Financial Repression, Deposit Rate Deregulation, and Bank Market Power

Yogeshwar Bharat Subhadeep Halder Nirupama Kulkarni *

September 14, 2024

ABSTRACT

Regulated banking systems with mandated fixed saving deposit rates below the prevailing market rates, a form of financial repression, allow banks to raise deposits cheaply. We examine the deregulation of savings deposit rates in 2011 in India, which increased banks' funding costs. Using regulatory branch-level data, we find that deposit rates increased, but only for banks with low market power. Consequently, deposits increased for banks with lower market concentration with a corresponding 32.3 percentage point increase in lending. Deposit shares shifted to low-maturity savings deposits and led to a shortening of loan maturity towards short-term loans. A simple static banking model with heterogeneous banks and depositors explains these findings. Our paper underscores how low deposit rates can shape bank asset portfolios, potentially intensifying credit constraints and limiting the level of financial intermediation in the economy. While deposit rate deregulation stimulates bank lending and fosters economic growth in developing countries, banks' market power limits gains.

JEL Classification:D43, E51, G21, G22, G28, O53

Keywords: Deposit franchise, banking, market power, credit, bank balance sheet

*Bharat: CAFRAL, Research Department, Reserve Bank of India Main Building, Fort, Mumbai 400 001. E-mail: yogeshwar.bharat@cafral.org.in. Halder: Economics and Planning Unit, Indian Statistical Institute – Delhi Centre and New York University Abu Dhabi. E-mail: subhadeep20r@isid.ac.in/ sh7991@nyu.edu. Kulkarni: CAFRAL, Research Department, Reserve Bank of India Main Building, Fort, Mumbai 400 001. E-mail: nirupama.kulkarni@cafral.org.in. We thank Viral Acharya, V V Chari, Amil Dasgupta, Mausumi Das, Chetan Ghate, Peter Hoerdahl, Jean Imbs, Amartya Lahiri, Justin Leung, Samreen Malik, Veda Narasimhan, N.R.Prabahla, Uday Bhanu Sinha, Etienne Wasmer, and participants at the Delhi School of Economics conference for helpful comments. Views expressed in this paper are personal and not necessarily the official viewpoint of CAFRAL or the Reserve Bank of India (RBI).

1 Introduction

Financial intermediation facilitates the transfer of funds from savers to borrowers. Households save through deposit accounts to smooth consumption. Banks raise funds through deposits and channel them to more productive sectors of the economy. In developing countries like India, efforts to increase financial inclusion have remained challenging. For example, while the percentage of households with bank accounts rose from 59% in 2011 to 99% in 2016 in India (ICE360 Survey 2016), account usage remains low, with many households continuing to maintain zero balance accounts. As a result, credit access to firms and households is limited, and financial constraints mute aggregate productivity (Hsieh and Klenow, 2009). Plausibly, limited financial intermediation in developing economies hinders household access to savings instruments and firms' access to credit.

This paper examines an oft-overlooked reason for low financial intermediation: the role of low deposit rates due to banks' market power. While low deposit rates allow banks to access deposits cheaply, households may look to invest elsewhere, lowering deposit market penetration and limiting the level of financial intermediation in the economy. At the bank level, low rates allow banks to invest in low-yielding government treasury securities while continuing to earn comfortable net interest margins, limiting credit access to firms and households.

This paper examines how bank market power determines their deposit rates using the 2011 savings deposit rate deregulation in India as the setting. Up until June 2011, savings deposit rates in India were regulated and set by the Reserve Bank of India, India's central bank. After deregulation in June 2011, banks could differentially set savings deposit rates. For nearly a decade before the deregulation episode, regulated savings deposit rates were at 3.5%, well below the policy repo rate, regardless of their market share or ownership status.[1] We exploit the ex-ante variation in bank market power combined with savings rate deregulation and examine the impact on deposit savings rates, deposit growth, and bank lending. This setting helps us nail down how market power depresses deposit rates, thus limiting household savings in the form of deposits

[1] Banks had the authority to set the rate of other forms of deposits like term deposits, recurring deposits, and current accounts, among others. The regulation applied only to savings deposit rates.

and credit to the economy and depressing financial intermediation.

We establish three main findings. Post-deregulation, banks with low market concentration increase their deposit rates relative to banks with high market concentration. Subsequently, low market power banks see an increase in deposits. Further, low market power banks increase lending. After deregulation, there was a 32.3 percentage point increase in lending for low-market-powered banks compared to high-concentration banks. These findings are explained by a simple static banking model that incorporates heterogeneous banks and depositors. The paper highlights how deposit rate regulation can shape bank asset portfolios, potentially exacerbating credit constraints and limiting the level of financial intermediation in the economy. Deposit rate regulation can distort the banking system's ability to allocate capital efficiently. When banks are allowed to offer higher deposit rates, they can attract more deposits, which can then be channelled into lending activities, potentially funding productive investments and driving economic growth.

Our study suggests that deregulating deposit rates can lead to improved financial intermediation and greater access to credit, especially for under-served segments of the population; however, even with deregulation, market power limits the level of financial intermediation in the economy.

Deposits constitute the primary funding source for banks (around 80% in 2023[2]), with savings deposits accounting for approximately 30-40% of total deposits. There has been a steady rise in commercial bank branches in India; the average number of branches per 100,000 adults increased two-fold to around 16 percent in 2022 compared to 2004, which is higher than the world average.[3] Given the increased penetration of branches at the local district level, local market power has become quite important in banks' business operations. The growing importance of bank concentration plays an important role in defining funding costs and its subsequent implications on the bank balance sheets.

To look at the impact of market power on the funding costs and subsequently on the asset composition, we calculate two measures of bank market power, namely the Herfindahl–Hirschman index (HHI) of a particular bank operating multiple branches in multiple districts, and deposit beta following Drechsler et al. (2017), which is defined as the degree of pass-through to the sav-

[2] Reserve Bank of India (RBI) report
[3] World Bank

ings deposit rate following a change in the policy repo rate. While a higher HHI denotes higher concentration, a lower beta denotes lower pass-through and higher market power. Banks have substantial heterogeneity in their market concentration, which we exploit as a key source of heterogeneity in our identification strategy. Banks with relatively lower market power changed their savings deposit rate following deregulation to attract depositors and increase their market share, which led to increased funding costs. Consequently, to recover these escalated costs, banks increase their share of high-yielding investments in general and lending activity in particular to maintain their profits.

This change in the composition of assets is important, given the predominant role of the banking industry in supplying credit to the non-financial sector, which has gone up from about 20% of GDP at the start of the century to 60% of GDP in 2023. Because of their scale of operations and geographical presence, banks play an essential role in facilitating credit and fostering investment opportunities, which is vital for the smooth operation of the economy. Our research highlights that banks with greater concentration tend to diminish their lending share due to their market power, a trend that could hinder economic growth.

To see the role of market power on the asset composition of the banks, we build a simple partial equilibrium model of heterogeneous banks following Monti et al. (1972) and Gerali et al. (2010). In our model, banks derive their market power from the deposit market, and they set the lending and deposit rates considering prevailing market conditions alongside scheduled loan demand and deposit supply to maximize their profits.

Our model analysis reveals that banks with lower market power are inclined to allocate more resources towards loans, leading to an increase in their credit-to-asset ratio. Furthermore, we observe a relatively higher investment in loans during the post-deregulation period (when banks have the flexibility to adjust savings rates) compared to the pre-deregulation period. In other words, the credit-to-asset ratio declines for banks with higher market power. Before banks are allowed to set their deposit rates, they enjoy market power due to specific innate characteristics of the banks, including but not limited to ownership structure, withdrawal facilities, and ease of making deposits. However, once they have the additional tool of changing deposits, they can use

that channel to enhance their market power.

To empirically evaluate the findings of our theoretical model, we utilize granular branch-level data on lending and deposits sourced from the Basic Statistical Returns (BSR) encompassing all districts in India from 2005 to 2016. Using the total deposits at the branch level for each bank, we first calculate the HHI at the branch level, then aggregating it at the bank level to arrive at a measure of bank HHI, which is our first measure of market power. Our identification strategy leverages the heterogeneity at the branch level to employ a two-way fixed effects model in order to control for branch and location level variation and to look at the impact of market power on the bank's asset composition through change in their funding costs owing to savings rate deregulation.

Our findings indicate that, on average, total deposits for banks with low market power increased by approximately 13.5% compared to banks with a higher degree of market power. Here, we define a bank with low market power as having an HHI value lower than the median HHI of the total distribution. Following the deregulation, banks with lower market power increased their savings deposit rates, leading to a higher share of savings deposits relative to other forms of deposits, such as time and current deposits. We also found no significant change in the rate of time deposits for these banks, underscoring the critical role of savings deposits in channeling new deposits into the banking system post-deregulation. Therefore, banks with a lower degree of market power not only initially increased their rates to attract new investors, but they also managed to raise higher deposits due to the increased flow of savings deposits.

Following deregulation, banks with lower market power raised their savings deposit rates, which increased their cost of raising funds. Compared to the regulated period, it became costlier for these banks to raise additional deposits. To protect their profit margins, these banks increased their credit disbursal by around 32% across various sectors—mainly towards the industry and manufacturing sectors—compared to banks with higher market concentration. While the overall credit disbursal by these banks increased, the share of credit disbursed for personal expenditures, including housing loans, declined post-deregulation. This shift could have significant implications for the broader economy, given that consumption expenditure is a major component of GDP.

Due to the short-term nature of the new deposits raised in the form of savings deposits, less concentrated banks did not engage in maturity transformation; instead, they increased lending towards shorter-duration credit. Since much of this credit was directed towards relatively riskier Micro, Small, and Medium Enterprises (MSMEs), these banks became more vulnerable. The decrease in the share of long-term lending also has significant implications for the economy, as providing long-term credit is vital for firm growth and, consequently, for overall investment and productivity growth in the economy (Aghion et al., 2010; Drechsler et al., 2021). In order to increase the demand for short-term credit, these banks reduced their weighted average lending rate (WALR). Although these banks aimed to protect their profits by disbursing more credit to increase revenue, they sought to achieve this through an increase in the overall quantity of credit rather than its price. This approach is significant because it involves directing credit to riskier accounts, potentially heightening the banks' exposure if the associated risks are not accurately assessed and priced.

Additionally, we utilize bank-level data on balance sheets and income statements obtained from the Reserve Bank of India (RBI) spanning from 2006 to 2016 to find out the impact of market power on the bank's asset composition coming from deregulation. Since savings deposit rate in India is set at the bank-level and not at the individual branches, it is important to look at the aggregate picture as well. We use the same measure of HHI as in the branch level analysis and compare banks with low HHI against banks with higher degree of HHI. We find that the savings deposit rate increased, on average, by 0.37 percentage points for banks with low HHI compared to the high HHI banks. In order to attract deposits, banks that have lower presence need to increase their savings deposit rate more than that of banks that are already established in the market after deregulation. Deregulation empowers these banks to raise funds and compete against banks with a stronger market presence. Subsequently, total deposits increased for these low HHI banks post-deregulation by approximately 17%. Because of an increase in their cost of funding, these banks, in order to isolate their profit margins and to service the deposits, incur more lending than banks with higher market concentration by approximately 18%. Because of their higher presence, highly concentrated banks could afford to keep deposit rates low because they already have a steady flow

of funds. This phenomenon also occurs because, as we show later, of the ownership structure of the banks.

One of the critical factors determining the market power of banks in India is the ownership structure of banks (Zhao et al., 2010). A distinctive characteristic of the Indian banking sector is the diversity in ownership, with public sector (government-owned) and private sector banks holding significant shares of the total industry. Public sector banks, in particular, command a substantial proportion of total savings deposits, attracting a higher share of insured depositors than private sector banks. We show that banks that have relatively higher market power also tend to be government-owned banks.

Our analysis reveals that banks with relatively higher market power are typically those owned by the government. Public sector banks benefit from a wider geographical presence facilitated by mandatory branch expansions and the assurance provided by government-backed deposit insurance. Depositors in public sector banks not only enjoy convenient access to deposits but also benefit from a "de-facto" insurance, which stabilizes the flow of funds to these banks.[4] Such an advantage is not available to the private sector banks. Therefore, they need to maintain a higher deposit rate (or lower spread) in order to attract deposits, resulting in the escalation of funding costs for these banks. We found that private sector banks increased their lending, both in levels as well as a share of their assets, and their interest expenses as a fraction of their assets also went up due to higher savings deposit rates paid by them and because these banks have to increase their share of lending at a higher rate to maintain their profits.

We perform several robustness tests. Following Drechsler et al. (2017), we define an alternative measure of market power, bank beta, that relates banks' interest expense to Repo rate change. A lower beta corresponds to greater market power. Results confirm our baseline findings. Deposits and credit increase post-deregulation for banks with low market power remain. These findings support our assertion that banks with significant market power tend to allocate fewer funds towards loan disbursement and instead favour low-risk government securities. This behaviour aligns with "lazy banking," wherein banks prioritize low-risk investments over lending activities

[4]In fact, the number of branches almost doubles for public sector banks relative to the private sector banks as of March 2023 (RBI 2023).

(Mohan, 2003; Acharya and Rajan, 2020). The ownership structure of banks is strongly correlated with market power. Thus, public sector banks raise deposit rates to a lower extent leading to a shift in asset composition characterized by increased risk exposure among private sector banks and reduced credit expansion amongst public sector banks.

Related Literature Our paper belongs to the literature on the role of maturity transformation of modern banking theory wherein banks issue short-term deposits and make long-term investments (Diamond and Dybvig, 1983; Kashyap et al., 2002; Hanson et al., 2015; Di Tella and Kurlat, 2021). Central to this literature is the liquidity risk from issuing run-prone deposits (Brunnermeier et al., 2012; Bai et al., 2018). Although we do not explicitly quantify measures of liquidity risk, its presence is pivotal in our theoretical analysis, where the sole source of bank funding is deposits. In our model, risk emerges due to the banks' need to invest in high-yielding assets (loans) to cover deposit-raising costs, potentially yielding higher returns but accompanied by downside risk and search costs. Unlike Brunnermeier et al. (2012), our model does not distinguish between various asset-side risks but classifies risks on the liability side of a bank's balance sheet by considering different types of depositors.

We provide an estimate of the elasticity between the market power enjoyed by the banks and their lending activity, and confirm the critical role of banks' deposit franchise in explaining their lending behavior. Using our unique setting, where post-deregulation opened an additional channel for all the banks in terms of exploiting their market power, we contribute to the literature that shows the importance of market power in the lending behaviour of banks (Drechsler et al., 2021; d'Avernas et al., 2023). By looking at the real economic consequences of variations in banks' funding costs, we also contribute to the literature that looks at the impact of firm's funding dynamics on their strategic choices and investments (Becker and Ivashina, 2014; Chodorow-Reich, 2014; Huber, 2018; Carlson et al., 2022; Li et al., 2023).

Our paper also contributes to the literature on bank's risk management (Freixas and Rochet, 2008; Herndon and Matvos, 2016; Berger and Bouwman, 2017; van Greuning and Bratanovic, 2018; English et al., 2018; Nagel and Purnanandam, 2020; Drechsler et al., 2021; Di Tella and Kurlat, 2021;

Drechsler et al., 2023). Banks invest a substantial amount to generate market power in the deposits market by charging higher deposit spreads (gap between the short-term rate on other assets and the deposit rate) when interest rates are high (Kashyap et al., 2002; DeAngelo and Stulz, 2015; Stein, 2012; Moreira and Savov, 2017; Drechsler et al., 2017, 2021).

We also contribute to the literature on market concentration and its impact on the general economy. Earlier work looks at the impact of market concentration on firm dynamics and overall welfare (Rossi-Hansberg and Wright, 2007; Grossman and Rossi-Hansberg, 2012; Baqaee and Farhi, 2020; Barkai, 2020; Edmond et al., 2023), while Hopenhayn et al. (2022) and De Ridder (2024) looks at the impact on demographics and labor shares.[5] Another strand of the literature also talks about the impact of concentration in banking on the overall welfare (Koetter et al., 2012; Hakenes et al., 2015; Jiang et al., 2023). We provide estimate of how market concentration gets alleviated due to the deregulation policy and its impact on the overall access to credit and subsequent performance of firms in the economy.

We explicitly model the asset side of the balance sheet in our analysis and show how the size of these different types of depositors can affect the share invested in different types of assets. Another significant aspect of our model is its portrayal of different types of banks within the economy. We distinguish between public-sector banks, which benefit from sovereign government support during crises, and private-sector banks, lacking such a guarantee. Consequently, private-sector banks face the challenge of offering higher deposit rates than their public-sector counterparts and seeking assets with higher returns to sustain their profitability.

The literature has also explored the relationship between deposit funding and bank assets. Gatev and Strahan (2006) demonstrate that banks often witness deposit inflows during periods of financial strain, enabling them to supply increased liquidity to their borrowers. Kirti (2020) shows that banks with a higher proportion of floating-rate liabilities tend to provide more floating-rate loans, while Egan et al. (2017) investigates the impact of deposit competition on financial fragility. Our paper demonstrates the presence of different types of banks and their interactions with the different types of depositors on the classes of assets invested by the banks and their implications

[5] Autor et al. (2020) and De Loecker et al. (2020) talks about the declining share of labor due to rise in market concentration in the USA. See Rossi-Hansberg et al. (2021) and the references therein for further details.

for bank profitability.

The remainder of this paper proceeds as follows. Section 2 covers the institutional details of the Indian banking sector and the deregulation in savings deposit rates. Section 3 presents a static model explaining the channel linking deposit rates to deposit rate deregulation and banks' ex-ante market power. Section 4 describes the data, covers the descriptive statistics, and specifies the empirical design and presents the results. Section 5 concludes and suggests some policy implications.

2 Institutional Details

2.1 Banking Sector India

The formal credit system in India is comprised of three components: (i) Scheduled Commercial Banks comprising of public sector banks, private sector banks, and foreign banks, (ii) non-scheduled banks comprising cooperative banks, small finance banks, payment banks, and (iii) non-banking financial institutions. Following Agarwal (2023), we highlight certain facts about the banking sector. In 2022, the share of Bank and Non Bank assets stood at 118% of GDP. Of this, Public Sector Banks, Private Sector Banks, and NBFCs accounted for 101% of GDP of assets. Historically, Public Sector Banks have been crucial for supporting bank lending activity. In the late 1990s, these banks along with government directed development institutes contributed to around 80% of system assets. By 2020, this share dropped to around 50% due to increased penetration by NBFCs and Private Sector Banks. Shadow banks have increased their presence capturing around 16% of the financial system measured by assets. NBFCs (part of the shadow banking system) provide similar services like banks but depend more on wholesale funding and face less regulation. Mutual funds are a key part of the shadow banking system due to their role in funnelling funds into NBFCs.

In India, the banks hold a certain amount of cash with the RBI as reserves on which they earn interest. They give out loans (credit) based on deposits received from the depositors. They earn interest on their loans and pay interest on their deposits. A similar model exists for Mutual funds and NBFCs where they raise funding by taking deposits and paying interest on those; while

investing the cash at hand into downstream projects [6]. A key component here is the deposit interest rate being paid out by the financial institution; which can also be thought of as the funding cost for the institution.

2.2 Savings Deposit Rate Deregulation

India pursued financial reforms since the early 1990s. Deregulation of interest rates was a key component of these reforms. It was intended at improving competition, allocative efficiency and monetary policy transmission. By Oct 1997, most of the interest rates were deregulated. The only deposit side interest rate that remained regulated was the savings deposit interest rate (also referred to as savings deposit rate in this paper). The RBI released a discussion paper on highlighting the potential pros and cons of deregulating the savings deposit rate such as - improved financial inclusion, worsening of asset/liability mismatch, improved monetary policy transmission, etc.

For scheduled commercial banks, in India, deposits are a major source of funding. Savings deposits form around 30-50% of a bank's total deposits. Savings deposits offer the liquidity of current accounts while paying an interest rate on the deposits which is a feature of term deposit accounts. In the period 2001-10, the aggregate savings deposits saw an average annual growth rate of 19.4%. Additionally, households are the predominant users of savings deposit accounts.

The RBI deregulated the savings deposit rate in October 2011 after maintaining it at approximately 3.5% for over a decade. This decision aimed to provide better returns for depositors and encourage competition among banks. However, even after the deregulation, the majority of banks in India maintained the savings deposit rate at 3.5%, with notable exceptions such as Yes Bank, which increased its rate to as high as 7%, likely as a strategy to attract more deposits amidst financial struggles. In contrast, many public sector banks opted for more conservative increases. This deregulation marked a significant shift in the banking landscape, promoting more dynamic banking practices and highlighting the diverse strategies employed by banks in response to regulatory changes.

[6] For more details see Prabheesh and Durai (2019), Ganesh-Kumar and Gaurav (2019)

3 Model

We build a simple model of heterogeneous banks based on the canonical framework of Monti et al. (1972) and Klein (1971). This theoretical model delineates the variations in asset composition among banks across different markets, attributing these differences to variations in funding costs stemming from the distinct services they offer and the specific markets in which they operate. Our model tries to rationalize as to how the change in the regulation pertaining to the funding costs could have an impact on how the bank pursue its business when looked at the disaggregated level at the market in which they are conducting their business.

Our model generates several predictions regarding the asset composition of banks. Firstly, banks operating in markets characterized by intense competition face higher funding costs in attracting funds compared to those enjoying market power. Consequently, these elevated funding costs are expected to translate into increased outflows of risky lending activities by the former group of banks. Notably, this effect is exacerbated when banks are endowed with additional tools to attract funding, such as the deregulation of savings deposit rates.

Within our framework, banks primarily acquire funds through deposits from households, which they subsequently allocate to investments in government securities or the origination of risky loans. We simplify our analysis by assuming that banks are not subject to any capital ratio constraints. Our economy consists of different districts and all the banks operate in a given district, so we study the market structure of banks in a given district.[7] Banks operate under monopolistic competition, taking the local market conditions into account, wherein market power could arise from spatial and product differentiation.

Banks in a given district are indexed by i and there exist a continuum of heterogeneous banks. Banks demand deposits D_i from households, which is their only source of funds and use the funds to originate loans L_i and invest in government bonds G_i. Following Gerali et al. (2010), banks have market power in both the lending and the deposit markets which are characterised by the elasticity parameters, e^l and e^d respectively with $e^d < -1$ and $e^l > 1$. Higher elasticity means lower market power and vice-versa. Banks chose the lending rate it charges the borrowers, r_i^l, and the

[7] This is to proxy for the fact that banks have different branches in different districts

deposit rates it offers its depositors, r_i^d given the market concentration and the demand and supply of loans and deposits which we drive below. For simplicity, we assume that government bonds yield returns equivalent to the repo rate f . Additionally, beyond deposit services, banks also offer liquidity services to depositors, ranging from branch expansions to ATM facilities and the ease with which depositors could withdraw or transfer their deposits (Eisfeldt et al., 2023).[8] We denote these liquidity services by l_i. The balance sheet of the bank is given below.

Balance sheet of bank i

Assets		Liabilities	
Loans	L_i	*Deposits*	D_i
Govt. Securities	G_i		

Next, we derive the demand for loans and the supply of deposits for the banks and then proceed with their profit maximization exercise.

3.1 Demand and Supply

Following Gerali et al. (2010) we assume a representative household which consists of both borrowers and depositors. Since our focus is on the banks in a partial equilibrium setup, we refrain from going into the consumption decision behaviour of the household. We assume that each bank's products (loans and deposits) are a differentiated good for the households and have market power following the standard Dixit-Stiglitz structure. Specifically, we posit that the loan and deposit contracts acquired by households constitute a bundle of financial products with different qualities with a constant elasticity of substitution as mentioned above. These products, each with slight variations, are offered by different branches of various banks in the given district.

First, we derive the demand for loans by the household which can be found by minimizing the

[8]Think of these services as like online transfer facilities or the presence of an extra personnel in the branch to assist the depositor/investor or other infrastructure that allows for faster or lower-cost access to deposits. See Haendler (2022) for further details.

total repayment subject to the availability of loans above the aggregate loan demand. Households demand loans given the lending rate set by bank i to minimize

$$\min_{L_i} \int_0^1 r_i^l L_i di$$

subject to

$$\left[\int_0^1 (L_i)^{\frac{e^l - 1}{e^l}} di \right]^{\frac{e^l}{e^l - 1}} \geq \bar{L}$$

where $\bar{L}$ is the aggregate loan demand and we assume a continuum of bankers with unit mass for simplicity. Taking the FOC of the above problem and aggregating over symmetric households will yield us the loan demand schedule as

$$L_i = \left(\frac{r_i^l}{\bar{r}^l} \right)^{-e^l} \bar{L} \tag{1}$$

$\bar{r}^l$ is the overall lending rate index in the economy given by $\bar{r}^l = \left[\int_0^1 (r_i^l)^{1-e^l} di \right]^{\frac{1}{1-e^l}}$. Equation 1 gives us the demand schedule for loan of bank i with $\frac{\partial L_i}{\partial r_i^l} < 0$.

Next, we derive the supply schedule of deposits for bank i in a similar fashion, taking into account that the depositors will try to maximize the returns that they will earn on their deposits. Note that depositors earn returns both from the savings deposit rate provided by the banks and the liquidity services that it receives (say the number of ATM transactions allowed per month or the ease with which you could transfer your deposits among others). Specifically, depositor will pursue the following maximization problem

$$\max_{D_i} \int_0^1 R_i^d D_i di$$

subject to

$$\left[\int_0^1 (D_i)^{\frac{e^d-1}{e^d}} di\right]^{\frac{e^d}{e^d-1}} \leq \bar{D}$$

where $R_i^d = (r_i^d + l_i)$ is the total return accrued to the household and $\bar{D}$ is the economy wide aggregate deposit. Proceeding just like we have done in the case of loans, taking the FOC, imposing symmetry and aggregating will give us the following supply schedule for deposits by the household for bank i

$$D_i = \left(\frac{r_i^d + l_i}{\bar{R}^d}\right)^{-e^d} \bar{D} \tag{2}$$

$\bar{R}^d$ is the overall return index in the economy given by $\bar{R}^d = \left[\int_0^1 (R_i^d)^{1-e^d} di\right]^{\frac{1}{1-e^d}}$. The deposit supply schedule given in Equation 2 tells us that deposits are a function of two factors ($D_i(r_i^d, l_i)$) how much deposit rate the depositor gets on the deposits and the liquidity services that is associated with the deposits in terms of ease of withdrawing or transferring the deposits. It's worth noting that the influence on deposits extends beyond just the deposit rate. This implies that during regulatory periods when deposit rates are uniform across banks, depositors make decisions on where to allocate their deposits based on the additional liquidity services offered by each bank.[9]

3.2 Bank Profits

As mentioned earlier, banks in our model within a framework of monopolistic competition, taking the local market conditions into account. Banks maximize profits taking into consideration the market power it possess, the loan demand and the deposit supply schedule along with the balance sheet constraint. We assume that banks need to incur quadratic adjustment costs for providing liquidity services , $\frac{\phi}{2}(l_i)^2$, where ϕ is the adjustment parameter.[10] The profit function for bank i

[9] These services may also encompass intrinsic bank characteristics, such as ownership structure or perceived safety from bank failures. The heterogeneity of deposits that is observed empirically among banks, even during the regulation period, suggests the involvement of other influencing factors.

[10] Think of the adjustment cost as opening a new ATM in the district or hiring an additional personnel at the branch to improve services.

can then be written as

$$\pi_i = r_i^l L_i + fG_i - (r_i^d + l_i)D_i - \frac{\phi}{2}(l_i)^2 \tag{3}$$

Bank i maximizes Equation 3 subject to the loan demand (1) and the deposit supply (2) schedules, together with the balance sheet constraint, $L_i + G_i = D_i$. The choice variables for the bank are r_i^d, r_i^l and l_i. The FOC for the above problem will give us the following conditions linking the deposit rate, lending rate and the liquidity services to the bank's market power and the policy rate:

$$r_i^l = \underbrace{\frac{e^l}{(e^l - 1)}}_{\text{markup}} f \tag{4}$$

$$r_i^d = \underbrace{\frac{e^d}{(e^d - 1)}}_{\text{markdown}} f - l_i \tag{5}$$

$$l_i = (f - r_i^d) - (D_i + \phi l_i)\frac{\partial D_i}{\partial l_i} \tag{6}$$

where

$$\frac{\partial D_i}{\partial l_i} = -\bar{D}\frac{e^d}{\bar{R}^d}\left(\frac{r_i^d + l_i}{\bar{R}^d}\right)^{-e^d-1} > 0$$

One can explicitly solve for r_i^d and l_i by solving Equations 5 and 6. Equations 4 and 5 illustrate that the bank's lending and deposit rates are determined as markups and markdowns over the policy rate f, respectively. These markups and markdowns are contingent on the loan demand elasticity, e^l, and deposit supply elasticity e^d , reflecting the influence of market power.As the elasticity decreases, the markup rises while the markdown decreases, signaling increasing market concentration. Equation 5 also shows that in order to provide a higher liquidity services, banks need to cut its deposit rate, so as to lower its costs. Next we look at some comparative statics on the impact of the savings rate deregulation on the behavior of the banks.

Let us define γ_i to be the loan-asset ratio of the bank

$$\gamma_i = \frac{L_i}{D_i} = \frac{\left(\frac{r_i^l}{\bar{r}^l}\right)^{-e^l} \bar{L}}{\left(\frac{r_i^d + l_i}{\bar{R}^d}\right)^{-e^d} \bar{D}} \tag{7}$$

Before moving into the impact of regulations on savings deposit rates, we first examine how banks' lending behavior is influenced by their market power in the deposit market within the baseline scenario, where they have the flexibility to adjust deposit rates. We focus on the deposit market channel as it pertains to changes in banks' funding costs and their asset portfolio composition. [11]

Differentiating Equation 7 with respect to e^d will give us

$$\frac{\partial \gamma_i}{\partial e^d} < 0 \tag{8}$$

This indicates that as the absolute value of elasticity ($|e^d|$) decreases, the bank exerts greater market power, leading to a decrease in its loan-to-asset ratio. This result stems from banks with higher market power being able to lower their deposit rates, as per Equation 5, thereby reducing their funding costs. This reduced cost of funds allows banks to refrain from investing in risky loans, resulting in a decline in their loan-to-asset ratio. In the empirical section of the paper we provide evidence for this reasoning using granular level branch-level data, and also show that the reasoning holds at the aggregate bank-level.

3.3 Regulation vs Deregulation

In order to see the impact of a regulation on the savings deposit rate which mandates a flat rate across all the banks, consider that now banks can provide a fixed deposit rate of $r_i^d = \bar{r}^d \quad \forall i$. This implies that depositors will maximize their total returns on deposits, but these returns will solely reflect the liquidity aspects of deposits. This is important since if all the banks provide the same

[11] Although lending market power also plays a role, we primarily investigate the impact of changes in deposit market power.

deposit rate to the depositors, then this shall lead to a same flow of deposits to the banks, because essentially market power (in terms of deposit elasticity) will not play any role, given that all the banks will be similar. To introduce heterogeneity among banks, which is commonly observed in deposit flows, depositors must differentiate banks based on other factors. In our model, we term this factor l_i, which encompasses all inherent characteristics of the bank, along with the ease of deposit conversion/withdrawal (liquidity aspect).

Next, we want to examine how banks behave when faced with the situation of a regulated savings deposit rate $\bar{r}^d$. More specifically, we compare a same bank before and after deregulation, and see how the loan-asset ratio of the bank changes when the deposit elasticity changes in a regulation against deregulation period. Therefore, we compare

$$\left.\frac{\partial \gamma_i}{\partial e^d}\right|_{pre} \quad \text{against} \quad \left.\frac{\partial \gamma_i}{\partial e^d}\right|_{post}$$

Given our assumption on the sign of e^d and the fact that $r_i^d = \bar{r}^d \quad \forall i$, it can be shown that

$$\left.\frac{\partial \gamma_i}{\partial e^d}\right|_{pre} < \left.\frac{\partial \gamma_i}{\partial e^d}\right|_{post} \tag{9}$$

Equation 9 asserts that the effect of market power on the loan to asset ratio of the bank will be higher post deregulation as compared to the regulation period. This is because during regulation the only feature available to the bank to attract deposits and exert deposit market power is by the characteristics that the bank possess. However, after deregulation the banks have an additional tool, the choice of their savings deposit rate, that can enable them to exercise market power. We call this the *rate effect* of market power. Note that we still have $\frac{\partial \gamma_i}{\partial e^d} < 0$ irrespective of regulation, so that our initial result that banks with lower market power will have a higher loan to asset ratio still holds true. Equation 9 is simply saying that this effect will be higher in the deregulation period relative to the regulation period.

Our simple model illustrates how banks' lending behavior adjusts in response to their market power, particularly when faced with a regulation imposing uniform savings deposit rates. The key insight from our model is that banks with lower market power strive to attract depositors

by offering higher returns, achieved through either elevated deposit rates, enhanced liquidity services, or both, thereby increasing their costs. To offset these costs, such banks allocate more funds to risky loans, which offer higher returns compared to government securities (Equation 4), resulting in an uptick in their loan-to-asset ratio.

Consequently, our analysis show that banks with higher market power will have a lower loan to asset ratio and this effect remains even under regulation of savings deposit rates due to the presence of innate characteristics of the banks which play an important role in bringing in heterogeneity among banks. In the following sections, we try to quantify empirically the role of market power on the bank's funding costs and its further implications on its asset portfolio. We show how higher market power lead to a decline in the lending share of the banks that could be ascribed to another source of financial repression.

4 Results

4.1 Data and Descriptive Statistics

For deposit and credit data, we use RBI's Bank Statistical Return (BSR) database. It contains deposit and credit data variables such as amount, number of accounts, etc. The data is very granular and has a granularity at year, bank, district, state, branch, type of account holder, geography, applicable interest rate range and time duration, sector, borrower account type, etc. We also have bank level data from the RBI's Database of Indian Economy (DBIE) that gives us assets and liabilities variables such as government securities holding, loans and advances, cash credit, investments, etc. to list a few. For our analysis, we define a variable "Spread" as "Repo Rate - Savings Deposit Rate" at bank-year level. The Repo Rate data has been taken from the CEIC database and aggregated at year level.

For the period prior to 2011, the savings deposit rate was regulated by the RBI and was pegged at 3.5% from March 2003 to Oct 2011. Post October 2011, the saving interest rate was deregulated as a part of a larger deregulation of various other banks rates. Pre-deregulation the the saving interest rates was known as it was held constant for all banks. Post-deregulation in 2011, every bank was independent of putting up their own rates (however, public sector banks didn't change

their saving deposit rates), for each bank we did not have a ready data-set of savings deposit rate across banks. We prepared a novel data set at a bank-year level for our purpose. The historical trend of savings deposit rate for banks was obtained via the snapshots of their web-pages from Archive.org. Missing data was imputed using forward-fill or backward-fill where applicable and then aggregated at a bank-year level. We were able to collate bank-year level time series of savings deposit rates for 35 banks including public and private sector banks, while we have data for 58 banks in the regulated period.

Table 1 presents the descriptive statistics for key variables at both the bank-level and branch-level. Panel A reports the average and standard deviation (columns 1 and 2) of bank-level variables for approximately 55 banks from fiscal years 2007 to 2016. Columns 3 and 4 shows the average values of variables before and after deregulation for banks with low HHI, while columns 6 and 7 display these values for banks with high HHI. Column 5 details the differential effect of deregulation on the average values for low HHI banks, and column 8 provides this information for high HHI banks. Column 9 highlights the differential effect of deregulation between low HHI and high HHI banks and includes the significance level of the t-test for this difference.

The results indicate a smaller increase in savings deposit rates for high HHI banks, accompanied by a higher spread between the repo rate and the savings deposit rate set by these banks. Conversely, low HHI banks, aiming to attract more deposits, set higher deposit rates post-deregulation, resulting in a lower spread. Post deregulation, we find that low-market powered banks have significantly increased savings rates compared to high market powered banks. Both types of banks exhibit an increase in deposits and credit at levels, but the change is more pronounced for high HHI banks, which typically have larger asset and liability sizes during the regulation period. However, the credit-to-asset ratio increases more for low HHI banks compared to banks with high market power. To offset their increased costs of raising deposits, banks with less market power need to increase their lending share. We find that for credit-to-deposit ratio, post deregulation there is no significant difference between low and high market power banks, whereas credit-to-asset has increased for low market powered banks, implying an increased cost for low market powered banks led to an increase in credit as a share of asset and not necessarily deposit. While

looking at government securities, we find that on level there is an increase in high market powered banks compared to low market powered banks, whereas with respect to share of assets, there is no significant difference. Government securities are a well regulated market in India, and hence we do not find a significant difference between these types of banks post deregulation. Banks generally maintain a proportion of their assets in these securities beyond the statutory liquidity ratio (SLR) requirement.

The proportion of assets allocated to interest expenses and income is higher for banks with lower market concentration due to higher service costs of maintaining deposits and increased interest income from higher credit disbursement. Consequently, the net interest margin (NIM) is balanced and not significantly different between these banks. Short and long term investments other than loans were also not significantly different between low and high market powered banks post deregulation, this can also be explained by a regulated government securities market. In case of credit-to-asset ratio, the significance in the result is attributed to long term loans that are disbursed by low market powered banks vis ṽis high market powered banks. Panel B summarizes the branch-level data from 2007 to 2016, summarising various indicators of credit and deposits. showing that branches of banks with high market power have higher levels of deposits and credit compared to those with lower market power post deregulation. We also find that the high market powered banks became more concentrated post deregulation as their branch HHI increased compared to low market powered branches.

However, we cannot argue that they capture any causal impact of the deregulation, but it alludes to some time-specific trend and correlation related to deregulation and banks' asset and deposit size. Similarly, we find in Table A8 that the difference in mean of "Spread" for private sector banks is significant and positive, signifying that post deregulation, private sector banks are changing their saving deposit rates, but that is not the case with the "Spread" of public sector bank, showing their reluctance to change. We further see that loan to deposit and loan to asset ratio were positive and significant for private banks and insignificant for private banks, showing the effect of deregulation on private sector banks vis à vis public sector banks. In the next section, we will try to capture the causal impact of deregulation on low market powered banks in comparison to

high market powered banks and document the effect of savings rate deregulation on their asset portfolio as well as deposit portfolio. We further study the same effect on private sector banks vis à vis public sector banks, and how ownership heterogeneity plays a role in asset composition.

4.2 Impact of Market Power on Funding Cost and Asset Composition

In order to see the impact of market power on the funding costs for banks and its subsequent impact on the asset composition of banks, we analyze a unique event in the Indian banking sector, the deregulation of the savings deposit rate. Unlike other forms of deposit rate regulations where they take the form of a deposit rate ceiling like Regulation Q in the USA that bind whenever there was any hike by the Federal Reserve (Drechsler et al., 2020) or the deposit rate regulation in Hong Kong where a cartel of banks collectively decided the rate on savings deposit (Chong, 2010), savings deposit rate remained at a constant level for almost a decade before the government decided to deregulate the same.[12] Such a policy impact the ease and cost of raising deposits for the banks, as those banks with a lower geographical presence could not attract deposits by competing with banks with wider reach, essentially leading to the value of such more concentrated banks to be higher. The deregulation in 2011 altered this dynamic by enabling all banks to leverage an essential instrument for raising funds.

Figure 1 Panel A illustrates the average savings deposit rate across banks since 2007, highlighting a noticeable level effect post-2011, although the rate of change diminished after two years. As detailed in the following sections, this overall trend diverges when comparing banks with high and low concentration. This differential behavior impacts funding costs and, subsequently, the balance sheet composition of banks.

Before moving into our identification strategy and empirical analysis, we present our measure of market power in the banking industry: the Herfindahl-Hirschman Index (HHI). The next subsection outlines the calculation of HHI at the branch level, followed by its aggregation at the bank level, which serves as our primary metric for quantifying market power. Additionally, we validate our results using an alternative method of measuring market power: the degree of pass-through

[12]The impact of regulation Q on the banking industry has been studied extensively like studies by Santomero and Siegel (1981), Gilbert (1986), Bordo and Haubrich (2010), Koch (2015) among others who looked at the impact on credit supply and balance sheet compositional changes for banks.

of monetary policy rates to deposit rates by banks.

4.2.1 Measurement of Market Power: Bank HHI

Our first measure of market power enjoyed by banks is the bank and branch level Herfindahl index (HHI) following Drechsler et al. (2017). First, we calculate the branch level HHI using the squared deposit-market shares of all banks that operate branches in a given district in a given year, summing them up for each year

$$\text{Branch HHI}_{d,t} = \sum_{d} (\text{Deposit Market Share}_{b,d,t})^2 \tag{10}$$

where Branch $\text{HHI}_{d,t}$ is the HHI for the branch in district d in year t. We take the average value of branch HHI till 2011 to capture the pre-deregulation characteristics of the banks which are important for to ascertain market power to get

$$\text{Branch HHI}_{d} = \frac{1}{T} \sum_{t} \text{Branch HHI}_{d,t} \tag{11}$$

where T refers to the total number of years into consideration till 2011. These pre-deregulation characteristics include the banks' geographical coverage, ease of doing banking transactions, liquidity facilities provided, ownership structure of the banks among others. As shown in d'Avernas et al. (2023), these other characteristics play an important role in defining the bank's market power in the banking industry. Once we have the measure of the pre-deregulation average, we assign to each bank branch in our data the HHI of the district in which it is located, and refer to it as the respective branch's Branch-HHI. Figures 2 and A6 in Appendix 5 present the map of branch-HHI across India for total deposit (shares) and savings deposit (shares) respectively. A lower number indicates a lower level of concentration and hence a higher level of competition. As can be seen from these figures, there exist a substantial variation in the market power across districts showing strong heterogeneity.

In order to get the bank-level HHI, we define Bank HHI as weighted average of Branch HHI

across all bank branches, using branch deposit (savings deposit) as weights. Formally,

$$\text{Bank HHI}_b = \frac{1}{T}\sum_{t=1}^{T}\sum_{d=1}^{N}\omega_{bdt} \times \text{Branch HHI}_{d,t} \tag{12}$$

where ω_{bdt} refers to the share of deposit share for bank b that it raised in each market in branch in year t, N refers to the total number of branches for a bank. T refers to the total number of years into consideration till 2011. Bank HHI_b captures a bank's average market power across all markets in which it has branches. Two banks operating in the same district will generally have different levels of Bank HHI due to different funding conditions.[13]

Our measure of bank level HHI is the key metric to quantify the extent of any individual bank's market power. In the empirical strategy we use the measure of bank level HHI to distinguish between banks that have a high market power against the banks that have relatively lower market power. In order to characterize banks having low or high market power, we create an indicator variable $\mathbb{1}\{Low\ HHI_{bank}\}$ which takes the value 1 for banks having HHI below the median level of HHI in the total distribution. In this way we characterize banks between relatively lower and higher HHI. We also use other percentiles including the bottom 25th and the bottom 75th to characterize between banks, but the results from the analysis remain the same.

Figure 3 plots the savings deposit rate separately for low and high HHI banks (panel A) and the gap between the repo rate and the savings deposit rate, termed as the spread, for low and high HHI banks (panel B). As can be observed, post deregulation, banks with relatively lower value of HHI offers a higher level of savings deposit rate compared to banks with high value of HHI. Correspondingly, the spread is higher for banks with higher degree of market power (solid line in panel B). Because of their already lower market share, low HHI banks, try to incentivize depositors to park their funds by providing them with higher rate of interest. The increase in deposit rates increased the flow of deposits to the banks with lower market concentration but it also led to increase in their funding costs as well.[14] Consequently, in order to maintain their

[13] We also computed Bank HHI using savings deposit as the weight to compute branch HHI and then using the savings deposit market share of each bank. In our regressions, we use both the measures of bank HHI as a measure of robustness.

[14] See description of Table 1 in Section 4.1 for more details.

profits, low HHI banks induced in higher lending activities and the amount of credit disbursal by these banks increased compared to the banks with high market power. Figure 4 plots the credit to deposit ratio for the two types of banks. Notice that pre deregulation, because of their inherent market power, low HHI banks had a lower share of credit disbursal compared to the high HHI banks, but post 2011, the gap between the two curves decrease and after 2015, actually the trend reverse.

Next, we examine the impact of market power on the balance sheet composition of banks following deregulation, using the Bank HHI as our measure of market power. We employ a two-way fixed effects model to test our hypothesis: post-deregulation of savings deposit rates, do banks with high market power behave differently than those with relatively low market power regarding their asset portfolio?

4.2.2 Empirical Strategy

Using our measure of market power, we set up a two way fixed effects model incorporating fixed effects to take into account factors that are either time invariant bank characteristics or time varying factors affecting the total banking industry.[15] In order to look at the impact of market power on bank's asset composition following deregulation, we use the following specification for our branch-level regression

$$y_{jbit} = \beta Post_t \times \mathbb{1}\{Low\ HHI_{bank}\} + \alpha_j + \delta_t + \varphi_{it} + \epsilon_{jbit} \tag{13}$$

where y_{jbit} measures the various components of a bank balance sheet for branch j of bank b in district i in year t. $\mathbb{1}\{Low\ HHI_{bank}\}$ is an indicator variable that takes the value 1 for banks characterised by below median deposit market concentration in 2011 (averaged till 2011), $Post_t$ is an indicator variable that takes value 1 if year $\geq$ 2012 and 0 otherwise. We control for branch and time fixed effects to take care of various time varying and in-varying unobservables, as well as take into account interaction of district-year fixed effects, φ_{it}, to capture time-varying factors at

[15] For more details on two-way fixed effects models with treatment effects, see De Jonghe et al. (2020), Verdier (2020) and Schmidheiny and Siegloch (2023) among others.

the district in which the bank is located.

Prior to proceeding to the results section, where we will evaluate the validity of our hypothesis, we want to determine if high and low market power banks exhibit similar characteristics before the deregulation policy, based on several variables at the bank level. Figure 6 and 7 capture the trend of various variables related to credit and deposit over time. These figures indicate that before the savings rate deregulation policy, the trends of different variables had a strong parallel pattern. The pattern remains consistent for both deposit and credit variables, as illustrated in Figure 6 and 7. In both the figures, we have normalised the value of variables to the total value of 2010 as the reference year. We can conclude from these figures that low and high market power banks follow a similar trend pre deregulation policy for variables related to credit and deposits, and there is divergence in these variables post deregulation, showing the effect of policy on deposit and credit indicators. We find that post saving rates deregulation, growth in credit and deposit are accelerated in low market power banks compared to high market power banks, hence the divergence. In later subsection, we also use Rambachan and Roth (2023) to do the sensitivity analysis for the temporal dynamics of credit and deposits and establish the treatment effect of the savings rate policy deregulation on low market powered banks vis à vis high market powered banks.

4.2.3 Impact on Deposits and its Implications on Credit

In this section, we will discuss the baseline results for the impact of deregulation of savings deposit rates on deposits and the disbursal of credit. Table 2 shows the results from the branch-level regression capturing the effect of savings rate deregulation on both total and various types of deposits. Panel A reports the results for the branch level regression on the levels of different types of deposits. Column 2 indicates that, on average, the deposits of banks with low market power have increased by 13.5 percentage points compared to banks with high market power (controlling for various fixed effects). Since banks already govern term deposit rates, it's possible that the overall increase in deposits is due to the flow of term deposits rather than the effect of deregulation of savings deposit rate that enabled banks to alter their savings deposit rate. Column 4 shows that the level of savings deposit also increased by approximately 16 percentage points. Similar

magnitudes and increases could be observed for term as well as current account deposits. These results demonstrate that, in terms of total levels, banks with low concentration before deregulation experienced an increased flow of deposits due to changes in their savings deposit rates. This change incentivized depositors to direct their savings into such banks. Consequently, not only did savings deposits increase, but other forms of deposits also rose, leading to an overall increase in the flow of funds for these banks.

Despite the increase in total deposits following savings deposit rate deregulation, the composition of new deposits varied among deposit types. Panel B of Table 2 reports the impact of deregulation on deposit shares for banks with low market concentration. Term Deposit and Current Account are indicator variables denoting whether a particular deposit belongs to a term deposit account or current account for a particular branch, respectively. Results from column 2 show that the shares of both term and current account deposits in total deposits decreased following deregulation for these banks. This highlights that these banks were able to raise a significant proportion of savings deposits, which have a shorter duration and can be withdrawn by depositors at any time, compared to other relatively long-term deposit types. This result underscores that banks raised their savings deposit rates to take advantage of the savings rate deregulation and thereby countering the competition faced by these banks. Consequently, this led to an increased flow of savings deposits as a proportion of new deposits raised, potentially increasing the risk of quick outflows if many depositors were to withdraw their savings deposits simultaneously.

The fact that these banks did not increase term deposit rates, as evidenced by the insignificant coefficient for the impact of deregulation on the weighted average deposit rates (WADR)[16] for low-concentration banks (reported in Column 2 of Table 3), explains the reduction in the proportion of term deposits. Depositors found it more attractive to invest in savings deposits rather than term deposits, which have an implicit "lock-in" period for funds. Overall, this indicates an increase in short-term funding for these banks compared to high-concentration banks.

The increased funding for banks following deregulation of savings deposit rates should also have important implications for the level and composition of investments these banks make with

[16]WADR is the average rates of term deposits weighted by their respective outstanding term deposits

these funds to raise returns. To assess this impact, we run a similar branch-level specification like Equation 13 for the total credit disbursed by bank branches as well as the types of accounts to which they disbursed credit. Our dataset allows us to track the type of borrower that has taken credit from a branch in a given district. This enables us to classify the sector to which the borrower belongs and therefore check the composition of credit disbursed by different banks.

Table 4 reports the results of the impact of deregulation on credit disbursed for banks with low concentration compared to highly concentrated banks. Panel A reports the results for total credit (columns 1 and 2) and the credit-to-deposit ratio (columns 3 and 4). We find that, on average, total credit disbursal increased for low-market power banks by approximately 33 percentage points post-deregulation compared to banks with a higher degree of market presence. Given the increase in the cost of raising funds for these banks due to higher savings deposit rates, they increased the proportion of their deposits used for disbursing credit (Panel A columns 3 and 4) to raise their revenues and insulate their profit margins.

To maintain their profitability amid rising deposit costs, banks may adopt two different strategies: a "search for yield" approach, attracting borrowers willing to pay higher interest rates, or increasing the quantity of their credit disbursement, both of which lead to an increase in their total revenue base. Columns 3 and 4 of Table 3 report the regression results for the weighted average lending rate of banks for their credit disbursement. It shows that there has been a decline in the WALR for banks with less concentration, which, combined with the results from Panel A of Table 4, points to the phenomenon of lowering the price (in this case the WALR) and therefore an increase in demand for credit by borrowers.

While the overall disbursal of credit is important for investments and the smooth functioning of the economy, however, the allocation of total credit to various sectors will determine the quality of the lending. Since allocating credit to sectors that are less productive or relatively more risky, will expose the bank's balance sheets and therefore the health of the banking industry in the economy that will lead to further credit reduction by the banks. To assess the impact of changing funding costs on credit allocation, we categorized total credit into four major sectors: agriculture, industry (including manufacturing firms of all scales), personal (housing, durable goods,

and credit card loans), and services (professional and non-professional). Due to the granularity of our dataset, we have information about the size of loans as per different sectors at branch level, therefore creating a distribution of sectoral allocation and bank's market concentration. Panel B of Table 4 presents the effects of deregulation on these credit types using a specification similar to Equation 13. All the columns show a positive and significant increase in the levels of credit disbursed under various brackets, while the increase is much larger for services, around 73%, followed by the overall industry sector that increased by 38% compared to banks with high concentration. Personal credit increased but not by a large magnitude because of the small ticket size of each individual loan, similar is the case with agricultural loans. Overall, the disbursal of credit by banks, post deregulation, has increased towards all the major sectors of the economy.

Although the disbursal of credit across various sectors has increased overall, the sectoral allocation as a proportion of total credit reveals notable heterogeneity. Appendix Table A9 presents the regression results for the share of total credit allocated to different sectors. While the shares allocated to agriculture, industry, and services sectors have increased, there has been a significant decline in the share of credit directed toward personal loans, which includes personal credit, housing credit, and credit card loans, among others. For banks with lower concentration, lending to sectors with a larger average loan size is more feasible to maximize loan volume and, consequently, revenue. This finding suggests that deregulation may prompt banks to shift away from financing expenditures on durable goods and housing—both of which are important determinants of aggregate demand in the economy.

We further study the part of loan to the industry sector that is directed to Micro, Small, and Medium Enterprises (MSMEs).[17] Given the perceived riskiness of lending to MSMEs (Ramcharran, 2017), it is crucial to analyze how low market power banks responded to deregulation. Table 5 presents the impact on the level of MSME loans (columns 1 and 2) and the share of MSME loans relative to total loans (columns 3 and 4). For both the absolute levels and the share of loans, there has been a substantial increase. This trend indicates that low market powered banks, aiming to insulate their profits from the rising funding costs, have allocated more credit to these relatively

[17] MSMEs contribute around 37% of the total manufacturing output in India and therefore account for a significant proportion of overall firms (MSME Ministry Annual Report).

riskier firms and possibly lower loan rates than personal credit.

Maturity transformation is one of the most important features of modern banking, where they borrow short-term and lend long-term credit (Diamond and Dybvig, 1983; Drechsler et al., 2021). For banks with low concentration facing higher funding costs, engaging in maturity transformation becomes crucial to take advantage of the premium on long-term lending compared to short-term. To test this hypothesis, we run our baseline empirical specification on the share of credit allocated to medium-term and long-term lending. Table 6 reports the results for branch-level regression on the maturity structure of lending. On average, post-deregulation, banks with low market power disburse credit with a shorter maturity duration compared to banks with higher market power. This result highlights that these banks seem to be not engaging in maturity transformation, instead investing their short-term funds, raised mainly through demand deposits, in short-term lending. This finding also corroborates the result from Table 5, which shows an increased share of MSME loans for these banks, typically characterized by a lower average maturity structure. Therefore, our results suggest that, post deregulation of savings deposit rates, banks having low levels of concentration increase their share of total lending across all the sectors except for personal credit. Banks focused on improving their revenue following the increase in their funding costs by increasing the quantity of credit disbursed rather than increasing the price of credit (interest rates). These banks did not engage in maturity transformation and increased their share of lending to short-term and relatively riskier MSME loans. Table 3 through 6 shows that low market power banks are not increasing interest rates on average (in fact decreasing) but they are increasing overall size of the loan.

Our results are robust when we use share of savings deposit instead of total deposit to calculate HHI as shown in Table A4 in the appendix. Our results become even stronger when we truncate the sample to three years immediately after and before deregulation, as shown in Table A5. Because our definition of a Low HHI bank is based on the value of median HHI, we further validate our baseline results using alternate definitions of constructing HHI, using the quartile values of HHI. We divide banks into four quartiles, based on their HHI value in 2011, and keep

banks in the top quartile as the reference category.[18] The results are given in Appendix Table A6. The key takeaway from that result is the strong positive coefficient for the interaction between Post and Bottom Quartile Banks, whch show that compared to the banks in the top quartile of the HHI distribution, banks with the lowest concentration faced an increase in their inflow of deposits (column 1), especially savings deposits (column 2), and as a result they disbursed more credit (column 3) in order to search for higher yield and maintain their profits. The results become even stronger when we restrict our sample to only look at branch-bank pairs within the three year bracket around deregulation, as can be seen from Table A7.

We run the same specification at the bank level as we did at the branch level, given that savings deposit rates in India are decided at the bank level. We find a similar pattern as in Tables 2 and 4. Table A8 reports the effect of savings rate deregulation on low-market concentration banks across various indicators of deposits and assets. There is a significant effect on levels of credit and deposits, although we lose significance for the credit-to-deposit ratio. We find meaningful signs for other bank-level variables related to assets and deposits, but some variables lose significance.

The impact of deregulation on government securities is significant in level terms for low market power banks, but the results are not significant as a share of credit or deposit. Table 7 shows this significance at level and insignificance as share for government securities. The insignificant shares suggest that we cannot say the estimates are different from zero. This makes sense as government securities markets are highly regulated in India, hence changes in deposit rates will not significantly impact banks' decisions to alter their share of government securities. Instead, we see a shuffle in the composition of loan types and maturities.

These results related to market concentration consolidate our hypothesis that high market power leads to "Lazy Banking" for such banks, while low market power banks are the ones increasing their deposits and credit in level. Table A8 shows that at the bank level, credit and deposits for low concentration banks have grown by 18 and 17 percentage points, respectively,

[18] We use a similar regression specification as in Equation 13 but with the three different quartiles as

$$y_{jbit} = \beta_1 Post_t \times \mathbb{1}\{\text{Bottom Quartile Bank}\} + \beta_2 Post_t \times \mathbb{1}\{\text{Second Quartile Bank}\} + \beta_3 Post_t \times \mathbb{1}\{\text{Third Quartile Bank}\} + \alpha_j + \delta_t + \varphi_{it} + \epsilon_{jbit} \quad (14)$$

post-deregulation. We also find that government securities have grown by 21 percentage points in levels (although insignificant as a share of total assets), as shown in Table 7.

This result is not surprising, given that banks in India are required to hold a substantial portion of their net time and demand liabilities as government securities (also known as the Statutory Liquidity Ratio). However, banks' holdings of these securities are much higher than the prescribed limit due to implicit requirements, acting as a form of financial repression. Thus, the inflow of extra funds post-deregulation did not significantly impact such investments, as banks' holdings were already high before deregulation.

When examining the net interest margins (NIMs) of these banks, defined as the difference between interest income and interest expenses, we found a significant rise in interest income due to higher credit disbursal (quantity effect), as well as a significant increase in interest expenses due to higher savings deposit rates. However, banks match their expenses with income such that their NIMs remain insignificant, a result similar to Drechsler et al. (2021). These results are reported in Table 8 and show how banks in India, even though they do not perform maturity transformation, still match their NIMs by raising deposits and investing them in assets paying relatively higher returns compared to government securities.

Our analysis reveals significant changes in Indian banks' behavior following savings deposit rate deregulation. Banks with lower market concentration increased both their deposit base and credit disbursement, challenging the notion of "Lazy Banking" associated with high market power. Despite higher funding costs, these banks maintained their net interest margins by expanding lending activities and investing in higher-yielding assets. While not engaging in traditional maturity transformation, their adaptive strategy demonstrates an effective response to the new regulatory landscape. These findings have important implications for understanding the impact of financial deregulation on banking sector behavior, market competition, and economic efficiency in emerging markets. Next, we present some sensitivity analysis for our results and provide another measure of market power to substantiate our findings on this section.

4.2.4 Sensitivity Analysis for Temporal Dynamics of Deposit and Credit

We use an event study method to document the trajectory of estimate of bank market concentration over time for different indicators of deposit and credit at branch level. The event study used for the sensitivity analysis is a standard event study regression and the equation used is the following:

$$y_{b(bank),t} = \sum_{l=-k}^{m} \beta_l \mathbb{1}\{Low\ HHI_{bank}\} \times \mathbb{1}\{t = 2011 + l\} + \phi_{b(bank)} + \delta_t + \gamma_{dt} + \epsilon_{b(bank),d,t} \tag{15}$$

Here $k > 0$ and $m > 0$; we are using the standard fixed effects as used earlier. Using event study plot, we try to see how β_l evolve over time and particularly post deregulation. To be more precise, do we see a rising trend in β_l post deregulation implying a strong effect of market concentration on bank branches decision related to deposit/credit.

In the previous subsection, we have seen an average effect of deregulation on banks with low market power vis à vis banks with high market power, we saw a consistent result at branch and bank level respectively. We further want to consolidate our result by using a sensitivity analysis to ascertain the treatment effect even if there is an existing pre-trend. Our trend figures in Figure 6 and 7 shows clear parallel trend pre-policy period between low and high market power banks and a divergence post-policy. The trend shows that there is no pre-trend but we also incorporate some sensitivity analysis to further establish the treatment effect of the policy on low market power banks vis à vis high market power banks. In order to do further sensitivity analysis and alleviate the issue of pre-trends, if any, we have incorporated Rambachan and Roth (2023) sensitivity analysis method to get the treatment effect even if there are existing pre-trends. Figure 8 shows us the sensitivity analysis of the restriction that the counterfactual trends can vary with respect to any existing pre-trend, this helps us to establish a treatment effect in a more general form. Using the Rambachan and Roth (2023) sensitivity analysis, we found that we can rule out the null effect unless allow for violations of post trend as large as the max in pre-period (Breakdown $\overline{M}$ for null effect is at least 1 for different variables). Using the above arguments and sensitivity analysis, we can conclude that we can rule out the null effect of the estimate for different variables of credit

and deposits and treat these estimates treatment effect.

4.2.5 Ownership Structure of Banks

One of the key determinants of a bank's market power is its ownership structure. State-owned banks, often endowed with substantial resources and implicit guarantees, can exert considerable market influence and undertake strategic initiatives. These banks, aiming to increase banking penetration across a broader geography, achieve significant market coverage, enabling them to assert a greater degree of market power. Previous studies have examined the performance of banks based on their ownership structure (Sapienza, 2004; Dinç, 2005), and how ownership structure affects lending patterns (Cull and Peria, 2013; Ferri et al., 2014; Bertay et al., 2015).[19] We provide evidence on the implicit link between market power and the ownership structure of banks and investigate the role ownership structure plays in the composition of bank assets. The wider coverage of state-owned banks before deregulation highlights the extent of market power enjoyed by these banks, with private sector banks unable to attract sufficient funds due to their lower coverage, despite offering similar savings deposit rates. We term this the quantity effect. Figure A7 in the appendix shows the heat map for public sector banks branch share pre-deregulation, clearly showing that public sector banks had a higher degree of market concentration compared to their private counterparts. Post-deregulation, private sector banks increasingly adjust savings deposit rates to mitigate their lower market share in raising deposits.

Table 10 reports the correlation between a bank's market concentration in a district, defined in terms of the bank branch HHI for total deposits and savings deposits, and the ownership status of the bank. We use two indicators of bank ownership: the public sector bank's savings deposit share in a given district and the public sector bank's branch share, which is defined as the proportion of bank branches owned by the government relative to the total branches in a given district. Using either measure of HHI, for total deposits or savings deposits, there is a strong and significant correlation between market concentration (measured by HHI) and ownership status. This implies

[19]Some studies have focused on the role local politicians play in influencing state owned banks' performance (Demirgüç-Kunt and Huizinga, 1999; Cull and Xu, 2003; Dinç, 2005), while Burgess and Pande (2005) look at how higher penetration of state owned banks in rural area alleviate poverty by making credit available.

that public sector banks exhibit higher market penetration compared to their private counterparts.

The correlation between market power and bank ownership underscores the strategic advantage of public sector banks post-deregulation. These banks, with their extensive geographical reach, can maintain lower savings deposit rates, thereby reducing the policy rate pass-through to depositors while enjoying a steady flow of deposits. In contrast, private sector banks, in their efforts to attract depositors and increase their deposit base, raise their savings deposit rates above those offered by public sector banks. This strategy increases their deposit inflows but also raises their interest costs. raises their interest costs.

To manage these higher costs, private banks expand their credit disbursal, thereby increasing their interest income to maintain profit margins. Table A2 in the appendix reports the summary statistics of key variables at the bank-level segregated by the ownership structure of banks. Panel A reports the statistics for the public sector banks while panel B reports them for the private sector banks. We present the statistics by looking at the average values of the variables pre deregulation (2006 to 2011) and post deregulation (for period 2012 till 2016). The savings deposit rate increased for both types of banks as column 5 reports, but the difference is statistically larger for the private sector banks, which are also the banks with less concentration in our sample. Analogously spread between the policy rate and the deposit rates fall more for the private sector banks. Credit disbursed as a share of both deposits as well as total assets increased more for private sector banks as compared to the public sector banks showing that private sector banks, in order to compensate for their higher funding costs owing to higher deposit rates, increased their credit disbursal.

Figure 9 plots the saving deposit rate (panel A), spread between the repo rate and the savings deposit rate (panel B), and the credit to deposit ratio (panel C) separately for public sector banks and private sector banks, highlighting the role of ownership structure. Private sector bank raised the savings deposit rate substantially compared to their public sector counterparts following the deregulation of savings deposit rate in 2011 in order to attract deposits, given the relatively lower market power of private sector banks.

Due to the higher costs of raising funds in the form of deposits, private sector banks increased their credit disbursal relative to their deposits post-deregulation, as shown in Panel C. Interest-

ingly, the credit-to-deposit ratio for public sector banks began to decline after deregulation, indicating a shift in their balance sheet composition. This highlights how public sector banks leverage their market power to maintain lower savings deposit rates and the subsequent impact on their lending activities.

Figures A1 and A2 in the appendix plots the share of deposits and credit for private and public banks separately respective to their 2012 levels, when the deregulation happened. Clearly, the deposit share for both types of banks have an upward trend but a stark divergence can be seen between private sector banks and that of public sector banks, with the share of deposits getting higher at every point in time for the private sector banks. Share of credit also started to diverge, albeit after some lag that might be due to the presence of sticky lender-borrower relationship that takes some time to change (Ioannidou and Ongena, 2010; Jiménez et al., 2014; De Jonghe et al., 2020). The difference between public and private sector banks also showed up in terms of the growth rates of their deposits and lending as shown in Figures A3 and A4,which shows a higher growth rate for private sector banks as compared to their public sector counterparts.

To see the impact of market power implied by ownership status on the composition of banks' balance sheet through deregulation, we use our baseline two way fixed effects specification at the bank level but modifying it to include the ownership structure as

$$y_{bt} = \beta Post_t \times \mathbb{1}Private + \alpha_b + \delta_t + \epsilon_{b,t} \tag{16}$$

where *Private* is an indicator variable taking value 1 if the bank is a private sector bank. We include bank fixed effects, α_b, to capture any time invariant bank specific characteristics that might lead to changes in the credit or deposit variables. Time fixed effects δ_t captures the time varying factors. The regression results are provided in Table 10. Panel A reports the results for the savings deposit rate and the levels of deposits and credit. Following deregulation, private sector banks increased their savings deposit rate by 0.46 percentage points, which led to an increased flow of deposits in these banks of around 25% higher than that of their public counterparts. Subsequently, their credit disbursement also goes up in order to maintain their profit margins with credit going up by around 28% higher than that of the public sector banks. The rest of the table segregates the total

investments and credit disbursal into maturity brackets. Overall, for the private sector banks, who have low market concentration, increased their deposits as well as their lending following deregulation. Their interest expenses and interest income both increased compared to the public sector banks owing to higher savings deposit rate offered and lending rate charged by these banks. In contrast, public sector banks, leveraging their greater market power, raised deposit rates less (maintaining a higher spread) and reduced their lending activity. Given the strategic importance of state owned public sector banks in providing credit and deposit facilities, particularly in the rural sector, such a reduction in lending owing to their market power could lead to credit crunch or improper allocation of credit and therefore impacting the economy at large.

4.3 Robustness Check

As a robustness check exercise, we validate the baseline results for our main empirical specification using a second measure of market power, bank beta which is defined as the extent of pass-through of the monetary policy rate on the deposit rates for the banks. This links our study with the growing literature of monetary policy transmission to deposit rates (Hannan and Berger, 1997; Driscoll and Judson, 2013).

4.3.1 Measure of Market Power: Bank β

Following Drechsler et al. (2021) we define bank beta as the extent of change in the deposit spread due to a change in the repo rate. Higher the spread following a change in the repo rate, lower will be the beta. More formally, if f is the repo rate and r^d denotes the deposit rate with $r^d = \beta f$, then the "spread" s is defined as

$$s = (1 - \beta)f$$

lower the β, lower is the sensitivity of deposit rate to the repo rate, higher is the spread and therefore higher is the market power enjoyed by the bank. In order to calculate the same, we measure the interest sensitivity of bank's interest expense to the change in the repo rate. Given that in India, deposit rates are set at the bank level and not at the branch level, we calculate this sensitivity at the bank-level. Specifically, for our analysis, we run the following time-series

regression for each bank i

$$\Delta IntExpRate_{i,t} = \psi_i + \eta_t + \sum_{\tau=0}^{3} \beta_{i,\tau} \Delta RepoRate_{t-\tau} + \epsilon_{i,t} \tag{17}$$

where $\Delta IntExpRate_{i,t}$ is the change in bank i's interest expense rate from t to $t+1$ which is calculated as the total quarterly interest expense divided by quarterly average assets and then annualized. $\Delta RepoRate_t$ is the change in the repo rate from t to $t+1$, ψ_i are bank fixed effects, and η_t are time fixed effects. Time is measured in quarterly frequency. We incorporate three lags of the repo rate changes to account for the cumulative impact of Fed funds rate adjustments over a span of one year. Our estimate of bank i's overall expense beta is the sum of the coefficients in Equation 17

$$\hat{\beta}_{bank} = \sum_{\tau=0}^{3} \beta_{i,\tau} \tag{18}$$

where we have replaced i with $bank$. $\hat{\beta}_{bank}$ measures the extent to which the interest expenses of the bank (that includes the deposit interest expenses) changes due to the change in the repo rate. A higher value of $\hat{\beta}_{bank}$ will mean that the bank has lower market power as it need to pass-through majority of the change in the repo rate to the deposit rates in order to attract deposits. We use this measure of market power in our regression analysis and show how the deregulation of interest rates brought change in the bank's funding costs due to its market power which further impacted its asset composition.[20]

[20] Analogously, we have also checked the interest income sensitivity of the banks to the change in the repo rate by running the same specification as in Equation 17

$$\Delta IntIncomeRate_{i,t} = \psi_i + \eta_t + \sum_{\tau=0}^{3} \beta_{i,\tau}^{Inc} \Delta RepoRate_{t-\tau} + \epsilon_{i,t} \tag{19}$$

where $\Delta IntIncomeRate_{i,t}$ is the change in bank i's interest expense rate from t to $t+1$ which is calculated as the total quarterly interest income divided by quarterly average assets and then annualized. Superscript inc denotes that now this beta is the income beta. Again we can define the bank interest beta as $\hat{\beta}_{bank}^{Inc} = \sum_{\tau=0}^{3} \beta_{i,\tau}^{Inc}$. Figure 5 in the appendix plots the relation between the two measures of betas. Clearly there exist a positive correlation between them which shows that banks that have higher expense beta also tends to have higher income betas as well, which, as we will show more formally in the next subsections, indicates that these banks also earn more from the extra lending that they incur to cover their funding costs.

4.3.2 Effect of bank deregulation and market competition at bank level

We start our analysis by first looking at the effect of savings rate deregulation on high/low market concentration bank with respect to indicators related to deposit and credit for these banks. We use $\hat{\beta}_{bank}$ as estimated in previous subsection (Equation 18) as our primary measure of bank concentration. Higher value of bank beta implies that banks have less market concentration with respect to low bank beta banks. We want to analyse how bank decision to accept and disburse deposit and credit are affected post deregulation with respect to bank's market concentration. We use the following regression equation to compare the effect between low/high concentration bank:

$$y_{b,t} = \beta Post_t * \hat{\beta}_{bank} + \phi_b + \delta_t + \epsilon_{b,t} \tag{20}$$

where $y_{b,t}$ denotes outcome variables for bank b in period t (we are looking levels of deposit and credit as outcome variables), ϕ_b denotes bank fixed effects, and δ_t denotes year fixed effects to control for bank and time varying unobservables. Our primary estimate of interest is β, that captures the differential effect of savings rate deregulation across banks of different market concentration on various outcome of interest. We expect β to be positive implying that post deregulation, banks with lower market concentration will have higher credit and deposit compared to a highly concentrated bank. The result subsection will help us to ascertain this claim.

4.4 Effect of bank deregulation and market competition at branch level

After looking at the effect of savings rate deregulation on high/low market concentration bank with respect to indicators related to deposit and credit for banks. We fine tune our analysis by going granular We use $\hat{\beta}_{bank}$ as estimated in previous subsection as our primary measure of bank concentration. Higher value of bank beta implies that banks have less market concentration with respect to low bank beta banks. We analyse in this part that how branches decide on deposit and credit question post deregulation with respect to bank's market concentration. We use the following regression equation to compare the effect between low/high concentration bank at branch level:

$$y_{b(bank),d,t} = \beta Post_t * \hat{\beta}_{bank} + \phi_{b(bank)} + \delta_t + \gamma_{dt} + \epsilon_{b(bank),d,t} \tag{21}$$

where $y_{b(bank),d,t}$ denotes outcome variables for branch b of bank "*bank*" in period t (we are looking levels of deposit and credit as outcome variables), $\phi_{b(bank)}$ denotes branch level fixed effects, and δ_t denotes year fixed effects, and γ_{dt} is district*time fixed effect to control for any time varying district level macroeconomic unobservables. Our primary estimate of interest is β, that captures the differential effect of savings rate deregulation across banks of different market concentration on various outcome of interest. We expect β to be positive implying that post deregulation, banks with lower market concentration will have higher credit and deposit compared to a highly concentrated bank. The result subsection will help us to ascertain this claim.

4.4.1 Results

Our estimate of bank beta from Equation 18 shows that for banks facing high competition, because of their lower market power, loans and deposits has risen in levels post deregulation compared to banks who have a higher degree of market power (lower beta). Table 9 reports the results of the regression in Equation 21.

Our branch level analysis show that banks with higher market competition have higher level of deposit and credit compared to less competitive market post deregulation. For a more competitive bank branch, a standard deviation increase in bank beta leads to a 14.4 percentage point increase in levels of deposit post deregulation when compared to a lower bank beta branch. The results are similar for savings deposit and it shows an increase of around 17 percentage point compared to a low bank beta branch.

The results are more interesting when we look at total credit with respect to bank beta, we find that for a standard deviation increase in bank beta leads to around 26 percentage point increase in total credit post deregulation. These branch level regression further establishes our claim that we substantiated in bank level regression i.e. high beta banks will have higher level of deposit and credit post deregulation in comparison to low beta banks. We ran the branch level regression with truncated data to see the consistency in our result and Table A10 shows that the estimates significance and sign holds as before, not only that the magnitude of estimates are of similar magnitude. Moreover, we perform the analysis aggregated at the bank-level using the bank level version of

Equation 21. The results are shown in the appendix from Tables A11 to A15. Supply of deposits and disbursal of credit increased for high beta banks. These banks, owing to their less market concentration, invest in riskier and high yield assets that can be seen from the increase in their share of long-term credit as a percentage of assets, that leads to an increase in their interest income but higher deposit rates, to attract funds, also lead to higher interest expenses. Overall, they earn a positive NIM meaning as their search for yield compensates for their funding costs.

Using our empirical specification and robustness results, we have established that market concentration plays an important role for banks when it comes to deciding on how much deposit they might receive and what cost these banks will have to bear to attract deposits from households. Similarly, we saw that this funding cost differential across banks with different market power implies the asset composition of banks. We demonstrate that banks with higher market power do indulge in investing less in riskier loans and more in safer government securities. This can be interpreted as banks with high market power indulging in "Lazy Banking" as their funding costs are lower compared to more competitive banks, and hence they can extract similar profit even by investing less in risky loans and more in safer government securities.

4.5 Impact of market concentration on households deposit and assets

After analyzing the impact of savings rate deregulation on banks with varying levels of market concentration, specifically in relation to deposit and credit indicators, we then shift our focus to the supply and demand dynamics of deposits and loans. This involves examining the effect of the policy change on household demand for loans and the supply of deposits in districts characterized by high and low bank concentration. In order to determine high and low concentration districts, we follow Drechsler et al. (2017), calculating the Herfindahl-Hirschman Index (HHI) for districts based on bank-level HHI. We used the following formula to calculate district level HHI:

$$District\ HHI_{d,t} = \sum_{d} Bank\ Deposit\ Share_{b,d,t} \times Bank\ HHI_{b,t} \tag{22}$$

Where $Bank\ Deposit\ Share_{b,d,t}$ is the deposit share of bank "b" operating in district "d" in time "t" and $Bank\ HHI_{b,t}$ is bank level HHI as calculated earlier. Once we have calculated district level

HHI using Equation 22 we calculate the average HHI until 2011 (the year before saving deposit deregulation came into effect). Using average value of district level HHI, we define district as high and low concentration district. If the average HHI value for a district is below the median value, we assign that district as a low concentration district and vice versa. We use the following regression equation to compare the effect on household decisions related to deposit and credit in low- or high-concentration districts at district level:

$$y_d = \beta \mathbb{1}\{Low\ HHI_{district}\} + \gamma y_d\{t-1\} + \phi X_d + \delta_s + \epsilon_{d,t} \tag{23}$$

Where y_d covers variables related to deposit and credit supplied and demanded by household at district level. $\mathbb{1}\{Low\ HHI_{bank}\}$ is a dummy that takes value 1 if the district level HHI is below the 2011 median value and 0 otherwise. $y_d\{t-1\}$ is the lagged dependent variable controlling for pre deregulation period values of dependent variable. We also use district level controls and state level FE to estimate β. β captures the effect on credit and deposit for an average household in a high market competition district post policy deregulation.

The data used for this analysis is the National Sample Survey Organization's (NSSO) survey of All India Debt and Investment Survey (AIDIS). This is a cross-sectional survey of Indian Households documenting various types of assets and liabilities held by them at a given point of time. The survey is comprehensive in nature as it covers the whole country and is seen as a representative of the population of India. There are two shortcomings of the data, firstly, this is a cross sectional data so we cannot track the evolution of debt and investment of a particular household over time, and secondly the survey is not done on a yearly basis and since 2000 there has been only 3 such surveys done (2003, 2013, and 2019) respectively. Our study is focused at the district level and we are looking at the effect of the policy deregulation on an average household at the district level. For our study, we have aggregated the variables of our interest at the district level using the household weights assigned to each household, creating district-level data as representative of the district population. Since, for our study, we have only 2003 as the pre-period data, we use dependent variable of 2003 as control to incorporate the base effect of household assets and liabilities in our regression specification.

Equation 23 captures the effect of policy deregulation on household supply of deposit and demand of credit in high/low market concentration districts. Table 11 shows the regression results for demand of loans and supply of deposits for an average household at the district level in post policy period and how it is affected by level of market competition. The table shows that for an average household in a high-competition district, the demand for loan is around 29 percentage points higher (column 3 of Table 11) than in a high concentration district in the post deregulation period. This is consistent to what we have found from the bank regression, thus showing demand for loans by household has increased in district where market competition with respect to banks are higher. The table further shows that for an average household in a high-competition district, the supply of deposits is around 27 percentage points higher (column 6 of Table 11) than in a high concentration district in the post deregulation period. This result is also consistent with the banks and branch level regression that we have done earlier, implying low market concentration districts have higher supply of deposits post deregulation. Our results for the household regression is in line with the hypothesis that we have established earlier from the bank side that low market concentration led to more flexibility in deposit rates and hence increase in supply of deposits in such markets and in order to cover for an increased savings rates, banks in these markets also indulge in giving more loans. This was established from the bank results and the household regressions also establishes this argument.

5 Conclusion

When bank funding costs are regulated, i.e. saving deposit rates are fixed by the regulator, it leads to the creation of captive depositors who do not have incentives to move from one bank to another in search of higher deposit rates. Such a regulated regime plausibly allows banks to invest in less risky assets, such as government securities, as they can earn comfortable margins. However, inadvertently, the share of funds available for loans reduces. In a regulated regime, banks can extract higher profit by reducing their funding cost in a period of high interest rates as they are getting a higher spread. This is akin to “lazy banking" documented in previous literature, wherein banks extract higher profits through the deposit channel and continue investing in safer

assets. Deregulation of deposit rates allows banks to raise deposit rates, and depositors can move to banks that provide better deposit rates. To attract more depositors, banks can increase their deposit rates, and as the funding cost increases for banks, their asset portfolio changes accordingly to compensate for the increased cost. We show that this phenomenon is more likely to occur for a bank with lower market power, where we define market power using two distinct definitions, namely bank HHI and bank beta. We link these findings to the ownership structure of banks, noting that banks benefiting from government guarantees (public sector banks) tend to possess a higher level of market power than their private counterparts, which leads them to not increase the deposit rates and hence can no significant change in the composition of assets.

The results showed a significant effect of deregulation on deposit and credit to low market powered banks. Specifically, following deregulation, banks with low market power experienced a 32.3 percentage point and 13.5 percentage point surge in loans and deposits compared to banks with high market power. However, we do not find any significant shift in the share of investment in government securities for these low market powered banks. The change in composition in the asset class happened with credit, as we show that low market powered banks shifted there loans from personal to industry where the ticket sizes are big and within industry they are increasing their share in MSME sectors. This shows that not only such banks were venturing for big ticket loans but also riskier ones in order to compensate for the increased cost in form of higher deposit rates. We further show that short term loans substituted medium and long term loans and simultaneously the WALR for such low market powered banks are lower than high market powered banks post deregulation. There is shuffling in the composition deposits too for low concentration banks, as we show that savings deposit share increase over term and current account deposit, showing such banks responding to savings rate deregulation by increasing their share of more saving deposits.

The findings of this research hold relevance beyond the context of India and can be applied to various emerging economies where the banking sector operates under diverse regulatory frameworks. These regulations can significantly influence banks' decisions regarding the diversification or concentration of their asset portfolios. Emerging economies often face challenges related

to limited access to credit for both households and businesses through traditional channels. Any regulatory measures that hinder banks' incentives to invest in higher-yielding but riskier assets or projects could exacerbate the credit crunch in the economy. Our study aims to shed light on this issue and demonstrate how the deregulation of deposit rates enables banks to allocate resources towards riskier ventures, consequently alleviating the demand for credit in the economy.

References

Acharya, V. V. and Rajan, R. (2020). Indian banks: A time to reform. *University of Chicago Booth School of Business Working Paper*.

Agarwal, R. (2023). The past future of indian finance. *M-RCBG Associate Working Paper Series 2023.212*.

Aghion, P., Angeletos, G.-M., Banerjee, A., and Manova, K. (2010). Volatility and growth: Credit constraints and the composition of investment. *Journal of monetary economics*, 57(3):246–265.

Autor, D., Dorn, D., Katz, L. F., Patterson, C., and Van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics*, 135(2):645–709.

Bai, J., Krishnamurthy, A., and Weymuller, C.-H. (2018). Measuring liquidity mismatch in the banking sector. *The journal of Finance*, 73(1):51–93.

Baqaee, D. R. and Farhi, E. (2020). Productivity and misallocation in general equilibrium. *The Quarterly Journal of Economics*, 135(1):105–163.

Barkai, S. (2020). Declining labor and capital shares. *The Journal of Finance*, 75(5):2421–2463.

Becker, B. and Ivashina, V. (2014). Cyclicality of credit supply: Firm level evidence. *Journal of Monetary Economics*, 62:76–93.

Berger, A. N. and Bouwman, C. H. (2017). Bank liquidity creation and financial crises. *Journal of Financial Intermediation*, 30:1–29.

Bertay, A. C., Demirgüç-Kunt, A., and Huizinga, H. (2015). Bank ownership and credit over the business cycle: Is lending by state banks less procyclical? *Journal of Banking & Finance*, 50:326–339.

Bordo, M. D. and Haubrich, J. G. (2010). Credit crises, money and contractions: An historical view. *Journal of Monetary Economics*, 57(1):1–18.

Brunnermeier, M. K., Gorton, G., and Krishnamurthy, A. (2012). Risk topography. *Nber macroeconomics annual*, 26(1):149–176.

Burgess, R. and Pande, R. (2005). Do rural banks matter? evidence from the indian social banking experiment. *American economic review*, 95(3):780–795.

Carlson, M., Correia, S., and Luck, S. (2022). The effects of banking competition on growth and financial stability: Evidence from the national banking era. *Journal of Political Economy*, 130(2):462–520.

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *The Quarterly Journal of Economics*, 129(1):1–59.

Chong, B. S. (2010). Interest rate deregulation: Monetary policy efficacy and rate rigidity. *Journal of Banking & Finance*, 34(6):1299–1307.

Cull, R. and Peria, M. S. M. (2013). Bank ownership and lending patterns during the 2008–2009 financial crisis: Evidence from latin america and eastern europe. *Journal of Banking & Finance*, 37(12):4861–4878.

Cull, R. and Xu, L. C. (2003). Who gets credit? the behavior of bureaucrats and state banks in allocating credit to chinese state-owned enterprises. *Journal of Development Economics*, 71(2):533–559.

d'Avernas, A., Eisfeldt, A. L., Huang, C., Stanton, R., and Wallace, N. (2023). The deposit business at large vs. small banks. Technical report, National Bureau of Economic Research.

De Jonghe, O., Dewachter, H., Mulier, K., Ongena, S., and Schepens, G. (2020). Some borrowers are more equal than others: Bank funding shocks and credit reallocation. *Review of Finance*, 24(1):1–43.

De Loecker, J., Eeckhout, J., and Unger, G. (2020). The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics*, 135(2):561–644.

De Ridder, M. (2024). Market power and innovation in the intangible economy. *American Economic Review*, 114(1):199–251.

DeAngelo, H. and Stulz, R. M. (2015). Liquid-claim production, risk management, and bank capital structure: Why high leverage is optimal for banks. *Journal of financial economics*, 116(2):219–236.

Demirgüç-Kunt, A. and Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2):379–408.

Di Tella, S. and Kurlat, P. (2021). Why are banks exposed to monetary policy? *American Economic Journal: Macroeconomics*, 13(4):295–340.

Diamond, D. W. and Dybvig, P. H. (1983). Bank runs, deposit insurance, and liquidity. *Journal of political economy*, 91(3):401–419.

Dinç, I. S. (2005). Politicians and banks: Political influences on government-owned banks in emerging markets. *Journal of financial economics*, 77(2):453–479.

Drechsler, I., Savov, A., and Schnabl, P. (2017). The deposits channel of monetary policy. *The Quarterly Journal of Economics*, 132(4):1819–1876.

Drechsler, I., Savov, A., and Schnabl, P. (2020). The financial origins of the rise and fall of american inflation. *NYU Stern School of Business*.

Drechsler, I., Savov, A., and Schnabl, P. (2021). Banking on deposits: Maturity transformation without interest rate risk. *The Journal of Finance*, 76(3):1091–1143.

Drechsler, I., Savov, A., Schnabl, P., and Wang, O. (2023). Banking on uninsured deposits. Technical report, National Bureau of Economic Research.

Driscoll, J. C. and Judson, R. (2013). Sticky deposit rates. *Federal Reserve Board Working Paper*.

Edmond, C., Midrigan, V., and Xu, D. Y. (2023). How costly are markups? *Journal of Political Economy*, 131(7):1619–1675.

Egan, M., Hortaçsu, A., and Matvos, G. (2017). Deposit competition and financial fragility: Evidence from the us banking sector. *American Economic Review*, 107(1):169–216.

Eisfeldt, A. L., Huang, C., Stanton, R., Wallace, N., et al. (2023). The deposit business at large vs. small banks.

English, W. B., Van den Heuvel, S. J., and Zakrajšek, E. (2018). Interest rate risk and bank equity valuations. *Journal of Monetary Economics*, 98:80–97.

Ferri, G., Kalmi, P., and Kerola, E. (2014). Does bank ownership affect lending behavior? evidence from the euro area. *Journal of Banking & Finance*, 48:194–209.

Freixas, X. and Rochet, J.-C. (2008). *Microeconomics of banking*. MIT press.

Ganesh-Kumar, A. and Gaurav, S. (2019). Bank credit allocation in india: Has the priority sector norms stifled the efficiency of banks? *Journal of Economic Policy and Research*, 14(2):71–94.

Gatev, E. and Strahan, P. E. (2006). Banks' advantage in hedging liquidity risk: Theory and evidence from the commercial paper market. *The Journal of Finance*, 61(2):867–892.

Gerali, A., Neri, S., Sessa, L., and Signoretti, F. M. (2010). Credit and banking in a dsge model of the euro area. *Journal of money, Credit and Banking*, 42:107–141.

Gilbert, R. A. (1986). Requiem for regulation q: What it did and why it passed away. *Federal Reserve Banks of St. Louis Review*, 68.

Grossman, G. M. and Rossi-Hansberg, E. (2012). Task trade between similar countries. *Econometrica*, 80(2):593–629.

Haendler, C. (2022). Keeping up in the digital era: How mobile technology is reshaping the banking sector. *Available at SSRN 4287985*.

Hakenes, H., Hasan, I., Molyneux, P., and Xie, R. (2015). Small banks and local economic development. *Review of Finance*, 19(2):653–683.

Hannan, T. H. and Berger, A. N. (1997). The rigidity of prices: Evidence from the banking industry. *J. Reprints Antitrust L. & Econ.*, 27:245.

Hanson, S. G., Shleifer, A., Stein, J. C., and Vishny, R. W. (2015). Banks as patient fixed-income investors. *Journal of Financial Economics*, 117(3):449–469.

Herndon, T. and Matvos, G. (2016). The value of risk management in agricultural banking. *Journal of Finance*, 71(2):867–906.

Hopenhayn, H., Neira, J., and Singhania, R. (2022). From population growth to firm demographics: Implications for concentration, entrepreneurship and the labor share. *Econometrica*, 90(4):1879–1914.

Hsieh, C.-T. and Klenow, P. J. (2009). Misallocation and Manufacturing TFP in China and India*. *The Quarterly Journal of Economics*, 124(4):1403–1448.

Huber, K. (2018). Disentangling the effects of a banking crisis: Evidence from german firms and counties. *American Economic Review*, 108(3):868–898.

Ioannidou, V. and Ongena, S. (2010). "time for a change": loan conditions and bank behavior when firms switch banks. *The Journal of Finance*, 65(5):1847–1877.

Jiang, E. X., Matvos, G., Piskorski, T., and Seru, A. (2023). Monetary tightening and us bank fragility in 2023: Mark-to-market losses and uninsured depositor runs? Technical report, National Bureau of Economic Research.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2014). Hazardous times for monetary policy:

What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking? *Econometrica*, 82(2):463–505.

Kashyap, A. K., Rajan, R., and Stein, J. C. (2002). Banks as liquidity providers: An explanation for the coexistence of lending and deposit-taking. *The Journal of finance*, 57(1):33–73.

Kirti, D. (2020). Why do bank-dependent firms bear interest-rate risk? *Journal of Financial Intermediation*, 41:100823.

Klein, M. A. (1971). A theory of the banking firm. *Journal of money, credit and banking*, 3(2):205–218.

Koch, C. (2015). Deposit interest rate ceilings as credit supply shifters: Bank level evidence on the effects of regulation q. *Journal of Banking & Finance*, 61:316–326.

Koetter, M., Kolari, J. W., and Spierdijk, L. (2012). Enjoying the quiet life under deregulation? evidence from adjusted lerner indices for us banks. *Review of Economics and Statistics*, 94(2):462–480.

Li, L., Loutskina, E., and Strahan, P. E. (2023). Deposit market power, funding stability and long-term credit. *Journal of Monetary Economics*, 138:14–30.

Mohan, R. (2003). Transforming indian banking: in search of a better tomorrow. *Reserve Bank of India Bulletin*, 1.

Monti, M. et al. (1972). *Deposit, credit and interest rate determination under alternative bank objective function*. North-Holland/American Elsevier Amsterdam.

Moreira, A. and Savov, A. (2017). The macroeconomics of shadow banking. *The Journal of Finance*, 72(6):2381–2432.

Nagel, S. and Purnanandam, A. (2020). Banks' risk dynamics and distance to default. *The Review of Financial Studies*, 33(6):2421–2467.

Prabheesh, K. and Durai, S. R. S. (2019). The determinants of bank asset concentration in india: Does financial development matter? *Journal of Applied Economics*, 22(2):388–411.

Rambachan, A. and Roth, J. (2023). A more credible approach to parallel trends. *Review of Economic Studies*, 90(5):2555–2591.

Ramcharran, H. (2017). Bank lending to small business in india: Analyzing productivity and efficiency. *The quarterly review of Economics and Finance*, 65:16–24.

Rossi-Hansberg, E., Sarte, P.-D., and Trachter, N. (2021). Diverging trends in national and local concentration. *NBER Macroeconomics Annual*, 35(1):115–150.

Rossi-Hansberg, E. and Wright, M. L. J. (2007). Establishment size dynamics in the aggregate economy. *American Economic Review*, 97(5):1639–1666.

Santomero, A. M. and Siegel, J. J. (1981). Bank regulation and macro-economic stability. *The American Economic Review*, 71(1):39–53.

Sapienza, P. (2004). The effects of government ownership on bank lending. *Journal of financial economics*, 72(2):357–384.

Schmidheiny, K. and Siegloch, S. (2023). On event studies and distributed-lags in two-way fixed effects models: Identification, equivalence, and generalization. *Journal of Applied Econometrics*,

38(5):695–713.

Stein, J. C. (2012). Monetary policy as financial stability regulation. *The Quarterly Journal of Economics*, 127(1):57–95.

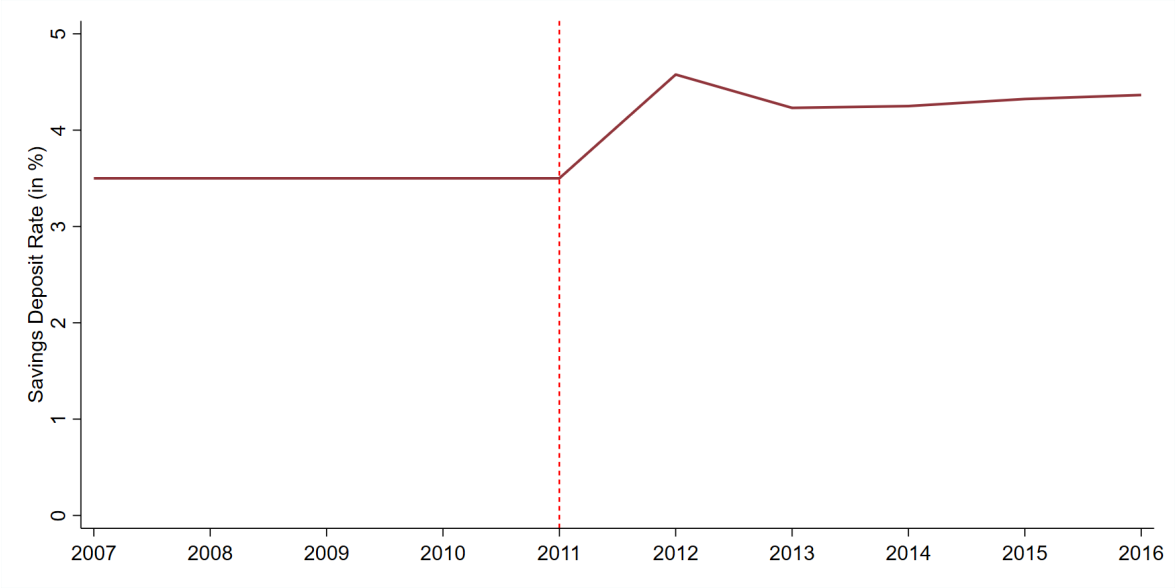
van Greuning, H. and Bratanovic, S. (2018). Risk management in financial institutions. *Journal of Banking and Finance*, 93:268–294.

Verdier, V. (2020). Estimation and inference for linear models with two-way fixed effects and sparsely matched data. *Review of Economics and Statistics*, 102(1):1–16.

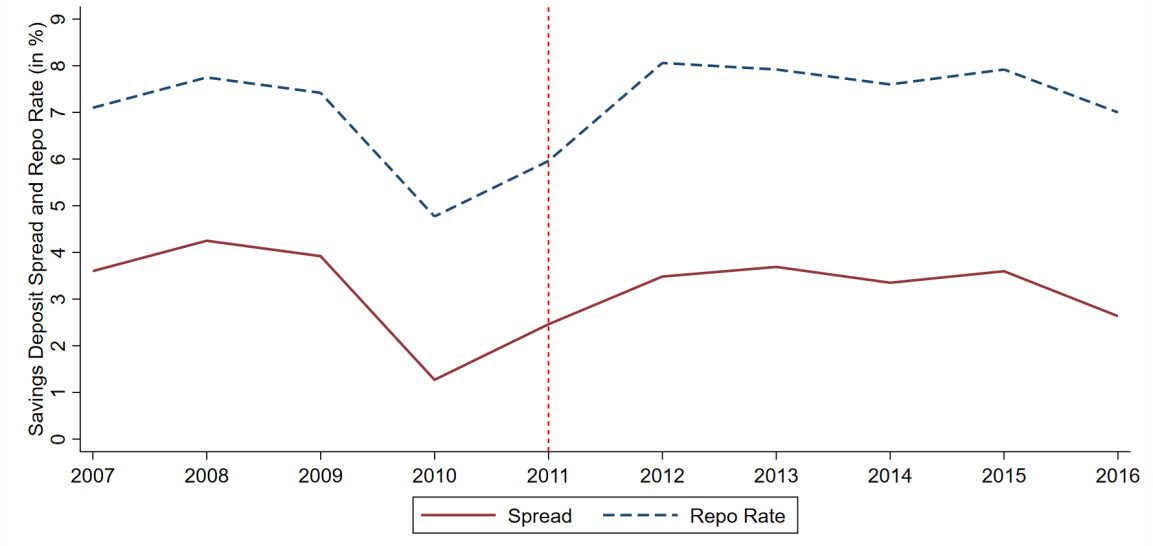
Zhao, T., Casu, B., and Ferrari, A. (2010). The impact of regulatory reforms on cost structure, ownership and competition in indian banking. *Journal of Banking & Finance*, 34(1):246–254.

Figure 1
Savings Deposit Rates

This figure plots the savings deposit rate, deposit spread, and the repo rate for all banks in India from 2007 to 2016. Panel A illustrates the savings deposit rate for all banks in India. The horizontal axis is the end of calendar year. Panel B shows the gap between the repo rate and the savings deposit rates (denoted as spread) and the repo rate for all banks. The horizontal axis is the end of financial year. The data for the savings deposit rate is from the annual reports of individual banks and is expressed as the annual average of the monthly savings deposit rate set by the banks , while the repo rate data is from the Reserve Bank of India (RBI) website. All the variables are expressed in percentages.



(A) Savings Deposit Rate: All Banks



(B) Savings Deposit Spread and Repo Rate

Figure 2
Deposit Concentration Across Districts

This figure shows the heat map for market concentration in India, showing the district level variation in market competition based on total deposits. We follow Drechsler et al. (2017) definition in computing this measure of market concentration. Using the squared share of total deposits for branches of bank i operating in district d, we compute the branch HHI. We used the BSR data on branch statistics for our computation. Details of the computation is given in Section 4.2.1. This figure corresponds to all banks in the economy. Area for which no data is available is marked in white.

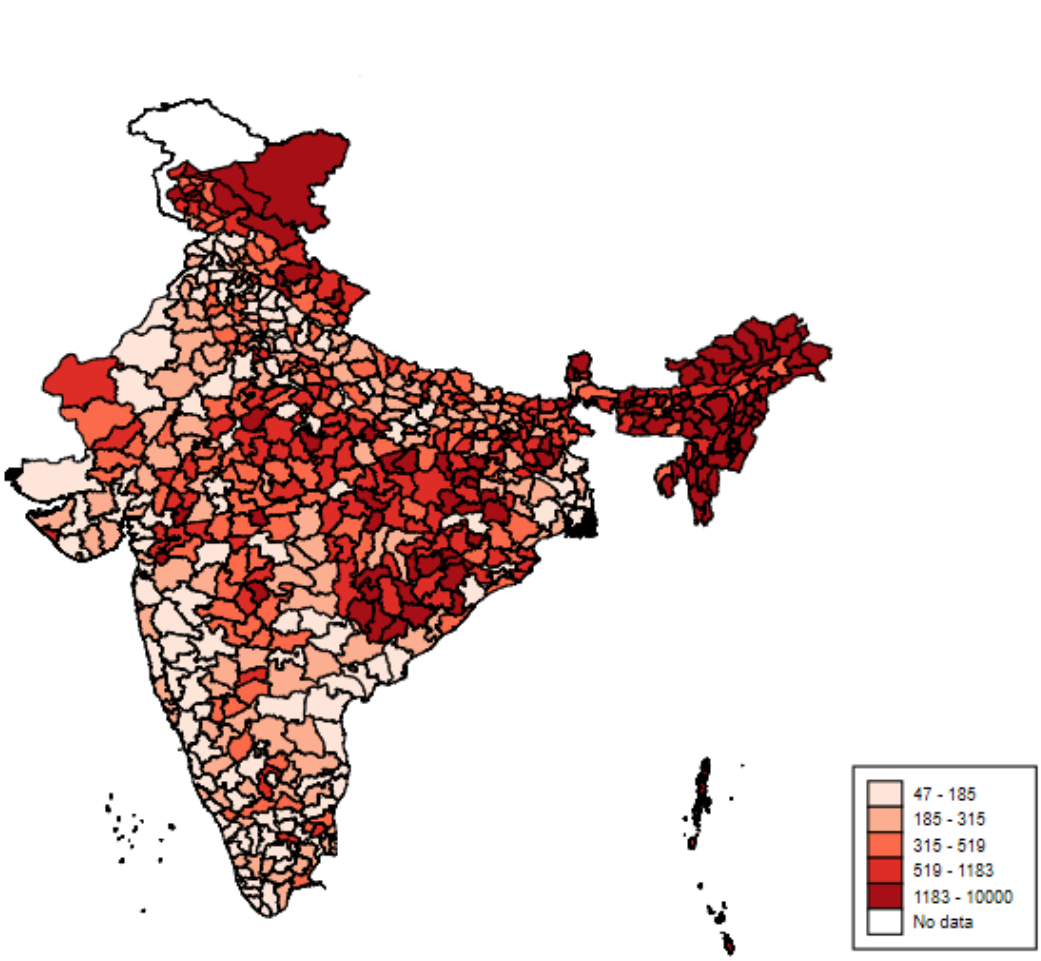
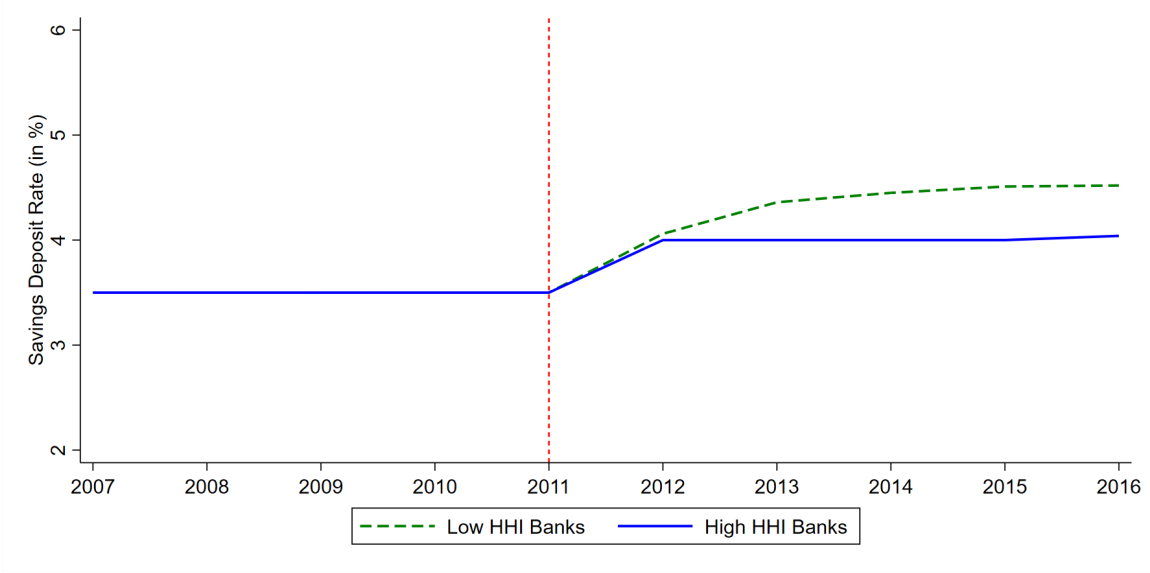
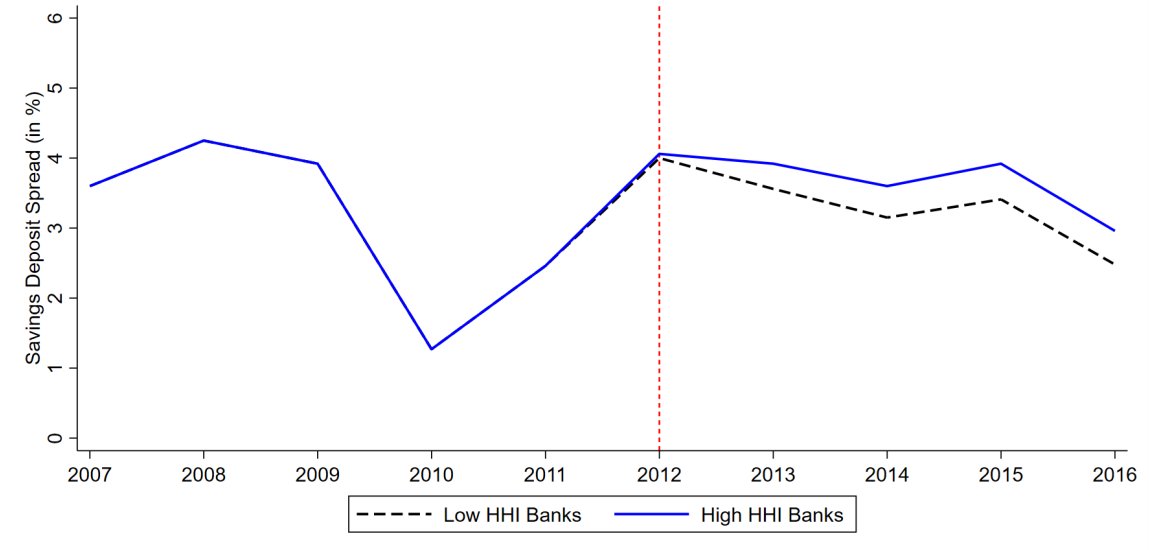


Figure 3
Savings Deposit Rates: Heterogeneity by Deposit Market Concentration

This figure shows the savings deposit rate and the spread between the repo rate and the savings deposit rate for banks with low and high HHI in India from 2006 to 2016. Panel A displays the savings deposit rate as a percentage for low-HHI (dashed line) and high-HHI (solid line) banks, with HHI measurement in section 5.1. Panel B shows the spread (repo rate minus savings deposit rate) for low-HHI and high-HHI banks. The horizontal axis represents the financial year. Banks with an HHI below the median are low HHI, and those above the median are high HHI, as described in Section 4.3. Savings deposit rates come from individual banks' annual reports, and repo rates are from the RBI.



(A) Savings Deposit Rate: Low HHI vs High HHI Banks



(B) Savings Deposit Spread: Low HHI vs High HHI Banks

Figure 4
Credit to Deposit ratio: Low HHI vs High HHI Banks

This figure plots the credit-to-deposit ratio for banks in India from 2007 till 2016, segregated by their market concentration: banks with low HHI (dashed curve) and banks with high HHI (solid curve). Measurement of HHI is described in Section 4.2.1. Low HHI banks are defined as those having its value of HHI below the median level of HHI in the banking industry, while those banks having a value of HHI higher than median are categorised as High HHI. The horizontal axis refer to the end of the financial year and the vertical axis denotes the credit to deposit ratio denoted in percentage terms. Description of credit and deposit is provided in Table A1 in Appendix B. Data is taken from the banks' balance sheet data available from RBI.

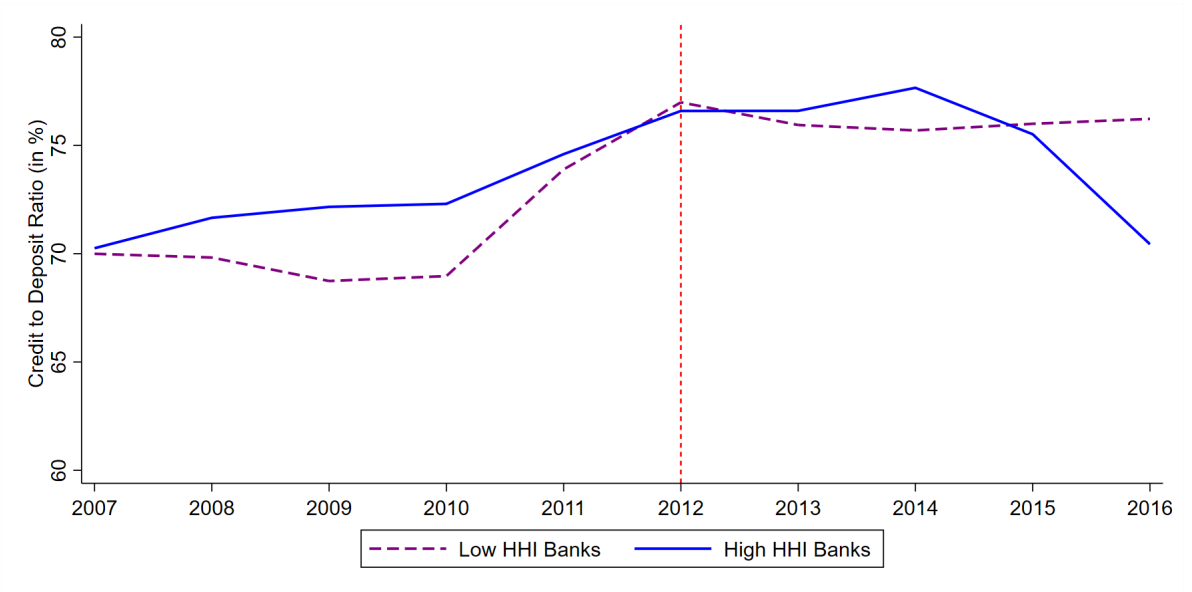


Figure 5
Interest Expense Beta and Interest Income Beta

This figure shows the scatter plot of interest expense beta against the interest income beta for all banks in India computed prior to 2011. Interest expense beta is defined as the sensitivity of interest expenditure due to a contemporaneous change in the repo rate, similar definition holds for interest income beta as well. The interest expense beta is calculated by using branch level data from BSR in the regression Equation 17 and finally aggregating them as per Equation 18. Similarly, interest income beta is calculated by using the interest income data from BSR and Equation 19.

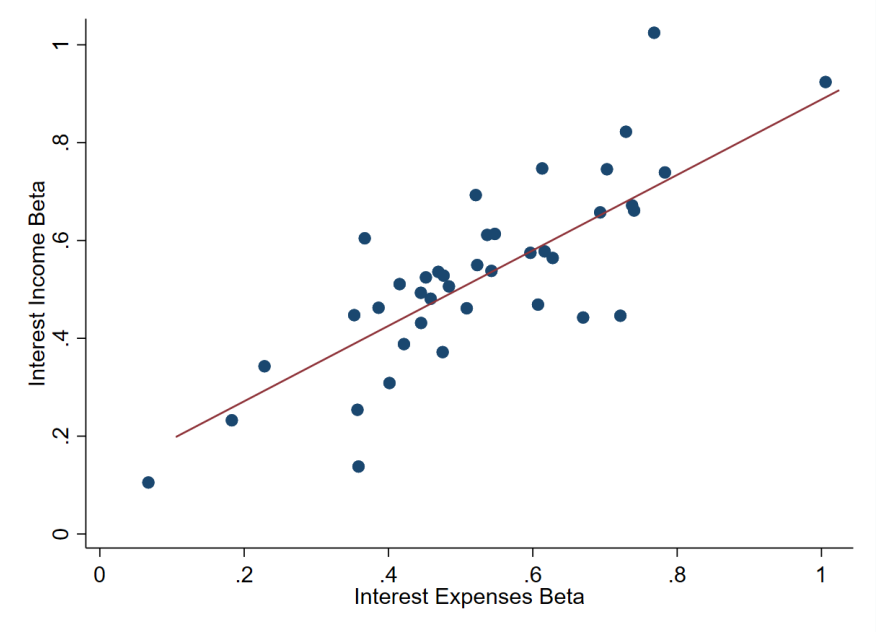
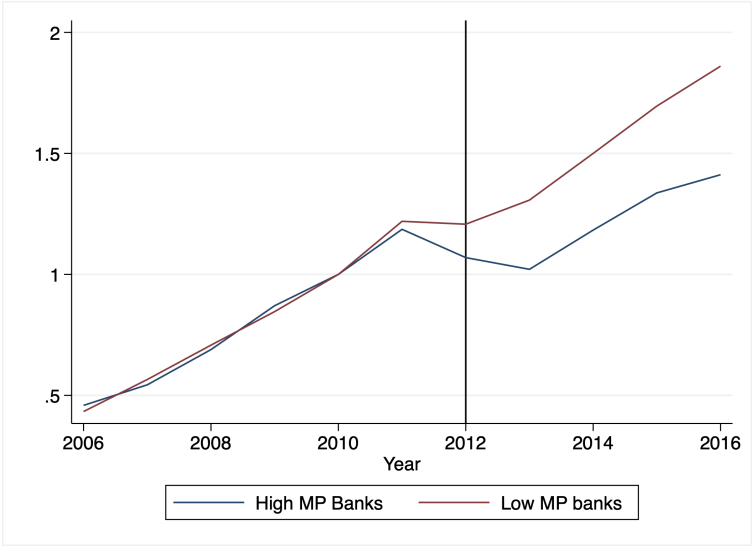
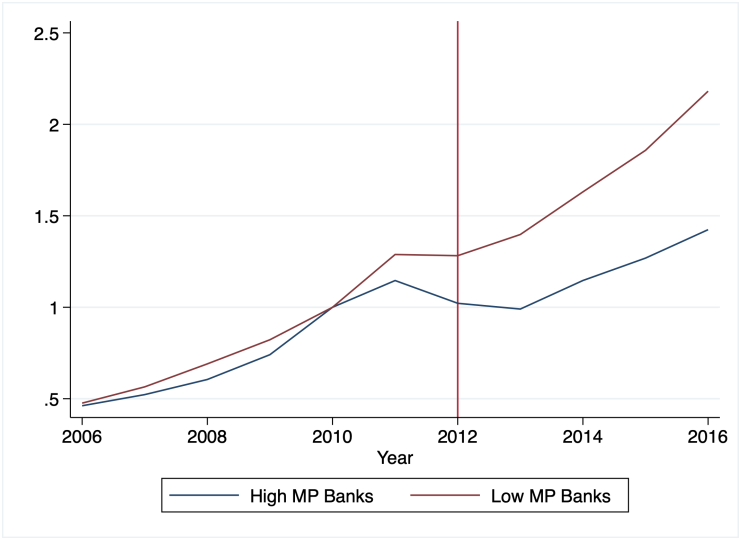


Figure 6
Temporal Dynamics: Deposits

This figure captures the trend of various indicator of deposits aggregated from branch-level data over time. It shows the trend of total deposits (panel A) and savings deposits (panel B) over time for low- and high-market powered banks. Low-market powered banks are defined as those banks that are below the median bank with respect to market concentration as defined earlier. Both total deposits and savings deposits over the year are normalised to the total value of 2010 as the reference year.



(A) Log(Deposit)



(B) Log(Savings Deposit)

Figure 7
Temporal Dynamics: Credit

The plot captures the trend of total credit aggregated from branch-level data over time. It shows the trend of total credit over time for low- and high-market power banks. Low-market power banks are defined as those banks that are below the median bank with respect to market concentration as defined earlier. The total credit over the year are normalised to the total credit of 2010 as the reference year.

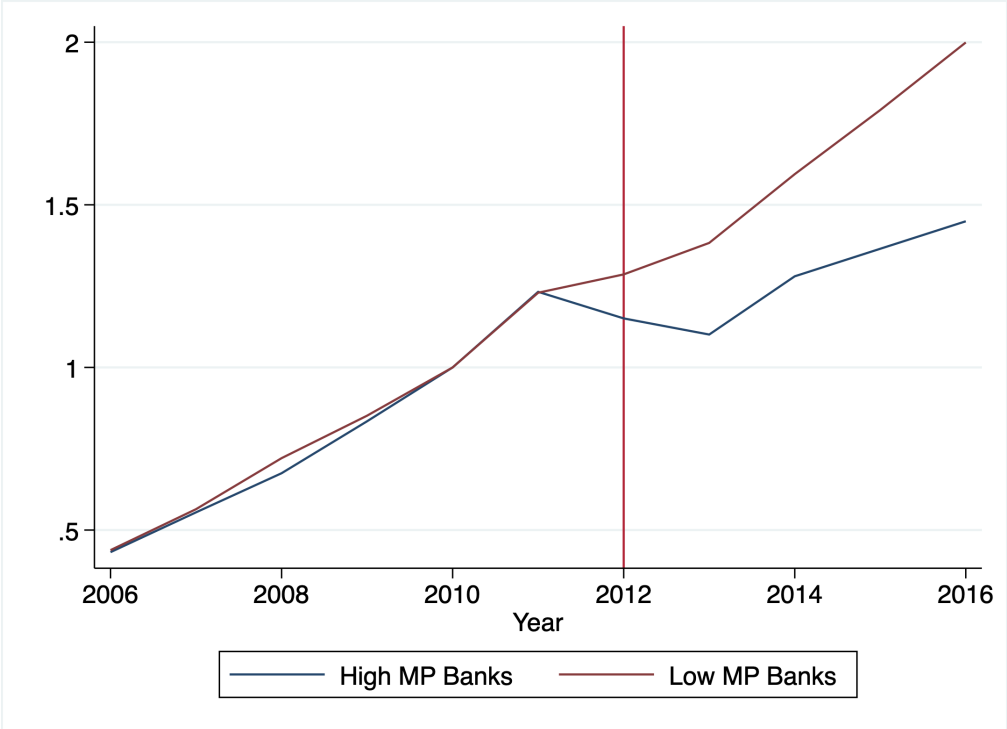
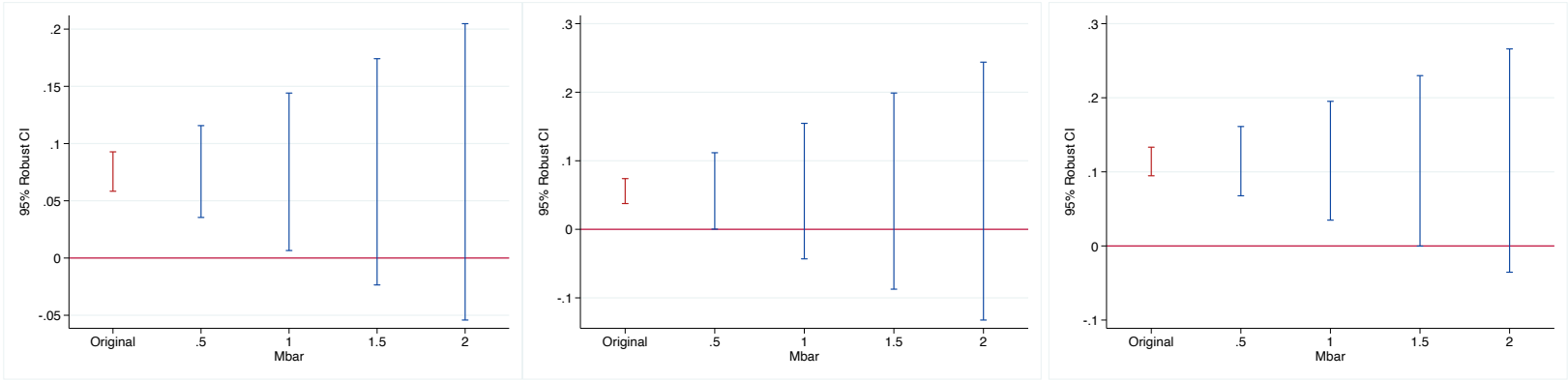


Figure 8
Event Study Sensitivity Analysis

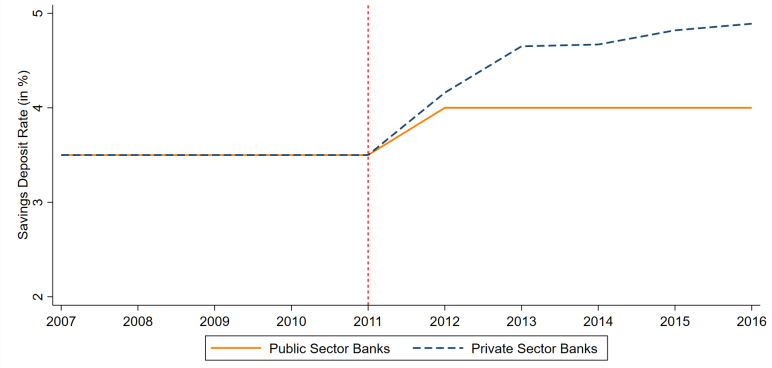
The plot shows the sensitivity analysis of the restriction that the counterfactual trends can vary with respect to the pre-trend. We use Rambachan and Roth (2023) honest Difference in Differences sensitivity analysis to find a range for counterfactual to get a meaningful treatment effect. The figure shows 3 panel covering the log of deposits and credit. The figure shows when we can rule out the null effect unless allow for violations of post trend as large as the max in pre-period (Breakdown $\overline{M}$ for null effect for different variables).



(a) Deposit **(b) Savings Deposit** **(c) Credit**

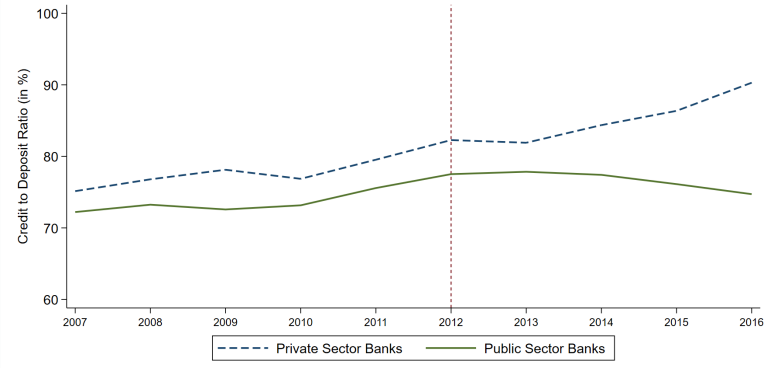
Figure 9
Heterogeneity by Bank Ownership: Savings Deposit Rate and Credit-to-Deposit

This figure illustrates savings deposit rates, spreads, and credit-to-deposit ratios for Indian public and private sector banks. Panel A shows savings deposit rates from 2007 to 2016, with private banks represented by a dashed line and public banks by a solid line. Data is sourced from individual bank balance sheets. Panel B displays the savings deposit spread, calculated as the difference between the repo rate and savings deposit rate. Repo rate data is from the RBI. Panel C depicts the credit-to-deposit ratio for both bank types, with deposits including all types. Private banks are represented by a dashed line, and public banks by a solid line. Credit and deposit data comes from bank balance sheets available on the RBI website, covering 2007 to 2016. Variable descriptions can be found in Table A1.



(A) Savings Deposit Rate

(B) Savings Deposit Spread



(C) Credit-to-Deposit

Table 1
Descriptive Statistics

This table presents summary statistics for key variables at both bank and branch levels. Panel A displays bank-level statistics from 2007 to 2016. Columns 1 and 2 show the mean and standard deviation for all banks. Columns 3-8 compare low-HHI and high-HHI banks, as defined in Section 4.2.1. For low-HHI banks, columns 3 and 4 show mean values before and after deregulation, while column 5 presents their difference with t-test significance. Similarly, columns 6 and 7 show means for high-HHI banks pre- and post-deregulation, with column 8 reporting their difference and t-test significance. Column 9 provides the difference-in-differences between low and high-HHI banks, including significance levels. Panel B focuses on branch-level statistics. Columns 1 and 2 present overall averages and standard deviations. Columns 3-5 show averages for low-HHI bank branches before and after deregulation, their difference, and significance. Columns 6-8 do the same for high-HHI bank branches. Column 9 reports the difference-in-differences between low and high-HHI branches, with associated significance. Definitions for all key variables are provided in Table A1.

Panel A: Bank-level Statistics

Variables	All		Low HHI			High HHI			
	Mean	SD	Pre	Post	Diff.	Pre	Post	Diff.	Diff-in-diff (8-5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Savings Deposit Rate (in %)	3.8	0.6	3.50	4.30	0.8***	3.50	3.91	0.41***	-0.40***
Spread (in %)	3.29	1.0	2.96	2.69	-0.27**	2.96	3.09	0.13	0.40**
Assets (INR billions)	1553	2414	430	1052	622***	1302	4843	3539***	2917**
Deposits (INR billions)	1238	1851	343	823	479***	1051	3902	2851***	2372***
Credit (INR billions)	854	1514	254	644	389***	765	2884	2119***	1730***
G-sec Investments (INR billions)	317	456	95	224	129***	290	1005	715***	586**
Credit to Deposit (in %)	74.62	24.11	70.24	76.16	5.92***	69.35	76.23	6.88***	0.96
Credit to Assets (in %)	59.78	6.17	56.81	60.83	4.02***	57.63	59.46	1.83***	-2.19**
G-sec to Assets (in %)	21.72	2.77	22.30	21.77	-0.53***	23.94	21.35	-2.58***	-2.05
Short Inv to Assets (in %)	7.59	6.18	9.01	9.66	0.65***	5.59	6.85	1.25	0.60
Long Inv to Assets (in %)	20.15	7.19	19.69	18.48	-1.21***	23.82	19.94	-3.87*	-2.66
Short Credit to Assets (in %)	21.90	7.88	22.86	22.45	-0.40	21.95	20.56	-1.38	-0.98
Long Credit to Assets (in %)	37.07	8.74	33.82	38.57	4.74***	37.77	40.90	3.13 **	-1.06*
Interest Expenses to Assets (in %)	5.35	.96	5.02	6.18	1.15***	4.49	4.99	0.50***	-0.65***
Interest Income to Assets (in %)	7.83	0.96	7.48	8.70	1.21***	7.03	7.60	0.57***	-0.64**
NIM (in %)	2.48	0.63	2.45	2.51	0.06	2.57	2.61	0.03	0.03
Observations	481		241			240			481
Number of Banks	55		27			28			55

Panel B: Branch-level Statistics

Variables	All		Low HHI			High HHI			
	Mean	SD	Pre	Post	Diff.	Pre	Post	Diff.	Diff-in-diff (8-5)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Deposits (INR millions)	667	4180	659	835	176***	497	757	260***	84***
Credit (INR millions)	524	8852	504	683	178***	373	601	228***	50**
Branch HHI	1365	364	1099	1064	-35***	1614	1634	20***	55**
Observations	707161		350174			356987			707161

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2
Impact on Deposits

This table presents estimates of identification regressions to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. Panel A shows results for various types of deposits that each branch receives in level (log) terms. They are regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in Equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration. Panel B focuses on the share of deposits, with Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ interacted with different deposit types. Odd columns refer to the results without district-year fixed effects, while the even columns constitute all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel from 2007 till 2016. Standard errors are clustered at the branch level.

Panel A: Levels and Types of Deposit

	Log (Deposit)		Log (Savings Deposit)		Log(Term Deposit)		Log(Current Account)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post $\times$ Low HHI_{bank}	0.086***	0.135***	0.103***	0.160***	0.148***	0.201***	0.140***	0.183***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)	(0.009)	(0.009)	(0.010)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District $\times$ Year FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	650019	649920	650019	649920	632527	632426	629940	629839
R^2	0.859	0.863	0.850	0.855	0.833	0.838	0.804	0.810

Panel B: Share of Deposit

	Share of Deposit	
	(1)	(2)
Post $\times$ Low HHI_{bank}	3.274***	3.274***
	(0.115)	(0.115)
Post $\times$ Low HHI_{bank} $\times$ Term Deposit	-6.872***	-6.872***
	(0.222)	(0.223)
Post $\times$ Low HHI_{bank} $\times$ Current Account	-2.950***	-2.950***
	(0.154)	(0.155)
Branch Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
District $\times$ Year Fixed Effects	No	Yes
Observations	1962186	1962185
R^2	0.515	0.514

Standard errors in parentheses
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 3
Impact on Deposit and Lending Rates

The table below provides estimates of identification regressions to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables represent the weighted average deposit rate (WADR) for term deposits and the weighted average lending rate (WALR) for a branch of bank b. They are regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in Equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration. Odd columns refer to the results without district-year fixed effects, while the even columns constitute all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	WADR Term Deposits		WALR	
	(1)	(2)	(3)	(4)
Post $\times$ Low HHI_{bank}	0.011**	-0.002	-0.065***	-0.082***
	(0.005)	(0.006)	(0.010)	(0.011)
Branch Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
District$\times$Year Fixed Effects	No	Yes	No	Yes
Observations	581521	581413	627658	627557
R^2	0.641	0.671	0.606	0.631

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4
Impact on Credit

This table provides estimates of identification regressions to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are different types of credit disbursed by each branch. Panel A shows results for total credit and credit-to-deposit ratio. Panel B breaks down the credit into specific categories: agriculture, industry, personal, and services. All variables are regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in Equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration. Odd columns refer to the results without district-year fixed effects, while the even columns constitute all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

Panel A: Level of Credit

	Log(Total Credit)		Credit to Deposit	
	(1)	(2)	(3)	(4)
Post × Low HHI_{bank}	0.285***	0.323***	10.750***	9.295***
	(0.008)	(0.009)	(0.485)	(0.540)
Branch Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
District×Year Fixed Effects	No	Yes	No	Yes
Observations	632527	632426	629940	629839
R^2	0.819	0.825	0.825	0.833

Panel B: Sectoral Allocation of Credit

	Log(Agriculture Credit)		Log(Industry Credit)		Log(Personal Credit)		Log(Services Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Low HHI_{bank}	0.076***	0.123***	0.394***	0.381***	0.074***	0.020***	0.814***	0.734***
	(0.009)	(0.011)	(0.011)	(0.012)	(0.007)	(0.007)	(0.013)	(0.014)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District×Year Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	783945	783880	736050	735980	885166	885116	936860	936812
R^2	0.777	0.787	0.803	0.809	0.817	0.825	0.696	0.717

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5
Impact on Credit to Micro, Medium, and Small Businesses

This table reports the estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are the level of loans disbursed to MSMEs and the share of such loans in total credit disbursed by a branch. It is regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration. Column 1 refers to the results without district-year fixed effects, while Column 2 constitutes all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	Log(MSME Loans)		MSME Loan Share	
	(1)	(2)	(3)	(4)
Post $\times$ Low HHI_{bank}	0.665***	0.812***	6.261***	6.380***
	(0.011)	(0.012)	(0.170)	(0.184)
Branch Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
District*Year Fixed Effects	No	Yes	No	Yes
Observations	545953	545837	545552	545436
R^2	0.760	0.773	0.753	0.769

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6
Impact on Credit:
Heterogeneity by Loan Maturity

This table reports the impact of savings interest rates for banks with high market power vis à vis low market power on the maturity structure of their share of credit disbursal. The dependant variable is the share of credit allocated and it is regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13. Medium Term Share represents the share of medium term credit in total credit, while long-term credit refer to the total long term credit in total credit. Column 1 refers to the results without district-year fixed effects, while Column 2 constitutes all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel from 2005 till 2016. Standard errors are clustered at branch level.

	Share of Credit	
	(1)	(2)
Post $\times$ Low HHI_{bank}	1.709***	1.073***
	(0.196)	(0.197)
Post $\times$ Low HHI_{bank} $\times$ Medium Term Share	0.425	0.455
	(0.279)	(0.279)
Post $\times$ Low HHI_{bank} $\times$ Long Term Share	-10.522***	-10.534***
	(0.360)	(0.360)
Branch Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
District*Year Fixed Effects	No	Yes
Observations	1704153	1704152
R^2	0.381	0.383

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7
Impact on Government Securities

This table examines the impact of deregulation on bank level G-Sec investments. The dependent variables are log of G-Sec investments, G-Sec investments to deposit ratio, and G-Sec investment to assets ratio. Post is an indicator variable for post deregulation of savings deposit rate and Low HHI_{bank} is an indicator variable for banks whose individual value of HHI is lower than the median HHI. Fixed effects are at bank and year level. Standard errors are clustered at the bank level. The analysis is conducted at the bank level and covers all Indian scheduled commercial banks from 2007 to 2016 in an unbalanced panel. Data is extracted from the balance sheets of the banks available from the RBI.

	Log (G-Sec Investments)	$\frac{\text{Gsec}}{\text{Deposit}}$	$\frac{\text{Gsec}}{\text{Assets}}$
	(1)	(2)	(3)
Post $\times$ Low HHI_{bank}	0.21**	0.98	0.66
	(0.097)	(1.092)	(0.642)
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	478	478	478
R^2	0.978	0.683	0.525

Robust standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8
Impact on Interest Income and Expenses

This table examines the impact of deregulation on bank level interest income and expenses. The dependent variables are log of interest income, log of interest expenses, net interest margin (NIM), interest expenses to assets ratio, and interest income to assets ratio. Post is an indicator variable for post deregulation of savings deposit rate and Low HHI_{bank} is an indicator variable for banks whose individual value of HHI is lower than the median HHI. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and covers all Indian scheduled commercial banks from 2007 to 2016 in an unbalanced panel. Data is extracted from the balance sheets of the banks available from the RBI.

	Log (Interest Income)	Log (Interest Expenses)	NIM	Interest Income / Assets	Interest Expenses / Assets
	(1)	(2)	(3)	(4)	(5)
Post × Low HHI_{bank}	0.19**	0.21**	-0.05	0.21	0.16
	(0.079)	(0.089)	(0.128)	(0.147)	(0.137)
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	478	478	478	478	478
R^2	0.987	0.973	0.719	0.833	0.792

Robust standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9
Monetary Policy Transmission

This table explains the impact of deregulation of savings interest rates for banks with high market power vis à vis low market power.The dependent variables are various indicators of deposit and credit that each branch receive or disburse at level terms. It is regressed against $Post * \hat{\beta}_{bank}$ that is set up in Equation 21 and $\hat{\beta}_{bank}$ is defined in Table A1. This is a baseline regression with no controls. The analysis is at branch level and are annual and cover all Indian schedule commercial banks from 2006 to 2016 in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times \hat{\beta}_{bank}$	0.631***	0.768***	0.809***	0.989***	1.366***	1.594***
	(0.026)	(0.028)	(0.031)	(0.033)	(0.037)	(0.041)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District $\times$ Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	650019	649920	650019	649920	632527	632426
R^2	0.860	0.863	0.851	0.855	0.820	0.826

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10
Heterogeneity by Bank Ownership

Panel A examines the impact of deregulation on the bank level deposits and credit variables using Bank HHI as a measure of market power. Panel A estimates the correlation between a bank's market concentration in a district (defined in terms of bank branch HHI for total deposit and savings deposit) and the ownership status of bank. Two indicators of bank ownership distribution are used, namely, saving deposit share of public sector banks in a district (columns 1 and 2) and bank branch share in a district (columns 3 and 4). Panel B reports the regression results for various metrics of deposits and credit. Post is an indicator variable for post deregulation of savings deposit rate while Private is an indicator variable if the bank is classified as a private sector bank. Fixed effects are indicated. The analysis is conducted at bank level and covers all Indian scheduled commercial banks from 2009 to 2015 for panel A and from 2007 to 2016 for panel B in an unbalanced panel. Data is extracted from the balance sheets of the banks available from the RBI.Standard errors are clustered at the bank level.

Panel A: Relationship between Market Concentration and Bank Ownership

	Deposit HHI		Savings Deposit HHI	
	(1)	(2)	(3)	(4)
Public Sector Bank's Saving Deposit Share	17.05***		16.90***	
	(4.510)		(4.570)	
Public Sector Bank's Branch Share		19.33***		19.13***
		(6.355)		(6.426)
Observations	642	642	642	642
R^2	0.021	0.021	0.021	0.021

Panel B: Role of Bank Ownership

	Saving Deposit Rate	Log (Deposits)	Log (Credit)	$\frac{\text{Credit}}{\text{Deposit}}$
	(1)	(2)	(3)	(4)
Post × Private	0.46**	0.25**	0.28***	1.41
	(0.234)	(0.094)	(0.103)	(2.766)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	534	580	580	580
R^2	0.680	0.980	0.980	0.608

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11
Households' Access to Deposit Savings and Credit

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for household in districts with low market power vis à vis high market power. The dependent variables are indicators of credit and deposit that a household demand or supply in these districts. It is regressed against $\mathbb{1}\{Low\ HHI_{district}\}$ that is set up in equation 23 and $\mathbb{1}\{Low\ HHI_{district}\}$ takes the value 1 if district belong to below median as per market concentration. Column 3 and 6 controls for state fixed effect and pre period district controls. This regression has the lag of dependent variable as one of the controls. The analysis is at the district level, is for year = 2013, and covers all the districts present in the NSSOs AIDIS survey. Standard errors are clustered at district level and all variables are aggregated to district level using household weights.

	Log Credit			Log Deposits		
	(1)	(2)	(3)	(4)	(5)	(6)
Low HHI District	0.561***	0.445***	0.289***	0.166	0.413***	0.275**
	(0.108)	(0.103)	(0.101)	(0.132)	(0.119)	(0.115)
State Fixed Effects	No	Yes	Yes	No	Yes	Yes
District Controls	No	No	Yes	No	No	Yes
Observations	550	546	545	550	546	545
R^2	0.506	0.614	0.698	0.395	0.530	0.597

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Financial Repression, Deposit Rate Deregulation, and Bank Market Power

Online Appendix

Figure A1
Deposit share of banks relative to the 2012 deposits

In this figure we plot the log deposit of public sector banks and private sector banks relative to the log deposits of these banks in 2012 (the year of deregulation). The data is compiled from the bank balance sheets from RBI. The yellow curve plots the average value for the private banks, while the blue curve shows the average value for the public sector banks.

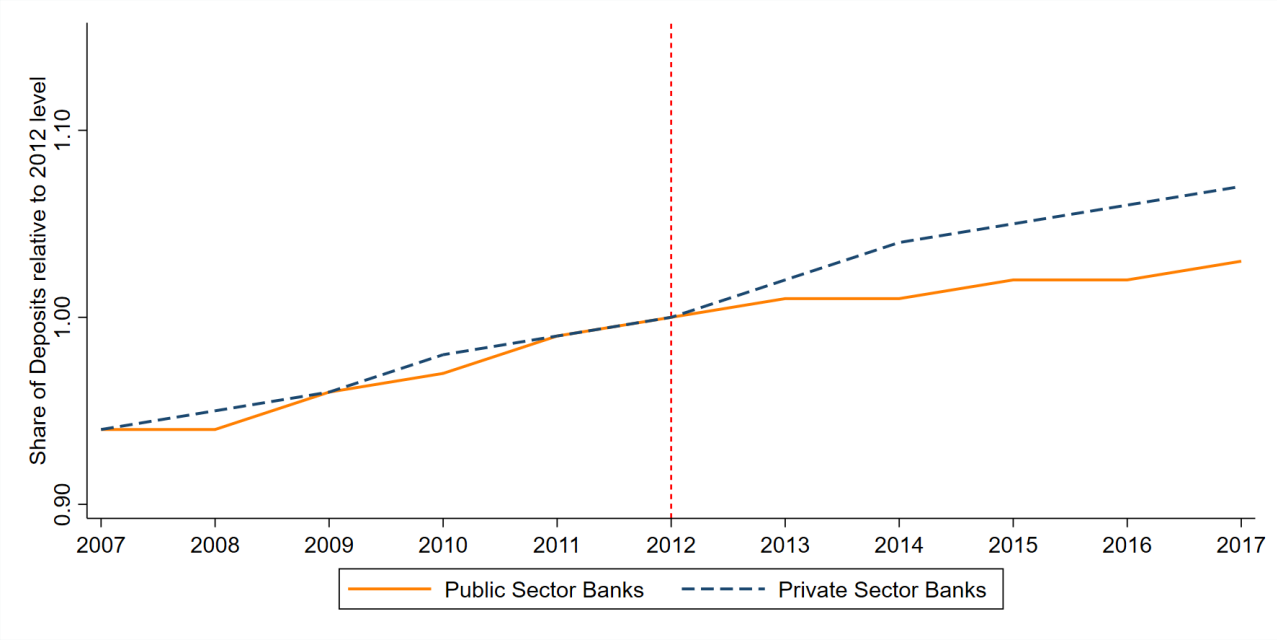


Figure A2
Credit share of banks relative to the 2012 deposits

This figure plots the log credit of public sector banks and private sector banks relative to the log credit of these banks in 2012 (the year of deregulation). Similar to Figure A1 that shows the deposit share, this figure plots how much the log of credit disbursed in any year is above or below the 2012 value. The blue line is for the private sector banks while the green line plots it for public sector banks.

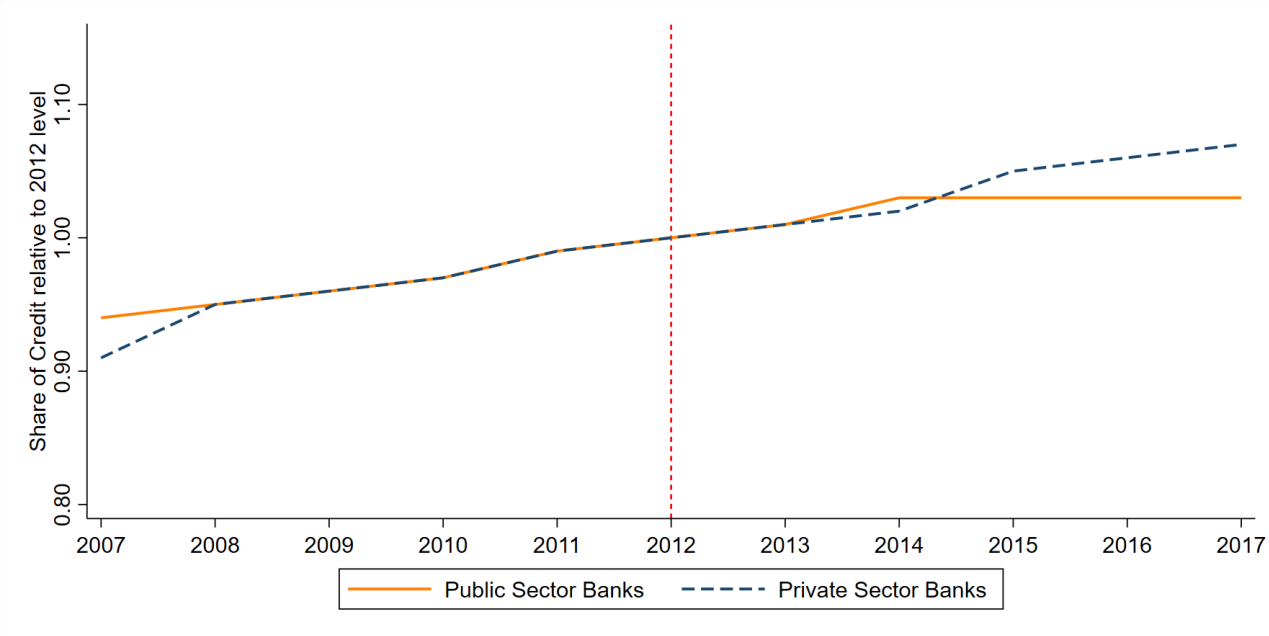


Figure A3
Loan Growth: Public Sector Banks against Private Sector Banks

This figure depicts the year-on-year loan growth for private and public sector banks, sourced from RBI balance sheets spanning from 2007 to 2016. The vertical line on 2011 separates the period of deregulation and non-deregulation. The dashed line plots the loan growth for the private sector banks while the solid curve plots the same for the public sector banks. Data is taken from the bank balance sheets consolidated by the RBI.

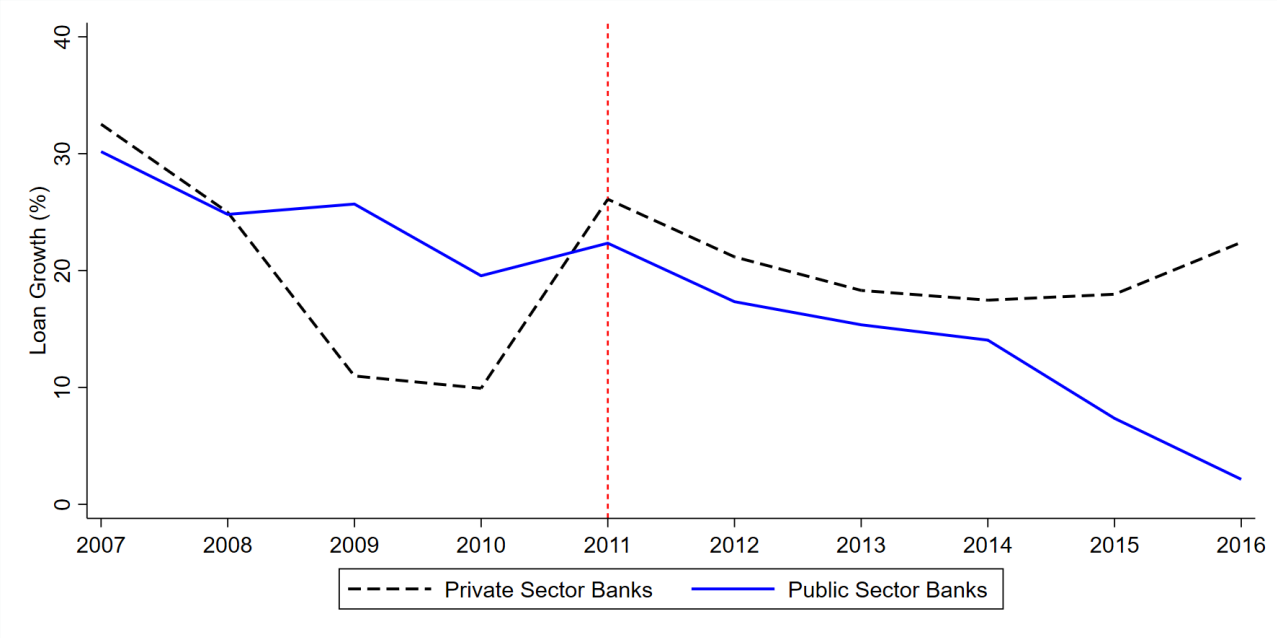


Figure A4
Deposit Growth: Public Sector Banks against Private Sector Banks

This figure plots the year-on-year deposit growth for private and public sector banks, sourced from RBI balance sheets spanning from 2007 to 2016. The vertical line on 2011 separates the period of deregulation and non-deregulation. The dashed line plots the loan growth for the private sector banks while the solid curve plots the same for the public sector banks. Data is taken from the bank balance sheets consolidated by the RBI.

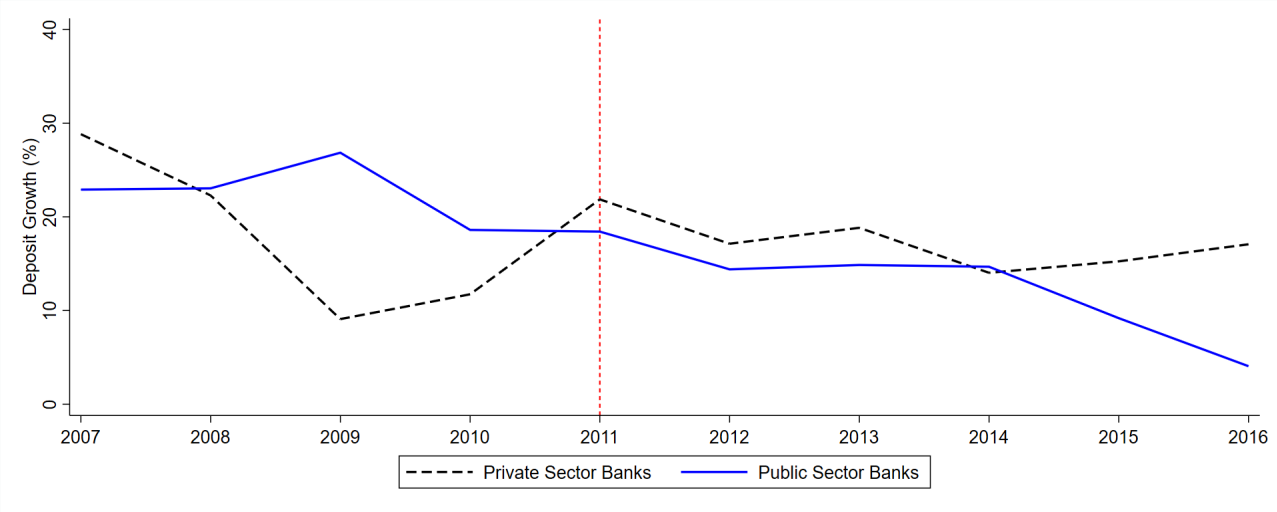


Figure A5
Heat Map: Public Sector Banks Savings Deposits

This figure produces the heat map for market concentration in India showing the district level variation in market competition based on the Public Sector Banks Savings Deposit Share. Details of the computation is given in Section 4.3. We use Equation 12 but replace the savings deposit share with that of only for public sector banks. Area marked in white have no data available.

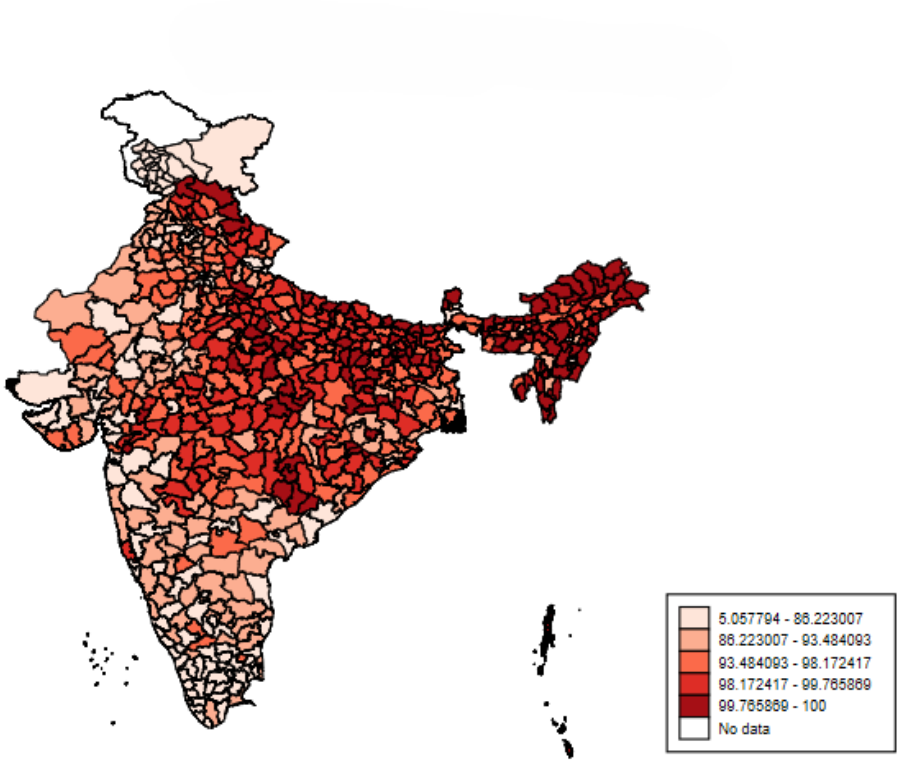


Figure A6
Heat Map: Savings Deposits

This figure produces the heat map for market concentration in India showing the district level variation in market competition based on total savings deposits. Details of the computation is given in Section 4.3 in which we used the BSR data on branch level deposit statistics to compute market power using the squared savings deposit shares. Area for which no data is available is marked in white.

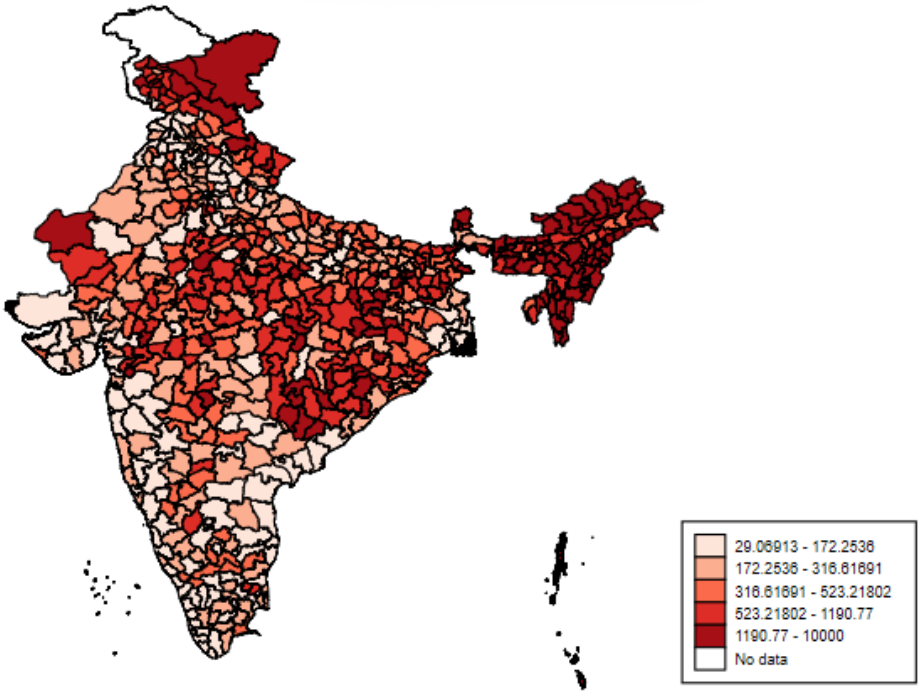


Figure A7
Heat Map: Public Sector Banks Branch Share

This figure produces the heat map for market concentration in India showing the district-level variation in market competition based on the Public Sector Banks share of Branches. We use the BSR data on the number of bank branches for public sector banks and use the definition given in Section 4.3 to compute the same.

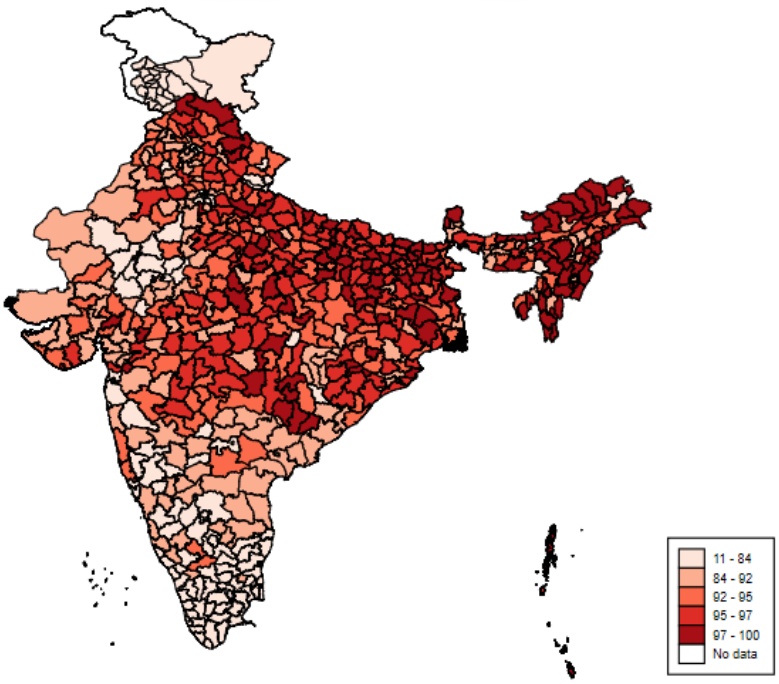


Table A1
Important Variables

Variable	Definition and Source
Credit and Deposits	Credit data is obtained from the bank's balance sheet on the RBI website. The data is available for all schedule commercial banks segregated for public sector, private sector and foreign banks. We omit foreign banks for our analysis and only use the data for public and private sector banks. Deposits data is also obtained from the balance sheet of the banks and it comprise of savings deposit and term deposits.
Savings Deposit Rate	Savings deposit rate is the average deposit rates that banks provide on the savings deposit accounts. It is obtained from each individual bank's website and statements. The data is available for almost all the public sector banks and around 80% of the private sector banks.
Spread	Spread is the gap between the repo rate and the savings deposit rate. Repo rate is obtained from the RBI statements. Higher the spread, lower is the pass-through from repo rate to the deposit rates that banks provide to depositors. Higher spread therefore indicates a higher market power for banks.
Bank beta	Bank beta is computed as the coefficient of pass-through from the change in repo rate to the change in interest expense for the banks. Data for the total interest expense is computed from the BSR banking statistics data for each branch of a bank. This is one of our measure of market power.
Branch HHI	Our second measure of market power, branch HHI is computed using the total deposits data at the branch level from BSR. We use the squared share of total deposits at branch i of bank b in district d and use the method in Drechsler et al. (2017) to compute the HHI measure. We also used, as another measure, savings deposit share in computing HHI using the same method.
Post	Indicator variable taking the value of 1 if the time period is above 2012, the financial year when deregulation took place., and 0 otherwise.
G-Sec Investment	Investment in both central and state government bonds by banks in any given financial year. We obtain this data from the balance sheet of individual banks.
NIM	Net Interest Margin is computed as the difference between total interest income and total interest expense for an individual bank. We obtain this data from the profit and loss statement of each bank at an annual frequency. Data is calculated at the bank-level.
Term Credit	Term credit indicate loans which has a maturity structure of more than one year. Data for term loans is obtained at the bank-level from the bank's balance sheets.
Short-term and Long-term Credit	Short-term Credit refers to credit disbursed by banks which are less than 1 year. These include consumption credit, working capital credit among others. Any credit disbursed that has a maturity term of more than a year is deemed to be long-term credit. Data for short-term and long-term credit is from the maturity disaggregated decomposition of banks' balance sheet data from RBI.
Short-term and Long-term Investments	Short-term investments refer to the investments made by banks that have a maturity period of less than one year. These majorly refers to government securities, Treasury bills, certificate of deposits among others. Long-term investments refer to investments having a maturity period of more than one year. Data is from from the maturity disaggregated decomposition of banks' balance sheet data from RBI.
Low median and High median HHI Bank	Low median HHI bank refers to a bank whose HHI is less than the median HHI among the distribution of banks' HHI. It is an indicator variable and takes the value 1 if a particular bank has a HHI lower than that of the median value. Analogously, high HHI bank is an indicator variable that takes the value 1 if the bank has a value of HHI higher than the median.

Table A2
Summary Statistics: Public Sector vs Private Sector Banks

This table reports the summary statistics of the important variables at the bank-level segregated by the ownership type of the bank: public sector bank or private sector bank. Panel A reports the statistics for public sector banks. Column 1 reports the number of observations. Column 2,3 and 4 report the average values of the variables for the full period, pre deregulation and post deregulation period respectively. The standard deviations are in parentheses. Column 5 reports the difference between columns 4 and 3 and the associated standard error of the t-test of difference is reported in the parentheses. Panel B reports the statistics for the private sector banks with column 5 reporting the difference in the average values between pre deregulation period (column 3) and post deregulation period (column 4). Deposits, Loans, and Assets are reported in INR Thousand Crores. The pre-deregulation period spans 2006-2011, while the post-deregulation period covers 2012-2016. Data is from the yearly bank balance sheet data accumulated by the RBI.

	Observation (1)	All (2)	Pre Deregulation (3)	Post Dergulation (4)	Difference (4-3) (5)
Panel A: Public Sector Bank					
Loan to Deposit (in %)	439	71.29	70.63	71.7	1.07
		(1.2)	(2.04)	(1.54)	(2.52)
Loan to Asset (in %)	439	58.88	57.83	59.55	1.72
		(0.99)	(1.83)	(1.16)	(2.05)
Total Deposit	439	5844.07	2669.19	7864.45	5195
		(704.56)	(415.79)	(515.04)	(730)
Loans	439	4148.92	1923.24	5565.26	3642
		(474.75)	(333.99)	(261.83)	(423)
Total Asset	439	7040.09	3250.22	9451.83	6201
		(836.26)	(494.59)	(596.94)	(850)
Savings Deposit Rate (in %)	449	3.64	3.5	3.86	0.36
		(0.01)	(0.0)	(0.02)	(0.02)
Spread (in %)	449	3.15	3.17	3.12	-0.05
		(0.04)	(0.04)	(0.05)	(0.08)
Panel B: Private Sector Bank					
Loan to Deposit (in %)	320	81.72	75.69	85.55	9.86
		(1.35)	(1.19)	(0.87)	(1.45)
Loan to Asset (in %)	320	58.52	55.03	60.74	5.70
		(0.79)	(0.62)	(0.58)	(0.88)
Total Deposit	320	2024.41	647.43	2900.66	2253
		(376.27)	(89.11)	(439.75)	(562)
Loans	320	1709.78	496.1	2482.12	1986
		(324.09)	(74.31)	(369.71)	(472)
Total Asset	320	2820.97	894.54	4046.87	3153
		(513.75)	(127.56)	(584.44)	(748)
Savings Deposit Rate (in %)	329	3.89	3.5	4.55	1.05
		(0.044)	(0.0)	(0.09)	(0.07)
Spread (in %)	329	2.89	3.15	2.44	-0.71
		(0.06)	(0.06)	(0.12)	(0.12)

Table A3
Branch Level Regressions for Levels of Credit and Deposit (Post $\geq$ 2012)

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are various indicators of credit and deposit that each branch disburses or receives at level terms. It is regressed against $Post_t \times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration. This is a baseline regression with no controls. The analysis is at branch level and is annual and covers all Indian scheduled commercial banks and truncated for ± 3 years from the year of savings rate deregulation (i.e. FY 2012) in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times$ Low HHI_{bank}	0.116***	0.163***	0.128***	0.177***	0.276***	0.315***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.008)	(0.010)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District$\times$Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	459356	459291	459356	459291	445493	445424
R^2	0.880	0.883	0.877	0.880	0.842	0.847

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4
Branch Level Regressions for Levels of Credit and Deposit (Post $\geq$ 2012)

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are various indicators of credit and deposit that each branch disburses or receives at level terms. It is regressed against $Post_t \times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration (with respect to savings deposit). This is a baseline regression with no controls. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times$ Low HHI_{bank}	0.090***	0.146***	0.103***	0.180***	0.268***	0.323***
	(0.006)	(0.007)	(0.006)	(0.008)	(0.008)	(0.010)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District$\times$Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	650019	649920	650019	649920	632527	632426
R^2	0.859	0.863	0.850	0.855	0.819	0.825

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5
Branch Level Regressions for Levels of Credit and Deposit (Post $\geq$ 2012)

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are various indicators of credit and deposit that each branch disburses or receives at level terms. It is regressed against $Post_t \times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration (with respect to savings deposit). This is a baseline regression with no controls. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post$\times$Low HHI$_{bank}$	0.119***	0.170***	0.126***	0.186***	0.271***	0.321***
	(0.006)	(0.007)	(0.006)	(0.008)	(0.008)	(0.010)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District $\times$ Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	459356	459291	459356	459291	445493	445424
R^2	0.880	0.883	0.877	0.880	0.842	0.847

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6
Branch Level Regressions for Levels of Credit and Deposit (Post $\geq$ 2012)

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are various indicators of credit and deposit that each branch disburses or receive at level terms. It is regressed against $Post_t \times \mathbb{1}\{Quartilei_{2011,b}\}$ that is set up in equation 14 and $\mathbb{1}\{Quartilei_{2011,b}\}$ takes the value 1 if banks belong to quartile i as per market concentration, and all comparisons are made with respect to topmost quartile banks. This is a baseline regression with no controls. The analysis is at the bank level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post× Bottom Quartile Banks	0.133***	0.192***	0.134***	0.213***	0.460***	0.541***
	(0.009)	(0.010)	(0.009)	(0.011)	(0.012)	(0.014)
Post × Second Quartile Banks	-0.062***	-0.035***	-0.114***	-0.076***	0.023***	0.018*
	(0.008)	(0.009)	(0.007)	(0.008)	(0.008)	(0.009)
Post× Third Quartile Banks	-0.048***	-0.050***	-0.125***	-0.120***	0.081***	0.064***
	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.010)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District×Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	650019	649920	650019	649920	632527	632426
R^2	0.860	0.863	0.851	0.855	0.821	0.827

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7
Branch Level Regressions for Levels of Credit and Deposit (Post $\geq$ 2012)

The table below provide estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are various indicators of credit and deposit that each branch disburses or receive at level terms. It is regressed against $Post_t \times \mathbb{1}\{Quartilei_{2011,b}\}$ that is set up in equation 14 and $\mathbb{1}\{Quartilei_{2011,b}\}$ takes the value 1 if banks belong to quartile i as per market concentration, and all comparisons are made with respect to topmost quartile banks. This is a baseline regression with no controls. The analysis is at branch level, is annual, and covers all Indian schedule commercial banks and truncated for $\pm$3 years from the year of saving rates deregulation (i.e. FY 2012) in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times$ Bottom Quartile Banks	0.183***	0.240***	0.169***	0.230***	0.446***	0.523***
	(0.009)	(0.010)	(0.009)	(0.010)	(0.012)	(0.014)
Post$\times$ Second Quartile Banks	-0.011	0.018**	-0.034***	-0.002	0.017**	0.016*
	(0.008)	(0.009)	(0.007)	(0.008)	(0.008)	(0.009)
Post$\times$ Third Quartile Banks	0.001	0.005	-0.069***	-0.059***	0.055***	0.039***
	(0.008)	(0.009)	(0.008)	(0.009)	(0.008)	(0.009)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District$\times$Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	459356	459291	459356	459291	445493	445424
R^2	0.881	0.884	0.877	0.881	0.844	0.849

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8
Impact of Deregulation on Bank Level Deposits and Credit

This table examines the impact of deregulation on the bank level credit and deposits. The dependent variables are saving deposit rate, log of deposit, log of loans, and the loan to deposit ratio in columns 1, 2, 3 and 4 respectively. Post is an indicator variable for post deregulation of savings deposit rate and Low HHI_{bank} is an indicator variable for banks whose individual value of HHI is lower than the median HHI. Definition of HHI is provided in Section 4.3. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at the bank level and covers all Indian schedule commercial banks from 2007 to 2016 in an unbalanced panel. Data is extracted from the balance sheets of the banks available from the RBI.

	Saving Deposit Rate	Log (Deposits)	Log (Credit)	$\frac{\text{Credit}}{\text{Deposit}}$
	(1)	(2)	(3)	(4)
Post $\times$ Low HHI_{bank}	0.37**	0.17**	0.18**	0.40
	(0.16)	(0.077)	(0.083)	(1.810)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	440	478	478	478
R^2	0.671	0.985	0.985	0.691

Robust standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$,*** $p < 0.01$

Table A9
Branch Level Regressions for Levels (Post $\geq$ 2012)

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power. The dependent variables are the shares of different types of loans that each branch disburse. It is regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 13 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration.Odd columns refer to the results without district-year fixed effects, while the even columns constitute all the fixed effects. The analysis is at the branch level, is annual, and covers all Indian scheduled commercial banks in an unbalanced panel. Standard errors are clustered at branch level.

	Agriculture Credit Share		Industry Credit Share		Personal Credit Share		Services Credit Share	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post $\times$ Low HHI_{bank}	1.070***	2.414***	0.798***	0.755***	-2.007***	-3.127***	3.628***	3.170***
	(0.114)	(0.122)	(0.098)	(0.112)	(0.108)	(0.120)	(0.096)	(0.107)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District*Year Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	783770	783705	735960	735890	884794	884744	935637	935589
R^2	0.868	0.879	0.747	0.752	0.804	0.811	0.624	0.638

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10
Impact of Deregulation on Branch Level Deposits and Credit

The table below provides estimates of an identification regression to assess the relevance of deregulation of savings interest rates for banks with high market power vis à vis low market power.The dependent variables are various indicators of deposit and credit that each branch receive or disburse at level terms. It is regressed against Post $\times\hat{\beta}_{bank}$ that is set up in Equation 21, and $\hat{\beta}_{bank}$ is the measure of market power described in Section 4.3.1. This is a baseline regression with no controls. The analysis is at branch level and are annual and covers all Indian scheduled commercial banks and is truncated for ± 3 years from the year of saving rates deregulation (i.e. FY 2012) in an unbalanced panel. Standard errors are clustered at branch level.

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post $\times\ \hat{\beta}_{bank}$	0.686***	0.805***	0.870***	0.994***	1.366***	1.583***
	(0.027)	(0.029)	(0.032)	(0.034)	(0.039)	(0.043)
Branch Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District×Year Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	459356	459291	459356	459291	445493	445424
R^2	0.881	0.884	0.877	0.881	0.844	0.848

Standard errors in parentheses

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Table A11
Impact of Deregulation on Bank Level Deposits and Credit

This table examines the impact of deregulation on the bank level credit and deposits. The dependant variables are log of deposit and credit in columns 1 and 2 respectively, while it is the ratio of credit to deposits (in percentage) in column 3. Post is an indicator variable for post deregulation of savings deposit rate and $\hat{\beta}_{Bank}$ is the measure of market power described in Section 4.3.1. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and are annual and cover all Indian schedule commercial banks from 2006 to 2020 in an unbalanced panel.

	Log (Deposits)	Log (Credit)	$\frac{\text{Credit}}{\text{Deposit}}$
	(1)	(2)	(3)
Post $\times \hat{\beta}_{Bank}$	0.76***	0.96**	19.88**
	(0.432)	(0.430)	(11.8)
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	623	623	623
R^2	0.967	0.965	0.393

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A12
Impact of Deregulation on Bank Level Gsec Investments

This table examines the impact of deregulation on investment in government securities(Gsec) at the bank level. The dependant variables are log of deposit in column 1 and the ratio of investment in Gsec to deposits and assets in columns 2 and 3 respectively. Government securities include both central government as well as state government securities and is properly described in Table A1. Post is an indicator variable for post deregulation of savings deposit rate and $\hat{\beta}_{Bank}$ is the measure of market power described in Section 4.3.1. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and are annual and cover all Indian schedule commercial banks from 2006 to 2020 in an unbalanced panel.

	Log (Gsec)	$\frac{\text{Gsec}}{\text{Deposit}}$	$\frac{\text{Gsec}}{\text{Assets}}$
	(1)	(2)	(3)
Post $\times \hat{\beta}_{Bank}$	0.75	0.81	-1.45
	(0.483)	(3.438)	(0.81)
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	623	623	623
R^2	0.963	0.512	0.581

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A13
Impact of Deregulation on Bank-Level Investments

This table examines the impact of deregulation on bank level investments tenor wise. Columns 1 and 2 show the impact on short term investments, while columns 3 and 4 show the impact on the long term investments. Short term investments are defined as investments made for a maturity of less than 1 year , while anything beyond 1 year is deemed as long term investments. All investments are recorded at book value. Description of the variables and their source is given in Table A1. Post is an indicator variable for post deregulation of savings deposit rate and $\hat{\beta}_{Bank}$ is the measure of market power described in Section 4.3.1. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and are annual and cover all Indian schedule commercial banks from 2006 to 2020 in an unbalanced panel.

	Log (Short Investment)	Short Investment / Assets	Log (Long Investment)	Long Investment / Assets
Post $\times \hat{\beta}_{Bank}$	-0.55	-10.11**	1.15**	7.99***
	(0.699)	(2.454)	(0.464)	(2.547)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	623	623	623	623
R^2	0.838	0.588	0.948	0.625

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A14
Impact of Deregulation on Bank Level Credit: Tenor Wise

This table examines the impact of deregulation on bank level credit disbursement tenor wise. Columns 1 and 2 show the impact on short term credit, while columns 3 and 4 show the impact on the long term credit. Short term credit refers to loans having maturity of less than 1 year. Anything having a maturity of more than a year is long term credit. Description of the variables as well as their source is given in Table A1. Post is an indicator variable for post deregulation of savings deposit rate and $\hat{\beta}_{Bank}$ is the measure of market power described in Section 4.3.1. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and are annual and cover all Indian schedule commercial banks from 2006 to 2020 in an unbalanced panel.

	Log (Short Credit)	$\frac{\text{Short Credit}}{\text{Assets}}$	Log (Long Credit)	$\frac{\text{Long Credit}}{\text{Assets}}$
	(1)	(2)	(3)	(4)
Post $\times$ $\hat{\beta}_{Bank}$	0.58	-7.91	1.27*	14.87***
	(0.468)	(4.88)	(0.489)	(5.247)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	623	623	623	623
R^2	0.930	0.639	0.957	0.564

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table A15
Impact of Deregulation on Bank Level Interest Income and Expenses

This table examines the impact of deregulation on bank level interest income and expenses. Column 1 shows the impact on interest income while column 2 shows on interest expenses. Net Interest Margin (NIM) is the gap between interest income and interest expenses and is shown in column 3. Description of the variables as well as their source is given in Table A1. Post is an indicator variable for post deregulation of savings deposit rate and $\hat{\beta}_{Bank}$ is the measure of market power described in Section 4.3.1. Fixed effects are indicated. Standard errors are clustered at the bank level. The analysis is conducted at bank level and are annual and cover all Indian schedule commercial banks from 2006 to 2020 in an unbalanced panel.

	Log (Interest Income)	Log (Interest Expenses)	NIM
	(1)	(2)	(3)
Post $\times \hat{\beta}_{Bank}$	1.04**	1.01**	0.68*
	(0.530)	(0.554)	(0.371)
Bank Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	623	623	623
R^2	0.962	0.958	0.645

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$