



Impact of Merger on Efficiency, Stability, and Competitiveness of Public Sector Banks

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Abstract

This study examined whether the bank's merger enhances competitiveness, stability, and an efficient banking system. Further, this paper examined the relationship between High-Powered Money and the six mentioned explanatory variables with the help of the Panel Data Model. We used the Reserve Bank of India dataset from 2009 to 2021 to explore the relationship. We observed that High-Powered Money has increased, and the closing balance of non-performing assets has decreased after the merger of the Indian banks. In addition, we have seen that high powered money has a positive and significant relationship with the capital-to-risk-weighted assets ratio and is negatively related to the Credit-Deposit Ratio and the Investment-Deposit Ratio. In addition, we observed that return on investments is positively associated with high powered money. These estimates show that Indian public sector banks have become competitive, financially stable, and efficient after the merger of banks. At the same time, we did not see a significant relationship between the return on investments and the Total Assets to Total Income Ratio.

Keywords: NPA, competition, high-powered money, Indian banking sector, panel data

1. Introduction

The merger of Indian banks was a path-breaking decision as the Indian banking sector is one of the world's most robust and efficient banking structures. The Indian banking sector is a lifeline for the Indians, the Indian economy, and the global economy. The banking sector is a ray of

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hope for millions of people to improve their lifestyles. Recently, PM Jan Dhan Account Scheme and Digital India have been playing a vital role in digital transactions¹. According to the PIB article (30th Oct 2023), India has the world's highest number of real-time digital transactions, which is 46 percent of total transactions in 2022. Today, the Indian banking sector is one of the most efficient and competes with the world banking sector. The present study is based on the merger of Indian banks and their efficiency, stability, and competitiveness in the domestic markets. To do so, we analyzed individual banks' competitiveness and efficiency. The happening entities operating in the banking sector across the globe are moving towards consolidation. However, in India after independence, the first time we have seen merger of banks in the 1970s. Bank mergers are happening in India according to the needs of the Indian banking sector, which prevents banking failure and complications in the regulation of banks. Further, to make a robust Indian banking system, the Reserve Bank of India, which is the banking regulator in India, has been making decisions regularly to enhance efficiency and competitiveness with the global banking sector.

Several debates in the banking sector on the stability of banks have led to competition among banks. As per the existing studies, two types of competition exist: the first is named "competition -fragility", and the second is "competition – stability". Market power, profit margin, and the result of franchise value are used under the traditional view of "competition -fragility" to see the competition. However, the book value is not the sole parameter for knowing the market value of banks. As Keeley 1990, Demsetz *et al.*, 1996 and Carletti and Hartmann 2003 say, higher risk leads to more return. Besides, the franchise value decreases if removing the interest rate ceiling on deposits (Hellmann *et al.*, 2000) further leads to moral hazard behaviour. At the same time, recent studies by Jimenez *et al.*, 2007 suggest that a higher-risk portfolio of loans helps enhance the competition. To measure the portfolio, Jimenez *et al.*, 2007 use the non-performing asset value across the years.

The second view is "competition – stability", which is based on the market power, interest rate, repayment of loans, and some derived indicators such as the Herfindahl-Hirschman index (HHI) and Lerner index. Boyd *et al.* (2005) suggested that a higher interest rate charged

to consumers leads to a decrease in the repayments of loans, a guide to eroding the market power and the loan market, which may affect the efficiency and balance sheet of the banks. It may result in riskier loan borrowers, as borrowers need to show interest in taking the loans, which erodes the bank's profit and decreases the investment in the economy. Reduced investment may lead to a decrease in employment and individual income. To minimize the losses, the banking institute seeks help from the government regarding a safety net. Further, recent studies suggest that the banking market is shrinking as banks take inverse measures of bank risk. De Nicolo *et al.*, (2007) and Boyd *et al.*, (2006).

Even the portfolio of loans is riskier if banks have high market power. Banks have a considerable franchise value because of their market strength, and they can use different strategies to safeguard that value from increased loan risk. They can balance the elevated risk exposure with more equity capital, lower interest rate risk, loan or credit derivative sales, a smaller loan portfolio, or other risk-mitigating measures. As a result, even if a bank charges higher rates for business loans and has a riskier loan portfolio, it may pick a lower total risk. In this paper, we used power money as the response variable and the Capital Risk-weighted asset ratio, NPA Closing Balance, Credit-Deposit Ratio, return on Advance, Return on Investments, and Total Assets to Total Income Ratio as explanatory variables. We have used high-powered money as a response because it has high liquidity in the money market. We use the data on the non-performing closing balance and the Monetary base value of individual banks to see banks' efficiency. The high-powered money will evaluate the market power, and at the same time, the non-performing closing balance will help assess the efficiency of the banks. Besides, we use the Capital to Risk-weighted assets ratio, Credit - Deposit Ratio, Investment - Deposit Ratio, and Return on Investments. Where the Capital Risk-weighted assets ratio will examine the stability of individual banks, the Credit - Deposit Ratio shows the bank lending amount out of the banks' deposits. Besides, the Investment - Deposit Ratio shows the investment made by the bank on the government scheme, and the return on investment will examine the profit on the investment. In this model, the high-powered money value will be the response variable, and the other six indicators are the explanatory variables.

Many pieces of the literature suggest that a bank's franchise value rises as it gains market share. Because franchise value is intangible Capital that can only be collected if the bank is in business, such banks incur substantial opportunity costs if they fail, making them less willing to participate in risky activities. They are more likely to operate responsibly by having more outstanding after-equity Capital, fewer riskier portfolios, and a smaller loan portfolio. Alternatively, when banks expand their presence in the market, their risk exposure may grow. According to the "competition-stability" strand of the research, financial instability increases when the degree of competitiveness decreases. Banks with market power will be able to charge higher interest rates on business loans, resulting in higher rents. These studies are empirical in nature and performed a quantitative analysis based on secondary data. The Indian commercial banking sector consists of 12 public sector banks. These public sector banks contribute to India's economic growth and the welfare of the people. To give a boost to banks, the government introduced the Insolvency and Bankruptcy Code 2016 and the recapitalization of public sector banks.

2. Literature Review

Disrupting the interbank lending market and payments system, reducing credit availability, and freezing deposits, the banking industry operates as a primary route for instability to convey to other economic sectors. The fear that increased competition may exacerbate financial system fragility has prompted regulators to focus on enacting policies that safeguard banking industry stability.

Existing studies on the "competition -fragility": The interest rate is associated with the bank's stability. (Keeley,1990) shows that bank failure happened in the US during 1980 because of increased competition, eroding the monopoly interest rate. Further, Hellmann *et al.*, (2000) state the prudent behaviour of banks in the competitive environment of deposits. They also list the crises that happened due to this, such as the loan crisis in the US and Japan's banking crisis that increased social costs. Alternatively, as franchise value increased, their market structure improved, leading to a gain of market power. The competition - stability infers that if banks have a low degree of competitiveness, it will erode their market power (Boyd *et al.*, 2005; Boyd *et al.*, 2006, Schenck *et al.*, 2006). They stated that financial stability could be distorted because of destabilized market

power. Financial disability is because of the asset's allocation decision with their optimal contraction problem and the decision for the portfolio. We focused on the banking regulator issue. As we have seen in April 2017, six associates of India's state bank merged into the State Bank of India. After that, in 2020, Canara Bank and Syndicate Bank merged into Canara Bank. Indian Bank and Allahabad Bank merged into Indian Bank. In addition, the Oriental Bank of Commerce, United Bank of India, and Punjab National Bank merged into Punjab National Bank. Union Bank of India, Andhra Bank, and Corporation Bank merged into Union Bank of India.

The existing literature shows that the lending and risk-taking characteristics of the banks have measured concerns with the monetary policy. Individual banks may incur capitalization liquidity and capitalization problems. Further, the literature on the transmission mechanism assigns a unique role to banks. Banking inefficiency and imperfect substitutability between loans and securities in bank portfolios and a means of borrowing for firms. The effectiveness of monetary policy and other banking regulations helps banks' lending channels. Besides, it also improves the efficiency of the banking or financial systems (Bernanke *et al.*, (1999). In addition, Bernanke *et al.*, (1999) described the relationship between loans and the security market. More recent research papers have examined the influence of monetary policy changes on bank credit risk. The concept of this channel is that when interest rates fall, banks' risk-taking incentives rise due to the reduced yield on loan activities, the shrinkage of agency costs, and banks' default probabilities assessments (Borio & Zhu, 2012). Indeed, actual research by Jimenez *et al.*, (2008), Ioannidou, Ongena, and Peydro (2008), and Delis, Hasan, and Mylonidis (2011) supports the risk-taking channel's theoretical claim. In this context, Mishra, P. (2018) research on merger and acquisition findings suggest that mergers may or may not be a cause for the monopoly. Further, he said that mergers and acquisitions enhance the impact towards the betterment of the organization.

We proposed a different way to examine the banking system's market power and efficiency. We discussed the first merger effect on the economic base value that will help determine the individual banks' market value with the help of the High-Powered Money value and Total Assets to

Total Income ratio of the Individual bank. Second, the non-performing closing balance statistics after the bank's merger and before the bank's mergers. Third, the panel data regression using the econometric model to examine the relationship between the high-powered money to the Capital Risk-weighted assets ratio, NPA Closing Balance, Credit - Deposit Ratio, Investment - Deposit Ratio, return on investments, Total Assets of Banks to Total Income ratio before and after the Mergers of Banks. The explanatory variable Capital to the Risk-weighted assets ratio is used by the RBI to see the financial stability, the NPA Closing Balance to analyze the bank's efficiency, the Credit - Deposit Ratio to see how much banks lend out of their deposit, the Investment - Deposit Ratio is to determine the how much money bank invested out of total deposits, return on investments will tell the banks profit. In addition, the Total Assets to Total Income ratio of Banks will examine the stability and competitiveness.

3. Data and Methodology

This paper used the data of individual banks for 2009-2021 published by RBI. We are using the derived data with the help of economics theories. For instance, we used high-powered money as the response variable. We have classified the data based on recent publications of RBI for the banks and the banking system. We have used high-powered money, known as the sum of the Currency in circulation (Currency with the public and Cash with Banks), Banker's deposits with RBI, and other deposits with RBI. In short, high-powered money is the sum of Currency with the public and the Reserve. We have not included the Other Deposits with RBI because of the unavailability of data. The Other Deposits with RBI are generally small amounts. It merely affects the high-powered money at a significant level. We will use six explanatory variables to see the effect on the response variable (High Powered Money) or the other way around. We have taken six explanatory variables. NPA Closing Balance to see the efficiency, CRAR to see the Financial Stability, and Return on Investment to see the Individual Bank's Profit. Other explanatory variables such as Credit-Deposits Ratio, Investment-Deposit Ratio, and Total Asset to Total Income Ratio to see the bank's performance and competitiveness. We examined individual banks' competitiveness, stability, and efficiency. To do so, we estimated the relationship with the help of the Fixed Effect and Random Effect Models.

We estimated pooled regression, FEM, and REM. In order to opt for the relevant models, we did the following tests: the Breusch-Pagan Test (1980), the VIF Test, the Restricted F Test, and the Hausman Test (1978). Breusch-Pagen test estimate suggests the suitability of REM and the pooled regression. VIF test was used to check the multicollinearity in the model. Further, we did Hausman Test to check whether FEM is suitable or not for the given sample.

4. Classification of Variables

We classified the response variable and the explanatory variables according to Table 1.

Table 1. Abbreviation of response variable and explanatory variables

Response Variable	Explanatory Variable
	Capital to Risk-weighted assets ratio (CRAR)
	NPA Closing Balance (NPACB)
High Powered Money (HPM)	Credit-Deposit Ratio (CDR)
	Investment - Deposit Ratio (IDR)
	Return on investments (ROI)
	Total Assets to Total Income (TATI)

4.1 High Powered Money

High powered money consists of currency in circulation, Bank Deposits with RBI, and Other Deposits. Currency in circulation is linked to the Cash Reserve Ratio, Repo Rate, and Reverse Repo Rate. Further, it has high liquidity as compared to others. Thus, we have chosen it as the Response variable.

$$\begin{aligned} \text{High Powered Money} = & \text{Currency In Circulation (Currency with Public} \\ & + \text{Cash with the Banks)} + \text{Bankers Deposits with} \\ & \text{RBI} + \text{Other Deposits with RBI} \end{aligned}$$

4.2 NPA Closing Balance

The amount that is not back into the system after the given loan period becomes Non-Performing Assets. It is used to see how banks are functioning. We have taken the value of NPA at the end of the financial year.

4.3 Capital to Risk-weighted Assets Ratio

The ratio measures a bank's financial stability by measuring its available capital as a percentage of its risk-weighted credit exposure. It is used to measure the financial stability of individual banks. Further, its use is to protect depositors and enhance financial stability.

$$\text{CRAR} = \frac{\text{Tier1 Capital} + \text{Tier2 Capital}}{\text{Risk - Weighted Assets}}$$

4.4 Credit to Deposits Ratio

It is the ratio of how much a bank lends out of the deposits it has mobilized. RBI does not stipulate a minimum or maximum level for the ratio, but a very low ratio indicates banks are not making full use of their resources.

$$\text{CDR} = \frac{\text{Total Advance}}{\text{Total Assets}}$$

4.5 Return on Investments

Return on investment or return on costs is a ratio between net income and investment. A high ROI means the investment's gains compare favourably to its cost. As a performance measure, ROI is used to evaluate the efficiency of an investment or to compare the efficiencies of several different investments.

$$\text{ROI} = \frac{\text{Net Profit}}{\text{Cost of Investment}}$$

$$\text{ROI} = \frac{\text{Present Value} - \text{Cost of Investment}}{\text{Cost of Investment}}$$

4.6 Investment to Deposit Ratio

IDR is used to check the financial health of individual banks. It is the ratio of Total Investment to Total Deposit. It is the long-term or short-

term investment done by the bank on sources like loans and advances, banks, and the share market divided by the total deposits received from the various accounts.

$$\text{IDR} = \frac{\text{Total Investment}}{\text{Total Deposit}}$$

4.7 Total Assets to Total Income Ratio

Earning assets, current and deferred tax assets, goodwill, and other intangible assets, etc. come under the Total Assets. However, the bank earns money from various sources lone interest and other types of interest payments are known as the Total Income of the bank. In this study, we have derived the ratio of Total Assets to Total Income to see the market power, market value, and competitiveness of the individual banks.

$$\text{TATI} = \frac{\text{Total Assets}}{\text{Total Income}}$$

We derived the data based on the rules and regulations of Mergers prescribed by the Competition Commission of India. In addition, we followed the Reserve Bank of India and the Ministry of Finance guidelines on the structure of Indian Public Sector Banks. We have taken the values of the variable from the RBI database.

5. Data Definition and its Calculations

We have classified the data based on recent publications of RBI for the banks and the banking system. In the given dataset we have 156 observations which are classified into 12 groups from 2009 to 2021.

Banking Mergers have been done several times since the independence of India. Public Sector Banks have been merged based on the requirement for the banking system by the Reserve Bank of India.

Table 2. The merger of banks classification

After the Merger of Bank	Before the Merger of the Bank	Branch Code
Bank of Baroda	Bank of Baroda	01
Bank of India	Bank of India	02
Bank of Maharashtra	Bank of Maharashtra	03

Canara Bank	Canara Bank (A)	04
	Syndicate Bank (B)	
Central Bank of India	Central Bank of India	05
Indian Bank	Indian Bank (A)	06
	Allahabad Bank (B)	
Indian Overseas Bank	Indian Overseas Bank	07
Punjab And Sind Bank	Punjab And Sind Bank	08
Punjab National Bank	Punjab National Bank (A)	09
	Oriental Bank of Commerce (B)	
	United Bank of India (C)	
State Bank of India	State Bank of Bikaner and Jaipur (A)	10
	State Bank of Hyderabad (B)	
	State Bank of India (C)	
	State Bank of Mysore (D)	
	State Bank of Patiala (E)	
	State Bank of Travancore (F)	
UCO Bank	UCO Bank	11
Union Bank of India	Union Bank of India (A)	12
	Andhra Bank (B)	
	Corporation Bank (C)	

We have driven the data according to Table 2 of the Response Variable and Explanatory Variables. While calculating the data we followed the definition of the variables. Before the merger of the bank, we have taken the data from the period of 2009 to 2021 of the individual banks as per Table 2. Further, After the merger of the bank we followed Table 2 to merge the value as follows to calculate the value of CDR, IDR, and ROI as follows:

$$\text{CDR / IDR / ROI Canara bank} = \frac{\text{Bank of A} + \text{Bank of B}}{2}$$

$$\text{CDR / IDR / ROI Indian Bank} = \frac{\text{Bank of A} + \text{Bank of B}}{2}$$

$$\text{CDR / IDR / ROI Punjab National Bank} = \frac{\text{CDR of A} + \text{CDR of B} + \text{CDR of C}}{3}$$

$$\text{CDR / IDR / ROI State Bank of India} = \frac{\text{Bank of A} + \text{Bank of B} + \text{Bank of C} + \text{Bank of D} + \text{Bank of E} + \text{Bank of F}}{6}$$

$$\text{CDR / IDR / ROI Union Bank of India} = \frac{\text{Bank of A} + \text{Bank of B} + \text{Bank of C}}{3}$$

In addition, we have taken the Basel III total value of the CRAR average value of individual banks before and after the merger of banks. Further, we have taken the HPM, NPA Closing balance, Total Assets, and Total Income of individual banks and after the merger of the bank we have driven as follows:

$$\text{HPM/NPAC/TA/TI Canara Bank} = \text{Bank of A} + \text{Bank of B}$$

$$\text{HPM/NPAC/TA/TI Indian Bank} = \text{Bank of A} + \text{Bank of B}$$

$$\text{HPM/NPAC/TA/TI Punjab National Bank} = \text{Bank of A} + \text{Bank of B} + \text{Bank of C}$$

$$\text{HPM/NPAC/TA/TI State Bank of India} = \text{Bank of A} + \text{Bank of B} + \text{Bank of C} + \text{Bank of D} + \text{Bank of E} + \text{Bank of F}$$

$$\text{HPM/NPAC/TA/TI Union Bank of India} = \text{Bank of A} + \text{Bank of B} + \text{Bank of C}$$

We used the panel data for the regression analysis 2009-2021. To perform the test to check whether multicollinearity was present in the data or not we ran the Variance Inflation Factor (VIF) test and the Correlation test. We found that the low value of VIF and the low value of the Correlation coefficient indicate that multicollinearity has been not present in the given data sample. We observed that VIF value has decreased after the merger of bank data compared to before the merger of banks. The above test we have done for the data before and after the merger of the banks. We have defined the same period which is 2009-2021 for both data of Before and after the merger of the banks.

vif

Variables	VIF	1/VIF
Intati	2.11	0.4731
lnidr	1.78	0.5626
lncdr	1.77	0.5654
lnroi	1.71	0.5853
lnrcar	1.54	0.6504
lnnpac	1.52	0.656
Mean VIF	1.74	

corr lnrcar lnnpac lncdr lnidr lnroi Intati, obs=156

	lnrcar	lnnpac	lncdr	lnidr	lnroi	Intati
lnrcar	1					
lnnpac	-0.3742	1				
lncdr	0.1004	-0.1578	1			
lnidr	-0.0787	-0.0089	-0.4583	1		
lnroi	-0.3623	0.0946	0.2821	-0.3602	1	
Intati	0.1976	0.3459	-0.3459	-0.0998	-0.3743	1

Figure 1. Before the Merger of Bank Multicollinearity result.

vif

Variables	VIF	1/VIF
lnidr	1.63	0.614
lnroi	1.61	0.6214
lncdr	1.56	0.6417
lnrcar	1.46	0.6855
lnnpac	1.17	0.8555
Intati	1.13	0.8817
Mean VIF	1.43	

corr lnrcar lnnpac lncdr lnidr lnroi Intati, obs=156

	lnrcar	lnnpac	lncdr	lnidr	lnroi	Intati
lnrcar	1					
lnnpac	-0.2877	1				
lncdr	0.0285	-0.2045	1			
lnidr	-0.0589	-0.0103	-0.5081	1		
lnroi	-0.4356	0.122	0.2815	-0.3904	1	
Intati	0.1872	0.0445	-0.5081	0.0032	-0.1852	1

Figure 2. After the Merger of Bank Multicollinearity result.

Further, we did the Breusch-Pagan/Cook-Weisberg test for the heteroscedasticity test. The null and alternate hypotheses for the Breusch-Pagan/Cook-Weisberg test are as follows:

H_0 : Having Constant Variance.

H_1 : Not Having Constant Variance.

The estimated result of the Breusch-Pagan/Cook-Weisberg test has a probability value of more than 0.05 for both datasets.

Breusch-Pagan /Cook-Weisberg test for hetroskedasticity

H0: Constant Variance

Variables: fitted valuse of lnhpm

chi2(1)=0.06

prob>chi2=0.8021

Figure 3. Before the Merger of Bank Bresusch-Pagan result.

Breusch-Pagan/Cook-Weisberg test for hetroskedasticity

H0: Constant Variance

Variables: fitted valuse of lnhpm

chi2(1)=0.06

prob>chi2=0.8090

Figure 4. After Merger of Bank Bresusch-Pagan result.

Thus, we can't reject the null hypothesis, meaning the data doesn't contain a heteroscedasticity problem.

Furthermore, to check whether the Fixed-Effect Model and Random Effect Model are applicable to the given data sample or not, we did the Restricted F test for the Fixed Effect Model and Breusch-Pagen Lagrange Multiplier test for the Random Effect Model. We found that the Fixed Effect Model has F-value (47.16, 70.01) and a Probability Value (0.000, 0.000) before and after the merger of banks respectively, which means the Fixed Effect Model is suitable. To check the validation of the Random Effect model we found that the Wald-Chi² statistic (148.24, 179.02) and

the Probability Value (0.000, 0.000) before and after the merger of banks respectively, which means the Random effect Model is suitable. We have taken balance panel data from 2009 to 2021. And we ran the Fixed Effect Model. “In a fixed-effects model, the unobserved variables are allowed to have any associations whatsoever with the observed variables (Bell A *et al.*, 2019)”. Also, FEM is used to know the control for partial time-invariant effect with the time-invariant variables. After that, we ran the Random Effect Model. Badi H *et al.* (2003) inference suggested that the Fixed-Effect Model and the Random Effect Model should be implemented in empirical panel applications. The random effects analyse the fluctuations among the group, whereas the fixed effects analyse changes that are consistent with the variable.

Fixed Effect Model Before and After Merger of Banks:

$$\text{lnhpm}_{it} = \beta_0 + \beta_1 \text{Incrar}_{it} + \beta_2 \text{lnnpac}_{it} + \beta_3 \text{Incdr}_{it} + \beta_4 \text{lnidr}_{it} + \beta_5 \text{lnroi}_{it} + \beta_6 \text{Intati}_{it} + u_{it} + e_{it} \quad (3.1)$$

Random Effect Model Before and After Merger of Banks:

$$\text{lnhpm}_{it} = \beta_0 + \beta_1 \text{Incrar}_{it} + \beta_2 \text{lnnpac}_{it} + \beta_3 \text{Incdr}_{it} + \beta_4 \text{lnidr}_{it} + \beta_5 \text{lnroi}_{it} + \beta_6 \text{Intati}_{it} + e_{it} \quad (3.2)$$

The null and alternate hypotheses for equations (3.1 & 3.2) are as follows:

H_0 : Explanatory variables do not affect the Response Variable.

H_1 : Explanatory variables affect the Response Variable.

Here, β_0 is a constant term, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$, and the β_6 the parameter represents the time-variant of the respective parameter. Where t is time, and i denote the banks. High-powered money is the response variable, and six mentioned explanatory variables. The random part of the model introduces u_{it} in the model that considers the error in the model. And the random part of the model introduces e_{it} in the model. The vital difference between the FEM and REM is studied and described algebraically and graphically by Raudenbush & Bryk (2002). To choose between FEM and REM, the present study used the Hausman Test statistics.

The null and alternate hypothesis for the Hausman Test Statistics.

H_0 : Random effect model is appropriate.

H_1 : Fixed effect model is appropriate.

6. Results

We used STATA to estimate results. First, we saw the trend of HPM and NPA Closing Account Balance based on the economic theories of individual banks for the given period. We observed that in Figure 5, after the mergers of banks, high-powered money (Monetary Base) increased except for the Punjab and Sindh banks and Punjab national banks. This estimate infers that enhancement in the competitiveness of individual banks. Second, we have plotted the closing balance of non-performing assets value.

F-urtherrmore, in Figure 6, we observed that the closing balance of non-performing assets had declined after the merger of the banks. A descriptive analysis of Table 3 suggests that the mean high-powered money is 32934.74, and the Standard deviation is 37756.91, which is 14.64% more than the mean value. In addition, the mean of non-performing assets is 29215.28, and the Standard deviation is 36059.08, which is 23.43% more than the mean value. The statistic implies that high-powered money is more volatile than non-performing assets.

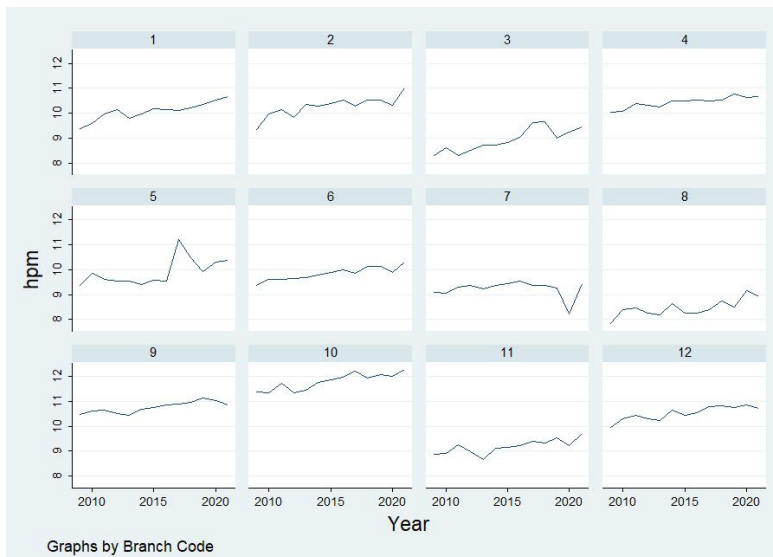


Figure 5. The trend of High Powe Money across the year of Individual Bank.

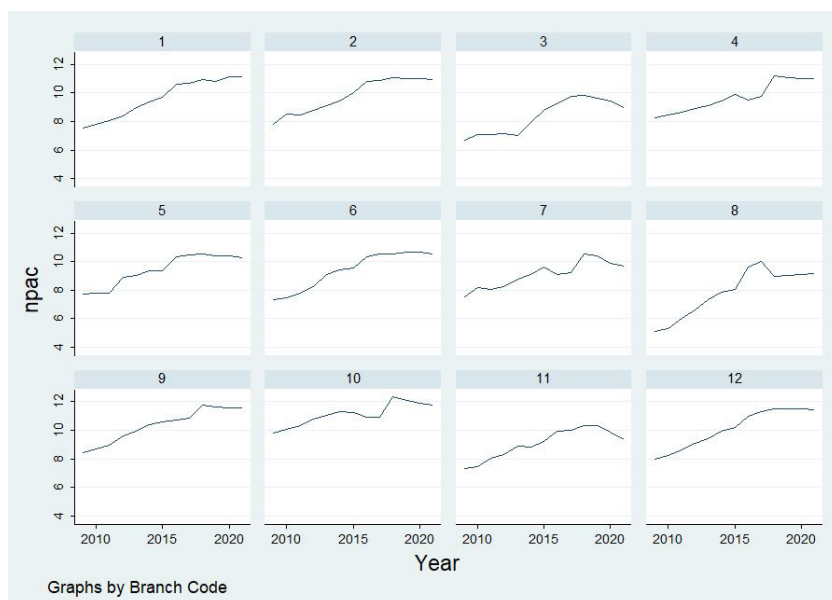


Figure 6. The trend of NAP Closing Balance across the year of Individual Bank.

However, the mean value of the Investment - Deposit Ratio and Return on Investments is 31.44712 and 7.266026, respectively, and the standard deviation is 4.7881 and 0.5000783. In addition, we can see that the Investment - Deposit Ratio and Return on Investments are less volatile than the High-Powered Money.

Table 3. Descriptive statistics of response variable and explanatory variables

Variables	Mean	Std. Dev	Min	Max
High Powered Money (HPM)	32934.74	37756.91	2541.904	213201.9
Capital to Risk-weighted assets ratio (CRAR)	12.23629	1.448827	9.04	17.06
NPA Closing Balance (space)	29215.28	36059.08	161.04	223427.5
Credit - Deposit Ratio (CDR)	69.54865	7.381194	46.99	88
Investment - Deposit Ratio (IDR)	31.44712	4.7881	18.92	47.1
Return on investments (ROI)	7.266026	0.5000783	6	9
Total Assets (TA)	634905.9	752806.8	41363.8	4534428
Total Investment (TI)	51135.95	58838.15	3654.862	308647

Then we ran a regression using panel data from 2009 to 2021. While running the regression, we used the Fixed effect Model and Random effect Model to estimate the data's result before and after the merger of the bank. We ran the Hausman test to check FEM and REM usability for the given data. The Hausman test was used to check the applicability of the Fixed effect model vs the Random effect model and we found that the Fixed Effect Model is appropriate for the analysis of results.

Test: H0: difference in coefficients not systematic

$$\chi^2(6) = (b-B)'[(V_b - V_B)^{-1}](b - B)$$

$$26.82$$

$$\text{Prob} > \chi^2 = 0.0002$$

Figure 7. Hausmann test estimated results Before the Merger of Banks.

Test: H0: difference in coefficients not systematic

$$\chi^2(6) = (b-B)'[(V_b - V_B)^{-1}](b - B)$$

$$22.02$$

$$\text{Prob} > \chi^2 = 0.0012$$

Figure 8. Hausmann test estimated results After the Merger of Banks.

Table 4 estimated results contain the Before and After merger of Banks regression coefficient of the Fixed -Effect and Random Effect Models. In addition, it also depicts the comparative analysis of the Fixed-Effect Model regression coefficient. Table 4 estimated results show that the HPM is positively associated with the Capital Risk-weighted assets ratio, NPA Closing Balance, Return on Investment, and Total assets to Total Income ratio. However, HPM is negatively associated with the Credit-Deposit Ratio and Investment Deposit Ratios. At the same time, we observe that if we increase the HPM by 1% then the Total Assets to Total Income ratio will increase by 1.13%, the Return to Investment will increase by 0.726%, and the NPA Closing Balance will increase by 0.16% having 1%, 10%, and 1% Statistical Significance levels, respectively. However, we have seen that if HPM increases by 1% then the Credit-Deposit Ratio decreases by 0.61%, having 5% Statistical Significance levels, respectively.

Furthermore, we ran the regression to see the estimated result (Table 4) for the data after the merger of the bank. We found that HPM is positively associated with Capital to Risk weighted ratio, NPA Closing Balance, Total Assets to Total Income ratio, and Return on Investment. At the same time, HPM is negatively associated with the Credit Deposit Ratio and Investment to Deposit ratio. At the same time, we observed that if HPM will increase by

1% then the Capital to Risk-weighted assets ratio will increase by 0.45%, and NPA Closing Balance will increase by 0.16% having 5% and 1% statistical significance levels. However, estimated results infer that if HPM increases by 1% then Credit-Deposit Ratio will decrease by 1.04%, and Investment-Deposit Ratio will decrease by 0.40% having 1% and 10% statistical significance levels respectively vis-à-vis.

Table 4. Estimated Results

	Before the Merger of the Bank		After the merger of the Bank		Comparative analysis of Regression coefficient value of Fixed Effect Model
Variables	Fixed-effects Model	Random effect Model	Fixed-effects Model	Random effect Model	
R-Square Value (Within)	0.5491	0.5326	0.5178	0.4864	
Capital to Risk-weighted assets ratio (Incrar)	0.2411	-0.2521	0.4543**	0.5531*	Increased and Become Statistical Significance.
Standard Error	0.2008	0.2008	0.2209	0.3027	
NPA Closing Balance (Innpac)	0.1619***	- 0.2098***	0.1679***	-0.2472***	No Change
Standard Error	(0.0216)	(0.0253)	0.0209	0.0276	
Credit – Deposit Ratio (Incdr)	-0.617**	-0.0373	-1.0466***	-0.3599	Increased in absolute term
Standard Error	0.3080	0.3586	0.2697	0.3633	

Investment - Deposit Ratio (Inidr)	-0.3280	0.1777	-0.4044*	-0.3785	Increased in absolute terms and Become Statistical Significance
Standard Error	0.2770	0.2654	0.2364	0.3085	
Return on investments (Inroi)	0.726**	0.6635	0.3156	0.0625	No Statistical Significance
Standard Error	0.3730	0.4496	0.3849	0.5341	
Total Assets to Total Income ratio (Intati)	1.139***	1.467***	0.0261	0.0268	No Statistical Significance
Standard Error	0.3796	0.4469	0.1024	0.1416	

Source: Author's calculation ***, ** and* indicates 1%, 5% and 10% significance level, respectively.

To conclude, we did the comparative analysis based on the calculated regression coefficient values. We observed that before the merger of banks, the regression coefficient had a positive value to the Total Assets to Total Income ratio (1.139) and Return on investment (0.726), having Statistical Significance levels of 1% and 5%, respectively. However, the Credit-Deposit Ratio (-0.617) has negative values with a 5% Statistical Significance level. At the same time, the HPM regression coefficient to the explanatory variable after the merger of the bank data has positive regression coefficient values to Capital to Risk-weighted assets ratio (0.4543), and the NPA closing Balance (0.1679) having its Statistical Significance levels of 5%, and 1%, respectively. However, the Credit-Deposit Ratio (-1.046) and Investment-Deposit Ratio (-0.4044) have 1% and 10% Statistical Significance levels. In addition, estimates show that HPM has a positive relationship with CRAR and a negative relationship with the Investment-Deposit ratio before the merger of the bank. After the merger of the bank, HPM has a positive relationship with Return on Investment and Total assets to Total Income ratio.

Since we compare the regression coefficient values before and after the merger of banks' Credit - Deposit Ratio becomes inferior in terms of HPM by 40.87%. At the same time, the Investment-Deposit Ratio regression coefficient has been negatively associated and become significant to HPM

after the merger of banks. The estimate infers that banks may have ample money but may worry about investing that money in the Domestic and International Market.

Furthermore, we observed that the Capital Risk-Weighted Ratio (0.4543) became positive and had Statistical Significance (5%) after the bank merger. At the same time NPA closing Balance didn't show a significant change with the HPM before and after the merger of banks. Moreover, the estimated results infer that the crucial observation is that the Return on Investment and Total Asset to Total Income ratio have positive relationships with HPM but they are not statistically significant after the merger of the Banks.

6. Conclusion and Policy Implications

We have observed that the High-Powered Money has been increasing, and Total assets have increased throughout the year. It shows that the Market value of Individual banks has improved. In addition, NAP Closing Balance has decreased except for Punjab and Sindh Bank and Punjab National Bank which infers that the banks are now performing well. In addition, we have also seen that the Capital risk-weighted ratio becomes significant in relationship with HPM. It can be inferred that banks are now attaining more financial stability after the merger of banks. However, the estimated result shows that Banks may or may not be performing at their full potential. We observed negative relationships between the Credit Deposit Ratio and the Investment Deposit ratio. Thus, based on these results of the model, we infer that the individual banks have become more efficient, stable, and competitive after the bank's merger, but we still need to improve further. The estimated results can help in banking regulation, more specifically to regulate the parameter according to RBI guidelines on the Interest rate Risk in Banking Book (IRRBB). Furthermore, we have used High-Powered Money as a response variable, and we know that HPM consists of currency in Circulation. So, it may help to regulate Monetary policy indicators such as Cash Reserves Ratio (CRR), Repo Rate, and Reverse Repo Rate. In addition, the result obtained in this paper can help to regulate the Statutory Liquidity Ratio (SLR) and the Bank Rate for individual banks. Furthermore, the estimates indicate that Indian public sector banks have become more competitive, and they have increased their market share, and it will help to overcome the market power of

private sector banks. Besides, the estimated results suggest that the merger of public sector banks leads to enhancing their competitiveness, becoming more efficient and enhancing financial stability, which will help in competing with private banks and in dealing with market power.

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