Universiteit Utrecht

Master Thesis U.S.E

Topic - Impact of Foreign Bank Presence on Indian Domestic Banks.

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1. Abstract

This research aims to examine how the presence of Foreign Banks influences the profitability of Domestic Banks in India. It focuses on analyzing this impact during periods of shocks, specifically the Non-Performing Asset (NPA) crisis in 2013 and the COVID-19 pandemic. Bank-specific data and macroeconomic data were collected from 2003 to 2023 for each Private Sector Bank, Public Sector Bank, and Foreign Banks. The results show that the Foreign Banks have a subtle impact on the profitability of Public Sector and Private Sector Banks In India.

Keywords: Public Sector Banks, Private Sector Banks, Foreign Banks, NPA (Non-performing assets), COVID-19

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2. Introduction

2.1 Background and Context

The global financial landscape has undergone a significant transformation in recent decades. This change has been largely driven by the widespread adoption of the Liberalization, Privatization, and Globalization (LPG) policy all over the world. In developing economies especially, the presence of foreign institutions has increased due to the liberalization of the banking sector.

The liberalization of banking sectors has created opportunities for banks from more developed economies to establish their branches in developing countries, allowing them to expand their operations and enter new markets. However, the presence of Foreign Banks in developing economies raises the question: Is the entry of Foreign Banks beneficial for developing economies?

Foreign Bank entry in developing countries can be advantageous as they bring in advanced technologies and enhance the market competition, these factors can lead to overall improvement of domestic banking sectors efficiency. Conversely, Foreign Banks may pose challenges to domestic banks, particularly those that are less prepared to compete on a global scale. There is also the possibility that Foreign Banks might destabilize the economy if they are granted excessive control, as their primary motive is profit rather than the welfare of the host country.

Given these contrasting perspectives, it becomes interesting to investigate the impact of Foreign Bank presence on domestic banking sectors in developing economies. This research aims to address the central question: How does the entry and operation of Foreign Banks influence the performance of domestic banks in developing countries?

It's crucial to recognize that the effects of Foreign Bank presence are not uniform across all nations. The impact can differ significantly from one country to another, largely due to variations in regulatory frameworks. Some nations implement strict regulations for the operations of Foreign Banks, while others maintain a more relaxed regulatory environment. These differences in regulatory approaches play a substantial role in shaping the extent and nature of Foreign Banks' influence on the domestic banking sector and the broader economy.

As shown by Clarke et al. (2001) in their study how the Foreign Bank penetration was very rapid in Latin America and Eastern Europe whereas the Foreign Bank presence in Asia remained very low from 1994 to 1999. But in recent times many countries in Asia have grown at a rapid rate, among them India is one of the fastest-growing economies in the world. India ranked 3rd in the world in terms of purchasing power parity and 5th in terms of nominal GDP (WorldData.info). Therefore, for this study, India is chosen as the region to examine the impact of Foreign Bank presence.

It is interesting to investigate that if Foreign Banks have an impact on Indian domestic Banks and if the impact is positive or negative. This brings us to the research question of this study: Impact of Foreign Bank presence on Indian Domestic Banks.

In short, this study examines the impact of Foreign Banks' presence on the profitability of domestic Indian Banks mainly the Private Sector and Public Sector Banks in India from 2003-2023. During this period, two shocks were observed first one being the Non-Performing Assets Crisis in 2013 and the second one being the COVID-19 crisis that are discussed in detail in the coming sections.

There has been limited research on the topic of the impact of Foreign Bank presence on Indian Banks. As per my knowledge,, the last research was done by Sharda et al., 2014. There have been studies on the NPA crisis but those researches have not taken into account the presence of Foreign Banks. Lastly, as COVID-19 was a quite recent shock there is still research going on, and again the studies have not specifically taken into account the presence of Foreign Banks and their impact on domestic banks.

By analyzing the relationship between Foreign Bank entry and domestic bank performance, this study seeks to contribute to the ongoing discourse on financial sector development in emerging economies. The findings will provide valuable insights into the challenges and opportunities presented by increased foreign bank participation in India's banking system.

2.2 The Banking System in India

The banking system in India can be broadly classified into Scheduled Commercial banks, Non-Scheduled Banks, and cooperative banks. The scheduled banks can be further divided into Public Sector Banks, Private Sector Banks, Foreign Banks, Regional Rural Banks, Small Finance Banks, and Payments Banks. The Cooperative Banks are further classified into Urban Cooperative Banks, Rural Cooperative Banks, and State Cooperative Banks. The Reserve Bank of India (RBI) and the Securities & Exchange Board of India (SEBI) are the regulators of the Indian banking system.

This study specifically focuses on Foreign Banks and its impact on Public Sector Banks and Private Sector Banks. These banks are described below:

Bank	Description
Public Sector Bank	Banks in India, where a majority stake (i.e., more than 50%) is held by the Ministry of Finance (India) of the Government of India or State Ministry of Finance of various State Governments of India.
Private Sector Bank	Private Sector banks are those owned by private companies or individuals.
Foreign Banks	A bank that has its headquarters outside India but runs its offices as a private entity at any other location in India.

Table 1: Description of Banks in India (Department of Financial Services India)

To understand their market size and operation in the Indian economy, table 2 below shows the number of banks and asset sizes of Public, Private, and Foreign Banks. It can be observed that although Public Banks are the least in number (only 12), the asset size is the most in volume. On the other hand, the share of foreign banks in asset size is much less (around 0.06% of total asset size).

Type of Bank	Number of Banks	Asset size (as of 2023) (value in US$ billion)
Public Banks	12	1,688.15
Private Banks	21	1,017.26
Foreign Banks	46	188.83

Table 2. Data of number of banks and asset share (Source- India Brand Equity Foundation)

The presence of Foreign Banks in India has a long history, with the Oriental Banking Corporation establishing the first Foreign Banking presence in 1842 (T. Vinila, 2016). However, the significant evolution of Foreign Banks in the Indian banking system can be traced to the 1990s, The Narasimham Committee of 1991 recommended a structural reorganization of the banking system in India to improve the efficiency of operations of banks here. There was a clear push for Foreign Banks as they helped to improve the efficiency of the market with the top technology. In the 1990s India was still navigating its way in the world after its independence in 1947. Foreign Banks were allowed to open branches in India as fully owned or as subsidiaries. They were also permitted to enter into joint ventures with private banks for merchant banking or investment banking Sharda et al., 2014.

As of today, 46 foreign banks have been established in India. According to the article by the State Bank of India (TOI report 2022), in the next ten to fifteen years, India is anticipated to rank among the world's top three economies. With rapid economic expansion, increased disposable incomes, rising levels of consumerism, and better access to credit, the Indian banking sector has shown remarkable growth.

To further understand the study, the next section talks about the two shock periods that were observed between 2003-2023.

2.3 Shocks in the Indian Banking Sector : NPA Crisis

The Indian economy has undergone many transitions since the 1990s, One of them being the NPA crisis starting in 2013. According to the Reserve Bank of India, a non-performing asset (NPA) can be defined as an asset, other than investments where interest and/or installment of principal remain overdue for a period of more than 90 days in respect of a term loan. For a bank, this means that the loan asset may not be recovered fully or maybe only partly recovered. In case of rising NPAs, the banks need to create more provisions, which impacts the income statement and balance sheet. To further understand the NPA crisis in the Indian Banking System, NPAs in Public Banks, Private Banks, and Foreign Banks are observed.

As it can be seen in the chart below, the NPAs of Public Sector Banks started increasing in 2011, spiking in 2018, and then decreasing again. The Private Sector Banks' NPA also saw a rise since 2015 but still lower as compared to Public Sector Banks. The NPAs of Foreign Banks were the lowest, almost insignificant. The crisis was mainly due to the accumulation of bad loans that could not be recovered by Public Sector Banks. The Public Sector Banks undertook term lending and credit exposure in the industrial and infrastructure sectors, which were the sectors that were defaulting the most Das, S. K. (2023).

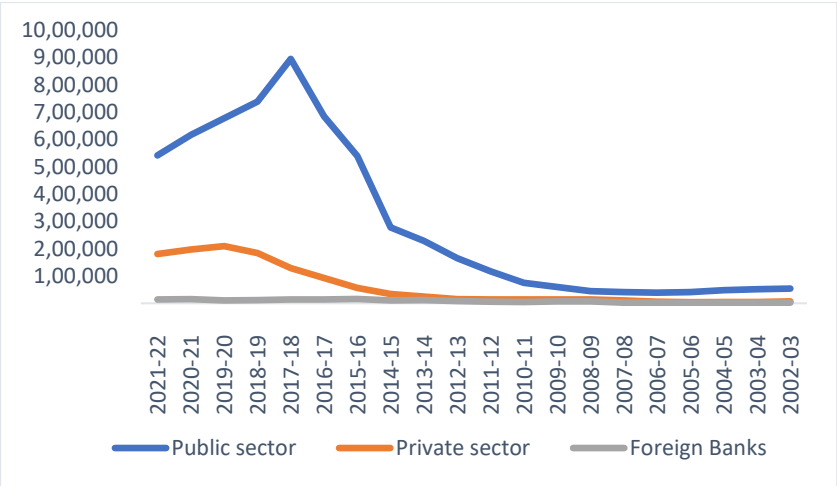

Chart prepared by author, based on data from RBI

2.4 COVID-19 Crisis

Just when the NPA's started coming down after the spike in 2018, a worldwide pandemic COVID-19 disrupted all operations over the world. On 24th March 2020, a nationwide lockdown was declared in India. Many challenges were faced by industries, government, and people. India was also affected by this distress and the effects were more prolonged due to the large population in the country. This led to not only one but several lockdowns in 2 years. The impact of COVID-19 was seen in the form of a decline in the Gross Domestic Product (GDP) growth rate of India. The growth rate declined to negative 24.4% in the second quarter of 2020 (Choudhary, Naveen 2022). Along with this, there was an increase in the unemployment rate, an increase in inflation, and a dip in foreign trade. In this situation, banks were expected to navigate the customers and firms in the storm. Banks had to quickly adapt to the new technology, because of the rising need and preference for digital transactions. The central bank acted quickly and implemented policies to support the dying businesses.

There is not much literature available in the context of Foreign Banks' performance in India during the NPA crisis and the COVID-19 pandemic. This will also make an interesting study for comparing different banks, thus increasing the significance of such studies.

Given the dual nature of Foreign Bank impacts, this study aims to critically examine how the presence of Foreign Banks influences the performance, stability, and overall efficiency of domestic banks in India. Specifically, it seeks to analyze the effects on Public Sector Banks and Private Sector Banks during three distinct periods: the pre-NPA crisis period (2003-2013), the NPA crisis period (2013-2020), and the COVID-19 crisis period (2020-2023).

The further sections are organized as follows: Section 3 talks about the previous literature and studies based on which hypothesis is formulated. Section 4 introduces the data and research design, the model, and the variables used. Section 5 presents the descriptive statistics, correlation matrix and regression analysis results. Section 6 in continuation of that discusses the results and states the limitations of the study. The last part of the study is Section 7 which contains the conclusion.

3. Literature Review

3.1 Impact of foreign bank's entry on domestic markets.

The banking systems all around the globe vary from one region to another in terms of size and operations, mostly due to the different macroeconomic environments they operate in, financial market conditions, different tax policies, legal requirements, and more. Therefore, firstly to analyze the impact of Foreign Banks on the domestic markets, a macro-level view will help to understand the overall trend of Foreign Bank presence. (Demirguc-kunt, et al., 1998) tested data from 80 countries to understand how the profitability of Foreign Bank varies between developed countries and developing countries based on different determinants like bank characteristics, macroeconomic conditions, taxation, regulations, and overall financial structure. The independent variable for this study is net interest margin and profit before tax and the data for different countries is tested by weighted least squares, with the weight being the inverse of the number of banks for a country in a given year. This method is quite appropriate as it deals with the problem of heteroskedasticity. They noted that foreign banks have higher profits than domestic banks in emerging countries. This may be because foreign banks in some emerging countries are exempt from credit allocation regulations and other restrictions that reduce the net margins. Also, due to pervasive market inefficiencies and outmoded banking practices in developing countries, there is an opportunity for foreign banks to reap higher interest margins than domestic banks. This paper helps to understand the profitability from the perspective of Foreign Banks and how it is different for developing countries. This can possibly be a good motivation for Foreign Banks to set up their branches in developing countries especially given the time this study was published which was 1998, after the Liberalization of banking systems around the world.

But to understand the impact of Foreign Banks on domestic markets, it is important to understand the impact from the perspective of the host country. In this context, the study done by (Cardenas, et al., 2003) helps us understand the entry of Foreign Banks in emerging countries from the perspective of the host country. They state the benefits and concerns that a Foreign Bank may possess to the domestic banks. Entry of foreign banks can be beneficial for the emerging economy as they bring in new technologies and introduce innovative banking products. (Agenor, P.-R. 2003) also mentions some benefits of Foreign Banks' entry and how it creates a competitive environment that leads to the improvement in the efficiency of domestic banks. It helps the country to access international capital. Foreign banks also contribute towards the stability of the domestic financial system and may contribute to the overall quality of the loan portfolio. The domestic banks also learn new and efficient management techniques from the foreign banks. On the other hand, greater participation of Foreign Banks might be a matter of concern for the host country. When the share of Foreign Banks increases, the host country becomes more exposed to the risks and events of that foreign country (Lehner, et al., 2006). A few other risks are stated by(Agenor, P.-R. 2003) as follows: Firstly, foreign banks may invest in small firms which may have an adverse effect on output, employment, and income distribution of the local economy. Second, to compete with foreign banks the domestic banks may have to merge which will create a monopoly power that may affect the efficiency of banks. Third, during the time of a crisis, a foreign bank may tend to cut and run.

Therefore, it can be seen that the role of Foreign Banks can be dual and it varies from country to country. Also, the studies above are more on a global level and not country-specific. For this study, it is important to investigate the Indian banking system regulations and framework.

In continuation with the context above, the paper by the Indian Institute of Management (Sharda, et al., 2014) gives us insight into the regulatory framework of India to understand the central bank's attitude towards foreign bank entry and the impact of foreign banks on the economy. The study suggests that the work of foreign banks is mostly confined to areas of investment banking and the foreign exchange market. The presence is more concentrated in the cities as compared to rural areas. Scheduled commercial banks have the dominance in priority sector lending which include lending to Agriculture, Small and micro enterprises, education, housing, export credit, etc. In India, the majority of the population still lives in rural area and is engaged in agriculture or small businesses to earn a livelihood. In this case, as said before the domestic banks have more dominance as compared to Foreign Banks which makes the presence of Foreign Banks concentrated to only a few sectors in the metropolitan area in India.

To assess the impact of Foreign Banks on competition among domestic banks in India, Sathye, M. (2002) conducted a study examining the market concentration of Foreign Banks in the Indian banking sector. The financial deregulation in India was intended to reduce domestic market concentration and foster competition among Indian banks.

The study's findings revealed that the coefficient for Foreign Banks was not statistically significant, suggesting that the presence of Foreign Banks did not have a substantial impact on market concentration in India. This lack of impact could be attributed to the restrictions placed on Foreign Banks, limiting their operations to metropolitan areas and mandating lending to priority sectors.

Further to understand if foreign banks have a positive or negative impact on the domestic markets, (Ghosh, Saibal 2012) examine the foreign bank entry effect in India. To do so, they take into account the asset share, branch share, and number of foreign banks. The results suggest that foreign bank penetration is positively related to profitability, which means it enhances the banking sector's competitiveness. The results also suggest a negative impact related to spread, overhead expenses, and non-performing loans. The overall conclusion was that the Foreign Bank's presence overwhelms the costs, suggesting that they are more of an asset to the country.

Based on this the following hypothesis can be built:

H1- The presence of Foreign Banks has a positive impact on the profitability of Public & Private Sector Banks.

(Based on the logic, that the presence of Foreign Banks increases the competition in the market. Foreign banks introduce advanced technological solutions, and innovative operational practices, Therefore when competition increases the domestic banks also upgrade their operations to sustain the competition. This leads to banks operating more efficiently and ultimately increasing their profitability)

3.2 NPA Crisis

The Global financial crisis of 2007-2008, had an impact on all economies, some economies faced larger consequences than others. The Global Financial Crisis didn't have a very long-lasting adverse impact on the performance of banks. In 2008, when the Crisis hit many advanced economies, the Indian economy was relatively unscratched with a marginal decline in lending Goswami, A., & Gulati, R. (2021). However, this trend reversed in the post-Global Financial Crisis years. There was low balance sheet growth, the period from 2013 to 2017 could be considered a turbulent period in Indian Banking history. The high growth of Non-Performing Loans led to a sharp deterioration in asset quality and lower profitability levels. The NPAs started building up in the balance sheets of Banks and Corporates which was being concealed but around 2013 the NPAs saw a sharp rise, which then started showing up in the balance sheet and Income statements and affected the profitability of banks. One of the possible explanations for the rising NPAs can be that, the Indian Corporate sector was indirectly dependent on external funding which got slowed down, due to which firms were unable to pay the loans, then affected the health of Domestic Banks (Chari 2019)
Das, C. P., & Swain, R. K. (2018) briefly discuss in their study about how there is no significant relationship between profit and NPA for foreign banks, the regression analysis results present that the p value is more than 0.05 which makes NPAs insignificant.

As of my knowledge, there is no particular literature that examines the impact of foreign bank presence on the profitability of domestic banks during NPA crisis in India. But most of the literature focuses on NPAs in public sector banks.

To get a better idea of the NPA crisis in terms of bank ownership, the private banks and foreign banks were not much affected but group that was largely affected was the Public Sector Banks. If we look at the source of NPAs, the large industrial loans were the ones that defaulted were major drivers of NPA. During the last decade, on average about 30% of bank credit went to the infrastructure sector. The Public sector Banks were largely exposed to large industrial loans and hence they were the most affected. Private Sector Banks mostly lend credit to small and medium enterprises, which partly explains the lower incidence of NPAs in Private Banks Das, S. K. (2023)

The origin of the NPA crisis began with the emergence of twin balance sheet problems, where both banks and the corporate sector came under financial stress. In the period of 2008-2013, the banks resorted to restructuring loans to postpone the recognition of NPAs. Therefore, banks classified loans facing solvency problems as "restructured" assets. In the period of 2008-2013, the NPA amounts were still low but there was a steep increase in the proportion of restructured loans (Chari, Deepak, & Raj, 2019).

Another feature of Non-Performing Assets in India is the share of large loans in the total advances given out. The share of large loans is more than 50%. Out of the total advances to large borrowers, more than 80% of loans were found to be NPAs Das, S. K. (2023).

After such turbulence in 2019, the government took initiatives to ensure the capital adequacy of banks. This included the recapitalization of Public sector Banks. Another measure was to merge weak Public Sector Banks with healthier Public Sector Banks, this was done to ensure the efficiency of banks. There were 27 Public Sector Banks as of 2017, which then consolidated to 12 Public Sector Banks (Invest India Article). One of the most important measures was to

implement proper regulations, on 1st April 2013 Basel III capital regulations were implemented in a phased manner which was finally implemented on 31st March 2019.

Based on the provided information, it's evident that the Non-Performing Assets (NPA) crisis of 2013-2019 had differing impacts on Public Sector and Private Sector Banks in India. This disparity in effects makes it compelling to examine these two banking sectors separately and investigate whether the presence of foreign banks influenced them differently during this period. Consequently, we can formulate distinct hypotheses for Public Sector Banks and Private Sector Banks to explore the potential varying impacts of foreign bank presence on their respective profitability during the NPA crisis.

H2- The presence of Foreign Banks negatively impacted Public Banks' profitability during the period of NPA crisis.

(The NPA's of Public sector banks were the highest and they were most affected during the NPA crisis. Public sector banks faced credit crunch and losses during this time. As foreign banks were less affected by the crisis they continued to operate and provide credit as before. This further affected the profitability pf Public Banks. Therefore, foreign bank presence had a negative impact on public sector banks in India.)

H3- The presence of Foreign Banks had a positive impact on Private Sector Banks' profitability during the period of the NPA crisis.

(The NPA's of private banks were lower than that of public sector banks. The private banks were not highly affected by the NPA crisis enabling private banks to maintain profitability. Due to the presence of foreign banks, that were also not majorly affected by the crisis and were operating efficiently, private banks were complied to work more efficiently to keep up with the competition of foreign banks. Therefore, this improved the profitability of Private sector banks.)

3.3 Role of foreign banks during COVID-19

The COVID-19 pandemic has significantly altered the business and employment landscape, leading to a decrease in loan demand and reduced repayment capacity due to job losses. This uncertainty poses challenges for banks in assessing creditworthiness for future loans. Government agencies and banks anticipate a shift towards digital banking, with a notable increase in online banking activities and reduced physical branch visits. The pandemic has forced many customers to adopt digital banking apps, accelerating digital transformation in the banking sector. However, this shift may pose challenges for technologically less literate bank customers.

A study by Gulati et al. (2023) reveals that the COVID-19 crisis had minimal initial negative impact on overall bank efficiency in India across all bank groups. This resilience may be attributed to policy interventions and monetary tightening by the Reserve Bank of India (RBI). The study aligns with recent RBI reports and government surveys, indicating improved operating efficiency in public sector banks and decreased deposit-generating efficiency in foreign banks during the pandemic. Large banks showed better deposit generation but lower operational and overall efficiencies compared to medium and small banks.

The global pandemic's macroeconomic slowdown affected loan servicing capabilities, impacting bank balance sheets. Sen et al. (2022) examined whether foreign banks acted as shock absorbers or transmitters during the COVID-19 crisis. Typically, Foreign Banks are considered shock absorbers due to parent company support and their tendency to reduce lending in host countries during crises.

Detragiache and Gupta (2004) demonstrated how Foreign Banks positively impacted Malaysia's economy during a crisis, with depositors perceiving them as safer. However, the unique nature of the COVID-19 crisis, with widespread lockdowns and supply chain disruptions, led to foreign banks acting more as shock transmitters. Their credit growth rate decreased post-COVID-19, while domestic banks in India took a leading role in economic revival with more relaxed lending requirements.

These observations form the basis for developing hypotheses regarding the impact of foreign banks on public and private sector banks in India during the pandemic years.

H4 - The presence of Foreign Banks during COVID had no impact on the profitability of Domestic Banks (Public & private Sector Banks)

(The domestic banks were more active during the COVID-19 shock, they were heavily supplying credit to industries and companies in need, and they had the support of the government as well. The foreign banks' operations were very neutral at this time as were affected by the global crisis but also had support from the parent banks. Therefore in this period, they didn't have an impact on the profitability of domestic banks.)

4. Data and Methodology

4.1 Research design

This study aims to examine the impact of foreign bank presence on the profitability of Indian Public and Private Sector Banks over a 20-year period from 2003 to 2023. This timeframe encompasses two significant economic shocks: the Non-Performing Assets (NPA) crisis beginning in 2013 and the COVID-19 pandemic starting in 2020.

Data Collection and Sample

To ensure a balanced panel dataset, 10 banks were randomly selected from each sector (public and private). Quarterly data was collected for all variables from Q1 2003 to Q3 2023, with values reported in Indian Rupees (crores).

Analytical Approach

The analysis was conducted using Stata 16.0 for panel regressions. Descriptive statistics and correlation matrices were employed to provide initial insights. The Hausman test was utilized to determine the appropriate model specification (fixed effects or random effects), with results predominantly favoring random effects models. Clustered standard errors is employed along with random effects to make the test more reliable and presented below. The regression with only random effects model is in the appendix part b.

The analysis is structured into three distinct periods:

2003-2012: Assessing the impact of foreign banks on domestic banks (both private and public)

2013-2019: Examining the influence of foreign banks on public and private sector banks separately during the NPA crisis
2019-2023: Investigating the impact during the COVID-19 pandemic on domestic banks

4.2 Model & Variable Specification

The study adopts a model based on Eissa et al. (2018) to measure bank profitability:

$$\mathbf{ROA_{it} = \alpha + \beta_1(CA)_{it} + \beta_2(AQ)_{it} + \beta_3(LIQ)_{it} + \beta_4(DEP)_{it} + \beta_5(LEV)_{it} + \beta_{13}(FB)_{it} + \beta_9(GDP) + e_{it}}$$

Where:
i denotes the bank (i = 1, ..., N)
t represents the time period (t = 1, ..., T)

ROA (Return on Assets) is the dependent variable
Independent variables include bank-specific factors (total assets, capital adequacy, asset quality, liquidity, deposit ratio, and leverage), foreign bank assets (to measure foreign presence), and GDP (as a macroeconomic indicator)

This model was chosen for its comprehensive inclusion of variables essential for profitability measurement, incorporating both bank-level and macro-level factors. Definitions and calculations for all variables are provided in Table 3, based on Eissa et al. (2018)

Dependent Variable	**Calculation**	**Definition**
ROA	Net Profit/Total Assets	It measures the profitability of a business in relation to its total assets.
Independent Variables		
CA, Capital Adequacy	Paid-up capital/Total Assets	It tells about a bank's ability to pay liabilities.
AQ, Asset Quality	Gross Advances/ Total Assets	It reflects on asset allocation and potential risks.
LIQ, Liquidity	Cash funds/Total Assets	It shows if the bank has enough cash deposits in case a depositor wants to withdraw.
DEP, Deposits	Total Deposits/Total Assets	It helps to understand how the deposits are used to generate assets.
LEV, leverage	Total Liabilities/Total Assets	Indicates a bank's financial health as how the bank is using its assets to pay off debt.
FB, Foreign Bank Assets	Ln(Foreign Banks Total Assets)	To take into account foreign bank presence

GDP, Gross Domestic Product	Ln(GDP)	Macro-economic variable which indicates the health of a country.

Table 3: Dependent and Independent variables

Data Collection and Variable Computation

This study utilizes financial data extracted from the income statements and balance sheets of the selected banks. The variables used in the analysis are derived through careful calculation and sorting of this financial information.

Data Source:

The primary data source for this research is the Reserve Bank of India (RBI) Database. As India's central bank and regulatory authority, the RBI maintains comprehensive datasets across various industries. Within the banking sector data, we specifically focused on the subsection containing Assets and Liabilities and Performance measures.

5. Descriptive Statistics & Regression Results

5.1 2003-2012, Pre-crisis period

For the period of 2003-2012, domestic banks (Public & Private Sector Banks) are analyzed and the descriptive statistics are as follows:

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	800	.006	.005	-.035	.021
lnas	800	10.923	1.489	7.639	14.069
cad	800	.009	.016	.001	.153
aq	800	.556	.07	.353	.682
liq	800	.059	.016	.013	.161
dep	800	.821	.085	.119	.916
lev	800	.93	.026	.748	.964
fbassets	800	12.596	.556	11.663	13.346
gdp	800	1.946	1.203	-1.846	5.804

Source: Computed by Author with Stata

There were 20 banks (10 Public & 10 Private) observed for 10 years on a quarterly basis, which makes the number of observations in the sample as 800. Return on Assets (roa) is positive but banks have a low roa of 0.006. Banks had a negative ROA in a few quarters while positive in another. The negative ROA is around the time periods of 2008, though not majorly affect but the Global Financial Crisis did have some impact on the balance sheets. The lnas (log of assets) has the highest standard deviation which suggest that there are some banks with larger sizes in the sample. The Capital Adequacy (cad) is also varying between 0.1% to 15.3% suggesting some banks are well capitalized whereas some are not. The mean Asset Quality (aq) is 55.6% suggesting moderate asset quality across the sample. On average, banks maintain a liquidity ratio of 5.9%, with some banks having very low liquidity (1.3%) and others much higher (16.1%). On average, deposits constitute a significant portion (82.1%) of banks' funding. The

wide range suggests varying funding strategies across banks. The Leverage ratio is quite high for the banks on average. Fbassets represent log of total foreign banks assets, the relatively narrow range suggests less variation in foreign bank presence compared to other variables. The average GDP growth is positive, but the wide range suggest periods of economic contraction and strong growth.

Matrix of correlations

Variables	roa	lnas	cad	aq	liq	dep	lev	fbassets	gdp
(1) roa	1.000								
(2) lnas	0.196	1.000							
(3) cad	-0.068	-0.243	1.000						
(4) aq	0.005	0.131	-0.296	1.000					
(5) liq	-0.005	0.008	-0.077	0.054	1.000				
(6) dep	-0.179	-0.103	-0.023	0.028	0.252	1.000			
(7) lev	-0.256	-0.132	0.061	-0.116	0.127	0.740	1.000		
(8) fbassets	-0.026	0.363	-0.245	0.705	0.186	-0.042	-0.290	1.000	
(9) gdp	-0.151	-0.087	0.052	-0.164	-0.083	0.014	0.065	-0.269	1.000

Source: Computed by Author with Stata

ROA and foreign bank assets (fbassets) have a very weak negative correlation (-0.026), indicating little direct relationship between foreign bank presence and domestic bank profitability in this period. The correlation between fbassets and asset quality (aq) is strong and positive (0.705), indicating that higher foreign bank presence is associated with better asset quality in the banking sector, which is a beneficial factor for domestic banks as foreign banks help them improve asset quality. The negative correlation between foreign bank assets and capital adequacy ratio might indicate that domestic banks face increased competition in markets with higher foreign bank presence, potentially leading to lower capital buffers. The positive correlation between foreign bank assets and bank size suggests that foreign banks tend to enter markets with larger domestic banks, possibly indicating a preference for more developed banking sectors like it is in more metropolitan areas. Leverage (lev) and deposits (dep) have a strong positive correlation (0.740), as expected since deposits are a major source of bank funding.

Regression Results

To check the presence of multicollinearity, vif of the model is checked which was less than 5 which is considered as a good sign. Further to choose the appropriate regression model for the analysis, Hausman test was conducted on each model, in which for almost all models a random effects test was suggested, therefore random effects model is used to analyze the data.

The hausman test for model of 2003-2012 is as follows:

Hausman (1978) specification test	
	Coef.
Chi-square test value	6.067
P-value	.64

Source: Computed by Author with Stata

The p-value is more than 0.05 therefore we reject the null hypothesis, suggesting Random Effects Model.

Random effects regression with Clustered Standard Errors :

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	0	2.38	.017	0	.002	**
cad	-.014	.005	-2.76	.006	-.023	-.004	***
aq	.005	.004	1.26	.209	-.003	.012	
liq	.016	.008	1.94	.053	0	.032	*
dep	-.003	.004	-0.78	.437	-.011	.005	
lev	-.053	.02	-2.71	.007	-.092	-.015	***
fbassets	-.003	.001	-4.37	0	-.004	-.002	***
gdp	-.001	0	-11.30	0	-.001	-.001	***
Constant	.082	.019	4.42	0	.046	.118	***

Mean dependent var	0.006	SD dependent var	0.005
Overall r-squared	0.157	Number of obs	800
Chi-square	782.258	Prob > chi2	0.000
R-squared within	0.091	R-squared between	0.318

**** p<.01, ** p<.05, * p<.1*

Source: Computed by Author with Stata

The overall R-squared is 0.157, indicating that the model explains about 15.7% of the variation in Return on Assets (ROA). The Foreign Banks assets variable is significant in this model and the coefficient is very small and negative (-0.003) indicating that if foreign bank presence increases by 1 unit the Return on Assets will decrease by 0.003 units. Other significant variables in the model are Bank size, the positive relationship between bank size and profitability supports the idea that larger banks tend to be more profitable, possibly due to economies of scale. Capital Adequacy and leverage are also significant with negative coefficients. An increase in leverage might also increase the risk therefore it might affect the profitability of banks. There is a negative coefficient for GDP which might need further investigation. Liquidity is not significant at 5% but it is at 10% level, with a positive coefficient suggesting increase in liquidity is good for banks profitability.

5.2 2013-2019, NPA crisis period

Public Sector Banks

As mentioned before during the NPA crisis period, the Public and Private Sector Banks were tested separately as the Public sector was affected by the NPA crisis the most and it will be insightful to see if the two banks have different impact of foreign presence during this time.

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	280	-.001	.006	-.036	.01
lnas	280	12.935	.722	11.67	15.027
cad	280	.005	.007	0	.052
aq	280	.614	.037	.459	.693
liq	280	.048	.019	.019	.225
dep	280	.864	.021	.8	.91
lev	280	.934	.011	.909	.967
fbassets	280	13.595	.154	13.331	13.875
gdp	280	1.629	.552	.2	2.9

Source: Computed by Author with Stata

Pubic Banks during 2012-2019, showed significantly lower profit with a negative ROA, which suggests that public banks were struggling during this period, likely due to the NPA crisis. The bank size (lnas- log of assets) is 12.93 which is large, which suggests that Public banks have a more dominant presence all over. The capital Adequacy ratio decreased suggesting that the capital in relation to its assets is low. The asset quality ranges between 45.9% to 69.3%, it might be possible that the asset quality decreased during the late 2010s when NPAs were at their peak. The Public Banks have slightly lower liquidity 4.8% during this time period. The deposit rate is 86.4%, which is higher than private banks (78.7%), one of the possible reasons for this can be that many people in rural areas still prefer public banks over other banks and public banks are used by all government employees and government-related work. The leverage ratio is high, and lastly the GDP growth low from 2012-2019.

Matrix of correlations

Variables	roa	lnas	cad	aq	liq	dep	lev	fbassets	gdp
(1) roa	1.000								
(2) lnas	0.148	1.000							
(3) cad	-0.483	-0.423	1.000						
(4) aq	0.312	-0.187	-0.229	1.000					
(5) liq	-0.253	-0.110	0.132	-0.437	1.000				
(6) dep	-0.179	-0.104	0.194	-0.274	0.274	1.000			
(7) lev	-0.435	-0.341	0.354	-0.010	0.328	0.283	1.000		
(8) fbassets	-0.417	0.188	0.305	-0.271	0.113	0.104	0.062	1.000	
(9) gdp	0.028	-0.087	-0.261	0.222	-0.042	-0.020	0.024	-0.415	1.000

Source: Computed by Author with Stata

There is a moderate negative correlation between ROA and foreign bank assets suggests that during the 2013-2019 period, which includes the NPA crisis, higher foreign bank presence was associated with lower profitability for public banks, which supports hypothesis H2 but its not

strong enough to conclude, further tests are conducted to confirm the hypotheses. The positive correlation between foreign bank assets and capital adequacy ratio suggests that markets with higher foreign bank presence tend to have public banks with higher capital adequacy ratios. This can be considered as a competitive response of public sector banks. The strong negative correlation between ROA and capital adequacy ratio could indicate that public banks maintaining higher capital buffers during this period experienced lower profitability, possibly due to the opportunity cost of holding more capital. The negative correlation between foreign bank assets and GDP growth as seen before might reflect the countercyclical role of foreign banks during the crisis, potentially increasing their presence during periods of lower economic growth. Lastly, the positive correlation between ROA and asset quality suggests that public banks that maintained better asset quality during this challenging period were able to achieve higher profitability.

The Hausman test again rejects the null Hypothesis suggesting the Random effects model

Hausman (1978) specification test

	Coef.
Chi-square test value	7.715
P-value	.462

Source: Computed by Author with Stata

Random effects regression with Clustered Standard Errors :

Regression results

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	0	.001	0.23	.817	-.001	.001	
cad	-.212	.116	-1.83	.068	-.44	.016	*
aq	.026	.014	1.79	.073	-.002	.054	*
liq	-.007	.014	-0.51	.607	-.034	.02	
dep	.007	.01	0.64	.522	-.014	.027	
lev	-.205	.096	-2.13	.033	-.393	-.017	**
fbassets	-.014	.004	-4.01	0	-.021	-.007	***
gdp	-.002	0	-5.07	0	-.003	-.001	***
Constant	.365	.093	3.94	0	.183	.547	***

Mean dependent var	-0.001	SD dependent var	0.006
Overall r-squared	0.469	Number of obs	280
Chi-square	381.643	Prob > chi2	0.000
R-squared within	0.378	R-squared between	0.772

**** p<.01, ** p<.05, * p<.1*

Source: Computed by Author with Stata

The Foreign Banks assets is significant for public banks and the coefficient is of negative 0.014. This is in line with hypothesis H2, that foreign bank presence negatively affected public banks profitability during NPA crisis period. Other significant variables are leverage and GDP, both

with negative coefficients. This again indicates that higher leverage is not good for the profitability of banks. Capital Adequacy and Asset Quality are both significant at 10% level. Capital adequacy has a negative coefficient suggesting high capital adequacy is not preferred for profitability. The coefficient of Asset Quality ratio is positive indicating higher asset quality better for ROA. The overall r-squared for the model is 46.9% which means the model explains 46.9% of variation in the model.

2013-2019 Private Sector Banks

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	279	.007	.006	-.017	.018
lnas	279	11.493	1.512	9.305	14.13
cad	279	.005	.006	0	.023
aq	279	.62	.051	.477	.733
liq	279	.042	.007	.025	.101
dep	279	.787	.079	.602	.924
lev	279	.899	.029	.746	.96
fbassets	279	13.594	.153	13.331	13.875
gdp	279	1.634	.546	.2	2.9

Source: Computed by Author with Stata

Private Banks show significantly better profitability than Public Banks during this period. Private banks had a positive ROA, indicating better performance during this period. The bank size of Private Banks is 11.49, therefore when compared to Public Banks it can be said Public Banks are larger than Private Banks. The Capital Adequacy is almost the same for Public and Private Banks, but the range is narrower for Private Banks. The mean Asset Quality of Private Banks (62%) is slightly better than Public Banks, this may be because most NPAs were observed in Public Sector Banks. The liquidity of Private sector Banks is 4.2%, which is lower as compared to Public sector Banks. As mentioned before the deposits of Public Banks (86.4%) is higher than the private sector banks (74.6%). The leverage ratio is slightly lower for Private sector Banks (89.9%). The impact of foreign bank presence and GDP was similar for both banks during this period.

These findings align with hypothesis H2 & H3 mentioned in the literature suggesting that Public Banks were affected more by during the NPA crisis as compared to Private Banks.

Matrix of correlations

Variables	roa	lnas	cad	aq	liq	dep	lev	fbassets	gdp
(1) roa	1.000								
(2) lnas	0.488	1.000							
(3) cad	-0.348	-0.677	1.000						
(4) aq	0.323	0.141	-0.249	1.000					
(5) liq	-0.134	-0.035	0.027	-0.304	1.000				
(6) dep	-0.515	-0.718	0.337	-0.104	0.336	1.000			
(7) lev	-0.597	-0.702	0.413	-0.257	0.345	0.802	1.000		
(8) fbassets	-0.074	0.172	-0.022	0.361	0.029	0.075	-0.071	1.000	
(9) gdp	-0.082	-0.070	0.008	-0.158	-0.048	-0.012	0.028	-0.408	1.000

Source: Computed by Author with Stata

In case of Private Banks there is a weak negative correlation between ROA and Foreign Bank assets, the overall presence of foreign banks had low impact on profitability of Private banks. There is a positive correlation between foreign bank assets and asset quality suggesting that a higher foreign bank presence is associated with better asset quality among private banks. This could indirectly support H3, as it indicates that private banks maintained better asset quality during the NPA crisis, potentially allowing them to compete effectively with foreign banks. Again as before there is a negative relationship between GDP and Foreign Banks. Leverage (lev) and deposits (dep) have a very strong positive correlation (0.802), as expected since deposits are a major source of bank funding.

Random effects regression with Clustered Standard Errors :

Regression results

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	.001	1.29	.199	0	.002	
cad	.087	.13	0.67	.503	-.167	.341	
aq	.021	.008	2.53	.011	.005	.037	**
liq	.105	.04	2.63	.009	.027	.184	***
dep	-.002	.014	-0.17	.867	-.03	.025	
lev	-.086	.036	-2.35	.019	-.157	-.014	**
fbassets	-.01	.002	-5.14	0	-.014	-.006	***
gdp	-.001	0	-4.33	0	-.002	-.001	***
Constant	.199	.037	5.40	0	.127	.271	***

Mean dependent var	0.007	SD dependent var	0.006
Overall r-squared	0.456	Number of obs	279
Chi-square	579.760	Prob > chi2	0.000
R-squared within	0.054	R-squared between	0.853

**** p<.01, ** p<.05, * p<.1*

Source: Computed by Author with Stata

The overall r-squared is 45.6% which is similar to that of public banks, and it shows that 45.6% of the variation in the model is explained by the variables. The coefficient of foreign bank presence is significant and negative. A 1% increase in the log-normal of foreign banks will decrease the ROA by 0.01%. This means foreign bank presence has a slight negative impact on profitability of private sector banks. Other significant variables that have an impact on profitability are Asset Quality, liquidity which have a positive impact on ROA. Better asset quality and liquidity are beneficial for profitability, whereas, leverage and GDP have a negative impact on profitability, same as public sector banks.

5.3 2020-2023, COVID-19 crisis period

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
roa	300	.005	.005	-.034	.022
lnas	300	12.863	1.493	9.422	15.491
cad	300	.009	.015	0	.07
aq	300	.61	.056	.466	.722
liq	300	.048	.018	.012	.142
dep	300	.822	.058	.639	.917
lev	300	.485	.404	.014	.939
fbassets	300	14.124	.113	13.97	14.299
gdp	300	1.459	8.927	-22.55	22.6

Source: Computed by Author with Stata

During the COVID-19 crisis, the average ROA was positive, indicating that banks were generally profitable during this period. However, the wide range suggests variability in performance, likely due to the impacts of the COVID-19 pandemic. The range of Bank size (lnas-log of assets) is quite large which suggests there are some big banks and some small banks in the sample. Capital Adequacy (cad) also has a wide range suggesting varying levels of capitalization across banks. The asset quality remained moderate (61%). The mean liquidity was 4.8% with a range of 1.2% - 14.2%. The deposit rate was again high around 82.2%. The mean leverage was lower as compared to all other periods at 48.5%. The foreign bank presence increased as compared to other periods. There was an extreme range in GDP from -22.55% - 22.6%, this range reflects the economic fluctuations during COVID.

These findings partially support hypotheses H4, suggesting that the presence of foreign banks during COVID-19 had a limited impact on domestic banks' (public and private sector banks') profitability. The data shows that banks maintained positive average profitability despite the economic volatility, with improved capitalization and a growing foreign bank presence.

Matrix of correlations

Variables	roa	lnas	cad	aq	liq	dep	lev	fbassets	gdp
(1) roa	1.000								
(2) lnas	0.016	1.000							
(3) cad	-0.310	-0.272	1.000						
(4) aq	0.411	-0.187	-0.520	1.000					
(5) liq	0.042	0.064	0.132	-0.147	1.000				
(6) dep	-0.513	-0.071	0.357	-0.338	0.055	1.000			
(7) lev	0.486	-0.488	-0.270	0.483	-0.041	-0.675	1.000		
(8) fbassets	0.192	0.071	-0.023	0.322	0.238	-0.024	-0.008	1.000	
(9) gdp	0.108	0.005	0.002	0.007	-0.002	0.009	-0.003	-0.029	1.000

Source: Computed by Author with Stata

During COVID-19 pandemic the correlation between ROA and Foreign Bank Assets was 0.192, suggesting a slight positive correlation. The moderate positive correlation between foreign bank assets and asset quality (0.322) indicates that a higher foreign bank presence is associated with better asset quality. This could suggest that foreign banks played a stabilizing role in maintaining asset quality during the pandemic. The correlation between GDP and foreign banks remained negative. The strong negative correlation between ROA and deposits (-0.513) might reflect the challenges faced by banks heavily reliant on deposits during the pandemic, possibly due to increased savings rates or reduced economic activity.

Hausman (1978) specification test

	Coef.
Chi-square test value	13.307
P-value	.065

Source: Computed by Author with Stata

Random effects regression with Clustered Standard Errors :

Regression results

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	0	2.63	.008	0	.002	***
cad	.012	.019	0.60	.549	-.027	.05	
aq	.019	.004	4.42	0	.011	.028	***
liq	.02	.023	0.90	.368	-.024	.065	
dep	-.004	.008	-0.49	.623	-.02	.012	
lev	.007	.001	4.56	0	.004	.009	***
fbassets	.004	.002	2.50	.012	.001	.008	**
gdp	0	0	6.55	0	0	0	***
Constant	-.082	.023	-3.61	0	-.127	-.037	***

Mean dependent var	0.005	SD dependent var	0.005
Overall r-squared	0.385	Number of obs	300
Chi-square	134.356	Prob > chi2	0.000
R-squared within	0.105	R-squared between	0.722

**** p<.01, ** p<.05, * p<.1*

Source: Computed by Author with Stata

Lastly, the period of COVID-19 shock, the overall r-squared for this period is 38.5%. The coefficient of Foreign Assets for this period is significant and positive. The only period where the coefficient of foreign banks is positive is during the COVID-19 crisis. The coefficient is still slightly small at 0.004 which means if foreign banks' presence increase by 1 unit the profitability (ROA) will increase by 0.004 units. The overall coefficients for this period are positive except the deposit ratio which can be due to a decrease in deposits during the pandemic as many people did lose their daily income and they tried to save as much as possible. The

significant variables are Bank size, as the bank size increases the profitability will also increase. The Capital adequacy and leverage were positive only in this period and were negative for all other periods.

6. Findings & Discussion

6.1 Discussions

The results suggest different effects of Foreign Bank presence on domestic banks (Public & private sector banks) across different periods from 2003 to 2023, each characterized by unique economic conditions.
Starting with the period of 2003-2012, this time didn't experience any big shocks or changes. The Global Financial crisis took place during this time but as mentioned before it didn't have any major impact on India during that time. The regression analysis suggests that Foreign Banks' presence was significant and had a slight negative impact on the profitability of domestic banks.
These results are different from those of Sathye, M. (2002) as in his study on the market concentration of Foreign Banks in India, the results suggested that the foreign banks didn't have an impact on market concentration. The results are also different from the studies of Clarke et al. (2001) and Clarke et al. (2001), which found positive effects in other emerging economies like Latin America and Eastern Europe.

In the next period of the NPA crisis, it is observed that again the impact of foreign banks is negative and significant which aligns with hypothesis H2. The Public sector banks were negatively affected by the mounting NPAs and were not operating well in this case the competition from Foreign Banks further impacted the profitability of Public sector banks negatively. Contrary to expectations, private sector banks also experienced negative effects on their ROA during this period, despite being less affected by the NPA crisis than the public banks.

Interestingly, the COVID-19 period marked a shift in this trend. The regression results indicate a positive impact of Foreign Bank presence on domestic bank profitability during this time. This finding are similar to the study by Detragiache and Gupta (2004) on foreign banks in Malaysia, highlighting their potential to support economic stability during crises.

As India continues to modernize its banking sector, encouraging greater foreign bank participation could prove advantageous. Foreign banks can introduce advanced technologies and practices, potentially enhancing the competitiveness and efficiency of domestic banks. This could be especially beneficial for public and private sector banks as they navigate the post-COVID landscape of accelerated digital transformation.

Therefore, while the impact of foreign banks on domestic bank profitability has varied over time, the recent positive trend observed during the COVID-19 period suggests that increased foreign bank presence could contribute to the overall development and resilience of India's banking sector. However, careful regulation and monitoring will be crucial to ensure that this presence remains beneficial to the Indian economy as a whole.

6.2 Limitations

It's crucial to acknowledge the limitations of this study. The research focused on a select group of 20 banks, evenly split between the public and private sectors. This sample size may not fully represent the entire banking landscape in India, and results could potentially differ if all banks were included in the analysis.
The Non-Performing Assets (NPA) crisis in India created significant challenges in financial reporting across all entities. This disruption in reporting consistency may have affected the reliability of data around 2013, potentially impacting the accuracy of our findings for that period. It's worth noting that the NPA issue continues to persist in the Indian banking sector and has not yet returned to pre-crisis levels.
Regarding the COVID-19 crisis, our study covers a relatively short timeframe of three years. A more extended period of analysis would likely yield more robust and dependable results, providing a clearer picture of the pandemic's long-term impact on the banking sector.
These limitations present opportunities for future research. Subsequent studies could expand the scope to include a broader range of banks, develop methods to address reporting inconsistencies

7. Conclusion

This study examines the impact of foreign bank presence on the profitability of Indian domestic banks, focusing on both public and private sector banks during three distinct periods: pre-NPA crisis (2003-2013), NPA crisis (2013-2020), and the COVID-19 pandemic (2020-2023). The research aimed to understand how foreign bank presence influenced domestic bank performance during these different economic conditions.

The findings suggest that the Foreign Bank presence has an impact on domestic bank profitability but the impact is quite modest suggesting that the foreign banks may create some competitive pressure on domestic banks, the effect is not substantial. The resilience of Indian domestic banks in the face of foreign competition is evident, as they have largely managed to maintain their profitability despite foreign bank presence for so many years.

The study also highlights the varying impacts of foreign bank presence during different economic periods: During the pre-crisis period of 2003-2012 and the NPA crisis period of 2013-2019, the impact of foreign banks was negative and very less. In the COVID-19 period the impact was still very low but positive.

These findings contribute to the broader discussion on financial liberalization in developing economies. While Foreign Banks bring advanced technologies and potentially enhance market competition, their impact on domestic bank profitability appears to be slightly negative in the Indian context for the first two periods (2003-2019) and then positive for 2020-2023.

However, it's important to note that this study focused primarily on profitability and did not examine other potential benefits of foreign bank presence, such as improved banking practices, technological spillovers, or enhanced financial stability. Future research could explore these aspects to provide a more comprehensive understanding of foreign banks' role in India's banking sector.

In conclusion, while foreign bank presence in India has a slight negative association with domestic bank profitability, the impact is modest. As India continues to integrate with the global financial system, policymakers can take into considerations these findings when formulating regulations to ensure a balanced and competitive banking sector that benefits from foreign participation while protecting the interests of domestic institutions.

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Appendix

Appendix A : List of Banks

Public Sector Banks

BANK OF BARODA
BANK OF INDIA
BANK OF MAHARASHTRA
CANARA BANK
CENTRAL BANK OF INDIA
INDIAN BANK
INDIAN OVERSEAS BANK
PUNJAB NATIONAL BANK
STATE BANK OF INDIA
UNION BANK OF INDIA

List of PrivateSector Banks

AXIS BANK LIMITED
CITY UNION BANK LIMITED
CSB BANK LIMITED
DCB BANK LIMITED
DHANLAXMI BANK LIMITED
FEDERAL BANK LTD
HDFC BANK LTD.
ICICI BANK LIMITED
INDUSIND BANK LTD
KOTAK MAHINDRA BANK LTD.

Appendix B

Results & VIF

2003-2012

Regression results Random effects

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	0	2.94	.003	0	.002	***
cad	-.014	.011	-1.23	.221	-.035	.008	
aq	.005	.003	1.42	.156	-.002	.012	

liq	.016	.009	1.72	.086	-.002	.034	*
dep	-.003	.004	-0.85	.394	-.01	.004	
lev	-.053	.01	-5.36	0	-.073	-.034	***
fbassets	-.003	.001	-5.09	0	-.004	-.002	***
gdp	-.001	0	-5.99	0	-.001	0	***
Constant	.082	.011	7.38	0	.06	.104	***

Mean dependent var	0.006	SD dependent var	0.005
Overall r-squared	0.157	Number of obs	800
Chi-square	84.360	Prob > chi2	0.000
R-squared within	0.091	R-squared between	0.318

**** p<.01, ** p<.05, * p<.1*

vif

Variable	VIF	1/VIF
fbassets	2.96	0.338268
lev	2.66	0.375693
dep	2.51	0.398834
aq	2.27	0.439973
lnas	1.28	0.780787
cad	1.16	0.860134
liq	1.15	0.871374
gdp	1.08	0.924248
Mean VIF	1.88	

Public 2012-2019

Variable	VIF	1/VIF
cad	1.80	0.556668
lnas	1.64	0.608025
aq	1.64	0.611237
liq	1.49	0.671166
fbassets	1.43	0.697967
lev	1.43	0.699576
gdp	1.28	0.784223
dep	1.20	0.834737
Mean VIF	1.49	

Regression results RE

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	0	.001	0.15	.883	-.001	.002	
cad	-.212	.054	-3.91	0	-.319	-.106	***

aq	.026	.01	2.69	.007	.007	.044	***
liq	-.007	.017	-0.41	.685	-.041	.027	
dep	.007	.015	0.46	.645	-.022	.035	
lev	-.205	.037	-5.61	0	-.277	-.133	***
fbassets	-.014	.002	-6.61	0	-.018	-.01	***
gdp	-.002	.001	-4.48	0	-.003	-.001	***
Constant	.365	.043	8.56	0	.282	.449	***

Mean dependent var	-0.001	SD dependent var	0.006
Overall r-squared	0.469	Number of obs	280
Chi-square	185.147	Prob > chi2	0.000
R-squared within	0.378	R-squared between	0.772

**** p<.01, ** p<.05, * p<.1*

Private 2013-2019

Variable	VIF	1/VIF
lnas	5.42	0.184350
dep	4.47	0.223903
lev	3.46	0.288805
cad	2.43	0.411159
fbassets	1.68	0.593609
aq	1.48	0.675247
liq	1.48	0.677889
gdp	1.21	0.828791
Mean VIF	2.70	

Regression results RE

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	.001	1.64	.102	0	.002	
cad	.087	.099	0.88	.379	-.106	.28	
aq	.021	.008	2.54	.011	.005	.037	**
liq	.105	.047	2.23	.025	.013	.198	**
dep	-.002	.008	-0.28	.777	-.019	.014	
lev	-.086	.02	-4.35	0	-.125	-.047	***
fbassets	-.01	.002	-4.24	0	-.015	-.006	***
gdp	-.001	.001	-2.72	.007	-.002	0	***
Constant	.199	.033	6.09	0	.135	.263	***

Mean dependent var	0.007	SD dependent var	0.006
Overall r-squared	0.456	Number of obs	279
Chi-square	89.490	Prob > chi2	0.000
R-squared within	0.054	R-squared between	0.853

**** p<.01, ** p<.05, * p<.1*

2020-2023, COVID crisis

vif

```
    Variable |       VIF       1/VIF
-------------+----------------------
         lev |      4.70    0.212976
         dep |      3.05    0.327710
        lnas |      2.81    0.355322
          aq |      2.22    0.451225
         cad |      1.98    0.504217
    fbassets |      1.36    0.735766
         liq |      1.15    0.866560
         gdp |      1.00    0.997855
-------------+----------------------
    Mean VIF |      2.28
```

Regression results RE

roa	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
lnas	.001	0	2.55	.011	0	.002	**
cad	.012	.036	0.32	.747	-.059	.083	
aq	.019	.008	2.39	.017	.003	.035	**
liq	.02	.016	1.31	.19	-.01	.051	
dep	-.004	.01	-0.42	.674	-.023	.015	
lev	.007	.002	3.41	.001	.003	.01	***
fbassets	.004	.002	1.75	.08	-.001	.009	*
gdp	0	0	2.59	.01	0	0	***
Constant	-.082	.034	-2.42	.015	-.149	-.016	**

Mean dependent var	0.005	SD dependent var	0.005
Overall r-squared	0.385	Number of obs	300
Chi-square	83.020	Prob > chi2	0.000
R-squared within	0.105	R-squared between	0.722

**** p<.01, ** p<.05, * p<.1*