studies for developed nations also confirm similar results. For example, Saunders et al. (2016) confirmed higher profits for higher NII in the larger US banks, as did Chiorazzo et al. (2008) and Brighi and Venturelli (2014) for Italian banks; and Yuksel et al. (2018) for the post-Soviet banking sector.

In contrast, Micco et al (2007) and Stiroh (2004) found no evidence of higher profitability associated with NII. Further, Stiroh and Rumble (2006) reported significant negative association when they linked diversification to implicit costs like inefficient allocation of resources, asymmetric information between branches, etc. Goddard et al. (2008) highlighted the agency problems when managers seek higher growth by investing excessively in risky investments to increase NII. In the US, diversification was also associated with higher fixed costs (DeYoung and Roland, 2001), worsening banks' risk-return trade-off (DeYoung and Rice, 2004). In Australia, Williams (2016) studied a sample of 26 banks where NII was adjudged riskier than interest income, thereby increasing the volatility of profits while Acharya et al. (2006) found no such association for Italian banks. In European countries, Lepetit et al. (2008) confirmed that fee-based income led to problems managing the diverse sources of income and enhanced banks' operating risk.

3.2 Banks in emerging economies

The empirical evidence from emerging market economies is sparse (Lee et al., 2014; Hsieh et al., 2013). Doumpos et al. (2016) concluded that diversification was more beneficial for banks in developing countries as compared to developed countries and this was corroborated by Sanya and Wolfe (2011) for a panel of 226 listed banks across 11 emerging economies and by Salike and Ao (2017) for 947 banks from 12 Asian economies. Studies in South Asia reveal that fees and commission incomes negatively impacted profitability (Nisar et al., 2018) and therefore, banks with greater market power preferred traditional interest income (Nguyen et al., 2012). Hunjra et al. (2020) highlighted that banks needed to maintain an optimal mix of interest-based and fee-based

incomes to improve profits, which depended crucially on the regulatory environment of individual countries. Foreign banks were found to benefit more from nontraditional activities in the Philippines (Meslier et al., 2014); Indonesia (Hidayat et al., 2012); Vietnam (Minh and Thanh, 2020); the Middle East and North Africa (Ammar and Boughrara, 2019). In contrast, NII's revenues adversely impacted banks in Pakistan (Javaid, 2016).

3.3 Banks in India

Das and Ghosh (2009) included bank-specific variables using data envelopment analysis while Desai (2021) used static panel models. Ahamed (2017) estimated bank profitability using GMM technique. A significant lacuna in the three studies was the omission of macroeconomic variables from their specifications. Another strand of literature used a mix of bank-specific and macroeconomic variables in the specification of their profitability equations using static (Subbarayan and. Jothikumar, 2017; Almaqtari et al. 2018; Aspal, 2019; Das and Uppal. 2021) or dynamic panel analyses (Al-Hommaidi, 2017, 2019; Gupta and Mahakud, 2020; Kumar and Bird, 2020).

However, a significant gap in these banking studies, is the omission of policy variables from the specification of the profitability equations. Monetary policy variables are especially relevant given the crucial role of banks in the sector. Also, the inconclusive empirical evidence, especially in emerging markets, regarding the relationship between income diversification and profitability motivates us to explore these issues further. As India moves up the ranks to become one of the largest economies in the world, a detailed and careful examination of its banking sector assumes substantial importance.

3.4 Research gap and research questions

The main research objective of this paper is to examine the role of income diversification, as reflected in the importance of noninterest income, on the profitability of Indian banks. The review of literature for banks in India and in the rest of the world shows that the dynamics between income diversification and bank performance remain inconclusive. This leads us to our primary research questions:

Research question 1	How does income diversification affect the performance of banks?.
Research question 2	How does the relationship between income diversification and bank performance in India differ across public sector, private sector and foreign banks?.

The literature on bank performance also reveals some other lacunae, notably, the lack of attention to the role of macroeconomic and policy environment on bank profitability.

Research question 3	How does the macroeconomic environment, in terms of the rate of growth of GDP and the rate of inflation, affect bank performance?.
Research question 4	How do fiscal and monetary policies affect bank performance?.

4 Data and methodology

Our specification of the profitability equation includes three categories of variables, namely bank-specific financial factors, macroeconomic factors and policy variables. The general form of the specification we use is given in equation (1) while the dynamic panel data version is given in equation (2).

$$Bank\ profitability\ = \alpha_0 + \boldsymbol{\alpha_1 X} + \boldsymbol{\alpha_2 Y} + \boldsymbol{\alpha_3 Z} + u \tag{1}$$

where

Bank profitability will be represented by ROA and return on equity (ROE)

$\boldsymbol{X}$ is the matrix of bank-specific financial variables

$\boldsymbol{Y}$ is the matrix of macroeconomic variables

$\boldsymbol{Z}$ is the matrix of policy variables

u represents the disturbance term.

α's are parameters to be estimated. Specifically, α_0 is a scalar while α_1, α_2, and α_3 are vectors of appropriate dimensions.

Table 2 lists out the variables included in the $\boldsymbol{X}$, $\boldsymbol{Y}$ and $\boldsymbol{Z}$ matrices.

In line with earlier studies that have pointed out the importance of changes in ownership and institutional structure in determining profitability (Daadaa, 2021; Kansil and Singh, 2018), this study separately estimates the profitability of banks in the public sector, private sector and foreign sector.

4.1 Estimation Strategy

A dynamic panel data model has been estimated, relating bank profitability (ROA) with NII in the presence of a set of control variables listed in Table 2. We follow the approach of Arellano and Bond (1991) and the description given by (Roodman, 2009a, 2009b) below.

Equation (1) can be expressed as a dynamic panel data model:

$$ROA_{it} = \alpha_0 ROA_{i,t-1} + x'_{it}\,\alpha_1 + y'_{it}\,\alpha_2 + z'_{it}\,\alpha_3 + e_{it} \tag{2}$$

$$e_{it} = \mu_i + u_{it}$$

$$E(\mu_i) = E(u_{it}) = E(u_i, u_{it}) = 0$$

where, i relates to the cross-section unit and t relates to time; x'_{it}, y'_{it}, and z'_{it} are vectors of the $\boldsymbol{X}$, $\boldsymbol{Y}$ and $\mathbf{Z}$ matrices defined earlier; e_{it}, the disturbance is made up fixed effects, μ_i and shocks, u_{it}.

Equation (2) has been estimated using the two-step system GMM. We guard against the warning of instrument proliferation by Roodman (2009a) by ensuring that for each equation, the time dimension is much smaller than the number of cross-section units. To evaluate the estimated equations, we report three tests:

a Hansen's test of over-identifying restrictions: When instruments are used in estimating an equation, it is important to ascertain the independence of instruments

from an unobservable error process. GMM equation requires that the estimated equation be overidentified (Baum et al., 2003). Hansen's test is a test of the orthogonality conditions where the rejection of the test indicates that instrument(s) are not independent from the error process. This may be either because the instruments are not truly exogenous, or because they are being incorrectly excluded from the regression.

b Difference-in-Hansen tests of exogeneity of instrument subsets (GMM-style instruments and IV-style instruments): GMM-style instruments are typically constructed using lagged values of the dependent variable and exogenous variables while IV-style instruments are exogenous variables. Hansen's test evaluates the entire set of overidentifying restrictions. In addition, it may be important to test the validity of a subset of GMM-style and IV-style instruments. The difference-in-Hansen tests are employed for this purpose. The statistic is computed as the difference between two Hansen statistics – that for the regression using the entire set of overidentifying restrictions (as discussed above) versus that for the regression using a smaller set of restrictions, in which a specified set of instruments are removed from the set, called the Hansen test excluding group.

c Autocorrelation (AR2) Test: It is also important to be vigilant about autocorrelation in the idiosyncratic disturbance term u_{it} (in equation 2) that might render some lags invalid as instruments. The Arellano–Bond test for autocorrelation (null hypothesis: no autocorrelation) is applied to the differenced residuals, whereby the test for AR(1) process in first differences usually rejects the null hypothesis. The more important test is the AR(2) to detect serial autocorrelation.

4.2 Dependent variables

Risk-adjusted ROA is defined as the ROA divided by the standard deviation of ROA, as used by Stiroh and Rumble (2006) and Sanya and Wolfe (2011), among others. In our study, the standard deviation was calculated as in Table 1. A debatable issue in computing the risk-adjusted ROA is whether we should use a single value of the standard deviation for the entire time period. Given the variation in standard deviation across the time periods (Table 1), we computed ROA-1 using separate standard deviations for each sub-period. ROA-2 is used as an alternative dependent variable in our robustness check for which a uniform standard deviation was used in its computation.

Table 1 Standard deviation of return on assets

Time period		*Standard deviation of return on assets*
Entire period	2005–2020	2.16
Sub- periods	2005–2009	1.98
	2010–2014	1.99
	2015–2020	2.38

Source: Authors' calculations based on data from the Reserve Bank of India

4.3 Bank-specific variables

A Herfindahl-type measure has been used to represent income diversification by banks (Stiroh and Rumble, 2006; Sanya and Wolfe, 2011, Meslier, 2014; Ahamed, 2017). We use the definition employed by Stiroh and Rumble (2016) in which the measure is increasing in income diversification.

$$DIVERSE_{i,t} = 1 - \left[\frac{Noninrest\ Income}{Operating\ Income}\right]^2_{i.t} + \left[\frac{InterestIincome}{InterestIincome}\right]^2_{i.t} \quad (3)$$

where '*i*' refers to a particular bank in time '*t*'. A value of zero for DIVERSE indicates a complete absence of income diversification, and higher values indicate increasing diversification. Other bank-specific financial variables and ratios used in the study have been detailed in Table 2.

4.4 Macroeconomic variables

Extant studies have focussed only on bank-specific determinants of bank profitability and only a few researchers have broadened their approach to include macroeconomic variables (Athanasoglou et al., 2008; Engle et al., 2014; Tan, 2016, 2017; Geyfman, 2018; Rahman et al., 2020; Mehzabin et al., 2022). Our profitability equations include the rate of inflation (INFLATION) and GDP growth rate (GDP_GROWTH) as relevant macroeconomic variables. It is expected that high GDP growth will increase demand for bank loans and improve bank profitability but the impact of the rate of inflation remains ambiguous (Dhal et al., 2011). Table 2 gives details of the macroeconomic variables used in the study.

4.5 Policy variables

Policy variables have remained a blind spot in past research concerning bank profitability. Our research extends the literature in this direction. Government expenditure to GDP Ratio (GOVT_EXP) has been included to reflect the government's fiscal stance. An expansionary fiscal policy is likely to affect economic growth and affecting bank profitability by increasing the demand for loans (Boubakri et al., 2005, Antao and Karnik, 2022). The relevant monetary policy instrument in our model is the repo rate (REPO_RATE) which is the rate at which a country's central bank lends money to commercial banks in the event of any shortfall of funds (Table 2).

Our data covers the Indian banking sector across ownership groups, which includes public sector banks, private sector banks and foreign banks. The time range of the data is from 2004-05 to 2019-20. However, since we have an unbalanced panel, the number of banks covered changes from year to year. A summary of the data available is given in Table 3.

Table 2 Variables used in the study

Variable	*Definition*	*Explanation*	*Citation*
		Dependent variable	
ROA-1	Risk-weighted ROA. This is the dependent variable	Computation of this variable is given in notes to Table 5	Stiroh and Rumble (2006), Sanya and Wolfe (2011)
		Independent variables	
DIVERSE	Income diversification variable, defined in equation (2)	High value of DIVERSE indicates more diversification of income, lower value indicates more focused source of income	Stiroh and Rumble (2006), Sanya and Wolfe (2011), Ahamed (2017)
NII_OPINC	Share of NII in operating income	Higher NII_OPINC indicates higher risk-taking through non-traditional activities. Such risk-taking tendency may not be profitable for the banks	Engle et al. (2014), Stiroh (2004), Stiroh and Rumble (2006)
TA	Total assets	Log TA is a proxy for bank size which allows banks to exploit economies of scale and provides a cushion for negative shocks during recessions	Nguyen et al. (2012), Sanya and Wolfe (2011), Ahamed (2017), Salike and Ao (2017)
TAGR	Rate of growth of TA	Rapid economic growth would lead to demand for loans, which would push up profits	Sanya and Wolfe (2014), Ahamed (2017)
LOANRATIO	Ratio of loans to TA	LOANRATIO detects differences in the asset portfolios of banks	Stiroh and Rumble (2006), Sanya and Wolfe (2011)
EQUITYRATIO	Ratio of equity capital to TA	EQUITYRATIO allows banks with higher capital to absorb negative shocks	Ahamed (2017), Climent-Serrano (2019), Bezawada and Adaelli (2020)
DEPOSITRATIO	Ratio of deposits to TA	DEPOSITRATIO is included as a control variable	Lee et al (2014), Kalam and Utsho (2020), Selvakumar et al. (2019)
PROV_NPA	Provision for non-performing assets	This measures the provisions made for non-performing assets as per guidelines of the RBI	Ahamed (2017), Ozili and Outa (2017)
INFLATION	Rate of inflation	Macroeconomic variable	Engle et al (2014)
GDP_GROWTH	Rate of growth of GDP	Macroeconomic variable	Engle et al (2014), Salike and Ao (2017)
GOVT_EXP	Ratio of government expenditure to GDP	Policy variable	Antao and Karnik (2022)
REPO_RATE	Repo rate	Policy variable	

Table 3 Structure of panel data

Sector	*No. of Banks*	*Banks with data for all years*	*Observations*
Public Sector Banks	29 (25%)	18 (30%)	411 (30%)
Indian Private Banks	32 (28%)	19 (31%)	357 (26%)
Foreign Banks	55 (47%)	24 (39%)	610 (44%)
Total	116 (100%)	61 (100%)	1378 (100%)

Source: Authors' calculations based on data from the Reserve Bank of India

5 Empirical results

5.1 Descriptive statistics

Table 4 reports the descriptive statistics for the entire banking sector and each sub-sector. Foreign banks showed the lowest income diversification but had the highest share of noninterest income in their operating income. As expected, public sector banks had the highest total assets. However, growth of total assets was the highest for private banks. Foreign sector banks had the lowest loan and deposit ratios and the highest equity ratios. These bank-specific variables also had the highest standard deviations for the foreign sector.

The average inflation rate in India was high during the study period, reaching 11.99% in 2011. Average rate of growth of GDP was the lowest in 2020 in the aftermath of the COVID pandemic. Government expenditures and average repo rate moved in a narrow band with low standard deviations.

Table 4 Descriptive statistics

		Mean	*Std. dev.*	*Min*	*Max*
ROA	All Banks	0.43	1.02	–10.35	7.05
	Public Sector Banks	0.23	0.42	–2.17	0.94
	Private Indian Banks	0.39	0.74	–9.52	1.76
	Foreign Banks	0.58	1.37	–10.35	7.05
DIVERSE	All Banks	–85,404.19	1658593	–6.07×10+7	0.8521
	Public Sector Banks	–12,729.67	3,278.48	–48,441.70	–8,945.89
	Private Indian Banks	–14,503.41	11,196.12	–182,769.60	–8,426.49
	Foreign Banks	–176,914.70	2499074	–6.07×10+7	0.8521
NII_OPINC	All Banks	0.2840	0.8509	–18.7143	9.0882
	Public Sector Banks	0.1454	0.0495	0.0280	0.3785
	Private Indian Banks	0.1822	0.1327	–0.0572	2.2159
	Foreign Banks	0.4387	1.2619	–18.7143	9.0882

Table 4 Descriptive statistics (continued)

		Mean	*Std. dev.*	*Min*	*Max*
LOG TA	All Banks	9.65	2.46	3.40	15.19
	Public Sector Banks	11.83	1.08	7.02	15.19
	Private Indian Banks	10.28	1.67	5.41	14.24
	Foreign Banks	7.81	2.11	3.40	12.30
TA_growth	All Banks	–0.29	111.70	–975.85	684.04
	Public Sector Banks	11.68	66.50	–545.46	544.95
	Private Indian Banks	13.01	96.67	–509.50	619.86
	Foreign Banks	–16.27	139.18	–975.85	684.04
LOANRATIO	All Banks	50.17	16.89	0.03	87.75
	Public Sector Banks	58.88	7.14	7.92	70.61
	Private Indian Banks	57.54	7.65	11.68	72.65
	Foreign Banks	39.43	19.73	0.03	87.75
DEPOSITRATIO	All Banks	63.77	26.28	0.00	93.92
	Public Sector Banks	83.97	8.02	7.75	92.26
	Private Indian Banks	79.64	11.21	9.88	93.92
	Foreign Banks	40.84	22.26	0.00	86.65
EQUITYRATIO	All Banks	18.48	20.38	2.80	99.27
	Public Sector Banks	6.11	5.88	2.80	90.59
	Private Indian Banks	8.64	3.50	3.44	33.59
	Foreign Banks	33.09	23.39	3.65	99.27
PROV_NPA	All Banks	1,542.90	4,599.43	–1,062.30	71,374.22
	Public Sector Banks	3,137.26	6,545.23	–199.10	71,374.22
	Private Indian Banks	976.54	3,045.69	–1,062.30	27,806.04
	Foreign Banks	102.80	368.71	–372.85	3,809.63
INFLATION		6.72	2.82	3.33	11.99
GDP_GROWTH		5.85	3.87	–7.96	8.50
GOVT_EXP		14.09	1.39	12.20	17.60
REPO_RATE		6.60	1.10	4.25	8.50

Table 5 Profitability: risk-weighted ROA

Dependent variable: ROA-1	*All banks*	*Public sector banks*	*Private Indian Banks*	*Foreign Banks*
	(1)	(2)	(3)	(4)
Lagged ROA	0.2581*	–0.0402	0.2949	0.2501
	(0.1332)	(0.3927)	(0.1892)	(0.1976)
DIVERSE	-1.80×10^{-7}***	3.72×10^{-5}**	7.62×10^{-5}***	-1.02×10^{-7}*
	(4.81×10^{-8})	(1.58×10^{-5})	(5.52×10^{-6})	(5.98×10^{-8})
NII_OPINC	0.0058***	0.0527**	0.0087	0.0039**
	(0.0015)	(0.0246)	(0.0191)	(0.0017)
Log TA	0.0131	–0.1411	0.0762	0.1057
	(0.0828)	(0.1155)	(0.0514)	(0.1503)
TA_growth	0.001	0.0178*	0.0086	0.0001
	(0.0031)	(0.0099)	(0.0068)	(0.0077)
LOANRATIO	–0.0013	0.0752**	0.01	–0.0019
	(0.0155)	(0.0331)	(0.0066)	(0.0118)
DEPOSITRATIO	–0.0123	0.0025	0.0036	0.0303*
	(0.0154)	(0.0526)	(0.0122)	(0.016)
EQUITYRATIO	–0.0339	0.0668	0.0925***	0.0285
	(0.0606)	(0.0683)	(0.0223)	(0.0402)
PROV_NPA	-2.1×10^{-5}***	7.0×10^{-6}	-5.12×10^{-5}*	-3.19×10^{-4}**
	(5.53×10^{-6})	(1.53×10^{-5})	(2.94×10^{-5})	(1.48×10^{-4})
INFLATION	0.025*	0.0358**	0.037*	0.0045
	(0.0138)	(0.0168)	(0.0185)	(0.0495)

Notes: 1 ROA-1 is computed as ROA divided by the standard deviation (s.d.) of ROA. For this table, three s.d. of ROA *were* computed for non-overlapping 5-year intervals and ROA in each quinquennial is divided by the appropriate s.d.
2 Figures in Parentheses indicate standard errors;
3 *** denotes significant at 1%; ** denotes significant at 5%; * denotes significant at 10%
4 Lagged ROA, Log TA, DIVERSE, NII_OPINC and NPL_TL are modelled as endogenous variables and instrumented by their lagged values and by exogenous variables LOANRATIO, Total staff employed, REPO and GOVT_EXP
5 Hansen's Test 1: Hansen test of overidentifying restrictions
6 Hansen's Test 2: Difference-in-Hansen tests of exogeneity of instrument subsets (GMM style instruments)
7 Hansen's Test 3: Difference-in-Hansen tests of exogeneity of instrument subsets (IV style instruments).

Source: Authors' calculations based on data from the Reserve Bank of India

Table 5 Profitability: risk-weighted ROA (continue)

Dependent variable: ROA-1	*All banks*	*Public sector banks*	*Private Indian Banks*	*Foreign Banks*
	(1)	(2)	(3)	(4)
GDP_GROWTH	0.0194	0.0346	0.0069	0.0585
	(0.0173)	(0.0366)	(0.0291)	(0.0399)
REPO_RATE	0.156***	0.1481	0.0905*	0.2885**
	(0.0373)	(0.0856)	(0.0438)	(0.1315)
GOVT_EXP	0.1243**	0.0971	0.0328	0.3134**
	(0.0483)	(0.1054)	(0.0678)	(0.1198)
Constant	–1.6318	–6.5878	–2.8058	–9.3584***
	(3.1448)	(8.0933)	(2.0861)	(2.4888)
No. of Obs.	682	229	211	242
No. of groups	77	19	23	35
No. of instruments	24	29	29	29
F	105.58***	8.17***	383.91***	28.98***
AR(2) Test	0.92 [0.35]	0.01 [0.99]	0.10 [0.91]	1.08 [0.28]
Hansen`s Test 1	11.17 [0.34]	7.03 [0.95]	7.37 [0.95]	13.54 [0.56]
Hansen`s Test 2	4.05 [0.54]	4.86[0.43]	–2.99 [1.00]	3.78 [0.58]
Hansen`s Test 3	9.61 [0.29]	3.08 [0.92]	–2.36 [1.00]	5.72 [0.68]

Notes: 1 ROA-1 is computed as ROA divided by the standard deviation (s.d.) of ROA. For this table, three s.d. of ROA *were* computed for non-overlapping 5-year intervals and ROA in each quinquennial is divided by the appropriate s.d.
2 Figures in Parentheses indicate standard errors;
3 *** denotes significant at 1%; ** denotes significant at 5%; * denotes significant at 10%
4 Lagged ROA, Log TA, DIVERSE, NII_OPINC and NPL_TL are modelled as endogenous variables and instrumented by their lagged values and by exogenous variables LOANRATIO, Total staff employed, REPO and GOVT_EXP
5 Hansen's Test 1: Hansen test of overidentifying restrictions
6 Hansen's Test 2: Difference-in-Hansen tests of exogeneity of instrument subsets (GMM style instruments)
7 Hansen's Test 3: Difference-in-Hansen tests of exogeneity of instrument subsets (IV style instruments).

Source: Authors' calculations based on data from the Reserve Bank of India

5.2 Estimated equations

For the econometric exercise, we specify equation (2) as a dynamic panel data model with ROA as the dependent variable. Each equation was estimated using the two-step system GMM approach, and the results are reported in Table 5. It may be noted that the estimation approach models lagged ROA, log TA, DIVERSE, NII_OPINC and PROV_NPA as endogenous variables, which are instrumented by their lagged values and by exogenous variables such as LOANRATIO, total staff employed, REPO_RATE and GOVT_EXP. The last two exogenous variables are important since they capture the influence of policy variables on income diversification by banks.

5.2.1 Revenue diversification variables

Our results varied widely across the ownership groups indicating that ownership structure played an important role in determining the impact of diversification strategies on profitability of banks. Table 5 shows that the diversification variable is negative and significant for the banking sector (Column 1), indicating that risk-weighted ROA decreases with greater income diversification.

However, taking a more granular view, a different picture emerges. For the Indian private and public sector banks, the diversification variable is positive and significant, indicating that increasing income diversification improves profitability, as was found for Italian banks by Brighi and Venturelli (2014) and Meslier et al. (2014) for banks in the Philippines. For foreign banks (column 4), the coefficient is negative and weakly significant, signalling that these banks need to exercise caution in their diversification activities.

The share of noninterest income captured by NII_OPINC was positive and significant for the public sector and foreign banks. The coefficient was not significant, but had a positive sign for Indian private sector banks. So, an increase in the share of NII (at the expense of the share of interest income) improved bank profitability in terms of the risk-adjusted ROA, in line with Stiroh and Rumble (2006) and Meslier et al. (2014). However, the strategy for diversification into noninterest avenues differed across ownership groups.

Our results confirm that increased income diversity results in higher risk-adjusted profits for both the public and private domestic banks in India, but it results in less risk-adjusted profits for the foreign banks, which was in stark contrast with the findings of Ahamed (2017). The possible reason for the difference is that the diversification strategy of the banks has changed drastically over the years. According to RBI data, foreign banks relied mainly on commission, exchange and brokerage along with exchange transactions, which added up to 78% of total noninterest income sources in 2020, up from 66% in 2005. For the public sector banks, the noninterest income emanating from commission, exchange, and brokerage decreased from 35% in 2005 to 24% in 2020, while miscellaneous sources of income constituted 44% in 2020 against 18% in 2005 (RBI, 2021).

5.2.2 Bank-Specific variables

Banks size (Log TA) was estimated to be non-significant in all the equations of Table 5. Our results diverge from Kumar and Bird (2022), who found the coefficient to be

negative, and also from Stiroh and Rumble (2006), Meslier et al. (2014) and Ahamed (2017), who obtained a positive coefficient for total assets. Hence, the general theoretical belief that larger banks were supposed to be more efficient than smaller banks because of economies of scale and scope advantages did not hold for the Indian banks for any ownership group. Further, except for a weak positive coefficient for private sector banks, the rate of growth of total assets was not significant in any of the equations, following Ahamed (2017) and Meslier et al. (2014). Our result for the private sector follows Stiroh and Rumble (2006), who found the coefficient to be positive and significant.

The performance of the banks varied drastically across ownership groups in terms of their financial ratios. Loan ratio was positive and significant for public sector banks, in line with the results of Meslier et al. (2014), Ahamed (2017) and Vidyarthi (2019), while Li et al. (2021) found it to be negative. The coefficient was not significant for the other ownership groups.

The deposit ratio showed a weak positive significance for the foreign banks but remained non-significant in all the other equations, which was also confirmed by Almaqtari et al. (2019) and Al Homaidi et al. (2018). In terms of the equity ratio, the coefficient was positive and significant only for private banks, following Stiroh and Rumble (2006), Li et al. (2019) and Vidyarthi (2019). A higher level of capitalisation for private sector banks in India resulted in a higher ROA level due to reduced capital costs (Molyneux and Thornton, 1992). Provision for NPLs was negative and significant for all ownership groups except for the public sector. High NPLs due to lack of due diligence, increased the level of risk, adversely affecting the profitability of the banks, as was found by Aspal et al (2019), Gupta and Mahakud (2020), Das and Uppal (2021) and Kumar and Bird (2021).

5.2.3 Macroeconomic variables

Inflation had a significant positive effect on ROA for all banks and the subgroups barring foreign banks. This result conformed with that of Engle (2014) and Al Homaidi (2018) but ran counter to Nisar et al. (2018). Salike and Ao (2017) and Kumar and Bird (2021) found the variable to be non-significant, while Dhal et al. (2011) termed the relationship between financial stability and inflation to be a 'contentious' issue. GDP growth was not significant in any of the equations, which was in sharp contrast to Salike and Ao (2017), who found a positive effect of GDP growth on profitability, while Engle et al. (2014), Al Homaidi et al. (2018) and Aspal (2019) found negative relationships.

5.2.4 Policy variables

The inclusion of policy variables in our study is a significant extension of the existing literature since very few studies have included policy variables in estimating the profitability equations of banks. The fiscal policy variable, Government expenditure, was positive and significant for all banks and foreign banks. Our results differed from those of Djalilov and Piesse (2016) and Horobet et al. (2021), who modelled fiscal policy using government budget balance.

The monetary policy variable, repo rate, was positive and significant for All Banks and Foreign banks and weakly significant for private banks. Roy et al. (2019) found a significant positive impact using reverse repo rate as the monetary policy variable, while others used interest rate, which, although not a policy variable, was likely to be directly

affected by monetary policy. Almaqtari et al. (2019) and Al-Homaidi et al. (2018) found the interest rate effect negative. In contrast, for Kumar and Bird (2022), the interest rate was non-significant for India but positive for China.

5.3 Robustness checks

In the previous models, the dependent variable, ROA-1 was computed by dividing ROA by its standard deviation, which was computed for non-overlapping 5-year intervals. The ROA in each quinquennial was divided by the appropriate standard deviation. In the first robustness check of our results, ROA-1 is replaced by ROA-2, computed taking a single value of the standard deviation for the entire time period.

Table 6 Robustness Check-1

Dependent variable: ROA-2	*All sectors*	*Public sector Banks*	*Private Indian Banks*	*Foreign banks*
Lagged ROA-2	0.4438***	0.2574	0.2927	0.465*
	(0.1261)	0.3073	(0.2234)	(0.2387)
DIVERSE	-1.97×10^{-7}**	1.34×10^{-4}**	1.36×10^{-6}*	-7.81×10^{-8}
	(6.00×10^{-8})	(4.03×10^{-5})	(1.98×10^{-5})	(6.57×10^{-8})
NII_OPINC	0.0062***	0.0402	0.0614	0.0026
	(0.0018)	(0.0433)	(0.0557)	(0.002)
INFLATION	–0.0031	0.0256	0.0051	–0.0047
	(0.0394)	(0.0305)	(0.0878)	(0.0667)
GDP_GROWTH	0.0414	0.1066*	0.1493	0.0906
	(0.0442)	(0.0521)	(0.1011)	(0.0730)
REPO_RATE	0.2425**	0.2846**	0.4124**	0.3617**
	(0.0916)	(0.0955)	(0.1592)	(0.1293)
GOVT_EXP	0.1790	0.2758	0.4436*	0.4691**
	(0.1171)	(0.1731)	(0.2455)	(0.1681)
No. of Obs.	682	229	211	242
No. of Groups	77	19	23	35
F	24.61***	102.02***	23.07***	24.55***
AR(2) Test	–0.03 [0.98]	0.13 [0.89]	–0.64 [0.52]	0.34 [0.74]
Hansen's Test 1	7.91 [0.64]	10.88 [0.37]	10.49 [0.40]	8.51 [0.58]
Hansen's Test 2	2.12 [0.83]	8.53 [0.13]	7.75 [0.17]	4.93 [0.43]
Hansen's Test 3	6.65 [0.58]	9.25 [0.32]	9.88 [0.27]	7.56 [0.48]

Notes: 1 ROA-2 is computed as ROA divided by a single value of the standard deviation for the entire time period.
2 Each equation includes also included all the other bank-specific variables listed in Table 5
3 For other notes, see Table 5.

Source: Authors' calculations based on data from the Reserve Bank of India

Table 6 does not report the effect of bank-specific variables to conserve space. The coefficient for income diversification remains the same for the public and private sector

banks as in Table 5, but becomes insignificant for foreign sector banks. The coefficient for the share of NII for All Banks replicates that in Table 5 but becomes insignificant for public sector and foreign banks. The importance of the monetary policy variable is clearly seen in the positive and significant coefficient of repo rate. However, the fiscal policy variable and the macroeconomic variables are not significant.

Our next robustness exercise introduces a Hirschman-Herfindahl Index for the different sources of NII. HHI_NII is a measure of diversification within this source of income (Sanya and Wolfe, 2011; Amidu and Wolfe, 2013; Ahamed, 2017; Vidyarthi, 2019). A high value of the index shows increasing revenue concentration (Table 7). It may be noted that we introduce the HHI_NII variable in addition to the DIVERSE variable while Sanya and Wolfe (2011) introduce it instead.

Table 7 Robustness Check 2

Dependent variable	*All sectors*	*Public sector Banks*	*Private Indian Banks*	*Foreign Banks*
Lagged ROA	0.4386**	–0.2513	0.2424	0.2054
	(0.2143)	(0.3515)	(0.2166)	(0.261)
DIVERSE	$–1.62 \times 10^{–7}$**	1.79 × 10–5	$8.19 \times 10^{–5}$***	$–9.94 \times 10^{–8}$
	$(7.67 \times 10^{–8})$	$(2.8 \times 10^{–5})$	$(6.52 \times 10^{–6})$	$(6.86 \times 10^{–5})$
NII_OPINC	0.0055**	0.0564**	0.0236	0.0039*
	(0.0023)	(0.0252)	(0.0154)	(0.0019)
HHI (NII)	0.0095***	–0.2273	0.8986	–0.0709
	(0.0003)	(0.5247)	(0.5861)	(0.1094)
INFLATION	0.0718	0.0197	0.0280	0.0016
	(0.0330)	(0.0204)	(0.0242)	(0.0644)
GDP_GROWTH	0.0098	0.0618	0.0089	0.0539
	(0.0271)	(0.0386)	(0.0346)	(0.0607)
REPO_RATE	0.0211	0.2120**	0.1118**	0.2783**
	(0.0756)	(0.0659)	(0.0445)	(0.1275)
GOVT_EXP	0.0373	0.1794	0.0483	0.3179**
	(0.0727)	(0.1222)	(0.0778)	(0.1350)
No. of Obs.	733	229	211	242
No. of groups	79	19	23	35
No. of instruments	35	24	24	29
F	383.14***	62.92***	5,138.24***	30.03***
AR(2) Test	1.39 [0.16]	–0.70 [0.48]	0.26 [0.80]	0.63 [0.53]
Hansen's Test 1	22.97 [0.29]	4.52 [0.87]	7.49 [0.59]	13.46 [0.49]
Hansen's Test 2	10.92 [0.09]	2.10 [0.84]	4.73 [0.45]	4.37 [0.50]
Hansen's Test 3	3.82 [0.43]	2.87 [0.94]	7.46 [0.49]	5.12 [0.75]

Notes: 1 Please see notes to Table 5
2 Each equation includes all the other bank-specific variables listed in Table 5.

Source: Authors' calculations based on data from the Reserve Bank of India

The inclusion of HHI_NII in Table 7 leaves DIVERSE unchanged for All Banks and Private Banks, while the results for NII_OPINC are replicated. The coefficient of HHI_NII itself is positive and significant only for All banks indicating that increasing concentration of noninterest income improved the profitability of Indian banks (Vidyarthi, 2019). The importance of the monetary policy variable is confirmed, while the fiscal policy variable is significant only for Foreign Banks. The two macroeconomic variables are seen to be non-significant. Our exercises for robustness check in Tables 6 and 7, by and large, confirm our results in Table 5.

6 Summary and conclusions

The descriptive statistics of the Indian banking sector reveal that public sector banks were the largest in India, according to asset size, but were the least diversified and earned the lowest profits. Growth in assets had been highest for Indian private sector banks. Foreign sector banks earned the highest profits and had the highest share of income from noninterest sources. These operational differences across the banking sector in India offer a unique area of research for examining income diversification of banks, across their ownership types.

The primary focus of this paper has been to examine the effect of noninterest income on the profitability of Indian banks. The role of income diversification in bank performance has remained ambiguous in the literature and this has been the motivation for our study. The Indian banking sector represents a unique area of study in view of the coexistence of different ownership structures with a dominating presence of public sector banks and therefore, it behoves researchers to take a disaggregated view of the Indian banking system as has been attempted in the present study.

Income diversification was a major bank-specific determinant of financial performance. The results show that the diversification variable (DIVERSE) is negative and significant for the banking sector as a whole, indicating that risk-weighted ROA decreased with greater income diversification. However, the results differ significantly across ownership groups. For the Indian private and public sector banks, the coefficient of DIVERSE was positive and significant such that increasing income diversification improved profitability. The results emphasised that the Indian public and private banking sectors should continue their diversification strategies and explore deeper into noninterest sources as it has improved bank performance. However, the coefficient was negative and weakly significant for foreign banks, signalling that these banks needed to exercise caution in their diversification activities.

A major contribution of this study has been the emphasis on the role of monetary and fiscal policy on bank performance, which has been neglected in previous literature. The results clearly highlight the important role of monetary policy in bank performance as Repo Rate had a strong positive impact on bank profitability across all ownership groups. In contrast, the impact of fiscal policy has been, at best, weak. The effect of macroeconomic variables, namely inflation and GDP growth rate, remain ambiguous since inflation had a positive impact on ROA (Table 5) but the robustness checks could not confirm this result. Further, the GDP growth rate did not seem to play any role in determining bank profitability.

This study has important policy implications and practical applications for different stakeholders. Our findings indicate that Indian commercial banks should be encouraged

to diversify their income portfolio in favour of non-conventional sources to reap diversification benefits. The size of assets was not a significant determinant for bank profits and regulators need to treat large and small banks alike while formulating policies for the financial sector. Bankers should be attentive toward efficient utilisation of funds to minimise their credit risk and improve financial performance. The RBI needs to exercise caution when introducing changes in repo rates since these have a significant impact on bank profits.

A limitation of the current study is that our analysis did not fully capture the effects of the COVID pandemic on the operations of banks, because the relevant data was unavailable at the time of this research. Further research on this aspect and extensions of this study could yield interesting results along with the inclusion of other types of banks, such as regional rural banks and cooperative banks operating in India. The study may also be extended to the non-banking sector of the Indian economy. It has also been reported that the gender composition of the boards of directors has an impact on the financial performance of firms (Salloum et al., 2019). While this dimension of financial performance is undoubtedly important, we did not have access to information on the gender composition of the board of directors of Indian banks. At a broader level, another limitation is that we do not study other determinants of the profitability of banks and other organisations. For instance, the literature has identified the following factors: customer loyalty (Azouri and Senechal, 2022), managerial efficiency (Bitar, 2022), country-level governance (Ahmad et al., 2022), corporate social responsibility (Salloum et al., 2015; Khalilakbar and Pool, 2016).

References

Acharya, V.V., Hasan, I. and Saunders, A. (2006) 'Should banks be diversified? Evidence from individual bank loan portfolios', *The Journal of Business*, Vol. 79, No. 3, pp.1355–1412.

Ahamed, M.M. (2017) 'Asset quality, noninterest income, and bank profitability: evidence from Indian banks', *Economic Modelling*, Vol. 63, pp.1–14.

Ahmad, N., Akhter, T. and Azad, M.A.K. (2022) 'Country level governance and earnings management: new evidence from North-European countries', *International Journal of Work Innovation*, Vol. 3, No. 2, pp.105–129.

Al Sayyah, M., Salloum, C., Digout, J., Mercier-Suissa, C. and Jarrar, H. (2020) 'Social ties, foreign attractiveness and trust', *Journal for International Business and Entrepreneurship Development,* Vol. 12, Nos. 2–3, pp.83–108.

Al-Homaidi, E.A., Tabash, M.I., Farhan, N.H. and Almaqtari, F.A. (2018) 'Bank-specific and macro-economic determinants of profitability of Indian commercial banks: a panel data approach', *Cogent Economics and Finance*, Vol. 6, No. 1, p.1548072.

Al-Homaidi, E.A., Tabash, M.I., Farhan, N.H. and Almaqtari, F.A. (2019) 'The determinants of liquidity of Indian listed commercial banks: a panel data approach', *Cogent Economics and Finance,* Vol. 7, No. 1, p.1616521.

Almaqtari, F.A., Al-Homaidi, E.A., Tabash, M.I. and Farhan, N.H. (2019) 'The determinants of profitability of Indian commercial banks: a panel data approach', *International Journal of Finance and Economics*, Vol. 24, No. 1, pp.168–185.

Amidu, M. and Wolfe, S. (2013) 'Does bank competition and diversification lead to greater stability? Evidence from emerging markets', *Review of Development Finance*, Vol. 3, No. 3, pp.152–166.

Ammar, N. and Boughrara, A. (2019) 'What drives the banks' diversification decision? A dynamic nonlinear panel data approach', *Managerial and Decision Economics*, Vol. 40, No. 8, pp.907–922.

Antao, S. and Karnik, A. (2022) *Bank Performance and Noninterest Income: Evidence from Countries in the Asian Region*, Asia-Pacific Financial Markets, pp.1–29.

Arellano, M. and Bond, S. (1991) 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *The Review of Economic Studies*, Vol. 58, No. 2, pp.277–297.

Aspal, P.K., Dhawan, S. and Nazneen, A. (2019) 'Significance of bank specific and macroeconomic determinants on performance of Indian private sector banks', *International Journal of Economics and Financial Issues*, Vol. 9, No. 2, pp.168–174.

Athanasoglou, P.A., Brissimis S.N. and Delis, M.D. (2008) 'Bank-specific, industry-specific and macroeconomic determinants of bank profitability', *International Financial Markets, Institutions and Money*, Vol. 18, No. 2, pp.121–136.

Azouri, M. and Senechal, S. (2022) 'Millennials, COVID-19, and its impact on perception: the case of the banking system', *International Journal of Work Innovation*, Vol. 3, No. 3, pp.289–315.

Bapat, D. (2018) 'Profitability drivers for Indian banks: a dynamic panel data analysis', *Eurasian Business Review*, Vol. 8, No. 4, pp.437–451.

Baum, C.F., Schaffer, M.E. and Stillman, S. (2003) 'Instrumental variables and GMM: estimation and testing', *The Stata Journal*, Vol. 3, No. 1, pp.1–31.

Berger, A.N., Hasan, I. and Zhou, M. (2010) 'The effects of focus versus diversification on bank performance: Evidence from Chinese banks', *Journal of Banking and Finance*, Vol. 34, No. 7, pp.1417–1435.

Bezawada, B. and Adaelli, S.R. (2020) 'Corporate governance, board characteristics and performance of Indian banks: an empirical study', *International Journal of Economics and Financial Issues*, Vol. 10, No. 3, pp.83–87.

Bitar, G. (2022) 'Gender diversity: a qualitative review of Lebanese women contribution to boards of directors', *International Journal of Work Innovation*, Vol. 3, No. 1, pp.69–81.

Boubakri, N., El Ghoul, S., Guedhami, O. and Hossain, M. (2020) 'Post-privatization state ownership and bank risk-taking: cross-country evidence', *Journal of Corporate Finance*, Vol. 64, p.101625.

Brighi, P. and Venturelli, V. (2014) 'How do income diversification, firm size and capital ratio affect performance? Evidence for bank holding companies', *Applied Financial Economics*, Vol. 24, No. 21, pp.1375–1392.

CapitalIQ (undated) *Banking Data* [online] www.capitaliq.com (accessed 22 March 2023).

Chavan, P. and Gambacorta, L. (2016) *Bank lending and loan quality: The case of India, Reserve Bank of India Working Paper Series*, Working Paper No. 9.

Chiorazzo, V., Milani, C. and Salvini, F. (2008) 'Income diversification and bank performance: Evidence from Italian banks', *Journal Of Financial Services Research*, Vol. 33, No. 3, pp.181–203.

Climent-Serrano, S. (2019) 'Effects of economic variables on NPLs depending on the economic cycle', *Empirical Economics*, Vol. 56, No. 1, pp.325–340.

Daadaa, W. (2021) 'Corporate board, ownership structure and banking performance in the emergent market', *International Journal of Business and Emerging Markets*, Vol. 13, No. 4, pp.403–419.

Das, A. and Ghosh, S. (2009) 'Financial deregulation and profit efficiency: a nonparametric analysis of Indian banks', *Journal of Economics and Business*, Vol. 61, No. 6, pp.509–528.

Das, S.K. and Uppal, K. (2021) 'NPAs and profitability in Indian banks: an empirical analysis', *Future Business Journal*, Vol. 7, No. 1, pp.1–9.

Demsetz, R.S. and Strahan, P.E. (1997) 'Diversification, size, and risk at bank holding companies', *Journal of Money, Credit, and Banking*, Vol. 29, No. 3, pp.300–313.

Desai, R. (2021) 'Impact of priority sector lending on financial profitability: segment wise panel data analysis of Indian banks', *Management & Accounting Review (MAR)*, Vol. 20, No. 1, pp.19–38.

DeYoung, R. and Rice, T. (2004) 'Noninterest income and financial performance at U.S. commercial banks', *Financial Review*, Vol. 39, No. 1, pp.101–127.

DeYoung, R. and Roland, K.P. (2001) 'Product mix and earnings volatility at commercial banks: Evidence from a degree of total leverage model', *Journal of Financial Intermediation*, Vol. 10, No. 1, pp.54–84.

DeYoung, R. and Torna, G. (2013) 'Nontraditional banking activities and bank failures during the financial crisis', *Journal of Financial Intermediation*, Vol. 22, No. 3, pp.397–421.

Dhal, S., Kumar, P. and Ansari, J. (2011) *Financial Stability, Economic Growth, Inflation and Monetary Policy Linkages in India: an Empirical Reflection*, Reserve Bank of India Occasional Papers, Vol. 32, No. 3, Winter.

Djalilov, K. and Piesse, J. (2016) 'Determinants of bank profitability in transition countries: what matters most?', *Research in International Business and Finance*, Vol. 38, pp.69–82.

Doumpos, M., Gaganis, C. and Pasiouras, F. (2016) 'Bank diversification and overall financial strength: international evidence', *Financial Markets, Institutions and Instruments*, Vol. 25, No. 3, pp.169–213.

Elsas, R., Hackethal, A. and Holzhäuser, M. (2010) 'The anatomy of bank diversification', *Journal of Banking and Finance*, Vol. 34, No. 6, pp.1274–1287.

Engle, R.F., Moshirian, F., Sahgal, S. and Zhang, B. (2014) *Banks Noninterest Income and Global Financial Stability,* CIFR Paper No. 015.

Gambacorta, L., Scatigna, M. and Yang, J. (2014) 'Diversification and bank profitability: a nonlinear approach', *Applied Economics Letters*, Vol. 21, No. 6, pp.438–441.

Gamra, S.B. and Plihon, D. (2011) *Revenue Diversification in Emerging Market Banks: Implications for Financial Performance,* arXiv preprint arXiv:1107.0170.

Geyfman, V. (2018) 'Banks and public capital markets in European emerging economies', *International Journal of Business and Emerging Markets*, Vol. 10, No. 4, pp.360–379.

Ghosh, S. (2016) 'Productivity, ownership and firm growth: evidence from Indian banks', *International Journal of Emerging Markets*, Vol. 11, No. 4, pp.607–631.

Goddard, J., McKillop, D. and Wilson, J.O. (2008) 'The diversification and financial performance of U.S. credit unions', *Journal of Banking and Finance*, Vol. 32, No. 9, pp.1836–1849.

Gupta, N. and Mahakud, J. (2020) 'Ownership, bank size, capitalisation and bank performance: evidence from India', *Cogent Economics and Finance*, Vol. 8, No. 1, p.1808282.

Hahm, J.H. (2008) 'Determinants and consequences of noninterest income diversification of commercial banks in OECD countries', *East Asian Economic Review*, Vol. 12, No. 1, pp.3–31.

Haubrich, J.G. and Young, T. (2019) 'Trends in the noninterest income of banks', *Economic Commentary*, Vol. 2019, No. 14, pp.1–6.

Heffernan, S. (2005) *Modern Banking,* John Wiley & Sons, England, UK.

Helgi Library (2021) *What Country Has the Most Banks*? [online] https://www.helgilibrary.com/charts/what-country-has-the-most-banks/ (accessed 23 March 2023).

Hidayat, W.Y., Kakinaka, M. and Miyamoto, H. (2012) 'Bank risk and noninterest income activities in the Indonesian banking industry', *Journal of Asian Economics*, Vol. 23, No. 4, pp.335–343.

Horobet, A., Radulescu, M., Belascu, L. and Dita, S.M. (2021) 'Determinants of Bank Profitability in CEE countries: evidence from GMM panel data estimates', *Journal of Risk and Financial Management*, Vol. 14, No. 7, pp.1–23.

Hsieh, M.F., Chen, P.F., Lee, C.C. and Yang, S.J. (2013) 'How does diversification impact bank stability? The role of globalisation, regulations, and governance environments', *Asia-Pacific Journal of Financial Studies*, Vol. 42, No. 5, pp.813–844.

Hunjra, A.I., Hanif, M., Mehmood, R. and Nguyen, L.V. (2020) 'Diversification, corporate governance, regulation and bank risk-taking', *Journal of Financial Reporting and Accounting*, Vol. 19, No. 1, pp.92–108.

Javaid, M.E. (2016) 'Bank specific and macroeconomic determinants of bank profitability', *Journal of Management*, Vol. 10, No. 1, pp.38–54.

Jensen, M.C. and Meckling, W. (1976) 'Theory of the firm: managerial behavior, agency costs and ownership structure', *Journal of Finance Economics*, Vol. 3, No. 4, pp.305–360.

Kalam, A. and Utsho, M.I. (2020) 'Effects of firm specific factors on profitability of non-bank financial institutions in Bangladesh: evidenced from Dhaka stock exchange (DSE)', *International Journal of Science and Business*, Vol. 4, No. 11, pp.1–13.

Kansil, R. and Singh, A. (2018) 'Institutional ownership and firm performance: evidence from Indian panel data', *International Journal of Business and Emerging Markets*, Vol. 10, No. 3, pp.250–269.

Khalilakbar, R. and Pool, J.K. (2016) 'Corporate social responsibility, attitudes and behavioural intentions: an empirical study in banking industry', *EuroMed Journal of Management*, Vol. 1, No. 3, pp.252–264.

Köhler, M. (2015) 'Which banks are more risky? The impact of business models on bank stability', *Journal of Financial Stability*, Vol. 16, pp.195–212.

Kumar, H. (2023) *More foreign banks may shut shop in India after Citi consumer biz exit, MoneyControl*, March 3 [online] https://www.moneycontrol.com/news/business/more-foreign-banks-may-shut-shop-in-india-after-citi-consumer-biz-exit-10194971.html (accessed 17 June 2023).

Kumar, V. and Bird, R. (2022) 'Factors influencing the profitability of banks in India and China', *Applied Economics Letters*, Vol. 29, No. 5, pp.371–375.

Lee, C.C., Hsieh, M.F. and Yang, S.J. (2014) 'The relationship between revenue diversification and bank performance: do financial structures and financial reforms matter?', *Japan and the World Economy*, Vol. 29, pp.18–35.

Lepetit, L., Nys, E., Rous, P. and Tarazi, A. (2008) 'Bank income structure and risk: an empirical analysis of European banks', *Journal of Banking and Finance*, Vol. 32, No. 8, pp.1452–1467.

Li, X., Feng, H., Zhao, S. and Carter, D.A. (2021) 'The effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic', *Finance Research Letters*, Vol. 43, p.101957.

Markowitz, H. (1952) 'Portfolio selection', *Journal of Finance*, Vol. 7, No. 1, pp.77–91.

Mehzabin, S., Yousuf, Md., Wanke, P. and Azad, M.A.K. (2022) 'Progress or missed opportunity: regulation and bank stability in South European countries', *EuroMed Journal of Management*, Vol. 4, No. 2, pp.134–147.

Mercieca, S., Schaeck, K. and Wolfe, S. (2007) 'Small European banks: benefits from diversification?', *Journal of Banking and Finance*, Vol. 31, No. 7, pp.1975–1998.

Meslier, C., Tacneng, R. and Tarazi, A. (2014) 'Is bank income diversification beneficial? Evidence from an emerging economy', *Journal of International Financial Markets, Institutions and Money*, Vol. 31, pp.97–126.

Micco, A., Panizza, U. and Yanez, M. (2007) Bank ownership and performance. Does politics matter?', *Journal of Banking and Finance*, Vol. 31, No. 1, pp.219–241.

Minh, S. and Thanh, T. (2020) 'Analysis of the impact from noninterest income to the operational efficiency of commercial banks in Vietnam', *Management Science Letters*, Vol. 10, No. 2, pp.455–462.

Molyneux, P. and Thornton, J. (1992) 'Determinants of European bank profitability: a note', *Journal of Banking and Finance*, Vol. 16, No. 6, pp.1173–1178.

Nguyen, M., Skully, M. and Perera, S. (2012) 'Market power, revenue diversification and bank stability: evidence from selected South Asian countries', *Journal of International Financial Markets, Institutions and Money*, Vol. 22, No. 4, pp.897–912.

Nguyen, T.P.T. and Nghiem, S.H. (2016) 'Market concentration, diversification and bank performance in China and India: an application of the two-stage approach with double bootstrap', *Managerial Finance*, Vol. 42, No. 10, pp.980–998.

Nisar, S., Peng, K., Wang, S. and Ashraf, B.N. (2018) 'The impact of revenue diversification on bank profitability and stability: empirical evidence from South Asian countries', *International Journal of Financial Studies*, Vol. 6, No. 2, pp.1–25.

Ozili, P.K. and Outa, E. (2017) 'Bank loan loss provisions research: a review', *Borsa Instanbul Review*, Vol. 17, No. 3, pp.144–163.

Pennathur, A.K., Subrahmanyam, V. and Vishwasrao, S. (2012) 'Income diversification and risk: Does ownership matter? An empirical examination of Indian banks', *Journal of Banking and Finance*, Vol. 36, No. 8, pp.2203–2215.

Rahman, H., Yousaf, M.W. and Nageena Tabassum, N. (2020) 'Bank-specific and macroeconomic determinants of profitability: a revisit of Pakistani Banking sector under dynamic panel data approach', *International Journal of Financial Studies*, Vol. 8, No. 3, p.42.

Rajput, A. (2019) 'Competition trends in Indian banking: Panzar-Rosse approach in dynamic panel framework', *International Journal of Arts and Sciences*, Vol. 12, No. 1, pp.113–135.

RBI (2021) *Liabilities and Assets of Scheduled Commercial Banks, RBI Data Warehouse* [online] https://dbie.rbi.org.in (accessed 27 March 2023).

Roodman D. (2009a) 'A note on the theme of too many instruments', *Oxford Bulletin of Economics and Statistics*, Vol. 71, No. 1, pp.135–158.

Roodman, D. (2009b) 'How to do xtabond2: an introduction to 'difference' and 'system' GMM in Stata', *Stata Journal*, Vol. 9, No. 1, pp.86–136.

Roy, S., Misra, A.K., Padhan, P.C. and Rahman, M.R. (2019) 'Interrelationship among liquidity, regulatory capital and profitability-a study on Indian banks', *Cogent Economics and Finance*, Vol. 7, No. 1, p.1664845.

Salike, N. and Ao, B. (2017) 'Determinants of bank's profitability: role of poor asset quality in Asia', *China Finance Review International*, Vol. 8, No. 2, pp.216–231.

Salloum, C., Al Sayah, M. and Azouri, A. (2015) 'The financial involvement of the Lebanese banking sector in corporate social responsibility', *EuroMed Journal of Management*, Vol. 1, No. 1, pp.21–39.

Salloum, C., Jabbour, G. and Mercier-Suissa, C. (2019) 'Democracy across gender diversity and ethnicity of middle eastern SMEs: how does performance differ?', *Journal of Small Business Management*, Vol. 57, No. 1, pp.255–267.

Sanya, S. and Wolfe, S. (2011) 'Can banks in emerging economies benefit from revenue diversification?', *Journal of Financial Services Research*, Vol. 40, No. 1, pp.79–101.

Sarkar, J. and Sarkar, S. (2018) 'Bank ownership, board characteristics and performance: evidence from commercial banks in India', *International Journal of Financial Studies*, Vol. 6, No. 1, pp.1–30.

Sarkar, S., Sensarma, R. and Sharma, D. (2019) 'The relationship between risk, capital and efficiency in Indian banking: does ownership matter?', *Journal of Financial Economic Policy*, Vol. 11, No. 2, pp.218–231.

Saunders, A., Schmid, M.M. and Walter, I. (2016) *Noninterest Income and Bank Performance: Does Ringfencing Reduce Bank Risk*? Working Paper, New York University.

Selvakumar, M., Janani, H., Sathyalakshmi, V. and Siddique, R.M.A. (2019) 'Performance analysis of new generation private sector banks in India', *ICTACT Journal on Management Studies*, Vol. 5, No. 1, pp.954–963.

Stiroh, K.J. (2004) 'Diversification in banking: is noninterest income the answer?', *Journal of Money, Credit and Banking*, Vol. 36, No. 5,pp.853–882.

Stiroh, K.J. and Rumble, A. (2006) 'The dark side of diversification: the case of U.S. financial holding companies', *Journal of Banking and Finance,* Vol. 30, No. 8, pp.2131–2161.

Subbarayan, A. and Jothikumar, J. (2017) 'Bank specific, industry specific and macro economic determinants of profitability of public sector banks In India: 2010–2016 – a panel data approach', *International Journal of Agricultural and Statistical Sciences*, Vol. 13, No. 2, pp.655–662.

Tan, Y. (2016) 'The impacts of risk and competition on bank profitability in China', *Journal of International Financial Markets, Institutions and Money*, Vol. 40, pp.85–110.

Tan, Y. (2017) 'The impacts of competition and shadow banking on profitability: evidence from the Chinese banking industry', *North American Journal of Economics and Finance*, Vol. 42, pp.89–106.

Tan, Y. and Floros, C. (2012) 'Bank profitability and inflation: the case of China', *Journal of Economic Studies*, Vol. 39, No. 6, pp.675–696.

Trivedi, S.R. (2015) 'Banking innovations and new income streams: impact on banks' performance', *Vikalpa*, Vol. 40, No. 1, pp.28–41.

Vidyarthi, H. (2019) 'Dynamics of income diversification and bank performance in India', *Journal of Financial Economic Policy*, Vol. 12, No. 3, pp.383–407.

Williams, B. (2016) 'The impact of noninterest income on bank risk in Australia', *Journal of Banking and Finance*, Vol. 73, pp.16–37.

Yüksel, S., Mukhtarov, S., Mammadov, E. and Özsarı, M. (2018) 'Determinants of profitability in the banking sector: an analysis of post-soviet countries', *Economies*, Vol. 6, No. 3, pp.1–15.

Zhou, K. (2014) 'The effect of income diversification on bank risk: evidence from China', *Emerging Markets Finance and Trade*, Vol. 50, No. Sup3, pp.201–213.