Financial Repression, Deposit Rate Deregulation, and Bank Market Power

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May 26, 2025

ABSTRACT

Mandating low deposit rates, a form of financial repression, allows banks to raise deposits cheaply and makes investment in government securities profitable but limits credit access. Using regulatory data, we exploit India's 2011 deregulation of savings deposit rates to show that deposit rates increase after deregulation, more so for banks with low market power; consequently, deposits increase, and deposit maturity contracts. These banks shift from low-yielding government securities to loans, and loan maturity shortens. Credit to households and firms increases. A structural model demonstrates that high-market power banks restrain deposit growth. Deregulation improves financial intermediation, but market power limits gains.

JEL Classification: D43, E51, E58, G21, G28, O53

Keywords: Financial repression, deposit franchise, banking, market power

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We thank Viral Acharya, Adrien Bilal, Saroj Bhattarai, V V Chari, Amil Dasgupta, Mausumi Das, Chetan Ghate, Peter Hoerdahl, Peter Hull, Jean Imbs, Amartya Lahiri, Justin Leung, Aprajit Mahajan, Samreen Malik, Nirvana Mitra, Veda Narasimhan, N.R.Prabahla, B. Ravikumar, Uday Bhanu Sinha, Olivier Wang, Etienne Wasmer, and participants at the Delhi School of Economics conference and the NYU Stern-IIM Calcutta conference for helpful comments. We thank Rumana Patel for excellent research assistance. 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. While households save through deposits and smooth consumption, banks raise funds through deposits and channel them to productive sectors of the economy. However, efforts to increase financial inclusion through bank accounts in developing countries like India remain challenging as deposit account usage is muted[1], leading to lower credit and limiting financial intermediation.

This paper examines an oft-overlooked reason for low financial intermediation: low deposit interest rates arising from either explicit regulation or bank market power. While low deposit rates allow banks to raise deposits cheaply, households invest elsewhere leading to low deposit account penetration. Low rates also allow banks to invest in low-yielding government securities — a form of financial repression (Chari et al., 2020) — while they continue to earn comfortable net interest margins, but can then crowd out credit (Agarwal et al., 2024) to households and firms.

This paper examines the impact of the 2011 savings deposit rate deregulation in India in the presence of a concentrated banking system. Up until June 2011, savings deposit rates in India were regulated and set by the Reserve Bank of India (RBI), 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 a bank's market share or ownership status.[2] Motivated by a theoretical framework, our empirical setting exploits the ex-ante variation in bank market power combined with savings rate deregulation to examine the impact on bank balance sheets and the real sector. A parsimonious structural model highlights how banks' market power limits gains.

We establish five main findings. First, post deregulation banks with low market power increase their deposit rates relative to banks with high market power. Deposits increase across savings, term, and current deposits, but with a compositional shift to the relatively short-term and liquid savings deposits, indicating a shortening of banks' funding maturity structure. Low-

[1] While the number of bank account holders in India rose to 94.6 % in 2023 (Ministry of Statistics and Programme Implementation, 2023), more than one-third of account holders had an inactive bank account (Demirgüç-Kunt et al., 2022).

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

market power banks expand their branch network, facilitating a broad-based increase in deposits. Second, lending increases for the low-market power banks and is accompanied by a corresponding shortening of loan maturity. Lending shifts to personal loans, industry, and services, and to the financially constrained small business sector. Third, low-market power banks shift away from government securities to loans, plausibly to compensate for the rise in funding costs. Overall, interest incomes increase to match the increase in interest expense. Fourth, the credit access and deposit holdings of households increase in markets where low-market power banks operate. Fifth, matched bank-firm data help pin down the supply channel: low-market power banks increase credit to firms. A parsimonious structural model shows that aggregate deposits increase by 42% post deregulation in a counterfactual world with only low-market power banks. Overall, even with deregulated deposit rates, high bank market power can limit gains from deregulation.

To guide our empirical exercise, we build a simple partial equilibrium model with heterogeneous banks with differing market power. The model yields two key insights. First, post deregulation, low-market power banks increase deposit rates more relative to their high market power counterparts. As a result, the relative deposit increase is higher for low-market power banks. Second, asset-side changes depend on the increase in deposit rates. If the increase is low (say due to banks' market power), all deposit inflows are directed to government securities. If the increase in deposit rates is high, lending increases. The theoretical framework highlights how banking market structure shapes the extent and composition of post-deregulation credit expansion.

Our empirical strategy relies on two ingredients: the nationwide deregulation of savings deposit rates and the ex-ante variation in banks' market power. Our granular branch-level data allows us to compare low- and high-market power banks within the same local markets (districts) pre- and post-deregulation to examine the effects on bank balance sheets. Branch fixed effects control for branch characteristics invariant over time. For our baseline analysis, we rely on market concentration as the source of bank market power. Low-market power banks are those with below median deposit-weighted Herfindahl–Hirschman index (HHI) across the markets in which the banks operate. Several robustness checks exploit alternative sources of market power.[3] Regu-

[3] We use market power and market concentration interchangeably, and make the distinction between the two when important.

latory branch-level data on loans and deposits is from RBI for the period 2007–2016.

Banks raise three kinds of deposits: current, savings, and term deposits. While current and savings deposits can be withdrawn at any time, term deposits have different maturities, and early withdrawal incurs penalties. Post deregulation, savings deposit rates increase, more so for low-market power banks compared to high-market power banks. Consequently, savings deposits increase by 16% for low-market power banks compared to high-market power banks. Deposits also increase by 13.5% across the board with a 20.1% increase for term deposits (despite no effect on term deposit rates) and 18.3% increase for current accounts. Overall, deposit composition shifts to savings deposits, indicating deposit maturity shortening.

What explains this rise in term and current deposits? Increases in savings deposit rates allows low-market power banks to attract depositors, who typically save across products within the same bank explaining the rise in term and current accounts. Low-market power banks also see a 33% increase in the number of branches, especially in unserved markets, and branch-level efficiency in raising deposits improves.

Deposit increases translate to a 33% increase in loans at low-market power banks across sectors. Banks' loan portfolios shift to personal loans and the financially-constrained small business sector. Credit-to-deposit ratios rise. Corresponding to deposit maturity shortening, loan maturity contracts.

Regulated deposit rates allow banks to access cheap deposit funding and earn comfortable interest rate margins by investing in government securities. Post-deregulation, low-market power banks' share of government securities decreases, and the share of loans increases. While the level of government securities at low-market power banks increases mechanically due to statutory requirements such as the statutory liquidity ratio (SLR) that require banks to allocate a fraction of their deposits to government securities, the *share* of government securities declines. The compositional shift away from government securities suggests that as funding costs rise, banks are forced to shift away from low-yielding government securities. Financial repression can occur when government policies force banks to hold public debt, limiting credit to the real economy. Regulating deposit rates achieves similar financial repression, whereas deregulation stimulates lending.

Weighted average lending rates decline post-deregulation for low-market power banks, plausibly reflecting the shift away from low-yielding government securities to high-yielding loans. Alternatively, banks might have reduced the impact on their profit margins by expanding loan volumes due to their limited ability in increasing lending rates. Indeed, aggregate bank-level interest incomes rise to match the rise in interest expense, while net interest margins remain stable.

Finally, we examine the impact on credit to households and firms. Using household balance sheet data, we show that households in districts served by low-market power banks see an increase in deposit holdings and credit. Using matched bank-firm data, we show that low-market power banks increase credit to firms. We establish that the bank credit supply is driving this result by comparing loans to the same firm borrowing from low- and high-market power banks using a specification akin to Khwaja and Mian (2008).

Using a parsimonious structural demand estimation model, we validate our empirical strategy and estimate banks' spread semi-elasticities. Using a random coefficient logit model of household deposit demand across markets, we examine banks' savings deposit elasticities. We account for both the rate and non-rate characteristics of banks, with districts serving as distinct markets that capture local customer preferences. Using savings deposit spreads (the difference between the policy and the savings deposit rate) as our price measure and controlling for bank characteristics, we find significant price sensitivity among depositors. Three cost shifters (non-interest payments, share of officers in total employees, and staff expenses) serve as instruments to address potential endogeneity concerns. The demand elasticity is higher for low-concentration banks compared to high-concentration banks. A 1% increase in the savings deposit spread leads to a 2.11% (0.56%) decline in a low-market (high-market) power bank's deposit market share. These estimates also serve as an independent confirmation of our reduced form strategy: low-market concentration banks cater to markets with elastic deposit demand. Motivated by our theoretical framework, we ask a counterfactual question: how much would aggregate deposits increase if low-market power banks respond similarly to high-market power banks? Using the average semi-elasticity and deposit rate estimates for low-market power banks, deposits are 42% higher compared to the baseline estimates, indicating that banks' market power limits gains.

In our baseline analysis, we use bank HHI as the source of market power, which the structural model also validates. The source of deposit market power heterogeneity is not critical to our analysis. Deposit market power can arise from banks' liquidity services (d'Avernas et al., 2023), banks' market concentration either due to the industry structure (Drechsler et al., 2017) or branching regulation (Oberfield et al., 2024), implicit and explicit support for too big-to-fail banks or government guarantees, deposit insurance (Acharya et al., 2022; de Roux and Limodio, 2022) or inelastic depositor demand. Our results are robust to using alternate measures of market power including measures based on deposit rate sensitivity to policy rate changes (bank-β in Drechsler et al. (2017)), HHI measures using only savings deposits, and HHI redefined with more granular markets. To address concerns that some other feature, such as state ownership of banks, drives our results, we show our analysis holds using only private sector banks. Alternate explanations based on loan-market power and bank health do not explain our results.

Related literature We primarily contribute to two distinct strands of literature.

First, we contribute to the literature on how government debt issuance affects credit to firms (Becker and Ivashina, 2018; Demirci et al., 2019; Graham et al., 2014; Greenwood and Stein, 2010) and households. Governments can also explicitly or implicitly force banks to hold government securities (Chari et al., 2020), eventually crowding out credit (Agarwal et al., 2024). Such financial repression is not just a developing country phenomenon. Advanced economies adopted such policies after World War II (Reinhart and Sbrancia, 2015) and more recently post the 2007–2009 Global Financial Crisis (Reinhart, 2012; Becker and Ivashina, 2018). While these papers highlight how an increase in banks' sovereign debt holdings affect their loan portfolios, we link financial repression to banks' liability-side policies. Mandating low deposit rates can be a form of financial repression with similar crowding out of credit. Importantly, a concentrated banking system can also lead to depressed deposit rates, making investment in government securities lucrative but subsequently limiting bank credit. Drechsler et al. (2020) study similar deposit rate deregulation through the repeal of Regulation Q in the 1970s in the US, which increased deposit rates and quantities substantially. In contrast, Indian banking's concentrated market structure dampened gains from a similar deregulation episode. Our focus is on how regulated rates are a form of financial repression. Credit expands post-deregulation only if banks increase deposit rates substantially, which then induces a shift to loans away from government securities. With a concentrated banking sector, increases in deposit rates are muted and any increase in quantity of deposits may continue to be funneled to government securities.

We also contribute to a broader literature on the impact of market concentration on firm dynamism and welfare (Philippon, 2019; Rossi-Hansberg and Wright, 2007; De Ridder, 2024; Barkai, 2020; Autor et al., 2020; De Loecker et al., 2020). An emerging banking literature documents banks' deposit market power (Drechsler et al., 2017; Wang et al., 2022; Hakenes et al., 2015; Jiang et al., 2023; d'Avernas et al., 2023) and its implications for banks' loan portfolios (Drechsler et al., 2021; Li et al., 2023). Philippon (2019) distinguishes between "good" and "bad" market concentration. Good concentration can come from increases in elasticity of substitution or technological change leading to increasing returns to scale. Bad concentration can come from rising barriers to competition that can increase economic rents and reduce innovation. An older literature also highlights how bank concentration can depress deposit rates (Berger and Hannan, 1989; Hannan and Berger, 1991; Neumark and Sharpe, 1992; Granja and Paixao, 2021). Similarly, we show that market power depresses deposit rates, but then also highlight how this affects banks' assets and makes investment in government securities lucrative, limiting credit access. Banks market power can arise for "good" reasons (such as provision of specific liquidity services by banks) or "bad" reasons (such as regulation that tilts market power to certain banks, implicit and explicit government guarantees, or the lack of a level playing field in the banking industry). While we do not distinguish between the two types of concentration, we highlight one important aspect: a move to a less concentrated banking system can increase banks' deposit penetration and credit access.

Our paper is also tangentially related to papers on banks' deposit rate-setting behavior. A large literature examines the relationship between deposit rates and market interest rates (Diebold and Sharpe, 1990; Drechsler et al., 2017; Begenau and Stafford, 2022; d'Avernas et al., 2023). More recent work studies the factors determining deposit rates (Iyer et al., 2022; Morelli et al., 2024).

2 Institutional Details

The Indian banking system is highly concentrated, with the 58 private and public sector banks capturing nearly 95% of the overall bank lending in India. Bank branch penetration has steadily increased with the average number of branches per 100,000 adults increasing two-fold to 16% in 2022 compared to 2004, above the global average (World Bank).

Deposits constitute the primary funding source for banks (around 80% in 2023 as per RBI). Deposit rates are set at the bank level and are uniform across bank branches, though in some cases can vary by the size of the deposit account.[4] Deposits are of three types, namely current, savings, and term deposits. Savings accounts are mostly held by households and used for both transaction and savings purposes. While savings deposits provide the convenience of easy withdrawals, check encashment, and other payment facilities, they also serve as short-term savings instruments that earn interest. Current accounts are primarily maintained by companies, public enterprises and business firms and are used for day-to-day transaction requirements. Current and savings deposits have no associated maturity and can be withdrawn at any time. Term deposits are for different maturities and incur penalties on early withdrawal. Between 2001–2010, savings deposits grew by 19.4% annually and accounted for nearly 30-40% of aggregate deposits. Savings deposit penetration — measured by per capita savings bank deposits — increased from ₹1,067 in March 1996 to ₹7,767 in March 2009, though growth had slowed leading up to the deregulation episode, highlighting the relative unattractiveness of the low-interest savings deposits.

India has pursued financial reforms since the 1990s with deregulation of interest rates forming a key component. By October 1997, most interest rates were deregulated barring savings deposit rates. The issue of savings rate deregulation had been considered previously in 2002–03 and 2006–07, but abandoned citing timing issues as deposits were largely held by rural households and opposition from the Indian Banks' Association asking that the status quo be maintained. The association, however, contended that "in principle, deregulation of interest rates is essential for product innovation and price discovery in the long run," (Para 109, Annual Policy Statement, 2006-07). Indicating regulatory will to deregulate savings deposit interest rates, in November, 2010, the RBI

[4]See RBI website on how banks can set deposit rates.

proposed that a discussion paper be prepared to examine the pros and cons of deregulation. As the discussion paper notes, deregulation was intended to "strengthen the competitive forces, improve allocative efficiency of resources and strengthen the transmission of monetary policy." Finally, in October 2011, the RBI deregulated the savings deposit rate. In the period before deregulation, the interest rate on savings bank deposits remained unchanged at 3.5% since March 1, 2003 with banks free to choose savings deposit rates post deregulation. As with all deposit rates, savings deposit rates are uniform across the bank branches conditional on size of deposits.

Banks hold government securities, investments, and loans as assets. Loan rates were largely deregulated by October 1997. In contrast to uniform deposit rates, lending rates can vary across branches. Banks also hold a certain amount of cash with the RBI as reserves on which they earn interest. They are mandated to hold a certain proportion of their net demand and time liabilities in government securities as a part of their statutory liquidity ratio (SLR) requirements but generally hold in excess of these requirements (MoF Status Paper, 2023; Das et al. (2025)).

3 Theoretical framework

Based on the canonical Monti et al. (1972) and Klein (1971) setup, we examine how variation in market concentration affects bank's asset composition through deposit funding costs. Details are in Appendix A. Here, we briefly describe the setup and provide intuition for the key findings.

Banks operate under monopolistic competition. There is a representative household and each of the bank's products (loans and deposits) is a differentiated good for the household following the standard Dixit-Stiglitz structure. Banks in a given market can attract deposits through two channels: deposit interest rates and liquidity services. Liquidity services capture banks' inherent characteristics and spatial advantages in the markets. Banks allocate deposits between government securities and loans. Market power stems from the cost of providing liquidity services, which we take as given for a particular bank. A bank with a low (high) cost of providing liquidity service has high (low)-market power bank due to its ability to raise more deposits. Bank's asset portfolio choice depends on an exogenous threshold level of loan monitoring cost relative to the deposit spread (defined as the difference between the policy rate and the deposit rate).

This simple framework generates several key insights. First, prior to deregulation, a low-market power bank is unable to attract deposits due to its limited ability to provide liquidity services to households (arising from high costs). Following deregulation, the low-market power bank can raise deposit rate to offset the lower provision of liquidity services. Proposition 1 in Appendix A summarizes two key results: (i) the change in deposit inflows between pre- and post-deregulation is larger for low-market power banks than for high-market power banks; and (ii) low-market power banks offer higher deposit rates compared to high-market power banks.

To examine asset-side implications, we examine whether the increase in deposits post deregulation affects lending. We consider three cases that compares deposit spread to the cost of monitoring threshold that determines the banks' profits from making loans. In the first case, deposit spreads are high before deregulation and remain high post-deregulation (relative to the monitoring cost threshold). Thus, government securities remain attractive before and after deregulation. lending changes and credit-to-deposit ratios remain unchanged at 0.

In the second case, deposit spreads drop below the monitoring threshold. for low-market power banks but continue to remain above he threshold for high-market banks. Low-market power banks respond by shifting from government securities to loans whereas high-market power banks continue to invest in government securities. Relative change in lending is higher for low-market power banks and credit-to-deposit ratios increases. In this case, the increase in lending comes from both the post-deregulation increase in deposits *and* the shift away from government securities to loans.

In the third case, deposit spreads are below the threshold for both banks before deregulation. While deregulation leads to an increase in lending, the difference in lending between low- and high-market power banks is more modest compared to case 2 as all of the increase comes from the increase in deposits (due to the increase in deposit rates).

Overall, this simple framework motivates how deposit rates, deposits, and lending of low-market power change relative to high-market power banks. These differences motivate our use of heterogeneity in bank market power and savings rate deregulation in our empirical strategy.

4 Data and Descriptive Statistics

4.1 Data

Our primary dataset is the regulatory Bank Statistical Return (BSR) data from RBI. This dataset provides annual branch-level information on deposit and credit. Importantly, for our purposes, we have information on the type of deposits: savings, current, and term deposits. We can also observe sectoral allocation of credit, including credit to micro, small and medium enterprises (MSME). Weighted average lending rate is also at the branch-level. In supplementary tests, we also use granular markets using information on classification of a branch as catering to metro, urban, semi-urban, or rural markets within a district. We also supplement our analysis with publicly available bank-level data from the RBI's Database of Indian Economy (DBIE), which gives information on balance sheet and income statement variables. Data on the policy Repo rate is from the CEIC database, while the SLR datas from DBIE. We focus our analysis on the public and private sector banks, which account for nearly 95% of overall bank lending.[5] Our baseline dataset is for the universe of 58 banks public and private scheduled commercial banks.

We hand-collect data on savings deposit rates at the bank level. Deposit rates are uniform across bank branches. Prior to 2011, savings deposit rate were regulated by the RBI and this deposit rate data is from CEIC. Post deregulation, banks were free to set their savings deposit rates. We construct this data via snapshots of individual bank websites[6]. We collate bank-year time series data of savings deposit rates for 35 public and private sector banks, while we have data for 58 banks in the regulated period. We collect savings deposit rates data most widely applicable, and ignore the data for larger-sized deposits in our baseline analysis.

In supplementary analysis, we use household suvery data from 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 and documents their holdings of types of assets and liabilities. This pan-India survey is comprehensive and is representative at the district level. We use two 2003 and 2013 survey encompassing the deregulation episode. The deposit and credit

[5] Foreign and regional rural banks account for the remaining 5%.

[6] Specifically, we use Archive.org.

data is aggregated using the household weights to create representative district-level aggregates.

For the firm-level analysis, we rely on two datasets. The loan-level data at the bank-firm level is from India's Ministry of Corporate Affairs (MCA), which we use to calculate the bank-firm relationships drawn from security interest filings (Chopra et al., 2021). We then match the loan-level data to firm accounting data from CMIE Prowess for our analysis.

Definitions of the main variables used in our analysis are in Table A1.

Measurement of market power Our primary measure of market power is the branch-level Herfindahl index (HHI) aggregated to the bank-level. This measure captures whether a bank is operating in districts where it has a large share of the market. Branch-level HHI is:

$$\text{Branch HHI}_{i,t} = \sum_{b=1}^{B} (\text{Deposit Market Share}_{b,i,t})^2 \tag{1}$$

for district i in year t with Deposit Market $\text{Share}_{b,i,t}$ as the bank's market share in a given district.

The bank-level HHI is the weighted average of the Branch-HHI, defined as:

$$\text{Bank HHI}_{b,t} = \sum_{i=1}^{N} \omega_{bit} \times \text{Branch HHI}_{i,t} \tag{2}$$

where ω_{bit} is the deposit share for bank b that it raised in each market i in year t. N is the total number of districts (markets) a bank b is operational. Bank HHI_b captures a bank's average market power across all markets in which it has branches. In robustness results, we also compute Bank HHI using only savings deposits and using more granular markets within districts.

Bank-HHI is the key metric used to quantify the extent of a bank's market power. Low-market power banks (Low HHI_{bank}) have below median average Bank-HHI between 2007–2011.

Our empirical strategy relies on one source of heterogeneity in market power, namely, banks' deposit concentration following Drechsler et al. (2017) and Li et al. (2023). However, more recent work by d'Avernas et al. (2023) find that bank HHI may simply capture large banks that offer superior financial services and hence offer lower rates. We contend that low Bank-HHI can be observationally correlated with other bank features that confer banks higher deposit market power.[7] For our purposes, we simply need ex-ante variation in bank market power that induces a differential response post-deregulation and allows us to estimate reduced form effects. In Section 7, using a structural model, we confirm that customers of low-HHI banks exhibit high rate elasticities. Results are robust to using alternate measures of deposit market power. Concerns arise only if some alternate non-deposit sources of market power or alternative bank characteristics drive results, which we show is not the case (Section 8). With this context, we use bank concentration and market power interchangeably and make a distinction only when necessary.

4.2 Empirical strategy

Our primary empirical strategy exploits granular branch level data with two-way fixed effects to study the impact of savings rate deregulation on low-market power banks vis-á-vis high-market power banks. The granular data allow us to saturate the specification with fixed effects and control finely for confounding factors. We also examine several outcome variables — such as holdings of government securities and bank-level profitability — at the bank level as this is the appropriate unit of interest for outcomes (government bond holdings, investments) decided at the bank level.

Branch-level regressions We use the following specification using branch-level data to examine the impact on deposit and credit outcomes:

$$y_{jbit} = \alpha_j + \varphi_{it} + \beta \times \text{Post}_t \times \text{Low HHI}_b + \epsilon_{jbit} \tag{3}$$

for branch j of bank b in district i in year t. y_{jbit} is the dependent variable and outcome of interest namely logged deposits, logged credit, credit-to-deposit ratio, and the weighted average lending rate (WALR). Low HHI_b is 1 for banks with below median average deposit market concentration in the pre-period between 2007–2011. Post_t is 1 for year 2012 and later. Year is fiscal year as of March 31$^{\text{st}}$. The sample period is from 2007 to 2016. α_j is the branch fixed effect and controls for factors invariant across time at the branch level. The district-year fixed effects, φ_{it}, controls for time-varying factors within the district in which the bank branch is located. The empirical strategy

[7] Table A2 shows the correlates of low HHI.

relies on granular branch-level data, where we compare two branches with different market power within the same district. The coefficient of interest, β, estimates the impact on the outcome variable for low-market power banks relative to the high-market power banks, after controlling for local demand factors.

We examine temporal dynamics using the specification:

$$y_{jbit} = \phi_j + \gamma_{it} + \sum_{l=-k}^{m} \beta_l \times \text{Low HHI}_b \times \mathbb{1}\{t = 2011 + l\} + \epsilon_{jbit} \tag{4}$$

for branch j belonging b in district i at time t. $k > 0$ and $m > 0$, and t ranges from 2006 to 2016. ϕ_j, and γ_{it} refer to branch and district-time fixed effects. Event study plots show the estimates for β_l and allow us to examine how the outcome variable evolves over time. Importantly, these event study plots also allow us to examine violation of the pre-trend assumption.

To study compositional changes in deposit and credit, we use the following specification:

$$y_{jbit} = \alpha_j + \varphi_{it} + \beta \times \text{Post}_t \times \text{Low HHI}_b + \boldsymbol{\gamma} \times \text{Post}_t \times \text{Low HHI}_b \times \mathbf{X} + \epsilon_{jbit} \tag{5}$$

the dependent variable, y_{jbit} is the share of different categories. $\mathbf{X}$ is a vector of indicators for each category excluding a base category. β captures the change in share post-deregulation for the base category. The coefficient vector $\boldsymbol{\gamma}$ capture change in share relative to the base category.

Bank-level regressions To examine the impact on bank-level outcomes, we use the following specification:

$$y_{bt} = \eta_b + \delta_t + v \times \text{Post}_t \times \text{Low HHI}_b + \epsilon_{bt} \tag{6}$$

for bank b in year t. y_{bt} is the dependent variable and outcome of interest. Low HHI_b is 1 for banks with below median average deposit market concentration in the pre-period between 2007–2011. Post_t is 1 for year 2012 and later. Year is fiscal year as of March 31$^{\text{st}}$. η_b is the bank fixed effect and controls for factors invariant across time at the bank level. The time fixed effect, δ_t, controls for time-varying factors at the aggregate level. The coefficient of interest, v, captures the impact on the outcome variable for low-market power banks relative to high-market power banks.

4.3 Descriptive Statistics

Figure 1 presents the map of branch-HHI across India. A lower number corresponds to lower concentration and higher competition. There is substantial variation across districts, with Jammu and Kashmir in the north and the northeastern states exhibiting high market concentration as they cater to specific markets. There is significant cross-sectional variation across banks (Figure A1) and Bank-HHI has remained stable from 2006 to 2016 (Figure A2). Low-market power banks do not differ by the share of rural deposits or credit, state-ownership, number of branches, or the share of skilled officers (Table A2). Low-market power banks do have a higher share of non-performing assets and the measure is correlated with a bank-HHI calculated using credit instead of deposits (which is to be expected since deposits and credit markets are similar).[8]

Table 1 presents the descriptive statistics for key variables at both the bank-level and branch-level for 2007–2016. Panel A shows the mean and standard deviation overall and for low- and high-market power banks. Panel B reports the mean and standard deviation (columns 1 and 2) of bank- and branch-level variables for approximately 55 banks from fiscal years 2007 to 2016. Our empirical exercise focuses on the relative effect of low-market power banks compared to high-market power banks over the deregulation period. Columns 3 and 4 capture the average and standard deviation of different variables at bank and branch level for low market powered banks whereas columns 5 and 6 captures the average and standard deviation for high market powered banks. We find that saving deposit rates were lower on average for high market powered banks and spreads higher compared to lower market powered banks. We also find that, on average, banks with high market power were larger in size with respect to credit and deposit in comparison to low market powered banks, though their net interest margins were similar.

The Internet Appendix Table A3 captures the differences is mean values of variables at bank and branch level for high and low market powered banks before and after dergulation. Columns 1 and 2 show the average values of variables before and after deregulation for banks with low-

[8]In Section 8 we show that results hold even after controlling for NPA share. Since our main results document an increase in deposits and credit of low-market power banks, the NPA share, if anything biases the main results downwards. In Section 8 we also show that Bank-HHI using credit cannot explain our results.

market power, while columns 4 and 5 display these values for banks with high-market power. Column 3 details the differential effect of deregulation on the average values for low-market power banks, and column 6 provides this information for high-market power banks. Column 7 shows the difference in the estimates for post- versus pre-deregulation between low- and high-market power banks. For branch-level statistics, we use the residual from a branch fixed effect regression.[9]

The summary statistics indicate a smaller increase in savings deposit rates for high market banks, accompanied by a higher spread between the Repo rate and the savings deposit rate set by these banks. Conversely, low-market power banks, plausibly aiming to attract more deposits, set higher deposit rates post-deregulation, resulting in a lower spread. Post-deregulation low-market power banks significantly increased savings rates compared to high-market power banks. Logged assets as well as logged deposits increased for both types of banks post-deregulation, but the degree with which the low market-powered bank increased was higher than that of higher market-powered banks. Additionally, the credit-to-asset ratio increased more for low-market power banks compared to banks with high market power, plausibly to offset the higher deposits costs. Government securities increase in low-market power banks compared to high-market power banks, with no significant differences in the share of assets in the aggregate.

Interest expenses and income (measured relative to total assets) is higher for banks with lower market concentration. However, net interest margins (NIM) are not significantly different between these two sets of banks indicating a one-to-one matching (Drechsler et al., 2021). Net interest margins are marginally lower for low market-powered banks. Short- and long-term investments are not significantly different. Credit-to-asset ratios are higher for low-market power banks.

Trends are similar at the branch level. Deposits increase post-deregulation, with low-market-power banks exhibiting greater increases, barring current accounts. Similarly, residualized credit shows similar trends. These trends provide first evidence of our baseline hypothesis: low-market power banks raise deposits by increasing savings deposit rates, that translate to higher credit.

[9]Residuals are from the branch-level regression:

$$y_{bdt} = \alpha_b + \epsilon_{bdt}, \tag{7}$$

where $\hat{\epsilon}_{bit}$ gives the residualized values.

5 Bank funding, assets, and liabilities

This section examines the impact of deregulation on deposit rates and deposits, and the implications for bank assets and profitability.

5.1 Deposits

Deposit Rates Prior to deregulation, savings deposit rates were held constant at 3.5% from March 2003 to October 2011 (Panel A, Figure 2), despite significant variation in Repo rates (Panel B, Figure 2). Average savings rates increased after deregulation and ranged between 3.5–4.5%, well below the Repo rate with positive spreads (Repo rate - savings deposit rate) throughout 2011–2016 (Panel B). Impact is heterogeneous with low-market power banks increasing savings deposit rates more than high-market power banks (Figure 3, Panel A), but below Repo rates (Figure 3, Panel B).

We use the bank-level specification in Equation 6 (since deposit rates are set at this level) to examine the impact of deregulation on savings deposit rates. Low-market power banks increased their savings deposit rates by an average of 37 bps relative to high-market power banks (Table 2, column 1). Relative to the pre-period rate of 3.5%, this represents a 10% increase. In contrast, low-market power banks do not increase term deposit rates relative to high-market power banks, as banks were free to choose term deposit rates prior to the 2011 deregulation (column 2).

Savings deposits How do deposits respond? It is not necessary that the savings deposit rate increases translate to deposit flows. It is plausible that despite the rate increases, low-market power banks are unable to attract depositors if there is no unmet latent demand. Table 3 shows the estimates from the branch-level regression using the specifications with log in Equation 3 (Panel A) and deposit shares in Equation 5 (Panel B). Both specifications are saturated with a number of fixed effects. Branch fixed effects capture branch-level unobserved heterogeneity. Year fixed effects account for time-variant aggregate factors. District×year fixed effects control for unobserved heterogeneity within districts over time and hence account for local unobservable factors driving deposit demand. Our specification compares banks with varying market power within the same local market. Panel A reports the results for levels of deposits and savings deposits, both expressed in logs. Columns 1–2 show that low-market power banks increased savings deposits consistent with the increase in savings deposit rates in Table 2. The preferred specification in column 2 indicates that low-market power banks increase their savings deposits by 16 pp.

Figure 4 shows the temporal dynamics of savings deposits (Figure 5 for total deposits). Panel A shows descriptive trends for low- and high-market power banks with the log of aggregate savings deposits normalized to 2010 values. Pre-deregulation, savings deposits exhibit similar trends, but post deregulation the trends for low HHI banks outpace high HHI banks. We examine the temporal dynamics more formally in Panel B. The point estimates for β_l using Equation 4 are shown with the dependent variable logged savings deposits. The vertical red lines indicate the 95% confidence intervals for each point estimate ranging 5 years pre-deregulation to 4 years post-deregulation for 2007–2016. $t = 0$ corresponds to 2011. There is sharp increase in savings deposits after deregulation. While low and high HHI banks seem to be on similar trends prior to deregulation, there is a significant difference between the two in $t = -4$. Thus, one concern is that the parallel trends assumption is potentially violated. Note, however, low HHI banks branches were on a negative growth trend relative to branches of high HHI banks, indicating that if anything the point estimates are biased downwards and our observed estimates should be considered as a lower bound. Rambachan and Roth (2023) provide a way to more formally assess violations in the pre-trends assumption. Panel C shows the results from the sensitivity analysis relaxing the restriction that the counterfactual trends cannot vary with respect to any existing pre-trend. Using the sensitivity analysis, we show that to rule out the efficacy of the treatment effect (deregulation), the threshold variation needed for the post period trend to diverge (w.r.t. pre-period trends) is at least as big or bigger (known as the breakdown indicator $\overline{M}$ in Rambachan and Roth (2023)). The large violations in pre-trends required to find a null effect assuages concerns that our point estimates are spurious.

Term and current deposits Interestingly, we find that both term and current deposits grow by 20% and 18% respectively for low-market power banks. This is despite no change in term deposit rates. We hypothesize that the increase in savings deposit rates allows low-market power banks to attract depositors, which they are then able to leverage to increase term and current deposits. The growth across deposit types is reflected in the aggregate deposits (columns 7–8), which also increase. The preferred specification in column 4 indicates that deposits of low-market power banks increase by 13.5 pp compared to high-market power banks post deregulation.

Despite the increase across deposit types, we see a shift in deposit composition (Panel B). The share of savings deposits increases by 3.27% post deregulation for low-market power banks and term deposits declines by -3.60% (=3.27%-6.87%). Current deposits increases by a minuscule 0.32% (=3.27%-2.95%). Thus, deposit maturity shortens as both savings and current deposits increase. Overall, low-market power banks face elevated funding costs owing to higher savings deposit rates but also relatively unstable deposits, given their lower market power.

Branch expansion To further establish the mechanism through which low-market power banks increase their deposit base, we turn to the impact on number of branches in Panel A, Table 4 using the specification in Equation 6. Low-market power banks increased branches by 33% (column 1). Column 2 repeats the specification using number of branches normalized by deposits. The branch-to-deposit ratio increases 25%. Thus, low-market power banks dedicated more resources to mobilize deposits, explaining the rise in term and current deposits. However, deposit composition tilted towards savings deposits consistent with the hypothesis that the primary increase was in savings with spillovers to term and current deposits. One implication of new branches opening is the increase in alternatives available to depositors. Households typically invest in various deposit products (savings, term deposits, and fixed deposits) at the same bank, and hence it is unsurprising we see effects across the board.

Branch openings did not change the deposit market concentration post deregulation. Figure A2 plots the yearly HHI for low and high HHI. We see no changes in the aggregate trends. More formal regressions show similar muted effects on bank HHI (column 3, Panel A, Table 4). Instead low HHI banks expand into newer markets (Panel B). The dependent variable is whether a new branch was established in a district-market, where granular markets are defined within districts (metro, urban, semi-urban, and rural). We examine whether a low-HHI bank was more or less likely to set up a branch in a market it was already present in. Column 3 suggests that low HHI banks were 4.1 pp less likely to set up a branch in a market it was already present in. If anything, low-HHI banks were diversifying post deregulation. Morelli et al. (2024) argue that diversification allows banks to diversify idiosyncratic deposit demand shocks, reduce risk premiums and increase deposit rates. Potentially, low-HHI banks enter newer markets to diversify and can raise deposit rates through the lowering of aggregate deposit risk premiums.

5.2 Credit

The increased cost of funding due to deregulation, along with the higher flow of funds, has implications for the asset-side composition of bank balance sheets. Figure 6 shows the temporal dynamics of credit. The descriptive trends in Panel A, with the log of credit normalized to 2010 values, exhibit similar pre-trends, with post-deregulation credit for low HHI banks outpacing high HHI banks. Panel B shows the event study plots and displays the point estimates for β_l from Equation 4 using credit as the dependent variable and exhibit similar patterns. These results are robust to pre-trends, as Panel C shows using the sensitivity analysis from Rambachan and Roth (2023).

To assess the impact of deregulation and analyze the asset portfolios of banks, we run a branch-level specification similar to Equations 3 and 5, focusing on both total credit and credit composition. The granularity of our dataset allows us to track the type of borrower for each loan from a specific bank branch, enabling us to classify the sectors to which loans are directed and highlight shifts in banks' portfolios. Table 5 reports the estimates on credit. Lending increased 33 pp for low-market power banks post deregulation (columns 1–2). In the aggregate, credit-to-deposit ratios of low-market power banks outpace that of high-market power banks (Figure A3). More formally, credit-to-deposit ratios also increase by 10% (Table 5, columns 3–4) showing the mobilization of deposit inflows to credit and underscoring the shift to lending.

Table 6 shows the sectoral allocation of credit. The point estimates reported in Panel A are from the specification in Equation 3 using the dependent variable, logged credit for each of the following sectors (i) agriculture, (ii) industry, (iii) personal loans (such as housing, durable goods, and credit card loans), and (iv) services (professional and non-professional). Low-market power banks increase lending across the board. In Panel B, we examine the compositional shifts using the specification in Equation 5. The dependent variable is the share of each loan category and the base category is personal loans. We see a compositional shift towards personal loans. Personal loan share increases by 3.734%. Industry and services shares also increase by 0.948% (=3.734%-2.786%) and 2.224% (=3.734%-1.51%), respectively. The largest shift is towards the personal loan and services sector, which are in the small loan ticket-size category. Low-market power banks potentially picked up latent demand in both the services and personal loans segment. On the other hand, industry loans rely on relationship lending and are a more difficult market to capture.[10] In Panel C, we look at lending to Micro, Small, and Medium Enterprises (MSMEs).[11] Given the perceived riskiness of lending to MSMEs, which constitutes small businesses, the sector is typically financially constrained. Lending to MSMEs increases by 81%, driven by a low base effect in the pre-period. MSME loan share increases by 6.38%, indicating that the low-market power banks cater to smaller and more financially constrained borrowers post deregulation.

Loan maturity Maturity transformation is a key feature of modern banking: banks borrow short-term and lend long-term (Diamond and Dybvig, 1983). To examine the impact on loan maturity structure, we run the specification in Equation 5 on the share of credit allocated to medium-term and long-term lending with the base category, short-term loans. The estimates in Table 7 suggest that low-market power banks increased the share of short-term loans (and medium term) loans and decreased their share of long-term loans post deregulation. This result aligns with the shortening of deposit maturity due to the shift to savings deposits by low-market power banks.

5.3 Government securities and investments

Regulating deposit rates to be low allows banks to raise cheap deposits. This also allows banks to invest in safe but low-yielding government securities while continuing to earn comfortable margins. Deregulation resulted in low-market power banks raising deposit rates that increased their funding costs. Does this force banks to switch out of low-yielding government securities? To examine this, we use the specification in Equation 6. Low-market power banks increased govern-

[10] Bank-borrower relationship are generally sticky in nature. Borrowers are often best served by a small, close-knit circle of relationship banks and not by a perfectly competitive mass of investors (Murfin, 2012). Petersen and Rajan (2002) shows that smaller banking groups create an environment where lenders have a greater incentive to invest in building long-term relationships with borrowers. See Bharath et al. (2011) and the references therein for further details on bank-borrower lending relationships.

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

ment security holdings (Column 1, Table 8). We also look at the impact on investments (column 2), which increases. Low-market power banks see an increase in both savings and overall deposits and hence the increase in government securities is not surprising as banks need to maintain a minimum percentage of their deposits in safe assets as part of their SLR requirements.

More importantly, we examine how the asset-side composition changes post deregulation using the specification in Equation 5 but at the bank level, with share of credit as the base category and the share of government securities and investments as the heterogeneity variables. While credit share increases by 0.218%, the share of government securities declines by 0.137% (=0.218%-0.355%) for low-market power banks (Panel B). Investment share, too, decreases by 0.083%(=0.218%-0.301%). The increase in credit share is also consistent with the high credit-to-deposit ratios documented in Section 5.1. This shift away from government securities is striking as deregulation indeed increased credit allocation to productive sectors of the economy. Government policies that force banks to hold sovereign debt can limit their ability to invest in the real economy and are a form of financial repression (Chari et al., 2020). In our case, deposit rate regulation results in banks holding government securities voluntarily, but deregulation makes banks offload government securities and shift to credit. While we argue that deregulation reduced financial repression, one should be careful in extrapolating to welfare effects. It is entirely plausible that government borrowing is directed to investments that may be more beneficial to the economy as opposed to lending by banks. Thus, welfare implications of such a shift are not clear as a large literature documents both crowding out and crowding in effects of government debt (see Demirci et al. (2019) and references therein).

5.4 Interest income and interest expense

Our analysis of banks' asset portfolios in relation to their market power centers on the effects of savings rate deregulation. This policy change increased banks' funding costs due to higher savings deposit rates offered to attract depositors. We conjecture that, in response, banks expanded credit portfolios to insulate their profits from the rising funding costs. Figure 7 illustrates the evolution of weighted average interest income to deposit ratio (Panel A) and interest expense to deposit ratio (Panel B) for banks with low-market power (solid lines) and high-market power (dashed lines).

Both ratios are weighted by banks' deposits. The gap in interest expenses and income increased over time but the increase was much higher for low- compared to high-market power banks. The increase in interest expense is consistent with the rise in funding costs of low-market power banks.

Where did the rise in interest income come from? We observed in Section 5.3 that low-market power banks shifted away from low-yielding government securities to high-yielding loans. Thus, the increase in interest income can be explained by this shift. Potentially, lending rates could also have increased. We examine the impact of deregulation on weighted average lending rates (WALR) in Table 9 using the specification in Equation 3. We focus on the branch-level regressions as this allows us to more finely control for local economic conditions using district-time fixed effects. Also, since loan rates can vary across branches, this is the more appropriate unit of variation. We find that the weighted average lending rate *decreased*. Thus the rise in interest income is from the expansion in their credit offerings with banks prioritizing the "quantity" effect over the "price" effect when increasing revenue by reducing lending rates. Plausibly, low-market power banks compete with high-market power banks on the loan side too and cannot increase lending rates easily. In a bid to gain loan market share, low-market power banks decrease lending rates.

More formal regressions examine the impact on interest income and expenses using the bank-level specification of Equation 6 on interest income and expense. Since profitability is measured at the bank level, this the appropriate level of aggregation. The results are reported in Panel B, Table 9. Column 1 shows a 21% increase in interest expense earned with a similar increase of 19% in interest income by low-market power banks post deregulation. This is also reflected in muted changes in net interest margin (NIM) — defined as the difference between interest income-to-asset ratio and interest expense-to-asset ratio. Banks closely match their interest expense and interest incomes to smooth profits (Drechsler et al., 2021).

6 Implications for households and firms

Households To examine the impact on deposit savings and credit access of households, we define district-level HHI following Drechsler et al. (2017):

$$\text{District HHI}_i = \sum_b \text{Bank Deposit Share}_{b,i} \times \text{Bank HHI}_b \tag{8}$$

where Bank Deposit Share$_{b,i}$ is the deposit share of bank b operating in district i and Bank HHI$_b$ is bank-level HHI calculated as earlier. Low HHI$_{district}$ is 1 for below median values of average district-level HHI in the pre-period (2007–2011).

To examine household deposit and credit we use the following specification:

$$y_{i,t} = \delta_s(i) + \beta \times \text{Low HHI}_{district} + \gamma \times y_{i,t-1} + \phi X_i + \epsilon_{i,t} \tag{9}$$

where $y_{i,t}$ is the district-level dependent variable: logged deposit and logged credit. Controls include the lagged variables in $y_{i,t-1}$, district level controls X_i (district population and share of female population interacted with time trends) and state fixed effects δ_s. β captures the effect on household deposit savings and credit access in districts where low-market power banks operate.

Table 10 shows that post-deregulation household deposit increased by 28% (column 2) in districts exposed to low-HHI banks and household credit increases by 29% (column 4). Panel B shows the impact on composition of household assets along two dimensions. In columns 1–2 in Panel B, we examine the compositional shift between financial assets (stocks and deposits)[12] and physical assets (gold and real estate) using the specification in Equation 5. Though deregulation had no effect on the overall composition of physical and financial assets (columns 1–2) there is a compositional shift within financial assets to deposits (columns 3–4). Average household deposit share increases by 3.97% in low-HHI districts vis-à-vis high-HHI districts.

[12] The 2012 AIDIS dataset does not contain cash in hand and hence we exclude it.

Firms To examine firm-level access to credit on extensive and intensive margins, we use the specification:

$$y_{ibt} \quad = \alpha_b + \varphi_{it} + \beta \times \text{Post}_t \times \text{Low HHI}_b + \epsilon_{ibt} \tag{10}$$

where y_{ibt} is the dependent variables for credit for firm i at bank b at time t. Bank (α_b) fixed effects are included. To pin down the bank's supply-side channel, we follow the Khwaja and Mian (2008) methodology and include firm-time (ϕ_{it}) fixed effects. Low HHI_b and Post_t are as defined in Subsection 4.2. β captures the effect of post-deregulation on credit for firms borrowing from low-market power vis-à-vis high-market power banks for the same firm. In alternate specifications we also include firm and time fixed effects.

Post-deregulation, firms received 3.6 % (column 1, Table 11) more new loans from low-market power banks vis à vis high-market power banks. For the same firm credit from low-market power banks increases by 4.3% relative to the high-market power banks (column 2, Table 11). Using the log(1+credit) as the dependent variable shows a similar increase by low-market power banks on the intensive and extensive margin (columns 3 and 4). However, given the problems with these estimates (Chen and Roth, 2023), we use Poisson Pseudo-Maximum Likelihood model to estimate the overall intensive and extensive margin credit increase. Post-deregulation, low-market power banks increase credit by 19% relative to high-market power banks (column 6).

7 A Parsimonious Structural Demand Estimation Model

We examine the heterogeneity across low-HHI and high-HHI banks in the rate semi-elasticities — defined as the percentage change in deposit demand due to a change in the interest rates by the banks. These semi-elasticities reflect demand characteristics of markets in which banks operate and indicate the extent to which banks can adjust prices. To this end, we build a parsimonious demand estimation model based on recent work in corporate finance and financial intermediation Egan et al. (2017), Wang et al. (2022), and d'Avernas et al. (2023).

We use a parsimonious structural demand estimation model for two purposes. First, it serves as an independent test of the underlying assumption for our reduced form analysis: low-HHI banks cater to depositors that exhibit higher rate elasticities. Second, the model allows us to conduct a counterfactual exercise and estimate how aggregate savings deposits would have responded in a market with lower HHI (more competition or lower market power).

Following Wang et al. (2022), we assume that at time t, the economy consists of mass 1 of households, indexed by $h \in 1, 2, ..., n$, in each market, each endowed with one Rupee to invest. Households make a discrete choice of investing their endowment as savings deposits in one of the B banks or hold as cash (outside option).[13] Therefore, the portfolio or the choice set for the household is given by $\mathcal{C}^h = \{1, 2, ..., B, B+1\}$, where the first $1, 2, ..., B$ options represent the savings deposits in each bank and the option $B+1$ denotes cash holding. We define a district i in year t as a market i, t to capture the local sensitivity and dynamics. This exercise yields 6500 markets for our full sample from 2007–2016. We aggregate to the bank level in each market.

Each bank deposit option is a different product available to the household and the price of each product is characterized by its deposit spread $s_{b,i,t}$, defined as the difference between the policy short-term rate f_t (Repo rate) and the bank's savings deposit rate $r_{b,i,t}$, and is a measure of the opportunity cost of holding savings deposits. Higher the value of spread for bank b, higher is the opportunity cost of holding savings deposits in that bank.[14]Banks are also characterized by a vector of product characteristics $\mathbb{X}_{b,i,t}$ including the number of branches and the number of employees per branch that captures the non-rate utility of each option for the household. The yield on cash holding is assumed to be zero. The household chooses its allocation to cash and saving deposit to maximize its indirect utility:

$$\max_{b \in \mathcal{C}^h} U_{h,b,i,t} = \alpha_h s_{b,i,t} + \beta \mathbb{X}_{b,i,t} + \zeta_{b,i,t} + \varepsilon_{h,b,i,t} \tag{11}$$

where $\zeta_{b,i,t}$ denotes the fixed effects, $\zeta_{b,i,t} = \zeta_b + \zeta_{i,t} + \Delta\zeta_{b,i,t}$, consisting of bank fixed effects (ζ_j), market fixed effects ($\zeta_{i,t}$), and unobserved bank characteristics ($\Delta\zeta_{b,i,t}$). The coefficient β capture the sensitivities to the non-rate product characteristics. We allow households to have differential

[13]Since public holding of bonds in India is limited, only 5% (Das et al., 2025) , we abstract away from bond holdings in the household's portfolio, which is a common assumption for the US markets (Wang et al., 2022; d'Avernas et al., 2023).

[14]We use the spread on deposits rather than deposit rate since it is a more natural interpretation of the price of deposits.

rate sensitivities to capture the fact that depositors perceive different banks differently in terms of the rates they offer with $\alpha_h = \alpha + \sigma\nu_h$, where $\nu_h \sim N(0,1)$ and σ captures the size of the dispersion. α denotes the mean rate preferences that is common across all the households. Plugging the value of α_h in Equation 11 and combing terms that vary across households and terms that vary across bank products in a market, the indirect utility can be rewritten as:

$$U_{h,b,i,t} = \delta_{b,i,t} + \sigma\nu_h s_{b,i,t} + \varepsilon_{h,b,i,t}, \tag{12}$$

where $\delta_{b,i,t} = \alpha s_{b,i,t} + \beta\mathbb{X}_{b,i,t} + \zeta_{b,i,t}$ is the mean utility from product b across all the households in the market i,t; $\varepsilon_{i,j,d,t}$ refers to the idiosyncratic error term for household h and follows a Type 1 extreme value distribution ($F(x) = exp(-exp(-x))$). Household h will choose product b if the utility from product b is higher than that of other alternatives and is denoted by the following indicator function

$$\mathbb{1}_{h,b,i,t} = \begin{cases} 1, & if \;\; U_{h,b,i,t} \geq U_{h,k,i,t} \;\; \forall k \neq b \in \mathcal{C}^h \\ 0 & \text{otherwise} \end{cases}$$

Given our assumption on the idiosyncratic error term distribution, the standard choice probability that household h prefers product b in market i,t is:

$$d^m_{h,b,i,t} = \int \mathbb{1}_{h,b,i,t} dF(\varepsilon)$$

$$= \frac{exp(\delta_{b,i,t} + \sigma\nu_h s_{b,i,t})}{1 + \sum_{k=1}^{B} exp(\delta_{k,i,t} + \sigma\nu_h s_{k,i,t})} \tag{13}$$

where the outside utility is normalized to 1. The numerator represents the utility from holdings deposits at bank product b. Integrating across individuals, we arrive at the market share for product b in market i, t:

$$\begin{aligned} d^m_{b,i,t}(\mathbb{X}_{b,i,t}, s_{b,i,t}; \alpha, \beta, \sigma) &= \int d^m_{h,b,i,t} dF_\nu(\nu) \\ &= \frac{1}{N} \sum_{h=1}^{N} \frac{exp(\delta_{b,i,t} + \sigma \nu_h s_{b,i,t})}{1 + \sum_{k=1}^{B} exp(\delta_{k,i,t} + \sigma \nu_i s_{k,i,t})} \end{aligned} \tag{14}$$

where $F(\nu)$ stands for the distribution of the unobserved heterogeneous spread sensitivities ν_h. Since, standard integrating procedure cannot be used to integrate across individuals, we approximate the distribution with Monte Carlo integration for each market.

A standard challenge in identifying demand elasticities is the endogeneity of the savings deposit spread (price) with any unobservable demand shock that move the error term $\Delta\varepsilon_{b,i,t}$. To overcome this challenge, we follow Wang et al. (2022) and introduce cost shifters as instruments for savings deposit spreads, since these costs are unobserved by the households, while they are important for the banks in their deposit pricing decisions. Using these cost-shifters as instruments support the orthogonality assumption between the instruments and the error term. Specifically, we use the total non-interest payments, salaries to staff, and the ratio of officer level employees to total employees as the set of instruments.

Estimation We estimate the demand elasticities using the savings deposit rate data from individual banks to compute the savings deposit spread for 2007–2016. Banks in India apply uniform savings deposit rates across branches due to regulatory mandates, and therefore, in our setup we set $s_{b,i} = s_b$.[15] We use macro aggregates from RBI to proxy for overall cash holdings and savings deposits in the household's portfolio. To allocate the aggregate cash holding to different markets, we use district-level incomes. We measure district level income using night-time lights data from the Socioeconomic High-resolution Rural-Urban Geographic Dataset on India (SHRUG), and compute district weights based on the economic activity in that particular district relative to the overall economic activity in all districts.[16] Using these district weights we allocate the aggregate

[15] Though banks in India are mandated to keep savings deposit rates fixed across branches, recent work shows that banks often set uniform rates across multiple markets even in the US though they are not mandated to do so (Granja and Paixao, 2021; Begenau and Stafford, 2022).

[16] Researchers have used night lights as a proxy for GDP growth, and cross-sectional GDP among other variables (Hodler and Raschky, 2014).

cash holdings across districts. The bank characteristics $\mathbb{X}_{b,i,t}$, the set of instruments, and the total savings deposits for each bank are from the BSR dataset. For each market i, t, we draw 50 households from a standard normal distribution to capture the unobserved rate sensitivities ν_h.

Using the methods of Berry et al. (1993) and Conlon and Gortmaker (2020), we estimate the parameter set $\theta \equiv \{\alpha, \beta, \sigma\}$ with a linear IV GMM regression method. To calculate the semi-elasticity, we follow d'Avernas et al. (2023) and define the spread semi-elasticity of bank b in market i, t as:

$$\eta^s_{b,i,t} = \frac{\%\Delta d^m_{b,i,t}}{\Delta s_{b,i,t}} = \frac{\partial d^m_{b,i,t}}{\partial s_{b,i,t}} \frac{1}{d^m_{b,i,t}} \tag{15}$$

Estimation Results The estimation results of our demand system is reported in Table 12. Panel A reports the coefficients of our parameters from the demand estimation. The result shows an average spread sensitivity of -1.90 indicating that a 1% increase in the savings deposit spread leads to a 1.90% decline in the deposit market share for bank b in a market, ceteris paribus. The positive coefficient on the number of branch locations indicates that increasing a bank's branch network leads to a higher market share, highlighting the importance of non-rate characteristics in household banking decisions, consistent with the assumption in our simple theoretical model in Section 3 on the importance of provision of non-rate characteristics as an important factor in deposit supply by households and as a source of market power. Using these estimates of rate sensitivities, we compute the spread semi-elasticity using Equation 15. The spread semi-elasticity captures the impact of a change in the savings deposit spread on the quantity of savings deposits. Panel B of Table 12 reports the results. The mean spread semi-elasticity of -1.23 indicates that a 1% increase in the savings deposit spreads leads to a 1.23% decrease in deposit quantity, on average, demonstrating a more than one-to-one impact of spread changes on total deposit quantity.[17]

The average spread semi-elasticity masks important differences across banks with differing market power. Panel B reports the spread semi-elasticities for low-HHI and high-HHI banks, where we define low HHI banks based on whether the pre-sample period HHI value of a bank is below median and high HHI, otherwise. High-market power banks operate in relatively inelas-

[17]Even though these results are based on the total deposit shares, all results flow through with similar signs and magnitudes when we use banks' savings deposit share instead.

tic markets, with an average spread semi-elasticity of 0.56 (in absolute terms), while low-market power banks operate in relatively elastic markets, exhibiting a higher elasticity of 2.11 (in absolute terms). These estimates serve as an independent confirmation of the identifying assumption in our reduced form analysis: low-HHI (high-HHI) banks cater to markets with elastic (ineasltic) demand. High-HHI banks, operating in relatively inelastic markets, have a sticky depositor base, which limits the decrease in deposits when they raise their spreads. In contrast, Low-HHI banks face highly elastic markets, where a 1% increase in their spread results in a more than proportional decrease in deposits. This contrast has significant implications: high-HHI banks can sustain their spreads with minimal impact on deposits, potentially reducing their funding costs and lessening the pressure to expand lending. Conversely, Low-HHI banks, which experience a 2.1% increase in deposits for every 1% reduction in spreads, see escalated funding inflows and associated costs. To maintain profitability, these banks respond by increasing their share of overall lending as the reduced form analysis showed.

We use these elasticity estimates to calculate how much a ₹1 of saving deposit in the pre-deregulation period will increase post-deregulation.We also conduct a counterfactual exercise: what is the impact on deposits if the banking system is homogeneous with low market power? We use the deposit rate semi-elasticity, which is the negative of the spread semi-elasticity to abstract away from contemporaneous changes in the policy rate.[18]

₹1 of savings deposit pre-deregulation comprises of ₹0.45 from low market-power banks and the remaining ₹0.55 from high-market power banks.[19] We use $\Delta d = ₹1 \times \eta \times \Delta r$, where Δd is the change in the deposit value, η is the rate semi-elasticity estimate, and Δr is the change in the average savings deposit rates to estimate the change in deposits between the two periods. The change in deposits using the bank semi-elasticities is $\Delta d^{het} =$ ₹0.87 (₹0.45 $\times$ 2.11 $\times$ 0.79 + ₹0.55 $\times$

[18]To see the equivalence of semi-elasticities, notice that

$$\eta^s_{b,i,t} = \frac{\Delta d^m_{b,i,t}}{\Delta s_{b,i,t}} \frac{1}{d^m_{b,i,t}} = \frac{\Delta d^m_{b,i,t}}{\Delta (f_t - r_{b,i,t})} \frac{1}{d^m_{b,i,t}} = \frac{\Delta d^m_{b,i,t}}{\Delta s_{b,i,t}} \frac{1}{d^m_{b,i,t}} = \frac{\Delta d^m_{b,i,t}}{(f_t - r'_{b,i,t} - f_t + r_{b,i,t})} \frac{1}{d^m_{b,i,t}}$$

$$\implies \eta^s_{b,i,t} = \frac{-\Delta d^m_{b,i,t}}{(r'_{b,i,t} - r_{b,i,t})} \frac{1}{d^m_{b,i,t}} = -\eta^d_{b,i,t}$$

where $\eta^s_{b,i,t}$ and $\eta^d_{b,i,t}$ denotes the spread and rate semi-elasticity respectively. d'Avernas et al. (2023) use a similar measure in their analysis.

[19]45% of deposits are from low-market power banks and the remaining 55% is from high-market power banks.

0.56×0.41).[20] In the counterfactual exercise, we set the market elasticity of high-market power banks to be the same as that of low-market power banks, with a similar deposit rate response. This yields Δd^{cf} = ₹1.67 (₹0.45 $\times 2.11 \times 0.79 +$ ₹0.55 $\times 2.11 \times 0.79$) denoting a change in the value of savings deposit by ₹1.67 for every ₹1 of savings deposit pre-deregulation, with an aggregate of: d^{cf}_{post} = ₹2.67. Comparing the counterfactual value to the baseline value, yields a gap of ₹0.8 (₹ 2.67- ₹1.87). In the absence of any market power, savings deposits would have been ₹0.8 or 42% higher. Thus, we contend that a concentrated banking system limits the gains from deregulation.

8 Robustness and alternative hypotheses

Our baseline results are robust to using an alternative sample period $\pm$ 3 years (Internet Appendix Table A4), using an HHI measure based on savings deposits instead of total deposits (Internet Appendix Table A5), and defining more granular markets based on metro, urban, semi-urban, and rural sub-divisions within districts (Internet Appendix Table A6).

Our baseline results are at the branch-level, which allows us to compare low- and high-market power banks within districts and control more finely for local economic factors through district-time fixed effects. Our results also hold when we examine bank-level effects (Internet Appendix Table A7).

One concern might be that low-HHI is a proxy for some variation unrelated to deposit market power. Table A2 shows that low-HHI banks cater to urban markets, are less likely to be state-owned banks, have more skilled officers, and have higher NPAs (column 9). Even if low-HHI captures other sources of *deposit* market power, our results hold. Market power can arise from other factors such as better provision of liquidity services, explicit or implicit guarantees of deposits, regulation limiting free entry of banks, or by catering to markets with inelastic demand. While the baseline estimates rely on deposit market HHI, our structural estimation excercise (Section 7) confirmed that low-HHI banks cater to markets with elastic demand. We show robustness with several alternative sources of deposit market power. Concerns arise only if some alternate

[20] To see this,

$$\Delta d^{het} = \Bigg[\underbrace{₹0.45 \times \eta_{low} \times \Delta r_{low}}_{\text{low MP}} + \underbrace{₹0.55 \times \eta_{high} \times \Delta r_{high}}_{\text{high MP}} \Bigg] = 0.87$$

non-*deposit* source of market power or alternative bank characteristics drive results. We show robustness to alternative non-deposit related hypotheses.

8.1 Deposit-β

We define an alternate measure of market power, deposit-β, more closely tied to the banks' market power in pricing of deposits. We define deposit-β as the extent of pass-through of the monetary policy rate to the deposit rates for banks as in Drechsler et al. (2021). 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 (policy rate), higher is the spread and therefore higher the bank's market power. Given that deposit rates in India are set at the bank level and not the branch level, we calculate this sensitivity at the bank-level and relate a bank's interest expense to changes in the Repo rate. β for bank b is from the following specification:

$$\Delta\text{Interest Expense Rate}_{b,t} = \psi_b + \eta_t + \sum_{\tau=0}^{3} \beta_{b,\tau} \Delta\text{Repo Rate}_{t-\tau} + \epsilon_{b,t} \tag{16}$$

where ΔInterest Expense Rate$_{b,t}$ is the change in bank b'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. ΔRepo Rate$_t$ is the change in the repo rate from t to $t+1$, ψ_b are bank fixed effects, and η_t are time fixed effects. Time is at quarterly frequency. We incorporate three lags of the Repo rate changes to account for the cumulative impact of Repo rate adjustments over a span of one year. Our estimate of bank b's overall expense beta is the sum of the coefficients in Equation 16

$$\hat{\beta}_{bank} = \sum_{\tau=0}^{3} \beta_{b,\tau} \tag{17}$$

where b is replaced with *bank*. $\hat{\beta}_{bank}$ measures how much interest expenses change due to changes in the Repo rates. A higher value of $\hat{\beta}_{bank}$ indicates lower market power.

Table A2 shows a high correlation between our baseline low-HHI and deposit-β. We use the specification in Equation 3 and replace Low HHI with deposit-β. Based on the baseline results, we expect the coefficient on the interaction coefficient to be positive as this implies that lower market power bank (measured by higher value of beta) increased deposits and credit after deregulation. Table A8 reports the results. Low-market power banks indeed see an increase in deposits, credit, and credit-to-deposit ratios post-deregulation, in line with the baseline results.

8.2 The role of state-ownership of banks

State-owned banks may not have purely profit-maximizing incentives. State-ownership determines bank performance (Sapienza, 2004), lending decisions (Bertay et al., 2015), political influence (Dinç, 2005), and regulatory mandates (Burgess and Pande, 2005). To assuage concerns that other aspects of state-ownership drive our results, we confirm that all our results are similar when we restrict to only private sector banks (Internet Appendix Table A9).

State ownership itself can be a source of *deposit* market power for banks. State-owned public sector banks enjoy explicit and implicit government guarantees, which matters when deposits insurance is limited (Acharya et al., 2022). Government backing also allows these banks to exert considerable market influence and undertake strategic initiatives. Branching mandates ensure that these banks cater to broader geographies with a captive depositor base. Poorer households may not access private sector bank services due to switching costs. Households may also be required to open and maintain savings accounts with government banks to receive government transfers and salaries. In sum, state-ownership is an important dimension of deposit market power in India and is correlated with the baseline HHI measure (Table A2). We use the specification in Equation 3 and replace Low HHI with an indicator for private sector bank. Following deregulation, private sector banks increased their savings deposit rate by 0.14 pp, which led to 53% increased in deposits compared to public sector banks (Table A9).

8.3 Alternate hypothesis: Loan market concentration

One counterargument is that loan, as opposed to deposit, market concentration drives effects (Maingi, 2023). While there is no clear direct link between deregulation and loan-market concentration, one could argue that other demand factors or broader trends drive credit increases.

Indeed, deposit-HHI and an analogously defined loan-HHI[21] are highly correlated (Table A2) making it difficult to disentangle the two channels. Two tests support the deposit market power hypothesis. First, a credit-demand hypothesis predicts an increase in loan rates. In contrast, loan rates decline after deregulation (Table 9). In a second test, we define local district-level Loan Branch-HHI by replacing deposit shares with loan shares in Equations 1. In our baseline, we relied on bank-level HHI variation since regulation does not allow deposit rates to vary across bank branches. Loan rates need not be uniform across branches, and banks can compete for loans by differentially setting loan rates across branches (districts). As a result, local loan market power should determine rates and loan quantities. Internet Appendix Table A10 shows that the baseline results flow through even after controlling for local loan branch-HHI. If anything, the coefficient on Branch-HHI^{Credit} is negative, suggesting that internal capital markets are at play.

8.4 Alternate hypothesis: Bank distress

After the 2009 Global Financial Crisis, Indian banks were saddled with non-performing loans and the Indian government implemented several policies in the aftermath to clean up bank balance sheets (Chopra et al., 2021). To examine effects from banks' non-performing assets during the period, we look at the interaction between bank distress (defined as the non-performing share of assets in 2011) and low HHI in Table A11. The baseline interaction (Low HHI×Post) remains significant throughout. There is heterogeneity across banks with 18.2% higher growth (=20.6%-2.4%) at low-HHI distressed banks compared to 20.6% growth at non-distressed low-HHI banks (column 2). This pattern is also reflected in credit growth (columns 9–10). These results are to be expected as distressed banks may be more restrained in expanding their deposit and credit base. Overall, low-HHI banks increased their deposits, even after accounting for bank distress.

9 Conclusion

This paper examines the impact of India's 2011 saving deposit rate deregulation on financial intermediation. We show that banks with low market power increased deposit rates more, leading to higher deposits. Lending increased, especially to underserved sectors such as retail loans and

[21] Defined using loan shares instead of deposit shares in Equations 1-2.

small businesses. Low-market power banks shift from government securities to credit to offset funding costs. We demonstrate how deposit rate regulation can constrain credit availability and financial intermediation. While deregulation stimulates lending, banks' market power can mute gains. Importantly, banks' market power can achieve effects similar to financial repression.

Although regulation has kept deposit rates low for long, fixed deposit rates were deregulated in 1997 with savings deposit deregulation occurring only a decade later in 2011. Though monetary policy transmission to lending rates receives much regulatory attention, deposit rate transmission doesn't receive similar scrutiny. One plausible reason is fiscal dominance: depressed deposit rates allow banks to raise deposits cheaply while earning comfortable margins by simply investing in government securities. A concentrated banking system that achieves similar depressed rates may also be motivated by government policies arising from fiscal dominance.

Such depressed deposit rates are possible only until banks enjoy market power. As markets mature and savers find alternate investment avenues, banks' market power may diminish. A case in point is the recent outflow of bank deposits as households look to invest in a booming stock market.[22] However, this has also been accompanied by warnings from the regulator[23] and the government[24] on banks' dwindling deposits and rising credit-to-deposit ratios. Banks, in turn, have responded by increasing deposit rates. While rising funding costs can be a problem for banks, this paper highlights that it can push banks to move away from low-yielding government securities to loans, potentially reducing crowding out effects and improving aggregate activity.

[22]See here on Indian households' rising stock market participation.

[23]The RBI Governor warned banks regarding the recent outflow of bank deposits in August 2024 (see here).

[24]The Finance Minister urged banks in May 2024 to boost deposits as banks' credit-to-deposit ratios increased (see here).

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Figure 1
Deposit concentration across districts

This figure shows the heat map for district-level bank market concentration in India. Market concentration is district-level Herfindahl-Hirschman Index (HHI) calculated as the sum of the squared share of total deposits each bank operating in a district. Average market concentration as of 2011 is shown. All private and public sector banks are included in the analysis. Underlying branch-level data is from the Reserve Bank of India.

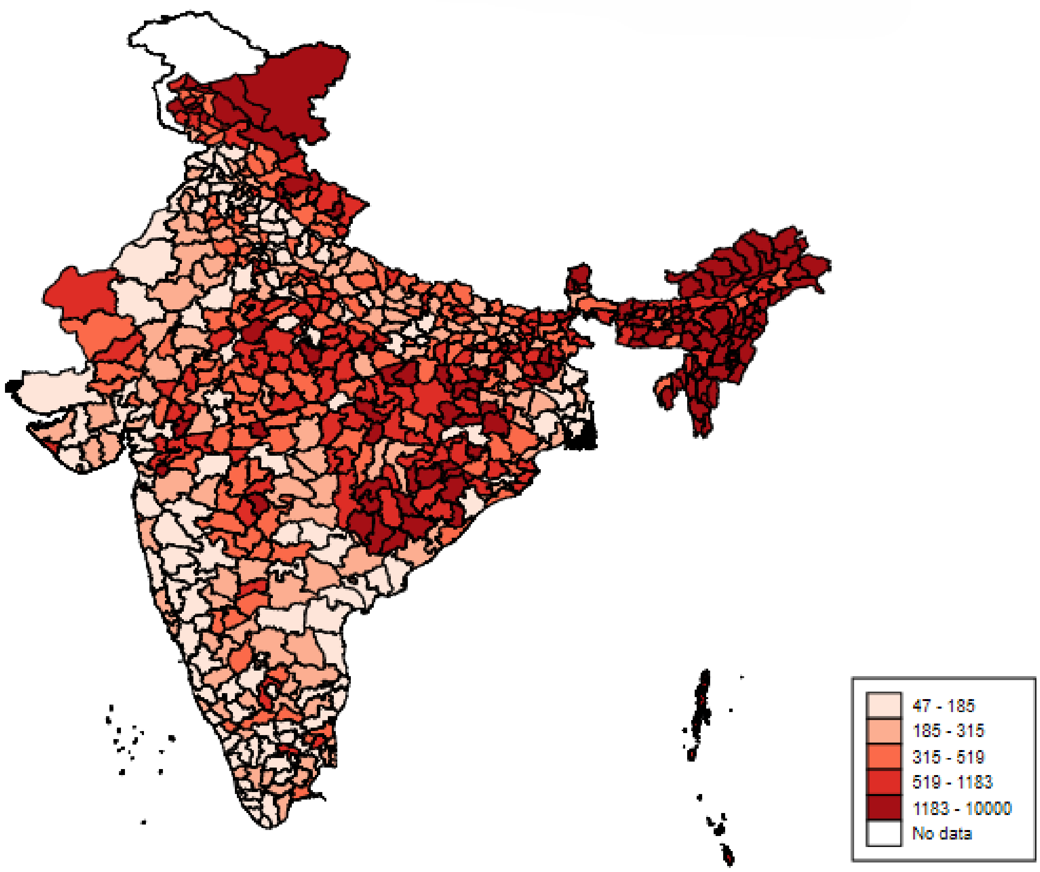
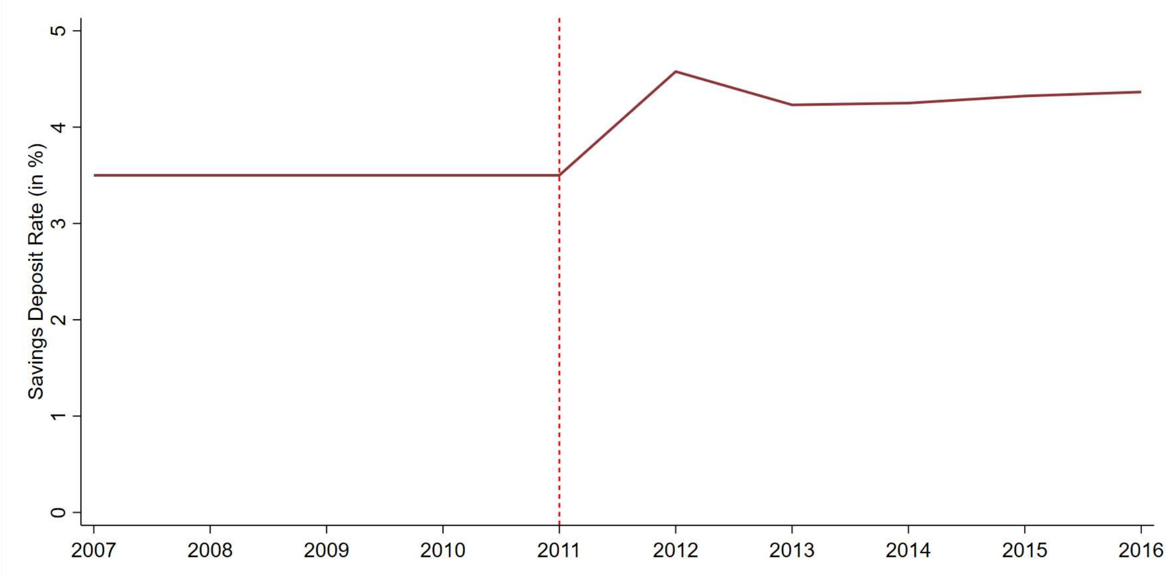
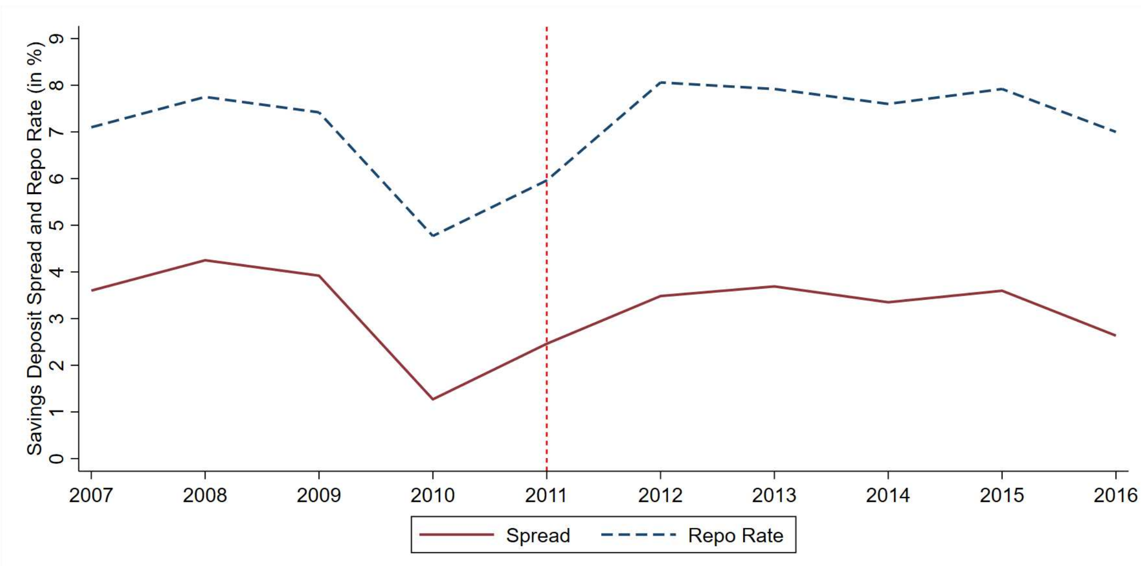


Figure 2
Savings deposit rates

This figure shows the savings deposit rate, spread, and repo rate from 2007 to 2016. Panel A shows the average savings deposit rate in India. Panel B shows the average spread defined as the repo rate minus the savings deposit rates. Years are the fiscal year as of March 31st. The vertical dotted red line denotes the year of deregulation, 2011. All private and public sector banks are included in the analysis. Repo rate is from CEIC. Savings deposit rate are hand-collected from bank websites.



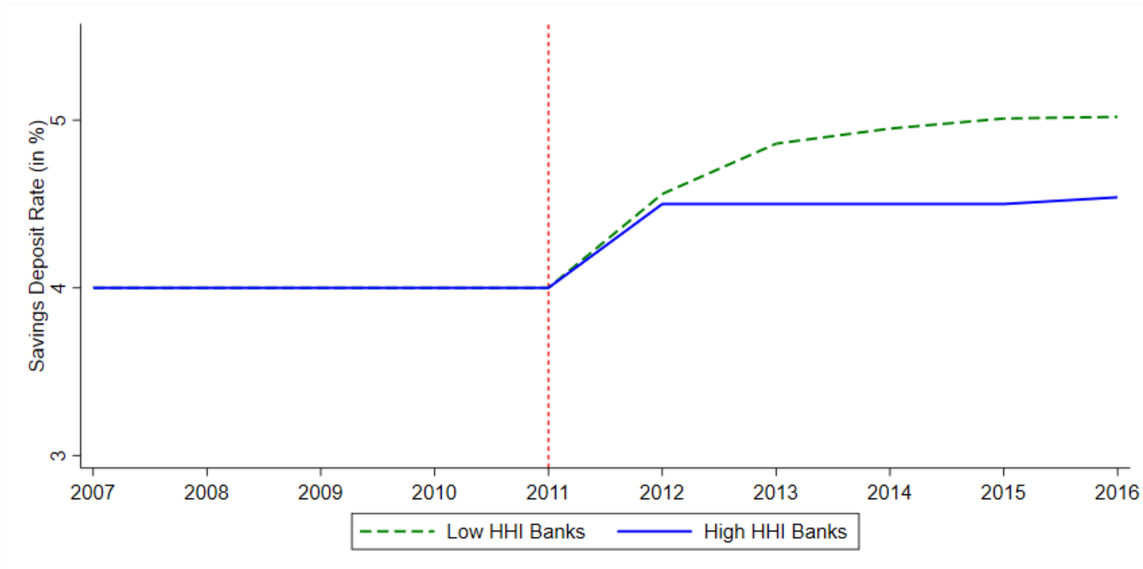
(A) Savings deposit rate



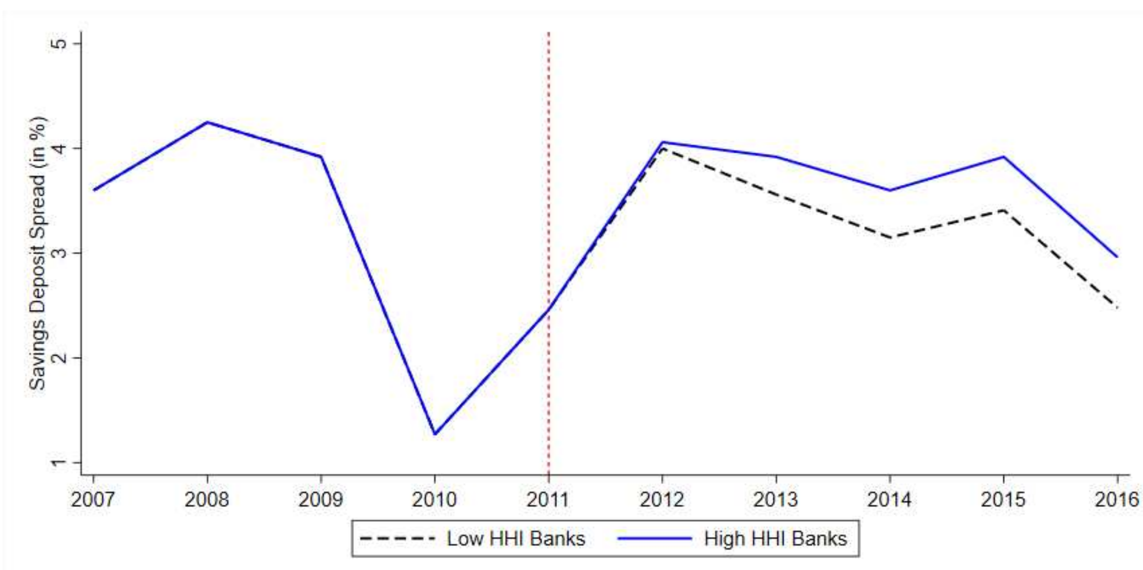
(B) Spread and repo rate

Figure 3
Savings deposit rates: Heterogeneity by deposit market concentration

This figure shows the savings deposit rate and spread by bank market power from 2007 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Panel A shows the average savings deposit rate for low and high HHI banks. Panel B shows the average spread defined as the repo rate minus the savings deposit rates for low and high HHI banks. Years are the fiscal year as of March 31st. The vertical dotted red line denotes the year of deregulation, 2011. All private and public sector banks are included in the analysis. Repo rate is from CEIC. Savings deposit rate are hand-collected from bank websites. Underlying branch-level data is from the Reserve Bank of India.



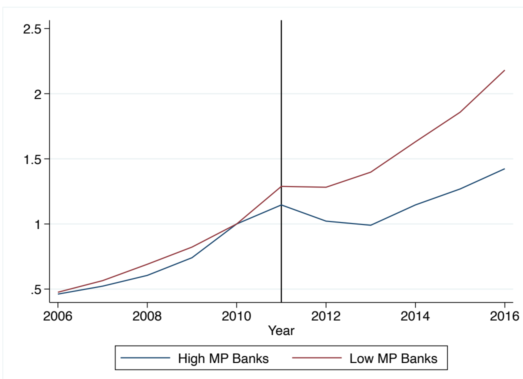
(A) Savings deposit rates: Low HHI vs High HHI banks



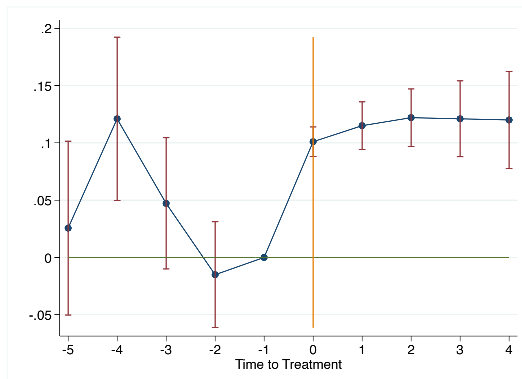
(B) Savings deposit spread: Low HHI vs High HHI banks

Figure 4
Pre-trend analysis for savings deposit

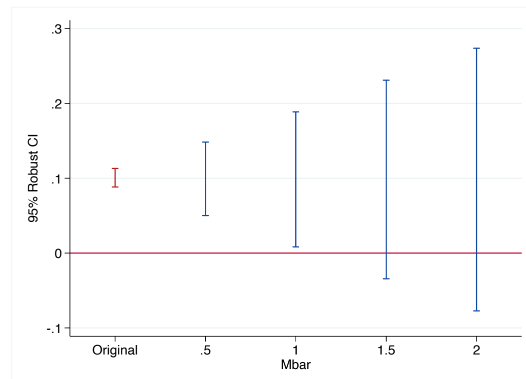
The plots below show temporal dynamics of savings deposits by bank market power for the period 2007 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Years are the fiscal year as of March 31st. The vertical line denotes the year of deregulation, 2011 In panel A, savings deposit is normalized to 2011. The aggregate deposits for low- and high-HHI banks are shown. Panel B shows the point estimates from an event study analysis. The vertical red lines show the 5% confidence interval for the point estimates. Panel C shows the sensitivity analysis using Rambachan and Roth, 2023. In Panel B and C, 2011 is the reference year. All regressions are at the branch level, with standard error clustered at the branch level. Data is from Reserve Bank of India.



(A) Trend of normalized savings deposits



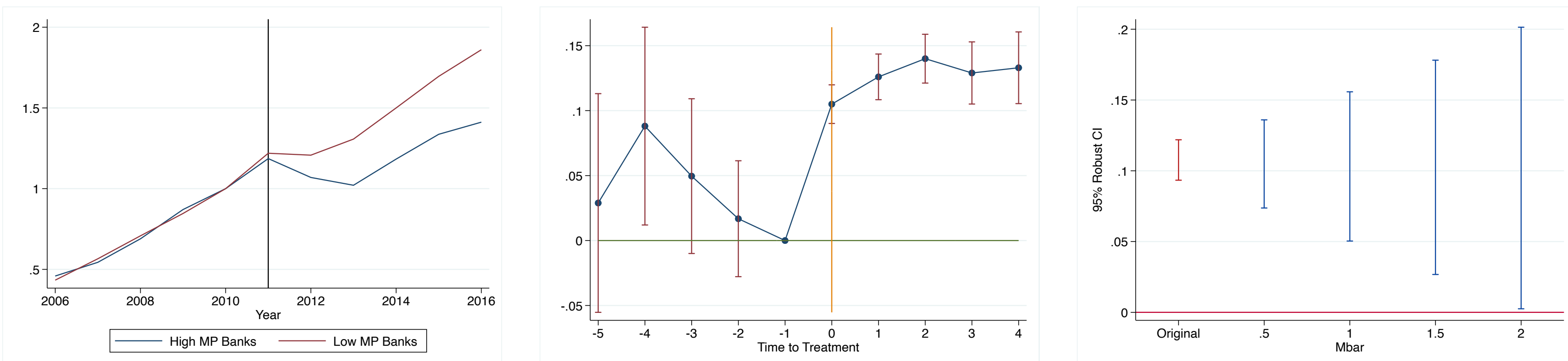
(B) Event study plot



(C) Sensitivity analsysis

Figure 5
Pre-trend analysis for total deposits

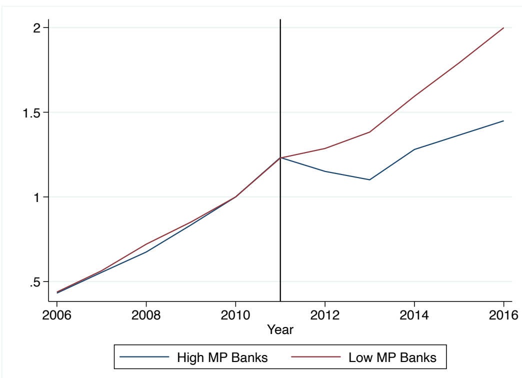
The plots below show temporal dynamics of deposits by bank market power for the period 2007 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Years are the fiscal year as of March 31st. The vertical line denotes the year of deregulation, 2011. In panel A, deposit is normalized to 2010. The aggregate deposits for low- and high-HHI banks are shown. Panel B shows the point estimates from an event study analysis. The vertical red lines show the 5% confidence interval for the point estimates. Panel C shows the sensitivity analysis using Rambachan and Roth, 2023. In Panel B and C, 2011 is the reference year. All regressions are at the branch level, with standard error clustered at the branch level. Data is from Reserve Bank of India.



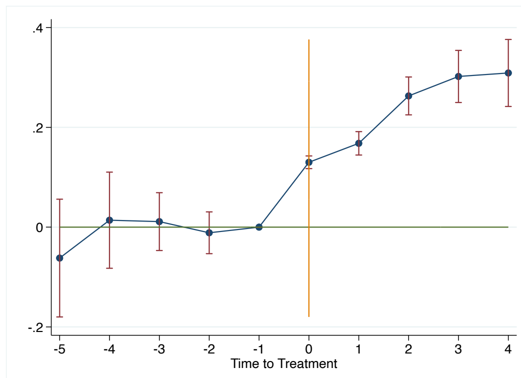
(A) Trend of normalized deposits **(B) Event study plot** **(C) Sensitivity analsysis**

Figure 6
Pre-trend analysis for credit

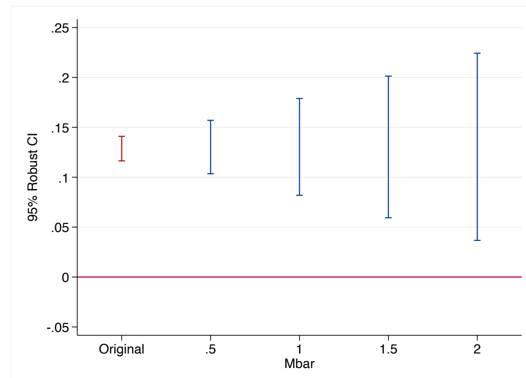
The plots below show the temporal dynamics of credit by bank market power for the period 2007 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Years are the fiscal year as of March 31st. The vertical line denotes the year of deregulation, 2011. In panel A, savings deposit is normalized to 2011. The aggregate credit for low- and high-HHI banks are shown. Panel B shows the point estimates from an event study analysis. The vertical red lines show the 5% confidence interval for the point estimates. Panel C shows the sensitivity analysis using Rambachan and Roth, 2023. In Panel B and C, 2011 is the reference year. All regressions are at the branch level, with standard error clustered at the branch level. Data is from Reserve Bank of India.



(A) Trend of normalized credit



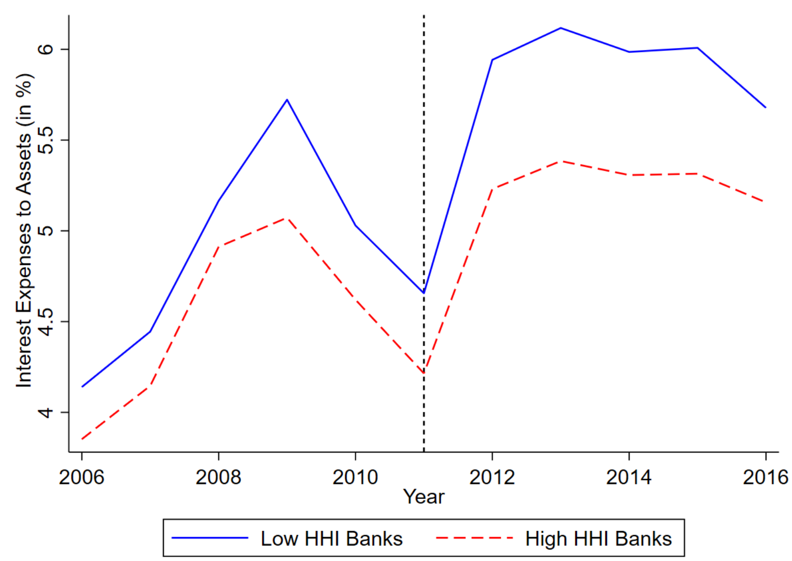
(B) Event study plot



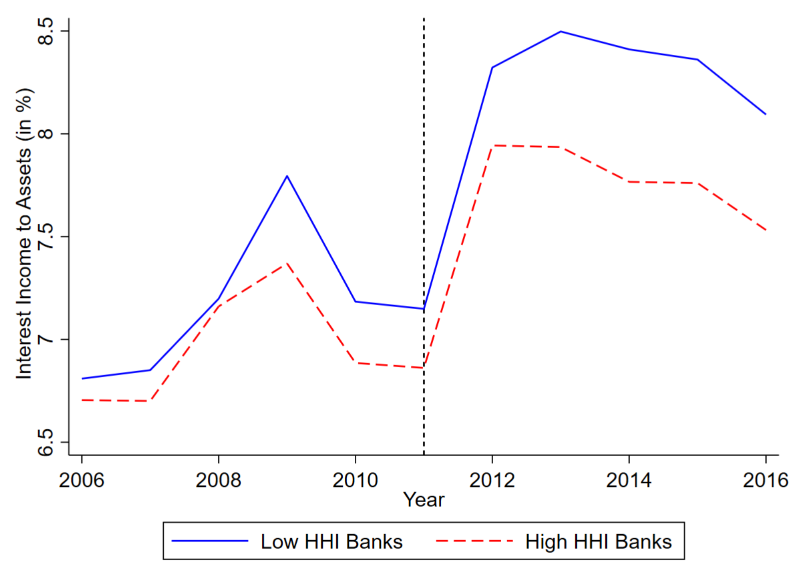
(C) Sensitivity analsysis

Figure 7
Interest income and interest expenses

This figure shows the interest expense to assets (panel A) and interest income to assets (panel B) by bank market power from 2006 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Years are the fiscal year as of March 31st. The vertical dotted line denotes the year of deregulation, 2011. All private and public sector banks are included in the analysis. Data is from the Reserve Bank of India.



(A) Weighted average interest expenses to assets



(B) Weighted average interest income to assets

Table 1
Descriptive statistics

Variables	All Mean (1)	All SD (2)	Low HHI Mean (3)	Low HHI SD (4)	High HHI Mean (5)	High HHI SD (6)
	Bank-level statistics					
Savings Deposit Rate (in %)	3.8	0.6	3.87	0.76	3.74	0.26
Spread (in %)	3.29	1.0	3.20	1.08	3.38	0.89
Assets (₹ billions)	1553	2414	723	901	2380	3078
Deposits (₹ billions)	1238	1851	570	681	1904	2346
Savings Deposits (₹ billions)	299	584	103	150	495	763
Term Deposits (₹ billions)	822	1124	407	463	1236	1404
Credit (₹ billions)	854	1514	438	549	1470	1941
G-sec Investments (₹ billions)	317	456	156	188	478	574
Credit to Deposit (in %)	74.62	24.11	73.03	5.93	76.23	32.1
Credit to Assets (in %)	59.78	6.17	58.71	5.93	60.86	6.24
G-sec to Assets (in %)	21.72	2.77	22.05	2.71	21.4	2.81
Short Inv to Assets (in %)	7.59	6.18	9.32	6.67	5.87	5.12
Long Inv to Assets (in %)	20.15	7.19	19.12	6.7	21.18	4.77
Short Credit to Assets (in %)	21.90	7.88	22.67	8.26	21.26	7.43
Long Credit to Assets (in %)	37.07	8.74	36.06	8.94	39.33	8.24
Interest Expenses to Assets (in %)	5.35	0.96	5.57	0.98	5.14	0.89
Interest Income to Assets (in %)	7.83	0.96	8.05	1.03	7.62	0.86
NIM (in %)	2.48	0.63	2.48	0.69	2.48	0.57
Observations	481		241		240	
Number of Banks	55		27		28	
	Branch-level statistics					
Deposits (₹ millions)	667	4180	740	5226	596	2793
Saving Deposits (₹ millions)	179	549	172	529	185	568
Term Deposits (₹ millions)	420	3553	489	4550	352	2166
Current Account (₹ millions)	69	1233	79	1212	59	1252
Credit (₹ Million)	524	8852	589	11200	460	5623
Agriculture Credit (₹ Million)	71	389	83	482	63	312
Industry Credit (₹ Million)	245	4256	284	4302	216	4221
Personal Credit (₹ Million)	87	2877	105	4428	75	616
Services Credit (₹ Million)	131	2332	174	2899	100	1807
MSME Credit (₹ Million)	116	1964	153	2763	88	1003
Long Term Credit (₹ Million)	215	5841	300	8526	158	2870
Medium Term Credit (₹ Million)	79	1471	99	1566	64	1397
Short Term Credit (₹ Million)	188	1983	213	2243	169	1757
Agriculture Credit Share (in %)	35.6	29.9	31.6	29.2	38.3	30.1
Industry Credit Share (in %)	11.5	17.3	14.13	19.4	9.8	15.5
Personal Credit Share (in %)	28.2	21.9	27.4	20.9	28.8	22.5
Services Credit Share (in %)	18.1	16.1	19.2	17.3	17.4	15.1
Long Term Credit Share (in %)	46.4	25.1	42.6	25.0	50.0	24.6
Medium Term Credit Share (in %)	11.5	15.3	13.5	17.1	9.5	15.2
Short Term Credit Share (in %)	42.1	24.6	43.8	25.1	40.4	23.9
Observations	707,161		350,174		356,987	

This table presents summary statistics for key bank- and branch-level variables in our analysis. Bank and branch-level mean and standard deviation for different variables for all, low HHI and high HHI banks. G-sec to Assets ratio is net of SLR. Variables are as defined in the Internet Appendix Table A1.

Table 2
Deposit rate

	Saving Deposit Rate	Term Deposit Rate
	(1)	(2)
Post × Low HHI_{bank}	0.37**	0.112
	(0.16)	(0.262)
Bank Fixed Effects	✓	✓
Year Fixed Effects	✓	✓
Observations	440	448
R^2	0.671	0.621

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$,*** $p < 0.01$

This table examines the impact of deregulation on savings and term deposit rates. The dependent variable is the saving deposit rate in column 1 and the weighted average deposit rate (WADR) for term deposits in column 2. Observations are at the bank-level in columns 1 and 2. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the bank level. All private and public sector banks from 2007 to 2016 are included. Data on savings deposit rates is from bank websites.

Table 3
Deposits

Panel A: Levels and types of deposit

	Log(Saving Deposit)		Log (Term Deposits)		Log (Current Account)		Log (Deposit)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Low HHI_{bank}	0.103***	0.160***	0.148***	0.201***	0.140***	0.183***	0.086***	0.135***
	(0.006)	(0.007)	(0.007)	(0.009)	(0.009)	(0.010)	(0.006)	(0.007)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓		✓
Observations	650019	649920	627658	627557	650019	649920	650019	649920
R^2	0.850	0.855	0.833	0.838	0.804	0.810	0.859	0.863

Panel B: Share of deposit

	Share of Deposit	
	(1)	(2)
Post × Low HHI_{bank}	3.274***	3.274***
	(0.115)	(0.115)
Post × Low HHI_{bank} × Term Deposit	-6.872***	-6.872***
	(0.222)	(0.223)
Post × Low HHI_{bank} × Current Account	-2.950***	-2.950***
	(0.154)	(0.155)
Branch Fixed Effects	✓	✓
Year Fixed Effects	✓	
District × Year Fixed Effects		✓
Observations	1962186	1962185
R^2	0.515	0.514

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

This table examines the impact of deregulation on deposits. Panel A shows the results for the deposits and panel B shows the results for deposit share. The dependent variable in Panel A is the logged value of savings, term, current, and total deposits. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median in the pre deregulation period. Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the branch level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table 4
Branch, Bank Concentration, and Markets Diversification

Panel A: Number of Branches and Bank Concentration

	Log (# Branches)	$\text{Log}\left(\frac{\text{\# Branches}}{\text{Deposits}}\right)$	Log(Bank HHI)
Post × Low HHI_{bank}	0.33***	0.25**	0.024
	(0.12)	(0.097)	(0.026)
Bank Fixed Effects	✓	✓	✓
Year Fixed Effects	✓	✓	✓
Observations	398	398	398
R^2	0.977	0.879	0.972

Panel B: Entry to New Markets

	Entry to New Market		
	(1)	(2)	(3)
Pre Existing Market Dummy × Low HHI_{bank}	-0.051***	-0.037**	-0.041**
	(0.017)	(0.018)	(0.019)
Market Fixed Effects	✓		✓
Bank Fixed Effects		✓	✓
N	178200	178200	178200
R-Squared	0.649	0.633	0.683

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

This table examines the impact of deregulation on the number of branches. The dependent variable in column 1 is the log number of branches and log number of branches to deposits in column 2, column 3 shows the log of Bank HHI. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. The table 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 variable represents different variables as mentioned earlier. It is regressed against Post $\times \mathbb{1}\{Low\ HHI_{bank}\}$ that is set up in equation 6 and $\mathbb{1}\{Low\ HHI_{bank}\}$ takes the value 1 if banks belong to below median as per market concentration averaged till 2011. Fixed effects are indicated. Standard errors are clustered at the branch level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table 5
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	✓	✓	✓	✓
Year Fixed Effects	✓		✓	
District × Year Fixed Effects		✓		✓
Observations	632527	632426	629940	629839
R^2	0.819	0.825	0.825	0.833

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

This table examines the impact of deregulation on credit. The dependent variable in columns 1-2 is the logged credit and credit-to-deposit in columns 3–4. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the branch level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table 6
Sectoral allocation of credit

Panel A: 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	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓		✓
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

Panel B: Change in sectoral composition

	Share of Credit	
	(1)	(2)
Post × Low HHI_{bank}	3.734***	3.734***
	(0.175)	(0.175)
Post × Low HHI_{bank} × Agriculture	-5.366***	-5.366***
	(0.355)	(0.355)
Post × Low HHI_{bank} × Industry	-2.786***	-2.786***
	(0.243)	(0.243)
Post × Low HHI_{bank} × Services	-1.510***	-1.510***
	(0.227)	(0.227)
Post × Low HHI_{bank} × All Others	-9.01***	-9.01***
	(0.21)	(0.208)
Branch Fixed Effects	✓	✓
Year Fixed Effects	✓	
District × Year Fixed Effects		✓
Observations	2009160	2009160
R^2	0.247	0.248

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

Panel C: Credit allocation to small business

	Log (MSME Loans)		MSME Loan Share	
	(1)	(2)	(3)	(4)
Post × Low HHI_{bank}	0.665***	0.812***	6.261***	6.380***
	(0.011)	(0.012)	(0.170)	(0.184)
Branch Fixed Effects	✓	✓	✓	✓
Year Fixed Effects	✓		✓	
District × Year Fixed Effects		✓		✓
Observations	545953	545837	545552	545436
R^2	0.760	0.773	0.753	0.769

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

This table examines the impact of deregulation on the sectoral allocation of credit. The dependent variables in Panel A in columns 1–2, 3–4, 5–6, and 7–8, are the logged credit to agriculture, industry, personal loans, and services. The dependent variables in Panel B are share of credit to agriculture, industry, personal loans, services, and other. The dependent variable in Panel C in column 1–2 is log of credit to the Micro, Small, and Medium Enterprises (MSME) and the the dependent variable in columns 3–4 is the share of the MSME sector. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the branch level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table 7
Loan maturity

	Share of Credit	
	(1)	(2)
Post × Low HHI_{bank}	0.50**	0.50**
	(0.208)	(0.209)
Post × Low HHI_{bank} × Medium Term Share	4.84	4.84
	(0.281)	(0.282)
Post × Low HHI_{bank} × Long Term Share	-6.34***	-6.34***
	(0.389)	(0.391)
Branch Fixed Effects	✓	✓
Year Fixed Effects	✓	
District × Year Fixed Effects		✓
Observations	1461402	1461402
R^2	0.367	0.368

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

This table examines the impact of deregulation on loan maturity. The dependent variable is the share of credit to short, medium, or long-term loans. The base category is short-term loans. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the branch level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table 8
Government securities and investments

Panel A: Impact on Government Securities and Investments

	Log (Gsec)	Log (Investments)
	(1)	(2)
Post × Low HHI_{bank}	0.21**	0.22**
	(0.097)	(0.099)
Bank Fixed Effects	✓	✓
Year Fixed Effects	✓	✓
Observations	478	478
R^2	0.978	0.981

Panel B: Impact on Share of Assets

	Share of Total
	(1)
Post × Low HHI_{bank}	0.218***
	(0.015)
Post × Low HHI_{bank} × G-Sec Share	-0.355***
	(0.004)
Post × Low HHI_{bank} × Investments Share	-0.301***
	(0.005)
Bank Fixed Effects	✓
Year Fixed Effects	✓
Observations	1443
R^2	0.227

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

This table examines the impact of deregulation on government securities and investments. The dependent variable is Panel A is the log of government security holdings in column 1 and the log of investments in column 2. The dependent variable in Panel B is the share of assets in government securities, investments and loans. The base category in panel B is loan share. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated. Standard errors are clustered at the bank level. Observations are at the bank-year level. All private and public sector banks from 2007 to 2016 are included. Data is from the Reserve Bank of India.

Table 9
Lending rates, interest income and interest expense

Panel A: Lending Rates

	Lending Rates	
	(1)	(2)
Post × Low HHI_{bank}	-0.065***	-0.082***
	(0.010)	(0.011)
Branch Fixed Effects	✓	✓
Year Fixed Effects	✓	
District × Year Fixed Effects		✓
Observations	632527	632426
R^2	0.606	0.631

Panel B: Bank profitability

	Log (Interest Expenses)	Log (Interest Income)	NIM
	(1)	(2)	(3)
Post × Low HHI_{bank}	0.21**	0.19**	-0.05
	(0.079)	(0.089)	(0.128)
Bank Fixed Effects	✓	✓	✓
Year Fixed Effects	✓	✓	✓
Observations	478	478	478
R^2	0.987	0.973	0.719

Robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

This table examines the impact of deregulation on lending rates, interest income, and interest expense. The dependent variable in Panel A is the weighted average lending rates (WALR). Observations in Panel A are at the branch-year level. Standard errors are clustered at the branch level. The dependent variable is Panel B is the log of interest expense (column 1), interest income (column 2), and net interest margin (NIM) in column 3. NIM is calculated as the interest income to total assets minus the interest exsense to total assets. Standard errors are clustered at the bank level in Panel B. Observations are at the bank-year level in Panel B. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated. All private and public sector banks from 2007 to 2016 are included. Data is from the Reserve Bank of India.

Table 10
Households access to deposits and credit

Panel A: Deposit and Credit

	Log Deposits		Log Credit	
	(1)	(2)	(3)	(4)
Low HHI District	0.413***	0.275**	0.445***	0.289***
	(0.119)	(0.115)	(0.103)	(0.101)
State Fixed Effects	✓	✓	✓	✓
District Controls		✓		✓
Observations	546	545	546	545
R^2	0.530	0.597	0.614	0.698

Panel B: Impact on Share of Assets

	Δ Share			
	(1)	(2)	(3)	(4)
Low HHI District	0.483	0.483	-3.963***	-3.969***
	(0.352)	(0.352)	(1.371)	(1.374)
Low HHI District × Financial Assets	-0.967	-0.965		
	(0.704)	(0.705)		
Low HHI District × Deposits			7.926***	7.938***
			(2.743)	(2.748)
State Fixed Effects	✓	✓	✓	✓
District Controls		✓		✓
Observations	1100	1098	1086	1084
R^2	0.020	0.020	0.096	0.096

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

This table examines the impact of deregulation on household holdings of deposits and access to credit. In Panel A, the dependent variables are log deposits (columns 1–2) and log credit (columns 3–4) as of 2013. District controls included the lagged values of the dependent variable as of 2003. District-level Herfindahl-Hirschman Index (HHI) is calculated using Equation 8. Whereas, in Panel B, we capture the effect on the change of share of different types of household assets in low HHI districts. Low HHI (High HHI) Districts have below (above) median pre deregulation District-HHI. The dependent variable in Panel B is the share of financial and physical assets (columns 1–2) and the share of deposits and stocks (columns 3–4). Physical assets consist of gold and real estate and financial assets consist of stocks and deposits. Data is from the 2003 and 2013 NSSO AIDIS survey. Standard errors are clustered at the district level. Observations are at the district level.

Table 11
Firm access to credit

	Loan Received		Log(1+Credit)		Credit (extensive + intensive)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Low MP Bank	0.036***	0.043***	0.627***	0.749***	0.272**	0.189**
	(0.001)	(0.001)	(0.014)	(0.024)	(0.116)	(0.090)
Firm Fixed Effects	✓		✓		✓	
Year Fixed Effects	✓		✓		✓	
Bank Fixed Effects	✓	✓	✓	✓	✓	✓
Firm*Year Fixed Effects		✓		✓		✓
N	2985720	1706570	2985720	1706570	2535550	552044
R-Squared	0.063	0.356	0.065	0.348	0.495	0.591

This table examines the impact of deregulation on firms' access to credit from low market powered banks. The dependent variables are new loans received by firms from low market power banks (columns 1–2), log credit (columns 3–4) for these firms and total credit to the firm at the extensive and intensive margin (columns 5–6), we used Poisson Pseudo Maximum Likelihood model to estimate the combined effect.Branch-level Herfindahl-Hirschman Index (HHI) is calcu- lated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts as calculated using Equation 2. Low HHI (High HHI) Banks have below (above) median pre deregulation Bank-HHI. Fixed effects are indicated and standard error are clustered at firm level. All observations are secured loan to firms by private and public sector banks.

Table 12
Demand Estimation

Panel A: BLP Estimation

Parameter	**Coefficients**
Deposit spread (α)	-1.90***
Log(Branch) (β_1)	0.84***
Heterogeneous Sensitivity:	
Rate Sensitivity (σ)	1.01***
No. of Individual Draws	50
Observations	100528

Panel B: Spread Semi Elasticities

	Observations	Mean	Std	25%	Median	75%
	(1)	(2)	(3)	(4)	(5)	(6)
All Sample	100528	-1.23	0.29	-1.43	-1.25	-1.08
High MP Banks	51945	-0.56	0.36	-0.81	-0.59	-0.34
Low MP Banks	48515	-2.11	0.17	-2.22	-2.12	-2.02

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

This table reports the estimates of the demand estimation model. Panel A reports the parameter estimates. The dependent variable is the share of a bank savings deposit product in a given district-year. 50 households are drawn from a standard normal distribution to measure heterogeneous sensitivities. Panel B reports the summary statistics for the spread semi elasticities, defined as the percentage change in the savings deposits due to change in the savings deposit spread. High MP banks refers to banks with higher than the median value of the Herfindahl-Hirschman Index (HHI) in the pre-sample period. Low MP banks refer to those which have a lower than the median value of the Herfindahl-Hirschman Index (HHI) in the pre-sample period. The sample consists of all private and public sector banks in India from 2007 till 2016. Data on savings deposit rates is from the individual banks' websites. Branch-level data is from the Reserve Bank of India.

Financial Repression, Deposit Rate Deregulation, and Bank Market Power

Online Appendix

A A Simple Model of Bank Competition Under Deposit Rate Regulation

We build a simple model of heterogeneous banks based on the canonical framework of Monti et al. (1972) and Klein (1971). There exists a continuum of heterogeneous banks, indexed by b, of unit mass, where $b \in (0, 1)$. Following Gerali et al. (2010), banks operate under monopolistic competition, taking into account local market conditions. For simplicity, banks are not subject to capital ratio constraints. Banks demand deposits D_b from a representative household (their only source of funds) and use these funds to originate loans L_b and invest in government bonds G_b. Investment in government securities is made at the bank level, while banks lend and raise deposits across markets. For simplicity, we assume that government bonds yield exogenous returns equivalent to the policy rate f.

A bank b chooses its lending rate, r_b^l, and its deposit rate, r_b^d given household demand for loans and supply of deposits across the markets the bank operates in. Apart from providing deposit facilities, bank b also provides liquidity facilities q_b as in d'Avernas et al. (2023). Intuitively, liquidity facilities could correspond to the provision of e-banking facilities, access to ATMs, higher number of employees per customer, etc.

The balance sheet of a bank b is:

Assets		*Liabilities*	
Loans	L_b	Deposits	D_b
Government Securities	G_b		

We focus on a partial equilibrium, static model setup for simplicity since our aim is to analyze the impact of deregulation of deposit rates on the banks' portfolio choices. We assume that each bank's products (loans and deposits) is a differentiated good for the household following the standard Dixit-Stiglitz structure (Dixit and Stiglitz, 1977). Specifically, we posit that the loan and deposit contracts acquired by households constitute a bundle of financial products with different qualities with constant elasticities of substitution. These products, each with slight variations, are offered by different banks in a given market. Local market conditions can be characterized by the lending and deposit market elasticity parameters (degree of substitution), e^l and e^d, respectively, with $e^d < -1$ and $e^l > 1$.[25] A higher elasticity indicates a higher degree of substitution between products. We further assume that the representative household consists of both borrowers and lenders who are segregated in two different groups having different objectives.

In our simple model, we focus on the deposit side of the market structure and examine the deposit market power of banks, while taking the loan side as given.[26]

Deposit Demand and Loan Supply The representative household borrows from banks and invests in deposits. The supply schedule of deposits for bank b is derived taking into account that

[25] The conditions $e^d < -1$ and $e^l > 1$ are regularity conditions needed to solve the model and is a standard assumption. See Gerali et al. (2010) for details.

[26] This assumption is consistent with our empirical results, where we show the robustness of the main results even after controlling for banks' lending market power.

depositors maximize the returns they earn on deposit holdings:

$$\underset{D_b}{max} \int_0^1 R_b^d D_b db$$

subject to,

$$\left[\int_0^1 (D_b)^{\frac{e^d-1}{e^d}} db\right]^{\frac{e^d}{e^d-1}} \leq \overline{D}$$

where $R_b^d = (r_b^d + q_b)$ is the total return to depositors from the deposit rate and the liquidity services provided by the bank. $\overline{D}$ is the aggregate deposit in the market. Optimization will yield the following supply schedule of deposits for bank b:

$$D_b = \left(\frac{r_b^d + q_b}{\overline{R}^d}\right)^{-e^d} \overline{D} \tag{18}$$

which depends on the return from a particular bank b, $R_b^d = (r_b^d + q_b)$, relative to the average return, $\overline{R}^d = \left[\int_0^1 (R_b^d)^{1-e^d} db\right]^{\frac{1}{1-e^d}}$. Equation 18 shows that the deposit supply function can be expressed as a function of deposit rates, liquidity services, and the deposit elasticity of substitution: $D_b\left(r_b^d, q_b, e^d\right)$.

The household demand for loans is obtained by minimizing their total repayment subject to the availability of loans above the aggregate loan demand:

$$\underset{L_b}{min} \int_0^1 r_b^l L_b db$$

subject to,

$$\left[\int_0^1 (L_b)^{\frac{e^l-1}{e^l}} db\right]^{\frac{e^l}{e^l-1}} \geq \overline{L}$$

where $\overline{L}$ is the aggregate loan demand. Solving the above problem and aggregating over symmetric borrowers yields the loan demand schedule:

$$L_b = \left(\frac{r_b^l}{\overline{r}^l}\right)^{-e^l} \overline{L} \tag{19}$$

where, $\overline{r}^l$ is the lending rate index (average) given by $\overline{r}^l = \left[\int_0^1 (r_b^l)^{1-e^l} db\right]^{\frac{1}{1-e^l}}$. Equation 19 gives us the downward-sloping loan demand schedule for bank b.

Bank Profits Banks maximize profits taking into account the loan demand (Equation 19) and the deposit supply (Equation 18) schedule along with their balance sheet constraint ($L_b + G_b = D_b$). Banks incur an additional cost of providing liquidity q_b, denoted by ϕ_b, which banks take as given. To obtain a closed form solution, we assume a quadratic liquidity adjustment cost structure

$\left(\frac{\phi_b}{2}(q_b)^2\right)$ for each bank.[27]

Banks choose whether to invest in government securities or to lend to households. m is a threshold cost of monitoring per Rupee of loan. Banks choose to lend if the deposit spread — defined as the difference between the policy rate f and the deposit rate r_b^d — is below the threshold m and in government securities otherwise. If returns from investment in government securities (relative to deposit rates) exceed the threshold monitoring cost, banks choose to invest in government securities and in loans otherwise.[28] The bank profit is given by

$$\pi_b = \left[(r_b^l - m)L_b + fG_b - (r_b^d + q_b)D_b - \frac{\phi_b}{2}(q_b)^2\right] \tag{20}$$

Under this setup bank b chooses r_b^d, r_b^l and q_b to maximize profits: subject to equations (19) and (18), and the balance sheet constraint. The F.O.C. for the above problem gives the following necessary conditions linking deposit rates, lending rates and liquidity services to markups, markdowns and the policy rate:

$$r_b^l = \underbrace{\frac{e^l}{(e^l - 1)}}_{\text{markup}} \frac{f}{1-m} \tag{21}$$

$$r_b^d = \underbrace{\frac{e^d}{(e^d - 1)}}_{\text{markdown}} f - q_b \tag{22}$$

$$q_b = \frac{(f - r_b^d)\dfrac{\partial D_b}{\partial q_b} - D_b}{\dfrac{\partial D_b}{\partial q_b} + \phi_b} \tag{23}$$

where $\frac{\partial D_b}{\partial q_b} > 0$. If $(f - r_b^d) > m$, then banks choose to invest only in government securities , while on the other hand if $(f - r_b^d) < m$ then banks choose only to lend.

Equation 22 shows that banks' deposit rates are determined by the markdown to the policy rate, f. The markdown depends on the deposit supply elasticity (e^d). As in standard monopolistic competition pricing, banks offer deposit interest rates below their marginal costs for deposits. Using Equations 22 and 23 yield a system of two equations in two unknowns, which can be jointly solved for r_b^d and q_b.

Bank Market Power Banks are heterogeneous with respect to their cost of providing liquidity services, ϕ_b. Beyond market elasticities and monopolistic competition, banks offer different de-

[27]These costs can arise from adjustment costs to open new ATMs or costs in hiring additional branch personnel to improve services. Alternatively, these costs can be considered as an outcome of different market equilibrium, which we do not explicitly model and take these costs as given for our purposes.

[28]Our model assumes that banks are risk neutral and hence this simple model will yield corner solutions: banks choose to invest in either only government securities or only lend to households. Introducing risk-aversion for banks will move away from these corner solutions wherein banks choose to invest in the two assets and trade off risk versus returns. For clarity, we simply model banks as risk neutral to highlight how deposit rate deregulation can make banks switch from government securities to loans.

posit rates due to heterogeneity in their liquidity adjustment costs (ϕ_b). This heterogeneity affects both their choice of liquidity services provided (q_b) and deposit rates. ϕ_b is the key source of differential market power across banks in our setup. For two banks, b_1 and b_2, if $\phi_{b_1} < \phi_{b_2}$:

$$\mathcal{M}_{b_1} > \mathcal{M}_{b_2},$$

where $\mathcal{M}_{b_1}$ and $\mathcal{M}_{b_2}$ denote deposit market power of banks b_1 and b_2. A bank with a lower cost of providing liquidity services can offer higher levels of deposit services and attract a greater volume of deposits, which increases the bank's market share relative to the high-cost bank.

Regulated Deposit Rates When deposit rates are regulated, $r^d_b = r^d \ \forall b$ and the only source of differential deposits across banks comes from variation in the choice of q_b. Formally, from the first order condition of bank's profit maximization in Equation 23, we have

$$q_b = \frac{(f - r^d)\dfrac{\partial D_b}{\partial q_b} - D_b}{\dfrac{\partial D_b}{\partial q_b} + \phi_b}$$

Differences in the cost of liquidity services provision, ϕ_b, will lead to differences in how much services (q_b) a bank provide to its customers, which in turn determines the level of bank deposits. A bank b's deposit supply can be written as $D_b = h(r^d, q_b(\phi_b), e^d)$ with q_b as the only choice variable for the bank. For two banks b_1 and b_2 with ϕ_1 being less than ϕ_2, the level of liquidity services provided by bank b_1 is larger than that of b_2. Consequently, deposits of bank b_1 is greater bank b_2.[29] Deposit spread $(f - r^d)$ is the same across all banks, and all banks choose to invest in government securities if the spread exceeds the monitoring cost threshold and in loans otherwise.

Deregulated Deposit Rates When interest rates are deregulated, banks gain an additional choice variable — the deposit interest rate, r^d_b — that they can use as a lever to attract household savings. Offering a higher deposit rate allows banks to draw in more deposits but at the cost of higher funding due to deregulated deposit rates, which may force banks to scale back on their provision of liquidity services to maintain profitability.

Proposition 1. *The following inequality holds for bank b_1 with high market power and bank b_2 with low market power ($\phi_1 < \phi_2$) post deregulation:*

$$\Delta D_{b_2} > \Delta D_{b_1},$$

where $\Delta D = D^{post} - D^{pre}$ denotes the change in deposit quantity between post- and pre-deregulation. Further, deposit rates satisfy:

$$r^d_{b_2} > r^d_{b_1}.$$

Section A.1 provides the proof for Proposition 1. The post-deregulation change in deposits for the low-market power bank (b_2) is higher than that for of the high-market power bank (b_1). The low-market power bank offers a higher deposit rate allowing it to attract higher deposits. Prior to deregulation, a low-market power bank characterized by a higher value of ϕ_b is unable to attract

[29] This can be seen by combining the effective change of ϕ_b on q_b, which is $\frac{\partial q_b}{\partial \phi_b} < 0$ and $\frac{\partial D_b}{\partial q_b} > 0$.

large volumes of deposits due to its limited ability to provide liquidity services to households (arising from high costs). Following deregulation, the same bank can compensate for this disadvantage by offering a higher deposit interest rate, offsetting its lower provision of liquidity services.[30]

Does the deposit increase translate to higher loans? We examine three separate cases and look at the impact on lending and investment in government securities. We define the credit-to-deposit ratios as $\gamma_b = \frac{L_b}{D_b}$ for bank b and examine the change in credit-to-deposit ratios pre and post deregulation, defined as, $\Delta\gamma_b = \gamma_b^{post} - \gamma_b^{pre}$.

Case 1: Pre-deregulation monitoring threshold is lower than the deposit spread and remains low for both banks post-deregulation, that is,

$$m < (f - r^d_{b,pre}) = (f - r^d) \quad \forall b$$

$$m < (f - r^d_{b_2,post}) < (f - r^d_{b_1,post})$$

Banks invest in government securities post deregulation despite the greater increase in deposit rates of low-market power banks. In this case, banks earn comfortable margins by investing in government securities. This is a case of financial repression, wherein deposit rates are regulated to be low so that investment in government securities remains profitable. Although deposit rates can increase post deregulation, market power of banks enables them to keep deposit rates low and thus both banks are able to continue investing in government securities. [31] In this case, even after deposit deregulation, lending in the economy does not increase. All the additional increase in deposits is directed to government securities with no effect on financial repression. Since there is no credit disbursed by both banks, credit-to-deposit ratios are 0 for both banks ($\Delta\gamma_{b_2} = \Delta\gamma_{b_1} = 0$).

Case 2: Before deregulation, the monitoring threshold is lower than the deposit spread for both types of banks but post-deregulation the threshold is higher than the deposit spread for the low-market power bank b_2 but continues to be lower for the high-market power bank b_1.

$$m < (f - r^d_{b,pre}) = (f - r^d) \quad \forall b$$

$$(f - r^d_{b_2,post}) < m < (f - r^d_{b_1,post})$$

As in Case 1, in the regulated period both types of banks invest only in government securities. Post-deregulation low-market power banks increase their deposit rates, but only the low-market power bank's deposit spread is below the monitoring threshold. Low-market power banks thus find it more profitable to lend to households while high-market power banks continue to invest in government securities. Formally,

$$\Delta L_{b_2} > \Delta L_{b_1} = 0$$

where $\Delta L_b = L_b^{post} - L_b^{pre} = L_b^{post}$ is the change in loans disbursed by the bank pre- versus post-deregulation. In this case, low-market power banks increase their deposit rates and shift away from government securities, leading to an increase in lending in the economy. Since lending by the low-market power bank increases with no effect on the high-market power bank, credit-to-

[30]Note, that the distribution of market power remains the same the pre- and post-deregulation allowing for a clean comparison over the two periods. This is consistent with the empirical results wherein market power does not change after deregulation.

[31]Note that from Proposition, 1 $r^d_{b_1} < r^d_{b_2}$ in the post period, therefore $(f - r^d_{b_1}) > (f - r^d_{b_2})$ will always hold true for a given f.

deposit ratios increase for low-market power banks but remains 0 for high-market power banks ($\Delta\gamma_{b_2} > \Delta\gamma_{b_1} = 0$).

Case 3: In this case, the pre-regulation monitoring cost threshold is well below the deposit spread for all banks:

$$(f - r^d_{b,pre}) = (f - r^d) < m \quad \forall b$$

$$(f - r^d_{b_2,post}) < (f - r^d_{b_1,post}) < m$$

Post-deregulation, the deposit rate increase and the resulting deposit quantity increase is directed to loans. In this case too,

$$\Delta L_{b_2} > \Delta L_{b_1}$$

However, the credit-to-deposit ratios remain the same for low-and high-market power banks ($\Delta\gamma_{b_2} = \Delta\gamma_{b_1} = 1$). In this scenario, regulated deposit spreads are well below the monitoring costs threshold and hence banks do not face financial repression and lend even pre-regulation. Deregulation simply allows banks to increase deposits, which they again direct to the productive sector of the economy by lending out.

The three scenarios laid out above highlight one important point. If post-deregulation deposit rates continue to remain low due to concentration in the banking sector, then financial repression can continue (Case 1). On the other hand, even with regulated deposit rates, banks can continue to lend to the productive sector if it remains unprofitable to invest in government securities even pre-deregulation. Any increase in lending is driven by the increase in deposits but there are no compositional changes for the two sets of banks. In contrast, for case 2, we see that the two sets of banks respond differently with only the low-market power banks increasing deposit rates whereas the high-market power banks continue to invest in government securities. Interestingly, only in Case 2 do we see a differential compositional shift for the low- versus high-market power banks. The increase in lending in this case comes from both the increase in deposit quantity as well as the shift away from government securities to loans.[32]

A.1 Proof

Proof of Proposition 1. From the household's deposit choice problem, we derive the (iso-elastic) deposit supply function for bank b, $D_b(r^d_b, q_b)$, as:

$$D_b = \left(\frac{R_b}{\overline{R}}\right)^{-e^d} \overline{D} \tag{24}$$

where $R_b \equiv r^d_b + q_b$. Let $D_R(R_b) \equiv \dfrac{\partial D_b}{\partial R_b}$. Differentiating Equation (24) gives:

$$D_R(R_b) = \frac{-e^d}{R_b} D_b > 0 \tag{25}$$

since $e^d < -1$.

From the bank's profit-maximization first-order conditions, the optimal choices for r^d_b and q_b

[32]In practice, investment in government securities is subject to regulatory constraints. For example, banks in India are required to hold a certain portion of their deposits in government securities to fulfill their Statutory Liquidity Ratio (SLR) requirements to ensure they have enough liquid assets to meet deposit withdrawals and other obligations. In our model, we abstract away from this nuance. In practice, this might result in a mechanical increase in the quantity of government deposits, though the qualitative results we described above will continue to flow through.

are given by Equations 22 and 23, respectively. As previously discussed, during the regulated period, the deposit rate is fixed across banks: $r_b^d = r^d\ \forall b$. In this case, the liquidity service level is determined by:

$$q_b = \frac{(f - r^d)\frac{\partial D_b}{\partial q_b} - D_b}{\frac{\partial D_b}{\partial q_b} + \phi_b}$$

where it can be shown that $\frac{\partial q_b}{\partial \phi_b} < 0$.

In the deregulated period, r_b^d becomes a decision variable for the bank. Combining Equations 22 and 23, we find that $\frac{\partial r_b^d}{\partial \phi_b} > 0$. This implies that a bank with lower market power (i.e., higher ϕ_b) offers a higher deposit rate. Consider two banks b_1 and b_2, where b_1 has higher market power than b_2, so that $\phi_{b_1} < \phi_{b_2}$. Then we obtain:

$$\Delta r_{b_2}^d > \Delta r_{b_1}^d$$

where $\Delta r_b^d = r_b^{d,\text{post}} - r^d$ represents the change in deposit rates from the regulated to the deregulated period.

Define $\Delta q_b = q_b^{\text{post}} - q_b^{\text{pre}}$ as the change in liquidity services, and $\Delta D_b = D_b^{\text{post}} - D_b^{\text{pre}}$ as the change in deposits. Taking a first-order Taylor approximation of $D_b(r_b^d, q_b)$ around the pre-deregulation values yields:

$$\Delta D_b \approx D_r \Delta r_b^d + D_q \Delta q_b \tag{26}$$

where $D_r = \frac{\partial D_b}{\partial r_b^d} > 0$ and $D_q = \frac{\partial D_b}{\partial q_b} > 0$.

Now, comparing the change in deposits between banks b_1 and b_2, we obtain:

$$\Delta D_{b_2} - \Delta D_{b_1} \approx D_r(\Delta r_{b_2}^d - \Delta r_{b_1}^d) + D_q(\Delta q_{b_2} - \Delta q_{b_1}) \tag{27}$$

We further assume that, for any bank b, the deposit rate has a stronger effect on deposit inflows than liquidity services. Formally:

Assumption A (Price effect dominates): For all (r_b^d, q_b) arising in equilibrium, we have

$$\frac{\partial D_b}{\partial r_b^d} > \frac{\partial D_b}{\partial q_b}$$

Using this, we can bound the right-hand side of Equation (27):

$$D_r(\Delta r_{b_2}^d - \Delta r_{b_1}^d) + D_q(\Delta q_{b_2} - \Delta q_{b_1}) > D_q \left[(\Delta r_{b_2}^d - \Delta r_{b_1}^d) + (\Delta q_{b_2} - \Delta q_{b_1}) \right] \tag{28}$$

We have already shown that $\Delta r_{b_2}^d - \Delta r_{b_1}^d > 0$, and since $D_q > 0$, the sign of the full expression depends on $\Delta q_{b_2} - \Delta q_{b_1}$. We now evaluate two cases.[33]

Case 1: If $\Delta q_{b_2} - \Delta q_{b_1} > 0$, meaning that the low market power bank (b_2) increases its liquidity services more than the high market power bank (b_1), then the entire bracketed term in Equa-

[33] Note that $q_{b_2} < q_{b_1}$ in both the pre- and post-deregulation periods. However, our focus is on the change in liquidity services, Δq_b, which may differ in sign.

tion (28) is positive, yielding:

$$\Delta D_{b_2} - \Delta D_{b_1} > 0$$

Case 2: If $\Delta q_{b_2} - \Delta q_{b_1} < 0$, we use the first-order condition for $r_b^{d,\text{post}}$ in the deregulated period:

$$r_b^d = \frac{e^d}{e^d + 1} f - q_b^{\text{post}} \tag{29}$$

Subtracting the regulated deposit rate r^d from both sides gives:

$$\Delta r_b^d = \frac{e^d}{e^d + 1} f - r^d - q_b^{\text{post}}$$

Comparing across two banks:

$$\Delta r_{b_2}^d - \Delta r_{b_1}^d = -\left(q_{b_2}^{\text{post}} - q_{b_1}^{\text{post}}\right) \tag{30}$$

Since $q_b^{\text{post}} = q_b^{\text{pre}} + \Delta q_b$, we can write:

$$\begin{aligned} q_{b_2}^{\text{post}} - q_{b_1}^{\text{post}} &= (q_{b_2}^{\text{pre}} + \Delta q_{b_2}) - (q_{b_1}^{\text{pre}} + \Delta q_{b_1}) \\ &= \underbrace{(q_{b_2}^{\text{pre}} - q_{b_1}^{\text{pre}})}_{<0} + \underbrace{(\Delta q_{b_2} - \Delta q_{b_1})}_{<0} \end{aligned} \tag{31}$$

Now consider the bracketed term in Equation (28):

$$\begin{aligned} (\Delta r_{b_2}^d - \Delta r_{b_1}^d) + (\Delta q_{b_2} - \Delta q_{b_1}) &= -(q_{b_2}^{\text{post}} - q_{b_1}^{\text{post}}) + (\Delta q_{b_2} - \Delta q_{b_1}) \\ &= -[(q_{b_2}^{\text{pre}} - q_{b_1}^{\text{pre}}) + (\Delta q_{b_2} - \Delta q_{b_1})] + (\Delta q_{b_2} - \Delta q_{b_1}) \\ &= q_{b_1}^{\text{pre}} - q_{b_2}^{\text{pre}} > 0 \end{aligned}$$

Hence,

$$\Delta D_{b_2} - \Delta D_{b_1} > 0$$

In both cases, we conclude that the change in deposits between the pre- and post-deregulation periods is greater for the low market power bank than for the high market power bank.

□

Table A1
Variable definitions

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 comprises 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 measures 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 indicates loans which have a maturity structure of more than one year. Data for term loans is obtained at the bank-level from the bank's balance sheets.

Variable	Definition and Source
Short-term and Long-term Credit	Short-term Credit refers to credit disbursed by banks which are less than one 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 refer to government securities, Treasury bills, and certificates of deposits among others. Long-term investments refer to investments having a maturity period of more than one year. Data is 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 an 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
Correlation of various Bank level determinants

	Low Market Power Bank Dummy								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of Rural Deposit	-0.0620***								-0.0216
	(0.0147)								(0.25)
Share of Rural Credit		-0.068***							-0.0075
		(0.020)							(0.036)
Deposit Beta (β)			1.20***						0.715*
			(0.412)						(0.416)
Public Sector Bank Dummy				-0.266*					0.098
				(0.141)					(0.200)
Share of NPA					0.005				0.177***
					(0.061)				(0.056)
Low Market Power Bank by Credit						0.428***			0.394***
						(0.132)			(0.138)
Log(Number of Branches)							-0.180**		-0.063
							(0.075)		(0.084)
Share of Officers								0.008**	0.002
								(0.003)	(0.004)
Observations	49	49	49	49	49	49	49	49	49
R^2	0.312	0.228	0.182	0.07	0.001	0.184	0.132	0.131	0.572

This table reports the correlation between low market power dummy (below median bank level HHI) for the year 2010 and other bank level determinants for the year of 2010. Column 1 through 8 has the individual correlation of these variables with low market power dummy variable, while column 9 reports reports the combined correlation of all variables with our dependent variable, low market power dummy. The sample consists of all private and public sector banks in India for the year 2010. Data on various bank indicators along with bank market power are aggregated from the branch-level data. Branch level data is from the Reserve Bank of India.

Table A3
Descriptive Statistics

Panel A: Bank-level statistics

	Low HHI			High HHI			
Variables	Pre (1)	Post (2)	Diff. (3)	Pre (4)	Post (5)	Diff. (6)	Diff-in-diff (3-6) (7)
Savings Deposit Rate (in %)	3.50	4.30	0.8***	3.50	3.91	0.41***	0.40***
Spread (in %)	2.96	2.69	-0.27**	2.96	3.09	0.13	-0.40**
Log (Assets)	9.88	10.98	1.10***	11.51	12.17	0.66***	0.44**
Log (Deposits)	9.67	10.76	1.08***	11.32	11.92	0.60***	0.48***
Log (Credit)	9.30	10.48	1.18***	10.99	11.67	0.68***	0.50***
Log (G-sec Investments)	8.36	9.45	1.08***	9.99	10.58	0.59***	0.99**
Credit to Deposit (in %)	70.24	76.16	5.92***	69.35	76.23	6.88***	-0.96
Credit to Assets (in %)	56.81	60.83	4.02***	57.63	59.46	1.83***	2.19**
G-sec to Assets (in %)	22.30	21.77	-0.53***	23.94	21.35	-2.58***	2.05
Short Inv to Assets (in %)	9.01	9.66	0.65***	5.59	6.85	1.25	-0.60
Long Inv to Assets (in %)	19.69	18.48	-1.21***	23.82	19.94	-3.87*	2.66
Short Credit to Assets (in %)	22.86	22.45	-0.40	21.95	20.56	-1.38	0.98
Long Credit to Assets (in %)	33.82	38.57	4.74***	37.77	40.90	3.13 **	1.06*
Interest Expenses to Assets (in %)	5.02	6.18	1.15***	4.49	4.99	0.50***	0.65***
Interest Income to Assets (in %)	7.48	8.70	1.21***	7.03	7.60	0.57***	0.64**
NIM (in %)	2.45	2.51	0.06	2.57	2.61	0.03	-0.03
Observations		241			240		481
Number of Banks		27			28		55

Panel B: Branch-level statistics

Variables	Low HHI			High HHI			Diff-in-diff (3-6)
	Pre	Post	Diff.	Pre	Post	Diff.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Residualized Deposit (₹ Million)	-234	174	409***	-148	162	311***	97***
Residualized Savings Deposit (₹ Million)	-57	46	103***	-49	50	99***	4**
Residualized (₹ Million)	-165	122	287***	-91	99	190***	97***
Residualized Current Account (₹ Million)	-13.4	9.9	23.3***	-8.9	9.7	18.6***	4.7
Residualized Credit (₹ Million)	-195	146	341***	-118	130	249***	92***
Residualized Agriculture Credit (₹ Million)	-333	191	524***	-205	159	364***	160***
Residualized Industry Credit (₹ Million)	-108	72	180***	-73	58	132***	48***
Residualized Personal Credit (₹ Million)	-32	21	53***	-21	17	38***	15***
Residualized Services Credit (₹ Million)	-74	46	120***	-28	22	50***	70***
Residualized MSME Credit (₹ Million)	-19.8	11.4	31.2***	-1.1	0.75	1.85	29.3***
Residualized Long Term Credit (₹ Million)	-129	82	211***	-51	38	89***	122***
Residualized Medium Credit (₹ Million)	-18.3	12.2	30.5***	-18.4	14.4	32.8	-2.3
Residualized Short Credit (₹ Million)	-109	63	172***	–78	50	128	44***
Observations		350174			356987		707161

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

This table presents summary statistics for key bank- and branch-level variables in our analysis. Panel A shows the bank and branch-level mean and standard deviation for different variables for all, low HHI and high HHI banks. Variables are as defined in Table A1. G-Sec to Assets ratio in Panel A is net of the SLR requirement. Panel B shows the mean and standard deviation in the pre and post period for low and high HHI banks. Post is an indicator variable for post deregulation of savings deposit rate. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. Branch-level statistics in Panel B is residualized with branch fixed effects as specified in Equation 7.

Table A4
Robustness using alternate sample period

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × 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	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓
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
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. The dependent variables are various indicators of credit and deposit that each branch disburses or receives at level terms. It is regressed against Post × Low HHI_{bank} that is set up in equation 3 and 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.

Table A5
Robustness with Alternate HHI

Panel A: Full Sample (All Years)

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × 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	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓
Observations	650019	649920	650019	649920	632527	632426
R^2	0.859	0.863	0.850	0.855	0.819	0.825

Panel B: Truncated Sample (FY 2012 ± 3 Years)

	Log (Deposit)		Log (Savings Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post×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	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓
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
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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 × Low HHI_{bank} that is set up in equation 3. Panel A uses an alternate definition of HHI, and Low HHI_{bank} takes the value 1 if banks belong to below median as per market concentration (with respect to savings deposits). Whereas, Panel B uses the old definition of HHI and is regressed on a truncated dataset of ± 3 years from year of deregulation. 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.

Table A6
Robustness: Alternate market definitions for market power

	Log (Deposit)		Log (Savings Deposit)		Log (Term Deposit)		Log (Credit)		$\frac{\text{Credit}}{\text{Deposit}}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Post × Low HHI_{bank}	0.086***	0.130***	0.103***	0.161***	0.170***	0.185***	0.285***	0.315***	10.750***	9.602***
	(0.006)	(0.007)	(0.006)	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)	(0.485)	(0.549)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓		✓	
Market × Year Fixed Effects		✓		✓		✓		✓		✓
Observations	650019	649683	650019	649683	652363	651548	632527	631719	629940	629592
R^2	0.859	0.866	0.850	0.858	0.832	0.851	0.819	0.831	0.825	0.838

Standard errors in parentheses
$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

This table examines the impact of deregulation on various indicators of deposit and credit. We use an alternate definition of bank market power using Equation 2 but now we are calculating market power at district-population center level instead of district level. Population center is divided into rural, semi-urban, urban, and metro areas. Post takes the value 1 if year $\geq$ 2012 and 0 otherwise. Whereas Low MP Bank takes the value 1 if below median Bank-HHI for pre deregulation period in terms of bank credit. The observations are at the branch-year level covering from 2007 to 2016 in an unbalanced panel for Indian scheduled commercial banks. Fixed effect are mentioned in the table. Standard errors are clustered at the branch level. In the table *Market* stands for a pair of district-population center.

Table A7
Robustness to alternate market power bank level deposits and credit

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

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

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 $\hat{\beta}_{Bank}$ market power based on the sensitivity of bank deposit rates to repo rates. 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.

Table A8
Robustness to alternate market power measure: Bank β

	Log (Deposit)		Log (Savings Deposit)		Log (Term Deposit)		Log (Credit)		$\frac{\text{Credit}}{\text{Deposit}}$		Saving Deposit Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post × $\hat{\beta}_{bank}$	0.630***	0.768***	0.809***	0.990***	1.166***	1.272***	1.366***	1.594***	33.595***	39.132***	0.283***	0.305***
	(0.026)	(0.028)	(0.031)	(0.033)	(0.037)	(0.039)	(0.037)	(0.041)	(1.915)	(2.124)	(0.015)	(0.016)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓		✓		✓		✓
Observations	650058	649961	650058	649961	652441	652344	632566	632465	629940	629839	652441	652344
R^2	0.860	0.863	0.851	0.855	0.832	0.838	0.820	0.826	0.824	0.833	0.919	0.921

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

This table examines the impact of deregulation on deposits using bank β as the measure of market power. The dependent variables are log deposits (columns 1–2), log savings deposit (columns 3–4), log credit (columns 5–6), and credit-to-deposit (columns 7–8). Post is an indicator variable for post deregulation of savings deposit rate. $\hat{\beta}_{bank}$ is the measure of market power based on the sensitivity of bank deposit rates to repo rates. Fixed effects are indicated. Standard errors are clustered at the bank level. Observations are at the branch-year level. All private and public sector banks from 2007 to 2016 are included. Branch-level data is from the Reserve Bank of India.

Table A9
Heterogeneity by bank ownership

	Log(Deposit)		Log(Savings Deposit)		Log(Term Deposit)		Log(Credit)		$\frac{\text{Credit}}{\text{Deposit}}$		Saving Deposit Rate	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Post × Private	0.493***	0.533***	0.597***	0.663***	0.638***	0.674***	0.988***	1.054***	15.043***	16.545***	0.135***	0.136***
	(0.011)	(0.011)	(0.013)	(0.013)	(0.014)	(0.015)	(0.019)	(0.020)	(0.805)	(0.837)	(0.005)	(0.005)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓		✓		✓		✓
Observations	650019	649920	650019	649920	652363	652264	632527	632426	629940	629839	652363	652264
R^2	0.861	0.865	0.853	0.857	0.834	0.839	0.825	0.831	0.824	0.834	0.920	0.921

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

The table examines the examines the impact of deregulation on deposit and credit. The dependent variables are log deposits (column 1 and 2), log saving deposits (column 3 and 4), log of term deposit (column 5 and 6), log credit (column 7 and 8), credit to deposit (column 9 and 10), savings deposit rate (column 11 and 12). Post is an indicator variable for post deregulation of savings deposit rate, taking value 1 for year $\geq$ 2012 and 0 otherwise. Private is an indicator variable with value 1 for private sector banks and 0 otherwise. Observations are at the branch level. Fixed effects are indicated. Standard errors are clustered at the branch level. All private and public sector banks from 2007 to 2016 are included. Data on savings deposit rates is from bank websites. Branch-level data is from the Reserve Bank of India.

Table A10
Market power based on deposits versus loans

	Log (Deposit)	Log (Savings Deposit)	Log (Term Deposit)	Log (Current Deposit)	Log (Credit)	$\frac{\text{Credit}}{\text{Deposit}}$
	(1)	(2)	(3)	(4)	(5)	(6)
Low HHI_{bank} × Post	0.092***	0.121***	0.169***	0.166***	0.297***	11.608***
	(0.006)	(0.006)	(0.008)	(0.009)	(0.008)	(0.492)
Branch-HHI^{Credit} × Post	-0.036***	-0.106***	0.002	-0.055***	-0.069***	-4.930***
	(0.006)	(0.006)	(0.008)	(0.009)	(0.008)	(0.490)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Observations	650019	650019	652363	652363	632527	629940
R^2	0.859	0.851	0.832	0.804	0.820	0.825

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

This table examines the impact of deregulation on various indicators of deposit and credit. It explores the interaction of market power based on credit and deposit simultaneously and captures their effect post deregulation. We use an alternate definition of branch market power using Equation 1, calculating market power concerning bank credit. Bank market power is calculated as before. Post takes the value 1 if year ≥ 2012 and 0 otherwise. Low MP Bank takes the value 1 if below median Bank-HHI for the pre-deregulation period in terms of bank deposit, and Branch-HHI^{Credit} takes the value 1 if below median Branch-HHI for the pre-deregulation period in terms of credit share in Equation 1. Observations are at the branch-year level covering 2007–2016 in an unbalanced panel for Indian scheduled commercial banks. Fixed effects are mentioned in the table. Standard errors are clustered at the branch level. Branch-level data is from the Reserve Bank of India.

Table A11
Robustness to alternate channels: Distressed Banks

	Log (Deposit)		Log (Savings Deposit)		Log (Term Deposit)		Log (Current Deposit)		Log (Credit)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low HHI_{bank} × Post	0.186***	0.206***	0.250***	0.297***	0.204***	0.213***	0.091***	0.110***	0.227***	0.273***
	(0.011)	(0.012)	(0.012)	(0.013)	(0.015)	(0.017)	(0.018)	(0.020)	(0.012)	(0.014)
Post × NPA Share	-0.001	-0.010**	0.015***	0.012***	-0.044***	-0.053***	-0.012*	-0.023***	-0.038***	-0.034***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.003)	(0.004)
Low HHI_{bank} × Post × NPA Share	-0.031***	-0.024***	-0.053***	-0.053***	0.004	0.011**	-0.010	-0.003	-0.002	-0.011***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)	(0.007)	(0.004)	(0.004)
Branch Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓		✓		✓		✓		✓	
District × Year Fixed Effects		✓		✓		✓		✓		✓
Observations	650019	649920	650019	649920	652363	652264	652363	652264	632527	632426
R^2	0.860	0.863	0.851	0.855	0.833	0.838	0.805	0.811	0.821	0.826

Standard errors in parentheses

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

This table examines the impact of deregulation on different indicators of credit and deposits that each branch disburses or receives at level terms for banks with varied level of distress. We regress using the setup defined in Equation 3 and an extra level of interaction capturing the level of distress of bank, the variable used is share of non-performing asset at the bank level. Post takes the value 1 if year ≥ 2012 and 0 otherwise. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low MP Bank takes the value 1 if below median Bank-HHI for pre deregulation period in terms of bank deposit. NPA share is non performing asset as a share of total asset at the bank level. The observations are at the branch-year level covering from 2007 to 2016 in an unbalanced panel for Indian scheduled commercial banks. Fixed effect are mentioned in the table. Standard errors are clustered at the branch level. Branch-level data is from the Reserve Bank of India.

Figure A1
Cross-sectional variation in Bank-HHI

This figure shows Bank-HHI for the banks in our analysis. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank-HHI is the deposit weighted average of branch-level HHI across all districts for 2006-2011. Data is from Basic Statistical returns from RBI.

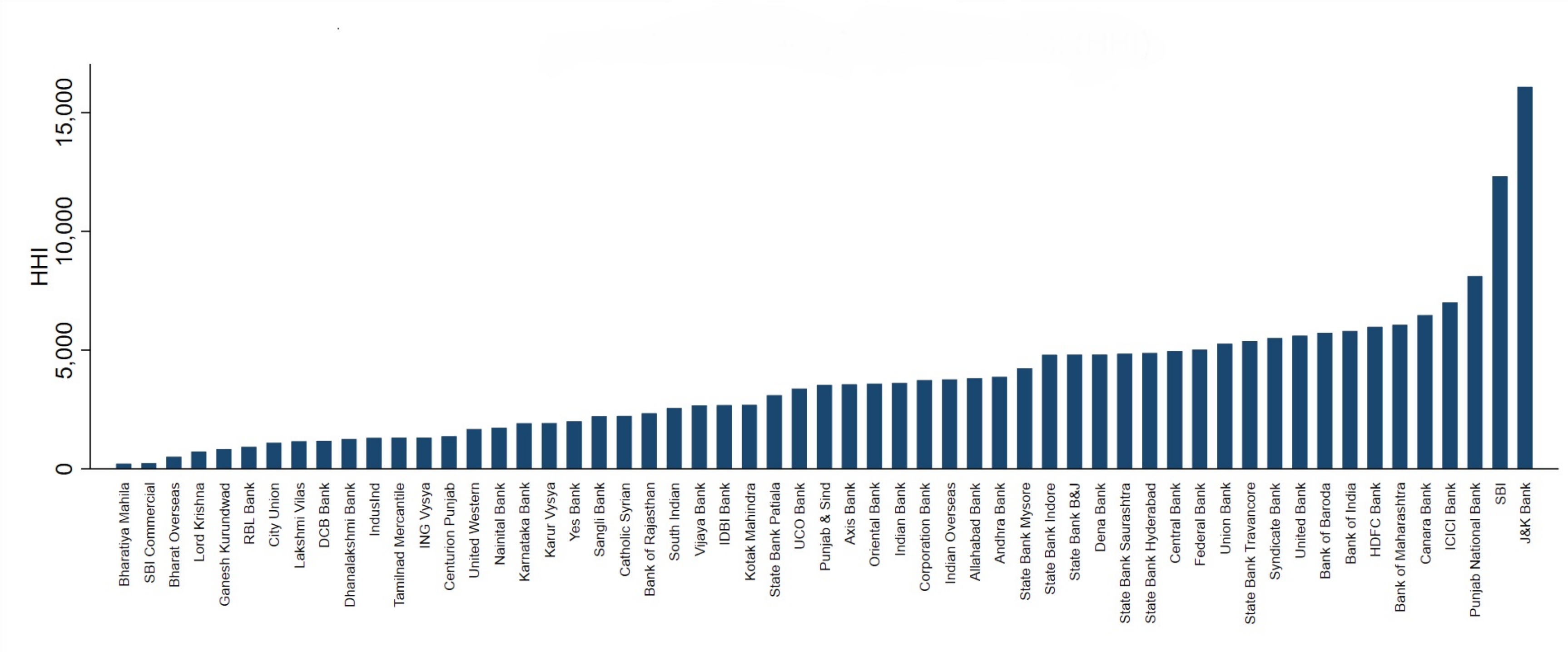


Figure A2
Trends in market power

This figure shows the evolution of Bank HHI from 2006 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI in a given year. The figure captures the average market power for low and high HHI banks over year. Years are the fiscal year as of March 31st. The vertical dotted red line denotes the year of deregulation, 2011. All private and public sector banks are included in the analysis.

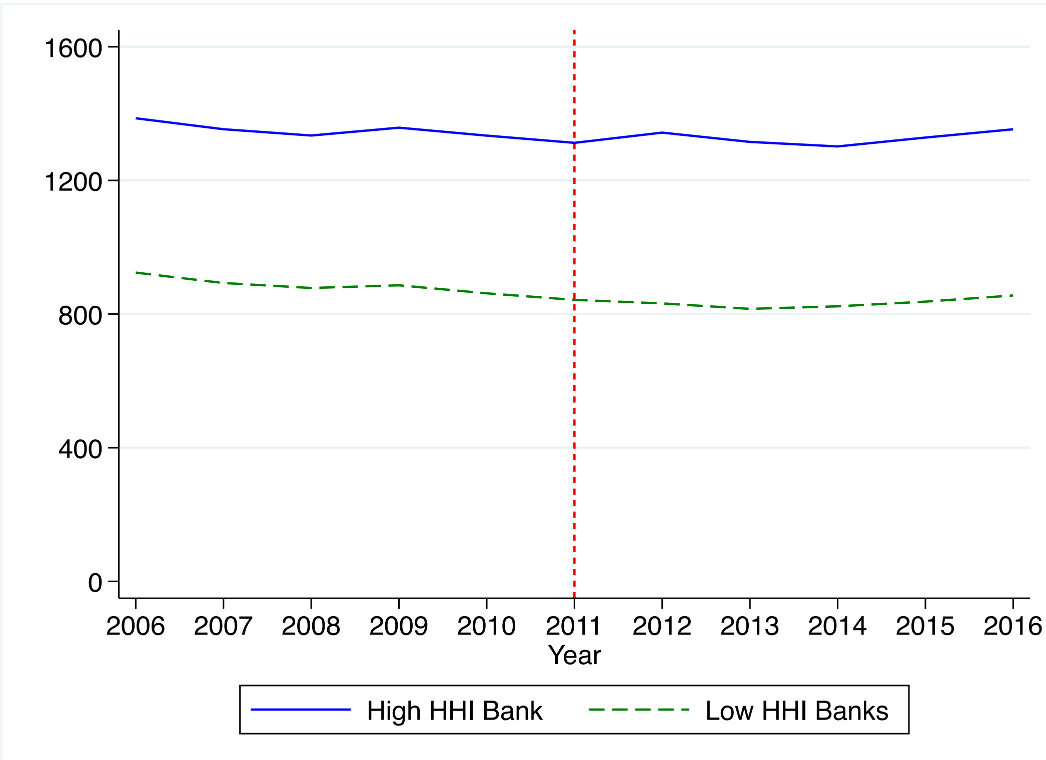


Figure A3
Credit to deposit ratio

This figure shows the credit-to-deposit ratio by bank market power from 2007 to 2016. Branch-level Herfindahl-Hirschman Index (HHI) is calculated as the sum of the squared share of total deposits of each bank operating in a district. Bank HHI is the deposit weighted average of branch-level HHI across all districts. Low HHI (High HHI) Banks have below (above) median Bank-HHI. This figure shows the average credit-to-deposit ratio for low and high HHI banks. Years are the fiscal year as of March 31st. The vertical dotted red line denotes the year of deregulation, 2011. All private and public sector banks are included in the analysis. Data is from the Reserve Bank of India.