Anatomy of a Banking Panic

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June 1, 2018

ABSTRACT

We develop micro-level evidence on a large-scale flight to safety by retail bank *depositors*. Private banks in India, who had little exposure to US experienced sudden withdrawals of deposits after the 2008 financial crisis in the US, reflecting pure panic of retail clients. We quantify, characterize, and examine the lending consequences of the deposit flight using granular branch-level data on deposits. Deposit flights are local as they transfer resources from private to public sector banks in the same district. The panic results in flight of both short and long-term deposits but the deposit gains are in term deposits, suggesting that panics result in *more* stable funding in the aggregate. There is significant credit reallocation due to panic flows due to differences in sectoral adjustments between branches losing and gaining deposits. Flights to safety thus reallocate deposits within local markets but transform the structure of bank assets and liabilities within the markets.

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The global financial crisis has spawned a vast literature on the causes and consequences of the financial crisis. The sub-prime crisis and risk-taking by banks, especially banks deemed too big to fail, have been implicated as causes of the crisis and the connectedness between banks has led to its propagation. Glasserman (2016) is a recent review. The crisis has led to a number of spillover effects. For instance, Cetorelli and Goldberg (2012) and Puri et al. (2011) discuss the spillover effects through the lending channel, as international banks adjust their portfolios in response to their US shocks. Ivashina and Scharfstein (2010) discuss the runs on banks due to withdrawal by borrowers of their lines of credit to increase their precautionary saving.

Our work identifies a new effect of the financial crisis, specifically a pure panic channel in which retail depositors run on local branches of banks although the banks that hold the deposits have no exposure to the fundamental crisis. We study the asset and liability transformations that occur as a result of this run including the branches that experience runs and the branches that receive the surpluses from the panic withdrawals.

If the funding structures at the flight bank and the receiving bank are different, there is a transformation of the nature of the bank deposit funding in the aggregate economy, and a transformation in the liability side of the two banks. If the funding changes trigger credit reallocations between the run and recipient banks, there is reallocation of credit. In sum, pure panic by depositors is capable of initiating an aggregate rebalance in both the liability and the asset side of an economy. We find that panic-induced funding shocks have long-lasting effects. Our evidence suggests that besides the frictions between firms and external capital markets, internal frictions between bank branches and headquarters also matter, even in a branch banking setup where all branches operate as part of the same legal entity.

India has an interesting mix of state-owned (public) and private sector banks. At the time of the 2008 financial crisis, state owned banks dominate in India and account for over 70% of total bank assets. Private banks are not as large but still significant with a 28% market share in terms of total assets in India. Both the state-owned and private banks are owned and operated domestically, and have little known economic exposure to the US banks. The bankruptcy of Lehman Brothers in the US in September 2008 was a source of exogenous shock in depositors' perception of bank fragility. India was relatively insulated from the market turmoil in the

US. Indian institutions did not have large exposures to the US subprime market securities or institutions. Nor did they have large footprints abroad that might have led to funding constraints locally. Thus, the Lehman bankruptcy in September 2008 affected depositors' *perception* of bank fragility rather than having an actual impact on bank health.

The domestic focus of the private and state owned banks in India is accompanied by a rather small presence of foreign banks in India, with little to no interlinkages between the foreign and domestic banks. Thus, depositor runs in the Indian banking system are pure panic effects arising out of suspicions of investors about a crisis whose genesis or consequences they have little prior understanding of. In addition, the state-owned banks or public sector banks (PSBs) are majority owned and thus implicitly presumed to be backed by the full faith and credit of the Indian government. Private sector banks are not owned by the government and bear no government imprimatur. The debt owed by the Indian government and the banking system is largely local currency denominated. The power of seigniorage thus implies that the deposits of state owned banks enjoy more protection than private bank deposits.

The variation between state owned banks and private banks provides an ideal setting to explore differences in depositor *perception* of bank fragility. When depositors understand the shock in the US market but do not understand its consequences for India's banks, the state owned banks become an automatic safe harbor. India's Bank Nationalization Act explicitly places all liability for public sector banks on the government. This is unlike the US, where ex-post state intervention through expanded deposit insurance or government stakes in banks require assurance of state ownership (Acharya and Kulkarni (2016)). Finally, unlike the US, India has a very limited deposit insurance program. Insurance coverage is provided by the Deposit Insurance and Credit Guarantee Corporation (DICGC) in India for bank deposits. However, coverage is limited to only Rs.100,000 (approximately $2000) per depositor per bank (Iyer and Puri (2012)). So, shifts to state owned banks is really the only feasible path for flight-to-safety deposits.

We exploit rich branch-level data of the entire banking network in India, and show that there is heterogeneity in private sector bank branches that experienced runs. We use four different measures of bank runs to identify branches which witnessed significant decline in deposits

between March 2008 to March 2009. We use four alternate definitions to identify branches that had runs on their deposits. In each of these measures a private sector branch is classified as having had a run (an indicator equal to 1) if it satisfies certain conditions. For the first bank run flag, a private sector bank branch is classified as having had a run if the actual deposit growth of private sector bank branches is less than predicted on an out-of-sample basis using a regression model. estimated on prior year data. For the second bank run flag, we first identify private sector bank branches which had growth between FY 09 to FY 08 below a cutoff defined as the 5^{th} percentile of growth rates in the prior year, that is between FY 07 and FY 08. To account for the fact that some branches may have persistently declining deposit growth rates, we include only those private sector branches for which the difference in growth rate between FY 08–09 and FY 07-08 is negative. For the third run flag, we look at private sector bank branches that transitioned from being above the cutoff — as before, 5^{th} percentile of growth rates in the prior year, that is between FY 07 and FY 08 — to being below the cutoff. That is a private sector bank branch is classified as having had a run if the growth in FY 08-09 is below the cutoff, but the growth rate in FY 07–08 is above the cutoff. The fourth bank run flag is the intersection of the first three measures, i.e. it takes the value 1 in case the bank classifies as run in all the three measures.

Using these measures of runs, we show that there are significant flights of deposits from private sector bank branches in the aftermath of the Lehman Brothers crisis. We then characterize the nature of the deposit flight. Next, we characterize the spillovers of runs on private sector banks on public sector bank branches in the same spatial location. To do this, we build a binary measure of propensity of runs at the district level to indicate districts that had higher private sector branch deposit outflows. We first identify districts which had branches with runs. We then calculate the negative of the deposit growth of all private sector branches which had runs in a given district. These variables are a continuous measure of propensity of private sector branch runs along each of the three measures. We classify the districts with above median values as having a greater propensity of bank runs.

We use this district level propensity of runs to test whether there was a greater outflow from the private sector banks (which had runs) to the branches of public sector banks. We see

that public sector bank branches in districts which had large deposit outflows on private sector branches had higher deposit growth. The growth in deposits was on the intensive margin, that is, in the volume (in Rupees) of deposits. There is almost no change on the extensive margin, that is, on the number of deposit accounts of public sector banks. Additionally, the deposit growth is on the long end with long-term deposits *increasing* for public sector bank branches. Our results emphasize that a banking panic resulted in a change in the type of funding. Surprisingly, public sector banks received windfalls of more stable deposits. Private sector banks on the other hand witnessed a flight of deposits across all maturities. Thus, there is a maturity transformation in deposits where short-term deposits move to long-term deposits in addition to just the flight from private sector branches to public sector branches. Public sector banks, following the banking panic received windfalls of more stable deposits.

We next look at bank lending. We find that private sector branches which had runs on their deposits also decreased their credit supply. Controlling for bank-fixed effects, we find that branches which witnessed runs cut down lending by 45 percent compared to branches within the same bank which did not experience runs. Results are similar when we use alternate measures of bank runs. We also look at spillovers on branch lending of public sector banks. Public sector branches which had a windfall of deposits also subsequently increased their lending. Public sector bank branches in districts which had higher branch runs (as measured by our first measure of deposit runs) increased their lending by 20 percent. Results are similar when we look at other measures. Our results show that impact of deposits on lending tends to be very localized. These results highlight the importance of geographical heterogeneity of the banking panic.

Our findings emphasize the role of state-owned banks in providing stability during banking panics. An older literature on state owned banks has emphasized how state owned banks provide financial intermediation in less financially developed countries (Gerschenkron (1962), Shleifer (1998), Hawtrey (1926), Lewis (1950)and Myrdal (1968)). Private sector banks would not be willing to participate without the presence of these state-owned banks. Other papers have highlighted the political motives of government ownership which may result in inefficient investments. Political motives of bank managers may result in politically motivated but

inefficient allocation of resources to supporters in return for political support (Shleifer and Vishny (1998), Kornai (1979), Sapienza (2004) and Calomiris and Haber (2009)). Government ownership of banks may also be associated with lower financial development and productivity growth (La Porta et al. (2002)). Our results are also consistent with prior findings that lending of state-owned banks tends to be less responsive to macroeconomic shock (Myrdal (1968), Bonin et al. (2013)). We show, however, that this macro-level analysis can mask significant heterogeneity across banks as well as heterogeneity across regions. Additionally, we look at a pure panic induced shift in deposits from public sector banks which were perceived to be more stable to private sector banks.

The paper is organized as follows. Section I describes the institutional details and Section II describes the data used in our analysis. Section III lists our empirical methodology. Section IV analyzes the characteristics of branches that had runs. Section V analyzes the spillovers on deposit growth of nearby branches, particularly the public sector bank branches. Section VI analyzes the impact on local lending of branches which had runs and Section VII analyzes the local impact on lending of the public sector branches which had an inflow of deposits. Section XI concludes.

I. Institutional details

The Indian banking sector has a mix of government owned state-banks (public sector banks) and private sector banks. The Indian banking sector has been dominated by public sector banks since 1969 when the larger banks were nationalized. In the 1990s, after economic liberalization, the government reduced its stake and allowed private sector banks and foreign players to enter the market. As of June 2016, nearly 70 percent of market share still belongs to public sector banks. Today's private sector banks can be further classified into two groups: old and new private sector banks. Old private sector banks refer to banks that existed prior to the nationalisation of banks in 1969 and since they were at the time deemed to be either too small or too specialized, were not nationalized. The new private sector banks refer to the banks that came into existence post-liberalisation in the 1990s.

The Indian banking sector was reasonably robust during the financial crisis of 2007–09 when fragility of the financial sector, especially in US and Europe, exacerbated economic shocks into severe recessions. The relative outperformance of the Indian banking sector at the time was attributed to heavy government regulation that prevented banks and financial firms from taking excessive risks. However, as we show there was significant heterogeneity in the way private and public sector bank fragility was perceived during this period.

Distress in the global financial markets can be traced to June 2007 when the investment bank Bear Stearns in the US had to rescue its subsidiary hedge fund which had heavy exposure to subprime mortgages. This eventually led to significant write-downs by Bear Stearns in March 2008 which set off a mass panic. Firms began withdrawing short-term financing to Bear Stearns and the ensuing panic resulted in a forced sale of Bear Stearns to J.P. Morgan (Chodorow-Reich (2014)). Markets stabilized in the period following the Bear Stearns debacle, but deteriorated sharply in September 2008. Lehman Brothers reported a $3.9 billion loss on September 10, 2008. Short-term financing dried up. Unable to find a buyer, Lehman Brothers filed for bankruptcy on September 15, 2008 and global markets plummeted.

Indian banks, despite limited exposure to the US real estate markets were also affected. Panel A in Figure 1 shows the value weighted (with the outstanding market value of each stock) stock index of private and public sector banks. The index has been normalized to 100 as of December 2007. The dashed line is shown as of the day of the bankruptcy of Lehman Brothers on September 15, 2008. We see that stock prices for public and private sector banks showed similar patterns in the period leading up to the Lehman crisis. However, once Lehman declared bankruptcy, the stock price of private sector banks fell more drastically compared to public sector banks.

Panel B, Figure 1 shows this is due to a flight-to-safety of deposits from private sector banks to public sector banks. The figure in panel B shows the quarterly deposit growth for private sector and public sector banks respectively for the period December 2007 to March 2009. Underlying data on deposits is reported by the RBI at quarterly frequency as of March 31^{st}, June 30^{th}, September 30^{th} and December 31^{st}. The dashed line is shown as of the day of the bankruptcy of Lehman Brothers on September 15, 2008. As we can see, deposit growth

rates were similar for both public and private sector banks. But as the crisis progressed, particularly post the Lehman crisis, deposit growth rates for public and private sector banks differed starkly. Particularly, deposit growth for public sector banks was almost five times that of private sector banks in the quarter immediately following Lehman bankruptcy. Note, the deposit growth rates diverged even in the quarter preceding the Lehman bankruptcy. This can be attributed to the sale of Bear Stearns in March 2008. For our main analysis, we use annual data — calculated from March 2008 to March 2009 — which encompasses both the Lehman bankruptcy and Bear Stearns sale and hence the exact timing of deposit outflows does not alter our analysis. Anecdotal evidence, too, suggests that depositors in India did panic following the Lehman bankruptcy. Infosys, a large Indian multinational corporation, transferred nearly Rs. 10 billion in deposits from ICICI (a private sector bank) to SBI (a public sector bank) after Lehman collapsed (see "Deposits with SBI zoom past Lehman collapse", April 7, 2009. `http:\/\/articles.economictimes.indiatimes.com\/2009-04-07\/news\ /27639025_1_private-banks-bank-deposits-deposit-base`).

II. Data

We now describe the data used in our analysis. We use data from the Basic Statistical Returns which is collected by the Reserve bank of India (RBI). This data has previously been used by Das et al. (2016), Cole (2009) and Kumar (2016). This dataset provides deposits and credit at the branch level. We use data for the period 2008 to 2009. Data is reported as of March 31st of every year. Deposit data is available at the branch level for every bank in India. Deposit data is further comprised of current (short-term), savings and term (long-term) deposits. We have both the volume of deposits in rupees as well as number of accounts. In addition, we also have information on branch-level personnel characteristics such as staff strength and whether the branch caters to an urban population. Branches classified as rural correspond to census city centers covering a population of up to 10,000, semi-urban branches to population between 10,000 and 100,000, urban branches to population between 100,000 and 1 million and metropolitan branches to areas with population above 1 million. In our analysis, we classify a branch as

urban if it is either urban or metropolitan.

Lending data is also at the branch level. We use the lending growth rate for our baseline analysis. Sector-wise lending is also provided. For our analysis on heterogeneity in lending, we look at the following sectors: personal loans, trade loans, financial loans, agricultural loans, industrial loans and professional services.

Our main analysis focuses on regional variation in the deposit flows. India is divided into states or union territories, and each state/union territory is further subdivided into districts. There are currently 36 states or union territories and 630 administrative districts. Each district resides within a state and this unit is comparable to counties within the US. For our baseline analysis we use data at the branch-level. We also use district-level variation to motivate the analysis and to identify nearby banks in our analysis of spillover effects. Districts can be thought of as regions which are economically integrated.

Table I shows the summary statistics of the data used in our analysis. Branch-level deposits grew by an average of 29.34 percent between March 2008 to March 2009. Lending grew by 29.45 percent on average at the branch-level. We also report the summary statistics for Deposit and Credit Growth by year in Table II and Table III respectively. It can be directly inferred from Table II that during the period 2008-09, the growth in deposits for private sector banks decreased drammaticly by 9.2 percentage points. On the contrary, for Public sector banks in the same time period, we notice a sudden increase in deposit growth to 1.1 percent.This can be attributed to the fact that during the crisis period, many people move away from the private sector banks and move towards public sector banks. We notice a similar pattern when we study the year wise credit growth rates of Private and Public sector banks. Table III summarizes the year - wise credit growth for the period 1997- 2013. In the year 2009, for the 10th percentile, we observe a sharp decline in the credit growth for private sector banks and it drops to -28.2 percent. The credit growth for both public and private sector banks is negative for the period but the decline is much more substantial for private sector banks.

These averages computed at the national level mask significant heterogeneity across regions. Figure A1, Panel A shows the geographical variation in overall deposit growth. The plots present the heat maps of deposit growth with lighter shades (white) corresponding to lower

deposit growth and darker shades (red) corresponding to higher deposit growth. Within private sector banks (panel b), we see that many regions had low deposit growth (lighter shaded areas) compared to public sector banks (darker shaded areas, panel c). However, since private sector banks also had a higher range in deposit growth, it is unclear from the heat map whether private sector banks on average performed worse than public sector banks in terms of deposit growth. In Figure 3 we explicitly restrict to regions which had low growth (less than 10 percent). Figure 3, panel a shows that there were a number of districts which had deposit growth below 10 percent. The greyed out areas represent areas which had deposit growth rates above 10 percent. However, from panel b we see that there were *no* districts with deposit growth below 10 percent for branches of public sector banks.

A. Identifying bank runs

For our analysis, we need to classify branches which had runs (significant deposit outflows) as a result of the global financial crisis. Motivated by the analysis in the previous subsection, particularly, the impact on stock prices and deposit growth in Figure 1 we classify branches as having had runs only if they belong to private sector banks. Next, within the private sector bank branches we classify a given branch as having had a run based on four different measures of bank runs. These methods exploit the time-series variation and cross-sectional variation in deposit growth.

Measure 1: The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. Figure 6 provides justification for this using this measure. Plot (a) shows that controlling for bank characteristics, private sector bank branches had lower deposit growth as noticed by the mass in the lower tail compared to the public sector banks. 3 percent of the branches are classified as having had runs using this measure. See Table I.

Measure 2: Figure 4 gives justification for the second classification of private sector branches that had runs. From Panel(a) we see that difference in growth rates between during March 2006–March 2007 and March 2007–March 2008 (Δ of growth rates) was very similar in for public and private sector banks. That is, unconditionally controlling for prior years growth rates the growth in the pre-panic period was very similar for public and private sector banks. In contrast, in panel(b) shows the difference in growth rates during March 2007–March 2008 and March 2008–March 2009 (Δ of growth rates). We see that, in contrast to the previous year, growth rates of private sector bank branches was below the growth rates of public sector banks. Motivated by this analysis, we calculate the first bankrun flag as follows. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. However, to account for prior year's growth rate we look at the change (Δ Growth Rate) in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above (Δ Growth Rate) is less than zero. 6 percent of the branches are classified as having had runs using this measure. See Table I.

Measure 3: Figure 5 gives justification for the third classification of private sector branches with runs. Panel(A) plots the raw deposit growth rates for public and private sector bank branches in 2008 (March 2007–March 2008) and 2009 (March 2008–March 2009). In Panel (A) we see that there we see that difference in growth rates for public sector bank branches is very similar, though there seems to be a slight increase in growth rates for public sector banks. In the plot on the right in panel(A) we see that growth rates of private sector bank branches were lower in 2009 compared to the previous year. The graphs in Panel (B) restrict to the lower tail and show the deposit growths below zero. Motivated by these figures we classify a private sector bank branch as having had a run as follows. We identify private sector banks in the bottom 5 percentile of their deposit growth between March 2007 to March 2008. Then using this cutoff, we look at private sector bank branches which had lower deposit growth between March 2008 to March 2009. The branches which were not previously below this cut-off but now appear below the cutoff are classified as having had runs. 1 percent of the branches are classified as having had runs using this measure. See Table I.

Measure 4: The fourth bank run flag is the intersection of the first three measures, i.e. it takes the value 1 in case the bank classifies as run in all the three measures.

In our analysis, we also look at the spillover effects on branches close to private sector branches which had runs. The goal is to identify geographic regions which had more number of runs. For analysis we focus district level variation of number of branches which had runs. Districts capture regions which are economically integrated and thus are a natural way to define exposure to branches which had runs. To get a measure of regions (districts) which experienced high number of bank runs we do the following. Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. Using this procedure of the propensity of private sector branch runs using the first measure is on average 6.23 implying that relative to the previous year, on average private sector branches had a negative growth of 6.23 percent. As we move towards the 75^{th} percentile we see that the number is 5.68 implying that deposit growth of private sector branches which had runs was negative. Similarly, using the second and third measure the propensity was on average 2.92 and 8.81 respectively. What matters for us is the relative measure of these propensities. Additionally, these measures intuitively map to the deposit growth rates of the private sector branches. See Table I.

III. Empirical Methodology

The main challenge in our setting is separating out demand from supply effects. We divide the analysis into two parts. First, we look at the effect on deposit flows at the local level due to a banking panic. Second, we look at the impact on lending at the *local* level. The goal is to trace the deposit flows at the origin and then link lending from the origin district to the destination district. Broadly, the set of empirical tests in this section tries to answer whether the deposit runs impacted local lending activity. That is, did the flow of deposits from private sector banks affect the bank composition of deposits, but did they also have any impact on local lending?

A. Local effects on deposit growth of private sector banks

We will argue that the 2008 shock is a source of exogenous variation in borrower perception of bank fragility. This borrower perception of bank fragility led to a flight to safety of deposit flows (from private sector banks to public sector banks).

We have branch level data of deposits for all public and private sector banks. Let $Deposit\ Growth_{jbd}$ be the deposit growth from 2008 to 2009 for a given branch j of bank b in district d. Then, let $\mathbb{1}_{Pvt\ Bank\ Run,j}$ be an indicator variable equal to one if the branch j is classified as having had a run. In Section II we define four different ways to classify branches which had deposit runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.To ensure these measures actually capture the branches with the lowest deposit growth, we conduct the following sanity check and include all branches in the regression:

$$Deposit\ Growth_{jbd} = \alpha + \beta * \mathbb{1}_{Run_j} + \gamma_b + \theta_d + \epsilon_j \tag{1}$$

where deposit growth is from 2008 to 2009 for a given branch j of a bank b in district d. $\mathbb{1}_{Run_j}$ is an indicator equal to 1 for a branch j which has had a bank run. γ_b and θ_d are branch and

district level fixed-effects. To ensure that we are capturing the branches which had runs, we need that $\beta < 0$. That is, deposits fell for (private sector) bank branches which experienced runs relative to other banks for a given district (district fixed-effects) and relative to other branches of the same bank (bank fixed-effects).

A.1. Intensive margin: Did quality of deposits change?

Next, we test whether the type of funding changes for the branches that had runs. That is, is there a maturity transformation in deposits of private sector branches that lost deposits?

To test the shortening or lengthening we repeat the regression in Equation 1 for long-term (term loans or savings deposits) and short-term deposits (demand deposits). We use the following specification:

$$Type\ of\ Deposit\ Growth_{jbd} = \alpha + \beta \mathbb{1}_{Run_j} + \gamma_b + \theta_d + \epsilon_j \tag{2}$$

where the dependent variable is the deposit growth for each type of deposit that we wish to analyze namely term/savings deposits (long-term) or demand deposits (short-term). The growth rate is calculated for the period 2008 to 2009 for a given branch j of a bank b in district d. $\mathbb{1}_{Run_j}$ is an indicator equal to 1 for a branch j which has had a bank run. γ_b and θ_d are branch and district level fixed-effects. Then, one can also repeat the above regression for demand deposit growth. We are ambivalent of the sign of β. This analysis will tell use where the deposit outflow was concentrated.

A.2. Placebo tests

To facilitate transparent examination of trends in deposit growth of the branches with runs versus others over time, we also estimate a year-by-year specification and present the results as event study plots. Similar to a difference-in-difference strategy, there is an implicit parallel trends assumption in the DDD specification. To examine the parallel trends assumption we plot the event study graphs below.

$$Deposit\ Gwt_{jt} = \alpha_j + \gamma_t + \sum_{\tau} \eta_\tau \times (\mathbb{1}_\tau \times \mathbb{1}_{(Run_j)}) + \epsilon_{jt} \tag{3}$$

where τ ranges from 2002 to 2013, $\mathbb{1}_\tau = 1$ if year is τ and η_τ is coefficient of interest. Bars show the 95% confidence intervals, $\tau = 0$ is the year 2007–2008 before the crisis, and all coefficients are normalized relative to $\tau = 1$. Robust standard errors are clustered at the branch level. The dependent variable is deposit growth rate. The coefficient of interest is η_τ, which measures the difference, in outcome, deposit growth, between branches with runs and remaining branches τ years after the passage of the crisis.

B. Are there spillovers on nearby banks and where are they concentrated?

Next, we look at the spillovers of the above deposit flight on the nearby branches. Specifically, our prior is that there was a flight-to-safety from the private sector banks to the public sector banks. To estimate this, we first identify districts which had branches with runs. Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. This tells us which districts had a higher propensity of bank runs along each of the four measures.

Then, we document the outflow of deposits from private sector banks to public sector banks, by focusing on the deposit growth variables. Specifically, we are interested in whether there was a greater outflow from the private sector banks which had runs to the public sector banks in the regions (districts) which had higher runs.

For the spillover analysis we wish to compare deposit growth of branches which did not have runs. Hence below, we restrict to public and private sector bank branches which did not have runs.

$$Deposit\ Growth_{jbd} = \alpha + \beta Propensity\ Run * \mathbb{1}_{Public} + \gamma_b + \theta_d + \epsilon_j \tag{4}$$

where deposit growth is from 2008 to 2009 for a given branch j of a bank b in district d. *Propensity Run* is the negative deposit growth rate of all branches in a district which has had runs. γ_b and θ_d are branch and district level fixed-effects. A flight-to-safety story indicates that $\beta > 0$. β can be interpreted as the average growth in deposits at public sector bank branches that were in districts which has a 1 percent decline in deposit growth at the branches with runs. That is, deposits increased more so for the public sector banks which were in regions where a larger number of (private sector) bank branches experienced runs.

B.1. Intensive margin: Did quality of deposits change?

Similar to the analysis for private sector banks, we also test whether there was a difference in the maturity of deposits for the public sector banks.

$$Type\ of\ Deposit\ Growth_{jbd} = \alpha + \beta * Propensity\ Run * \mathbb{1}_{Public} + \gamma_b + \theta_d + \epsilon_j \tag{5}$$

where the dependent variable is the deposit growth for each type of deposit that we wish to analyze namely term/savings deposits (long-term) or demand deposits (short-term). The growth rate is calculated for the period 2008 to 2009 for a given branch j of a bank b in district d. *PropensityRun* is the negative deposit growth rate of all branches in a district which has had runs. γ_b and θ_d are branch and district level fixed-effects. The above analysis is also repeated for savings deposits and demand deposits to see maturity transformation.

C. Lending responses

C.1. Identification of local effects on lending growth

Next, we estimate how these deposit flows affected branch lending. First we look at the lending of branches that had runs. We focus on the local effect (within the same district) of the outflow of deposits on branch lending.

The regression specification is:

$$Lending\ Growth_{jbd} = \alpha + \beta * \mathbb{1}_{Run_j} + \gamma_b + \theta_d + \epsilon_j \tag{6}$$

where lending growth is from 2008 to 2009 for a given branch j of a bank b in district d. $\mathbb{1}_{Run_j}$ is an indicator equal to 1 for a branch which has had a bank run. γ_b and θ_d are branch and district level fixed-effects. If our prior is that bank branch network is decentralized, then we would expect $\beta < 0$. If our prior is that bank branch network is centralized, then we would expect $\beta = 0$.

Next, we see the spillover effects, that is, what happened to the credit supply of public sector in districts which had more runs. First, the specification in Equation 4 established whether there were deposit flows to local public sector banks. For the spillover analysis we wish to compare deposit growth of branches which did not have runs. Hence below, we restrict to public and private sector bank branches which did not have runs. Next we see the the impact on local lending of public sector banks using the regression specification:

$$Lending\ Growth_{jbd} = \alpha + \beta Propensity\ Run * \mathbb{1}_{Public} + \gamma_b + \theta_d + \epsilon_j \tag{7}$$

where deposit growth is from 2008 to 2009 for a given branch j of a bank b in district d. *Propensity Run* is the negative deposit growth rate of all branches in a district which has had runs. γ_b and θ_d are branch and district level fixed-effects. If our prior is that bank branch network is decentralized, then we would expect $\beta < 0$. If our prior is that bank branch network is centralized, then we would expect $\beta_{lend,Pvt} >= 0$ assuming we find that there was indeed a flight-to-safety of deposits from private sector bank branches which had runs to public sector bank branches.

IV. Runs on branches of private sector banks

In this section, we document the factors that affected runs on private sector bank branches. We use four measures of runs as described in Section II. We first show that our measure of bank runs does indeed capture branches which had low deposit growth. We run the specification in Equation 1. Table IV shows the results. In Panel A, we focus on deposit growth in Rupees, that is the total volume of deposits."Bank Run: Δ Gwt 08-09" captures branches which are the

worst performing branches (below median) of the worst performing banks (bottom quintile) in terms of deposit growth.

In column 1, using the first measure of bank runs, "Bank Run: Residual", we see that on average branches classified as having had runs had 66 percent lower growth compared to other branches within the same bank. Using the second measure of bank runs which is based on the cross-sectional returns ("Bank Run: Δ Gwt 08-09"), we see that on average branches classified as having had runs had 40 percent lower growth compared to other branches within the same bank (column 2). In column 3, "Bank Run: 2008 Distribution" simply captures the private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. Using this measure, in column 3, we see that for a given bank the branches of the banks which had runs had 60 percent lower deposit growth compared to other branches of the same bank. Using our preferred measure 4 which classifies a branch as having had a run if it is classified as having had a run along all 3 previous measure, we see that the results are of similar magnitude with 60 percent lower deposit growth compared to all other branches.

To summarize, branches with runs along all four measures had lower deposit growth compared to remaining branches. Note, this is not mechanical. The "Bank Run: 2008 Distribution" does not make explicit use of the growth in deposit rates. Though "Bank Run: Δ Gwt 08-09" and "Bank Run: Residual" do use the deposit growth of branches, they are restricted to private sector banks. Thus, the results in Table IV assure us that our measures capture branches which had deposit runs.

Next, we also want to examine whether the deposit flight was on the intensive versus the extensive margin. In Panel B of Table IV, we look at the extensive margin, namely the number of accounts. We see that consistent with the pattern in Panel A, number of deposit accounts also declined for branches which had runs. Using "Bank Run: Residual" we find that on average branches with runs had 24 percent lower deposit growth compared to other branches of the same bank (column 1). Using "Bank Run: Δ Gwt 08-09" which captures runs in column 2, we see that on average, branches which had runs had a 18 percent lower deposit growth in number of accounts compared to other branches within the same bank. Using the "Bank Run:

2008 Distribution" measure (column 3) we find similar effects of 17 percent lower growth in deposit accounts for branches which have had runs. Using our preferred classification "Bank Run (All)" measure (column 4) we find similar effects of 18 percent lower growth in deposit accounts for branches which have had runs.

This analysis tells us that branches that had witnessed runs were hit on both the intensive and extensive margin: both number of accounts declined as well as amount of deposits declined.

In Table A1 we test for placebo on growth in volume of deposits and number of accounts for banks which had runs. That is, we repeat the same exercise taking the years 2004 to 2005 as the reference years and again using 2005 to 2006 as the reference years. Using all four bank run measures, we did not find any placebo effect of bank run on deposit growth except.

Further, in Figure 8 we look at the difference in deposit growth of the branches classified as having had runs versus the remaining branches. Using all four measures it seems the branches classified as having had runs experienced a sharp decline in deposit growth in 2008–2009 compared to remaining branches. These graphs are similar to the event study graphs used to test the parallel trends assumption in a formal difference-in-difference specification. This analysis helps assure us that the private sector branches with runs in the years prior to the crisis were similar to the remaining branches. It was only during the crisis that a panic induced run resulted in a sharp fall in deposits at these branches.

Next, we test whether the type of funding changes for the branches that had runs. That is, is there a maturity transformation in deposits where the loss in deposits was concentrated in long-maturity deposits. To test whether there was a shortening of deposit maturity on branches that had runs, we run the specification in Equation 2. Results are shown in Table V with the dependent variable as growth rate in term deposits (column 1–4), growth rate in savings deposits (column 5–8) and growth rate in current account deposits (columns 9–12).Panel A reports the growth in intensive margin (volume of deposits) and Panel B reports the extensive margin (growth in number of accounts). Term deposits are long-term deposits whereas current account deposits are usually short-term. From Table V we see that this drop in deposits doesn't seem to be concentrated in long-term or short-term deposits (term/savings vs. demand deposits).

In Columns 1–4 of Panel A, of Table V we look at how long-term deposits (term deposit)

fell for branches that had runs using all the four measures of defining banks that had runs. In column 1 using "Bank Run: Residual", we see that on average branches classified as having had runs had 81 percent lower growth compared to remaining branches of the same bank. In column 3 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 53 percent lower growth compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that term deposit growth fell by 73 percent (column 3). Using "Bank Run: All" (Column 4), we see that on average branches classified as having has runs had 73 percent lower growth compared to remaining branches of the same bank.

In Columns 5–8 of Panel A, of Table V we look at how another component of deposit growth: savings deposit growth which can also be classified as longer-term deposits, was affected for the branch which had runs. In column 5, using the "Bank Run: Residual" measure we find that branches had 37 percent lower growth. In column 6 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 27 percent lower growth in savings deposits compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that for a given bank the branches of the banks which had runs had 29 percent lower savings deposit growth compared to branches of the same bank (column 7). Using "Bank Run: All" (Column 8), we see that on average branches classified as having has runs had 29 percent lower growth compared to remaining branches of the same bank.

In Columns 9–12 of Panel A, of Table V we look at the short-term deposits, namely current account deposits (demand deposits). In column 9, using "Bank Run: Residual", we find that on average branches with runs had 90 percent lower growth in demand deposits compared to other branches of the same bank. In column 11 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 73 percent lower growth in demand deposits compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that for a given bank the branches of the banks which had runs had 77 percent lower demand deposit growth compared to branches of the same bank (column 11). Using "Bank Run: All" (Column 12), we see that on average branches classified as having

has runs had 88 percent lower growth compared to remaining branches of the same bank.

We now turn to the test of intensive margin of deposit growth for banks which have had runs. We run the specification in Equation 2 with number of accounts as the dependent variable and present the result in Panel B, Table IV. In Columns 1–4 of Panel B, of Table IV we look at how the number of term deposits accounts fell for branches that had runs. In column 1, using the "Bank Run: Residual" measure, on average branches with runs had 32 percent lower term deposit growth compared to other branches of the same bank. In column 2 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 26 percent lower growth compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that term deposit growth fell by 24 percent (column 3). Using "Bank Run: All" (Column 4), we see that on average branches classified as having has runs had 26 percent lower growth compared to remaining branches of the same bank.

In Columns 5–8 of Panel B, of Table V we look at how another component of deposit growth: savings deposit growth which can also be classified as longer-term deposits, was affected for the branch which had runs. In column 5, using "Bank Run: Residual" we find that on average branches with runs had 36 percent lower savings deposit growth compared to other branches of the same bank. In column 6 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 28 percent lower growth in savings deposits compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that for a given bank the branches of the banks which had runs had 21 percent lower savings deposit growth compared to branches of the same bank (column 7). Using "Bank Run: All" (Column 8), we see that on average branches classified as having has runs had 24 percent lower growth compared to remaining branches of the same bank.

In Columns 9–12 of Panel B, of Table V we look at the short-term deposits, namely current account deposits (demand deposits). Using "Bank Run: Residual", in column 9, we find that on average branches with runs had 23 percent lower growth in demand deposits compared to other branches of the same bank. In column 10 using "Bank Run: Δ Gwt 08-09", we see that on average branches classified as having had runs had 18 percent lower growth in demand deposits

compared to remaining branches of the same bank. Using "Bank Run: 2008 Distribution" to capture branch runs, we see that for a given bank the branches of the banks which had runs had 16 percent lower demand deposit growth compared to branches of the same bank (column 11). Using "Bank Run: All" (Column 12), we see that on average branches classified as having has runs had 18 percent lower growth compared to remaining branches of the same bank.

Overall these results suggest that the flight away from private sector banks was not concentrated in long or short term maturities. In fact, the branches which had runs noticed a drop in deposits across the board: both long-term as well as short-term deposits.

V. Spillovers on Local Branches

Next, we look at the spillovers of the above deposit flight on the nearby branches. Specifically, our prior is that there was a flight-to-safety from the private sector banks to the public sector banks. To estimate this, we first identify districts which had branches with runs. We first calculate the percentage of branches — using each of our three measures — which had runs in a given district. Then, we classify the districts with above median percentage of branches with runs as regions (districts) which experienced bank runs. This tells us which districts had a higher propensity of bank runs along each of the three measures. We are interested in whether there was a greater outflow from the private sector banks which had runs to the public sector banks which had runs.

Table VI shows the results of running the specification in Equation 4. We see that indeed, public sector bank branches had higher deposit growth where propensity of private sector branches to have runs is higher. From column 1, we see that a 1 percent decline in deposit growth at nearby private sector branches resulted in a 0.113 percent higher deposit growth for public sector branches as measured using "Bank Run:Residual". Results are similar when we use the alternate measures of branch runs. Thus, these results show that there was a flight-to-safety from private sector banks to public sector banks.

Next, similar to the analysis in Section IV, we also want to examine whether the deposit flight was on the intensive versus the extensive margin. In Panel B of Table VI, we look at the

extensive margin, namely the number of accounts. We see that there was almost no impact on the extensive margin on the number of accounts. Thus, while private sector branches lost deposits both on the extensive margin (number of accounts) as well as the intensive margin (volume of deposit accounts), the public sector banks only increased deposits on already existing accounts.

We now test for the heterogeneity in spillovers of deposit growth and discuss the results in Table VII. We find that on average branches of public sector banks in the district with above median bank runs had higher deposit growth in term deposits and savings deposits compared to remaining branches of the bank. Based on "Bank Run: Δ Gwt 08-09", we find that term deposits increase by 0.23 while the increase in term deposits is 0.29 using "Bank Run: 2008 Distributions", 0.206 using "Bank Run: Residual" and 0.205 using "Bank Run: All". Note, these numbers correspond to a 1 percent decline in deposit growth at the private sector branches which had runs. The results were similar for savings deposit growth but insignificant for current account deposit growth. Overall, we find that public sector branches in the districts with run saw an increase in stable, long term deposit.

Analogous to the analysis in Section IV, we are also interested in whether there was a difference in the maturity of deposits for the public sector banks. We run the specification in Equation 5 separately for growth in term deposits, savings and demand deposits. We find that the growth in deposits of public sector banks was concentrated in term deposits and savings deposits (Table VII).

In Panel A of Table VII, we look at how long-term deposits (term deposit) grew for public sector bank branches in the districts which witnessed greater propensity of runs on private sector branches. In column 1, we see that on average a one percent decline in deposits at rivate sector branches (based on "Bank Run: Residual") resulted in a 0.206 percent increase in deposit growth compared to remaining branches of the same bank. In column 2 we see that based on "Bank Run: *delta* 08-09", a 1 percent decline in deposit growth of private sector branches had a 0.23 percent higher growth compared to remaining branches of the same public sector bank. In column 3, based on "Bank Run: 2008 Distribution" public sector bank branches had a 0.281 percent higher growth compared to remaining branches of the same bank. Using our preferred

measure 4, we see that public sector branches had a 0.205 percent higher growth.

Our results emphasize that a banking induced panic resulted in a change in the type of funding. Public sector banks received windfalls of more stable deposits, in the form of savings and term deposits. Private sector banks on the other hand witnessed a flight of deposits across maturities. Thus, there is a maturity transformation in deposits where short-term deposits move to long-term deposits in addition to just the flight from private sector branches to public sector branches. Thus, possibly, public sector banks receive windfalls of more stable deposits, which, may trigger extra risk taking beyond windfall of temporary deposits of shorter term nature.

VI. Impact on Lending

In this section we look at the impact of flight of deposits out of the branch networks on the subsequent lending activity of branches. To motivate the analysis, we first look at lending growth of branches which had deposit bank runs against deposit growth. We find that there is localized impact of deposit growth on branch level lending.

We next turn to the formal analysis of impact of deposit flight on credit. Table VIII shows the results on running the specification in Equation 6. Private sector branches with runs had lower growth in credit. In column 1, the branches with deposit runs (using "Bank Run: Residual"), show the loss in funding by lowering credit by 50 percent against branches of same bank which did not experience runs. In column 2, we see that branches that witnessed deposit runs (using "Bank Run: Δ Gwt 08-09") also reflected this loss in funding by cutting down lending by 45 percent compared to branches within the same banks which did not experience runs. Results are similar when we use the other two measures of bank runs. In column 3, we observe that branches with deposit runs (using "Bank Run: 2008 Distribution") lower lending by 41 percent. If we use "Bank Run: All" (column 4), we notice that branches with deposit runs show loss in funding by lowering credit by 48 percent.

These results point to the fact that the impact on lending tends to be very localized thereby high-lighting the importance of geographical heterogeneity of the banking panic. Though Panel

B points to the drop being driven by the services sector and to a smaller degree the agricultural sector.

VII. Spillovers on Lending at Local Branches

Next, we turn to the spillovers on branch lending. In Section V we saw that public sector banks in districts which experienced runs on deposits of private sector banks grew their deposits. We now turn to whether these public sector branches which had a windfall of deposits also subsequently increased their lending. Table IX shows the results of running the specification in Equation 7. We see that public sector branches which grew their deposits, also increased lending (Table IX). Column 1 reflects that for branches in districts with higher branch runs (using "Bank Run: Residual"), lending goes up by 13.8 percent. Public sector bank branches in districts which had higher branch runs (as measured by "Bank Run: Δ Gwt 08-09" in column 2) increased their lending by 12 percent though this is not significantly different from zero. Public sector bank branches in districts with higher branch runs (using "Bank Run: 2008 Distribution" in column 3) increase their lending by 25 percent. Column 4 reflects that for branches in districts with higher branch runs (using "Bank Run: All"), lending goes up by 19.2 percent.

In Panel B of Table IX, we turn to heterogeneity in loan growth across industries. Column 1–4 reflects the change in lending for the services sector. Columns 5–8 and Columns 9–12 reports the credit growth for industry and agricultural sector. As is evident from the table, most of the credit was directed towards the services sector.

VIII. Aggregate Effects

We next move on to discuss the deposit and credit growth aggregated at the district level. We now move from branch level analysis to district level analysis. The goal is to quantify the aggregate effects of the banking panic. In Table X, we see that districts which had a 1 percent fall in deposit growth (as measured by "Bank Run: Residual") (Column 1), resulted in an

overall decline of .143 percent decline in deposit volume at the district level. That is, public sector banks did not fully compensate for the run on deposits in private sector branches. The results are similar if we use "Bank Run: Δ Gwt 08-09" in Column 2 and we notice a decline of 0.19 percent in districts that had higher branch runs. Using Measure 3 and 4 of classifying districts with runs, we get a lower decline in aggregate deposit volume (0.09 and 0.07 percent respectively).

Columns 5–8 focus on the affect of higher branch runs on Number of Deposit accounts at the district level. Districts which had higher runs as measured by "Bank Run: Residual", also witnessed a decline in number of deposit accounts 0.105 percent. The results are similar and significant using the different measures of classifying districts with runs. Results using credit growth are slightly weaker, though overall the results in columns 9–12 do seem to suggest that overall there was an increase in deposits. We next turn to whether this can be explained by the working of the internal capital markets.

IX. Internal Capital Markets

The results up until now point to effects of the runs being very localized. We now look at this in an alternate specification. We test whether the internal capital markets resulted in banks redirecting both the outflow/inflow of funds through deposits to other branches of the bank. Specifically, in Table XI, we examine how credit growth responds to changes in growth rates of deposits in the same district and of other districts. If credit growth responds more to the deposit growth at the branch, the firms are decentralized. However, if credit growth actually depends on other branches of the firm, then the branches are very decentralized. $\Delta Log(Credit)_{t-1,t}$ is the percentage change in credit from $t-1$ to t; $\Delta Log(Deposit)_{t-1,t}$ is the percentage change in deposits in the same district in the same time period and $\Delta Log(Deposits)_{t-1,t}$(Other) is the percentage change in deposits in other districts from $t-1$ to t. We see that for private sector banks, as deposits increase by 1 percent, the corresponding increase in credit is 0.42 percent. Next we see if in the period after the runs, post 2009, banks differed. Post 2009 (which we indicate by the variable "crisis"), increase in deposits of other branches by 1 percent leads to a

decline in credit growth by 0.174 percent. That is, during run periods banks actually become more decentralized.

Focusing on public sector banks, we observe that increase in deposits leads to a decline in credit growth by 0.23 percent but an increase in deposits of other districts leads to an increase in credit growth by 0.199 percent. In the event of crisis, we find that credit growth of public sector banks is less affected by the increase in deposit growth of other districts than private sector banks (-0.102) for public sector banks versus 0.174 for private sector banks. Public sector banks are somewhat more centralized than the private sector banks.

Finally, in a triple-difference specification we look at public sector branches during the run period and find that public sector branches respond to the local inflow of deposits by disbursing credit locally. These results reiterate the results seen in the previous section: the inflow of deposits to public sector branches had very localized effects on credit.

X. Long Run Effects

We now extend our analysis in Section IV to include year 2008–2013. The result of deposit growth of bank branches with runs from year 2008–2013 is presented in Table XII. We find significant negative effect on deposit growth of run branches using all the three measures of bank run. However, the drop in deposit growth is decreasing over the years.

Using "Bank Run: Residual" (M1) we find a significant cumulative decline in deposit growth of 48 percent till 2013 (M1). The deposit growth persists but diminished over time with a 22 percent decline in 2009–2010, 18 percent decline in 2011-2012, 8 percent decline in 2012–2013 and a 2 percent decline in 2012–2013. The results are similar using all other remaining 3 measures of bank runs.

We also test for extensive margin of deposit growth for branches which had runs as compared to other branches of the same bank. We find that there was a significant decline in number of accounts in branches with runs using all four measures over the years 2008–2013. As on the extensive margin, the decline in deposit accounts persists but diminishes over time.

In Table XIII we turn to the credit growth rate. Analogous to the long term effects of the deposit growth rate, we find that the effect on credit is localized and the impact diminishes over time. We find that there was a significant decline in credit in branches with runs using all three measures over the years 2008–2013.

In Table XIV we look at the openings and closing of branches in the period FY09–FY13. In Panel A, we look at whether a branch which had a run was more likely to be closed between FY09–FY13. The dependent variable in Panel A is an indicator for whether a branch closed during this period. We find that a bank which had a run was 3–6 percent more likely to be closed in the 5 year period following the panic (as measured by our respective four measures). In Panel B we also examine whether districts that witnessed more private sector branch panics also witnessed greater number of branch openings. The dependent variable in Panel B is the number of new branch openings in the period FY09–FY13. In districts where the private sector branches witnessed a 10 percent outflow of deposits, on average 5–9 new branches were opened in the same district. In Panel C, we see that the growth in overall number of bank branches was not significantly different in districts which had higher deposit growth compared to districts that had lower deposit growth.

In Table XV we also look at the impact on real outcomes. Since high quality GDP data is not available at the district level, we use lights data to proxy for GDP growth. Table XV shows that luminosity decreased by 9 to 15 percent between 2009 to 2013 in districts which experienced runs. This is consistent with our analysis since we find that districts in which private sector bank branches experienced runs also witnessed a decline in deposits at the district level, that is, not all the deposits made their way to public sector bank branches. Thus, we should expect to see an impact on real outcomes at the district level.

XI. Conclusion

In this paper we looked at the distributional effects of banking panics during crises. There was panic in the Indian banking sector following the Lehman bankruptcy. Using this as a source of exogenous variation in the depositors' perception of bank fragility in India, we show that banks

that were not state-owned — private sector banks — were more susceptible to runs. Exploiting rich branch-level data of the entire banking network in India, we show that there was significant geographical heterogeneity in private sector bank branches that experienced runs. Using three different measures of bank-runs, we show that private sector branches which experienced runs were the "better" branches: they were located in urban areas, had more skilled officers and were not deposit poor. In contrast, state-owned banks which were located in regions with more runs on private sector bank branches witnessed an inflow of deposits during this period. While the flight-to-safety from private sector banks lost both short-term and long-term deposits, public sector banks grew their long-term deposits. Further, the impact of these deposit flows on bank lending was highly localized. Private sector banks reduced their lending predominantly to the retail sector. Public sector banks which were flush with deposits increased their lending. Our results highlight the geographic heterogeneity in the effects of a banking panic.

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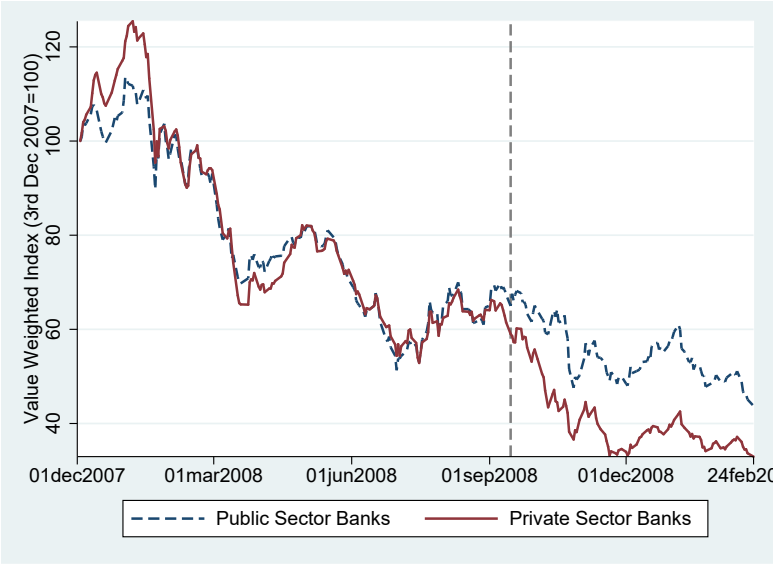
Figure 1. Market Reaction and Quarterly Deposit Growth

The top panel shows the stock index for the period December 2007 to February 2009. The bottom panel shows the cumulative quarterly deposit growth for private sector and public sector banks respectively for the period December 2007 to March 2009. The stock index is the value weighted (with the outstanding market value of each stock) index calculated separately for public and private sector banks. The index has been normalized to 100 as of December 2007. The dashed line is shown as of the day of the bankruptcy of Lehman Brothers on September 15, 2008. Data for quarterly deposit growth has been provided by the the Reserve Bank of India. Stock return data is from Bloomberg.

Panel A: Stock Index



Panel B: Quarterly Deposit Growth

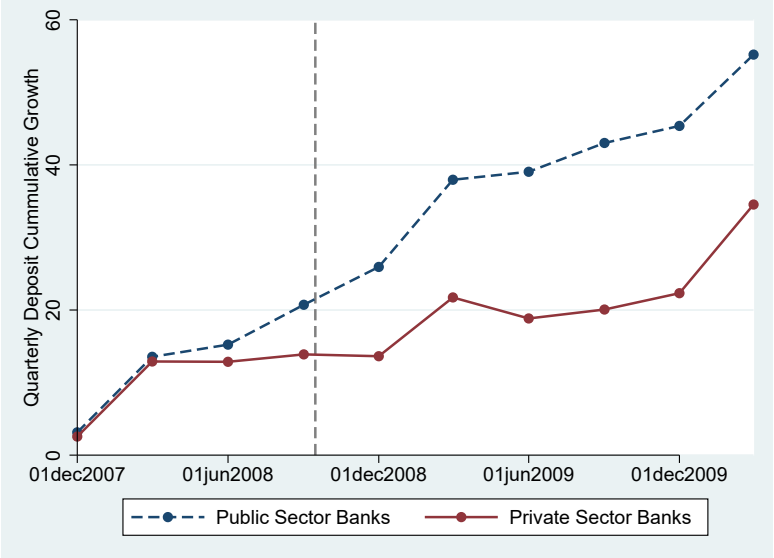
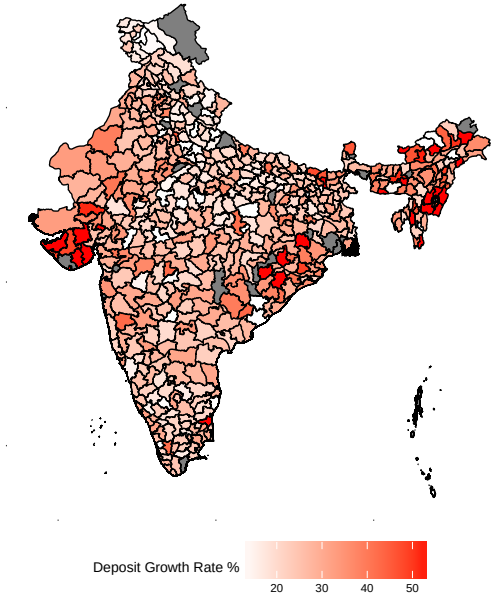
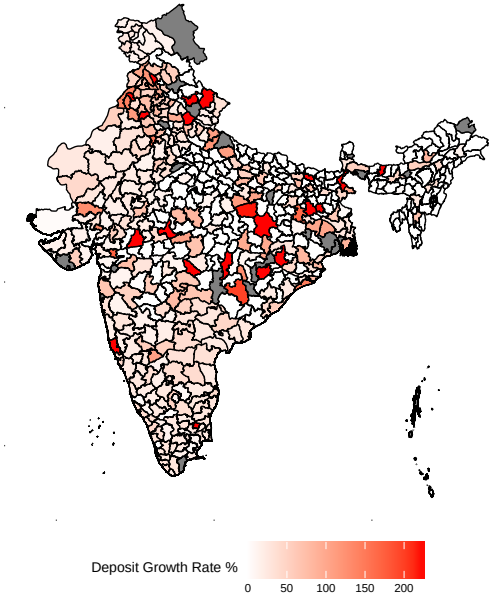


Figure 2. Deposit Growth and Bank Runs

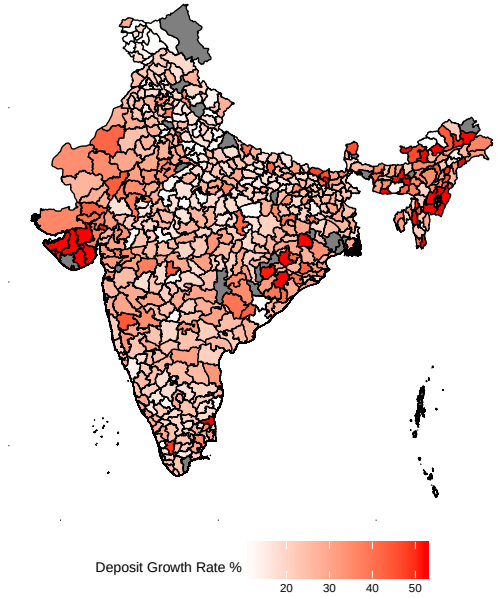
The figures below show the heatmap at the district-level the deposit growth for private and public sector banks. Deposit growth is from 2008 to 2009. We have retained only the public and private sector banks. Panel (a) shows the overall deposit growth. Panel (b) shows the deposit growth for private sector banks and panel (c) shows the deposit growth for the public sector banks. The greyed out areas either have no data available.



(a) **All Deposits**



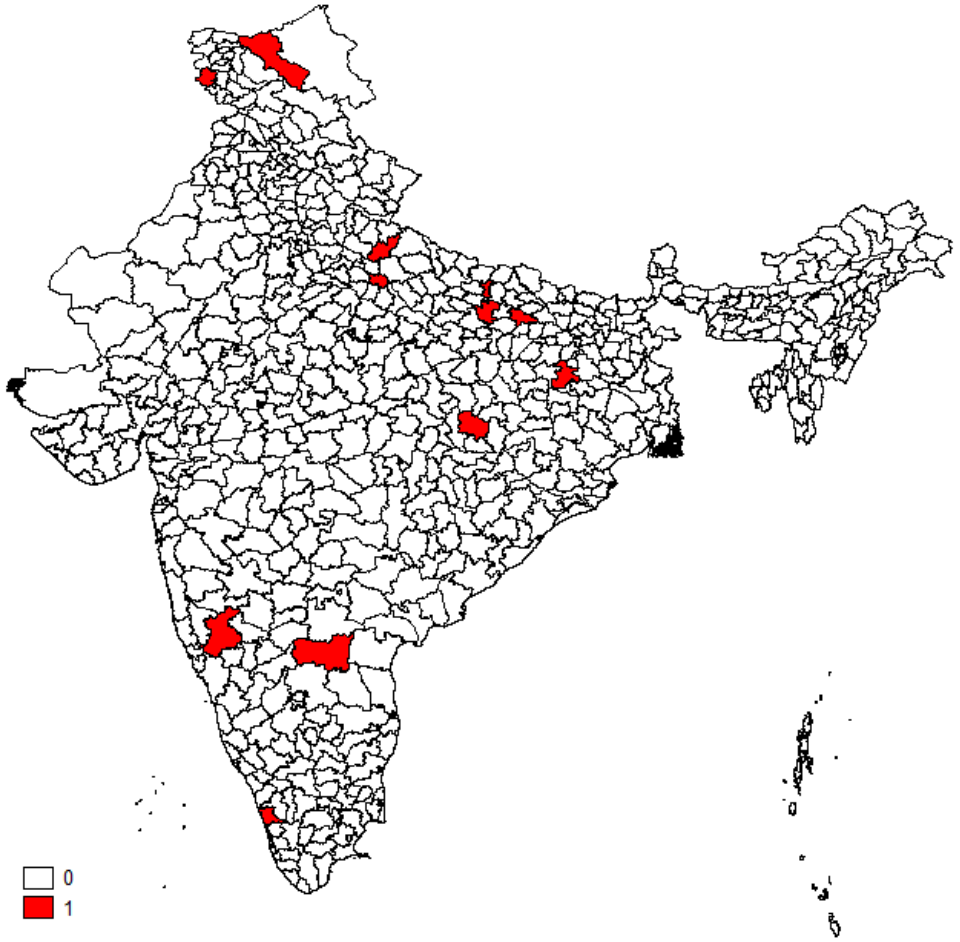
(b) **Private Sector Banks**



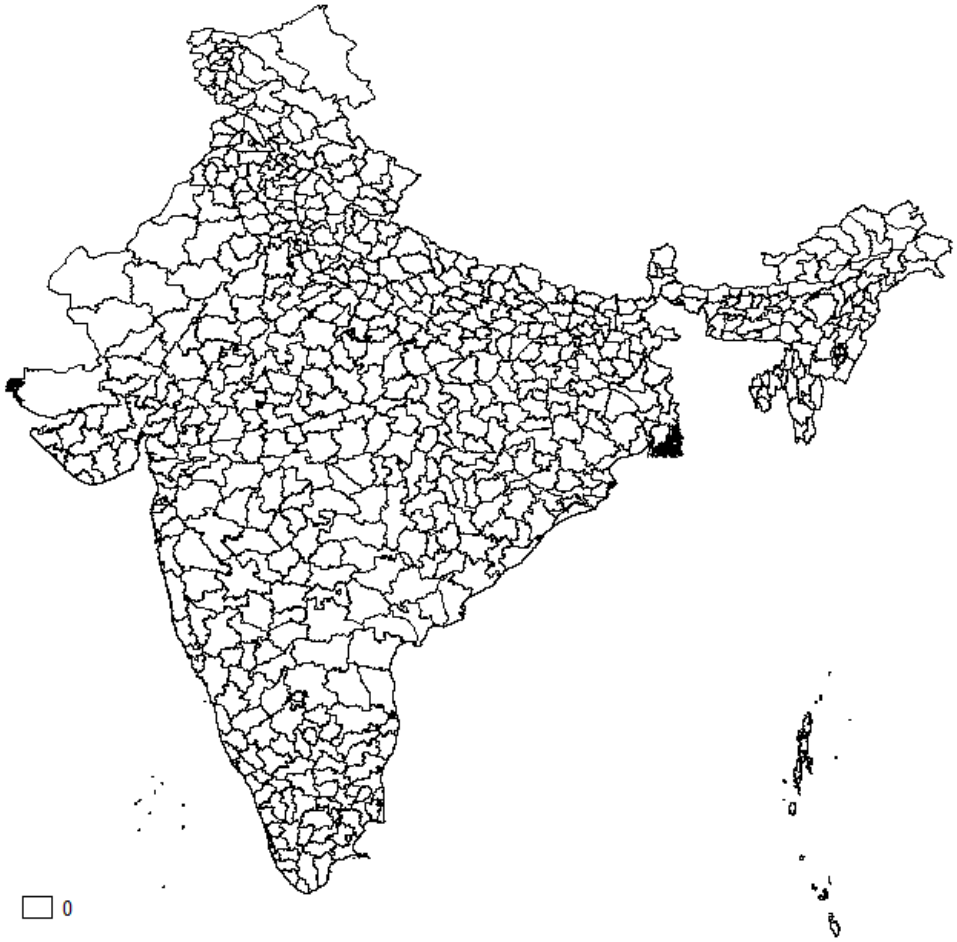
(c) **Public Sector Banks**

Figure 3. Deposit Growth and Bank Runs: Lower Growth

The figures below show the heatmap at the district-level the deposit growth for private and public sector banks. Deposit growth is from 2008 to 2009. We have retained only the public and private sector banks. Panel (a) shows the overall deposit growth. Panel (b) shows the deposit growth for private sector banks and panel (c) shows the deposit growth for the public sector banks. To make the graphs comparable we show only graphs with negative deposit growths are shown. The white areas either have no data available or positive deposit growth.



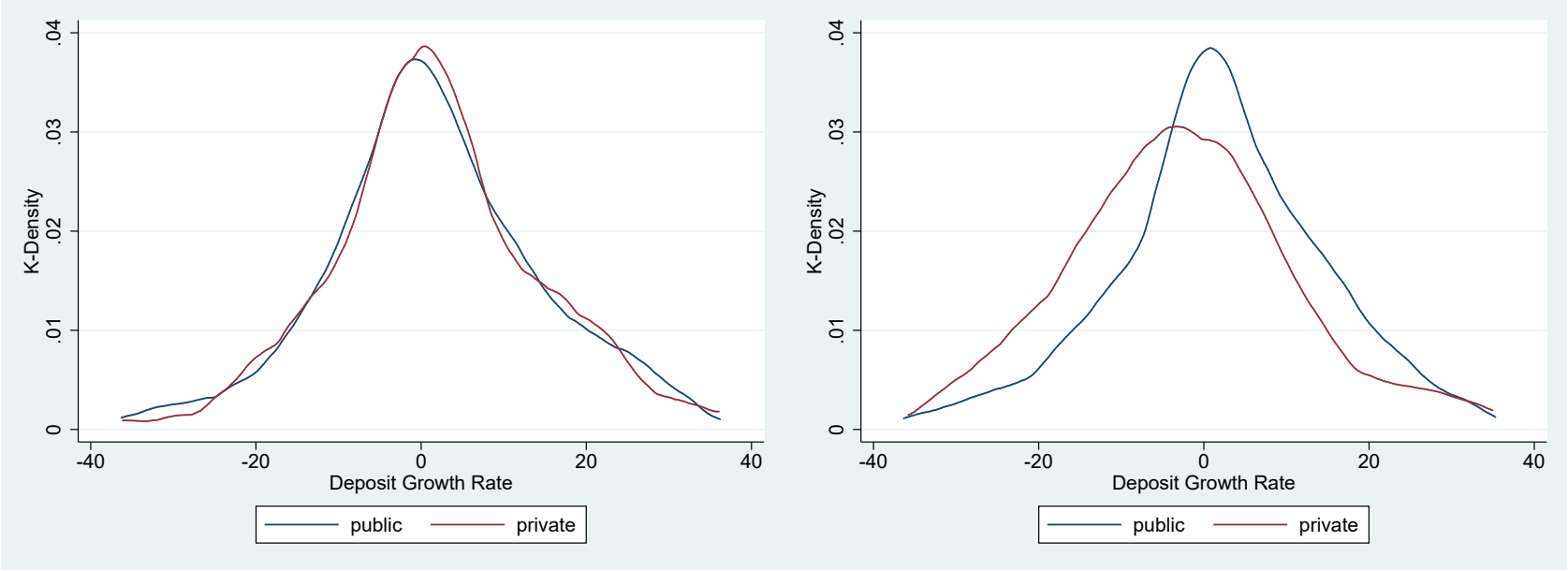
(a) **Private Sector Banks**



(b) **Public Sector Banks**

Figure 4. Distribution of Δ Deposit Growth Rates

The graphs below show the kernel density of the distribution of the change in growth rates of deposits. Panel (a) shows the difference in growth rates during March 2006–March 2007 and March 2007–March 2008 (Δ of growth rates). Panel(b) shows the difference in growth rates during March 2007–March 2008 and March 2008–March 2009 (Δ of growth rates.

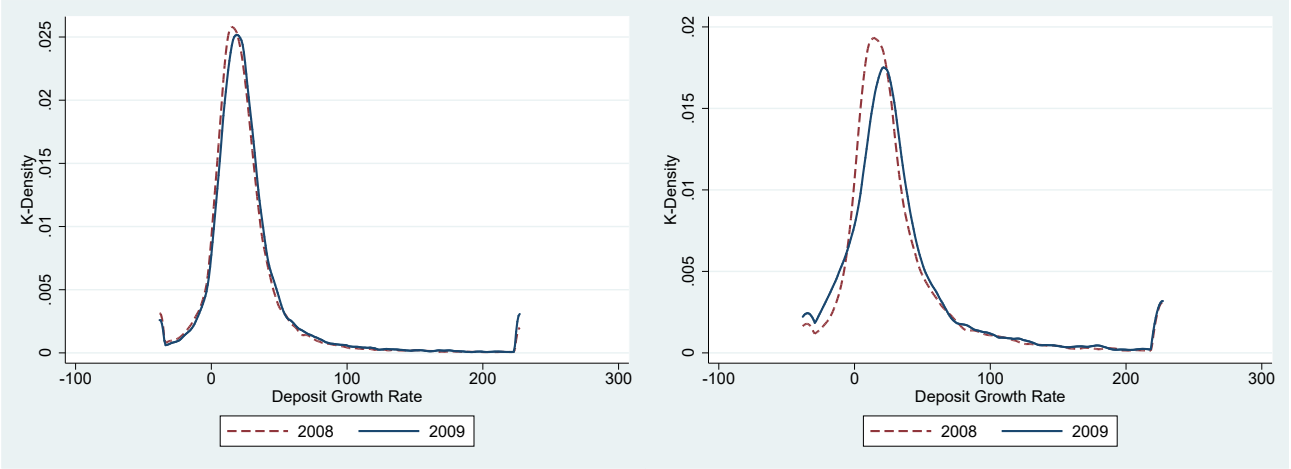


(a) **2008** (b) **2009**

Figure 5. Distribution of Deposit Growth

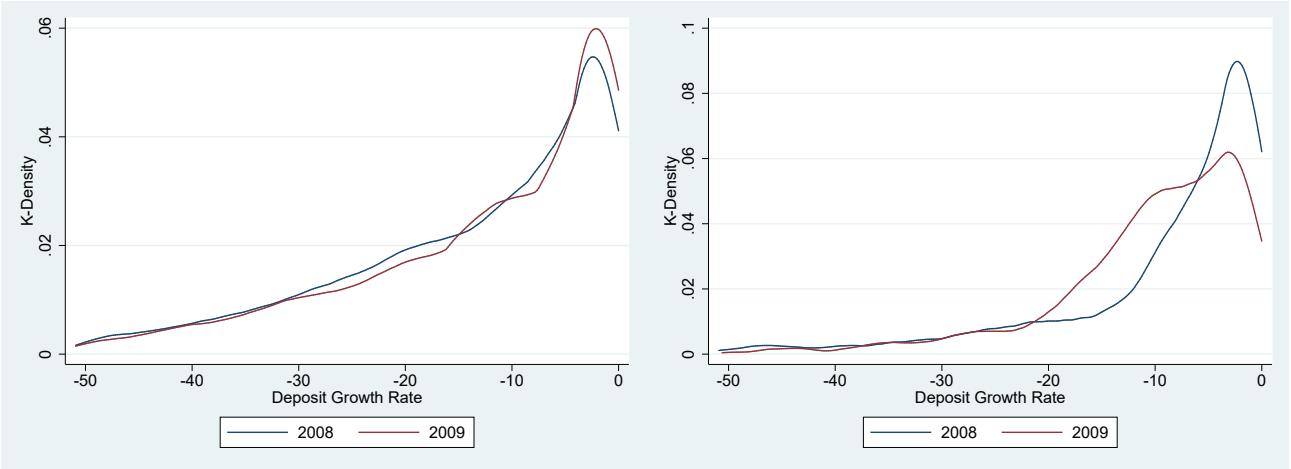
Panel A shows the distribution of deposit growth rate for 2008 (March 2007 to March 2008) and 2009 (March 2008 to March 2009). Panel B shows the corresponding distribution of number of deposit account growth. We repeat the previous graph and restrict to branches with deposit growth rates below zero in Panel B. Winsorized at the 1 percent level.

Panel A: Deposit Growth



(a) **Public Sector Banks** (b) **Private Sector Banks**

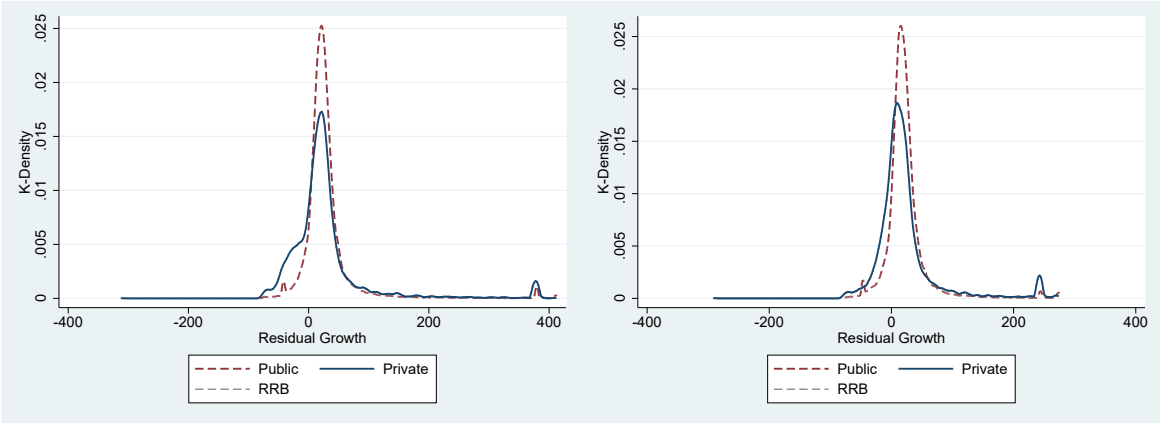
Panel B: Lower Tail of Deposit Growth



(c) **Public Sector Banks** (d) **Private Sector Banks**

Figure 6. Residuals: Distribution of Deposit Growth

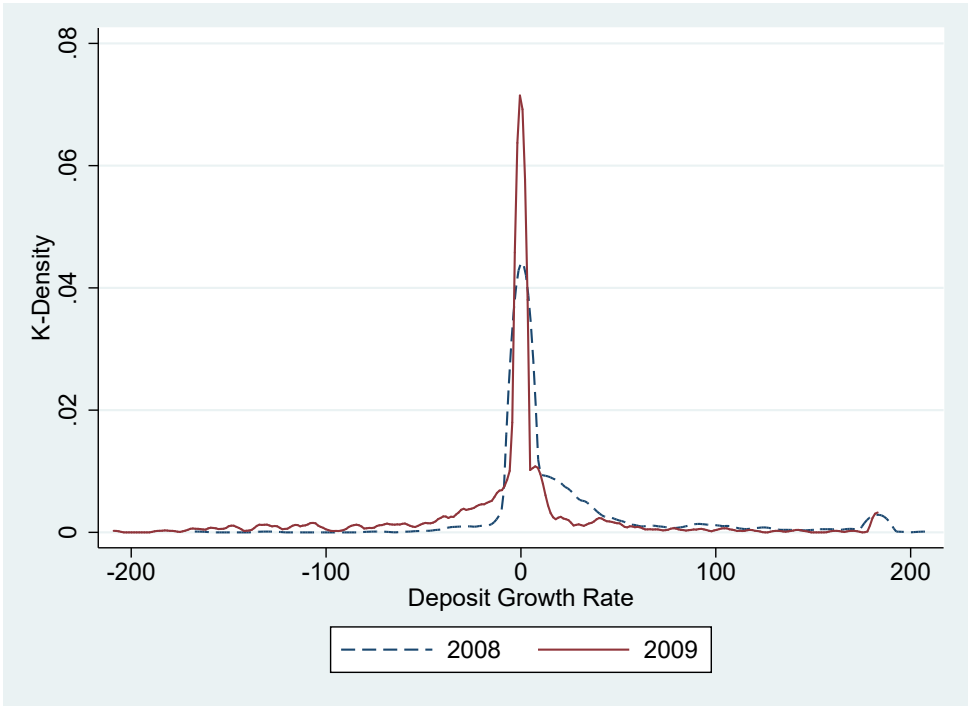
The graphs below show deposit growth rate controlling for size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years.



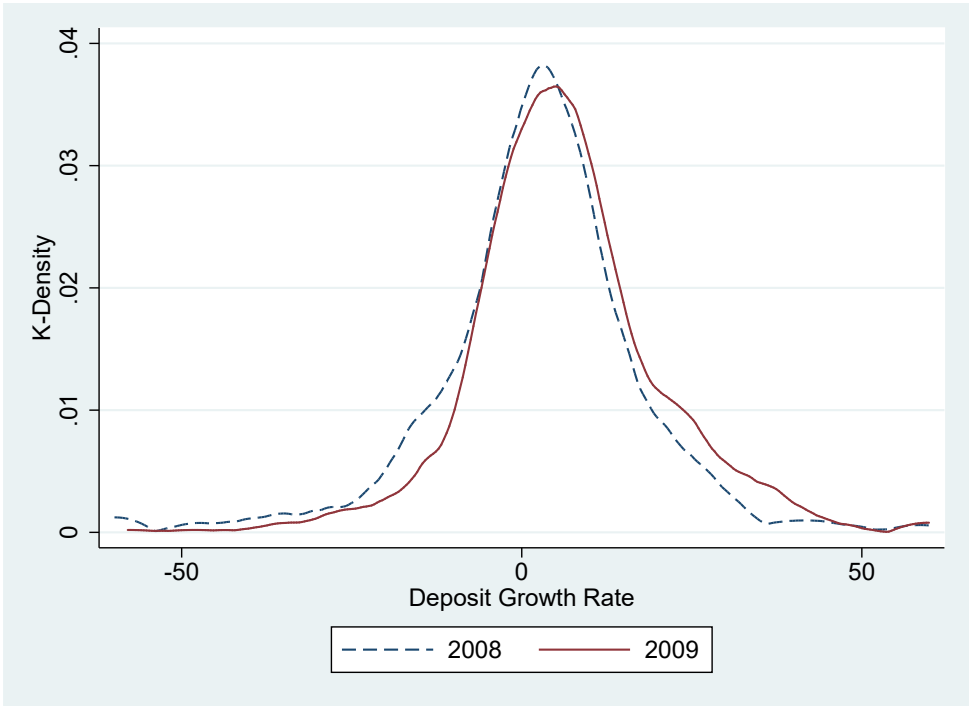
(a) **2009** (b) **2008**

Figure 7. District Level: Δ Growth Rates

The figures below show the distribution of the change in deposit growth at the district-level for private and public sector banks. That is the change in growth rates between 2007–2008 and growth rate in 2008–2009. We have retained only the public and private sector banks. Panel (a) shows the distribution for private sector banks and panel (b) shows the distribution for the public sector banks.



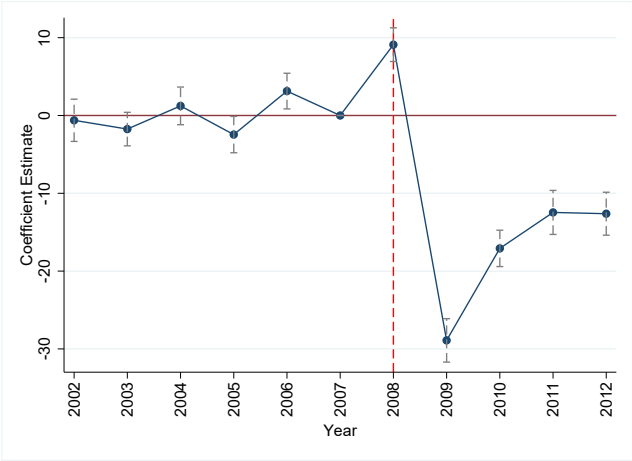
(a) **Private Sector Banks**



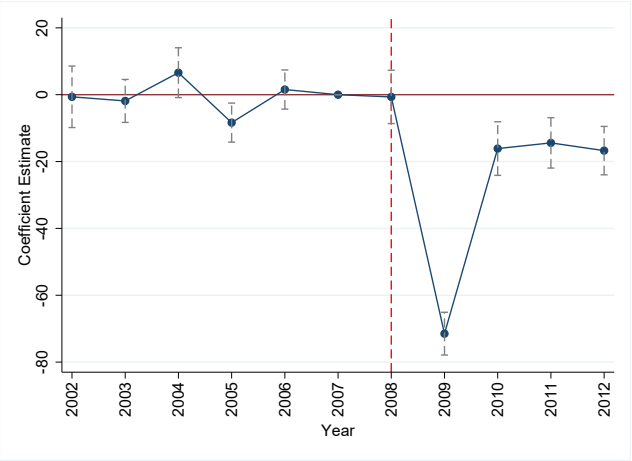
(b) **Public Sector Banks**

Figure 8. Parallel trends assumption for Run measures

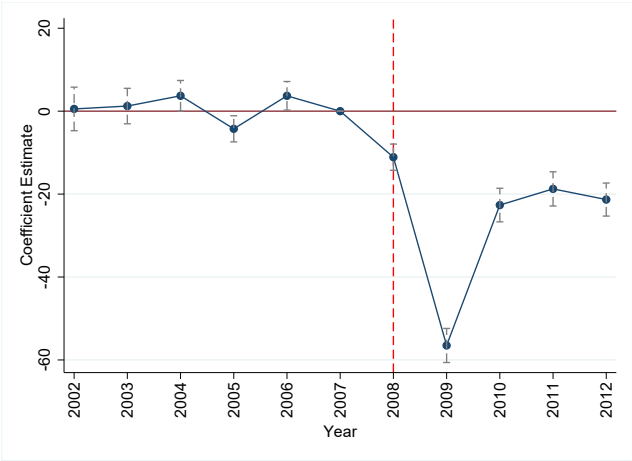
The figures below show the parallel trends assumption for each of the measures used in our analysis. We plot the coefficients for the event study plots as explained in Section A.2. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.The event study plots for the respective measures are in plot (a), plot (b), plot(c) and plot(d) respectively.



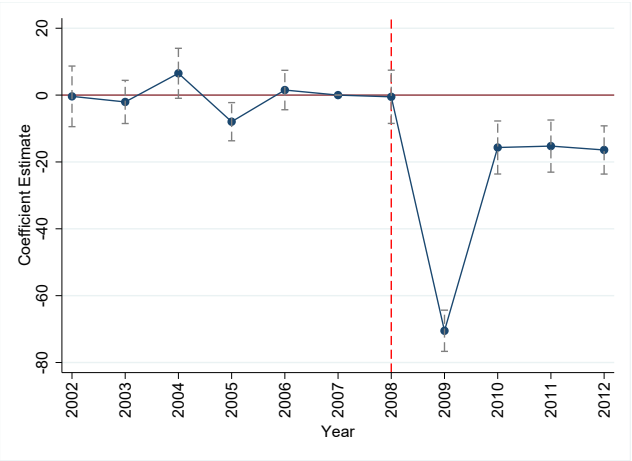
(a) **Measure 1**



(b) **Measure 2**



(c) **Measure 3**



(d) **Measure 4**

Table I. Summary Statistics: Branch Characteristics

Summary statistics for all branches in our analysis. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Percentage of banks with runs is then calculated at the district level and is the ratio of the number of banks which were classified as "runs" for each of these measures to the total number of branches in a district. We further divide this district level propensity of runs into a binary variable for districts with above median runs along each of the three measures. Deposit growth and credit growth is from March 2008 to March 2009. Deposit growth is further classified as demand deposits, term deposits and savings deposits. Credit growth is further classified as agricultural loans, industrial loans, loans to the professional sector, personal loans, trade loans and loans to the financial sector. Variables have been winsorized at the 2 percent level.

	Mean	SD	p10	p25	p50	p75	p90
All Branches: $N = 56,702$							
Deposit growth 08–09	29.34	38.61	-0.41	11.07	22.03	35.17	60.63
Credit growth 08–09	29.45	71.52	-12.13	0.01	12.35	30.22	67.20
Private Sector Branches: $N = 8,075$							
Deposit growth 08–09	35.40	49.68	-9.22	9.19	24.15	43.34	91.88
Credit growth 08–09	47.81	108.31	-28.57	-7.12	12.44	46.41	166.70
Public Sector Branches: $N = 48,627$							
Deposit growth 08–09	36.50	241.29	0.74	11.27	21.77	34.16	56.59
Credit growth 08–09	25.80	63.02	-9.99	0.65	12.34	28.90	58.06
Branch Run Measures							
Bank Run: Δ Gwt 08–09	0.06	0.24					
Bank Run: 2008 Distribution	0.01	0.10					
Bank Run: Residual	0.04	0.18					
District-level Propensity of Runs: $N = 630$							
Propensity Δ Gwt 08–09	2.92	10.69	0.00	0.00	0.00	0.00	5.47
Propensity 2008 Distribution	8.81	17.95	0.00	0.00	0.00	14.92	30.56
Propensity Residual	6.23	14.28	0.00	0.00	0.00	5.68	18.34

Table II. Summary Statistics: Deposit Growth By Year

Summary statistics for all branches in our analysis. Deposit growth is calculated from the March of the year indicated relative to March of the previous year.

Panel A: Private Sector Branches

Year	P10	P25	P50	P75	P90
1997	-1.8	6.8	22.0	36.1	54.4
1998	4.7	15.4	25.7	38.7	62.1
1999	-2.6	9.5	20.4	31.7	47.8
2000	-1.1	8.4	18.4	29.2	47.1
2001	-0.8	8.9	17.3	27.5	47.1
2002	-4.6	6.7	16.1	26.4	47.6
2003	-5.5	4.0	12.8	23.0	40.0
2004	-6.3	2.9	11.9	24.9	55.2
2005	-10.8	-0.9	8.2	21.8	52.1
2006	-6.1	4.4	14.3	32.0	93.0
2007	-3.8	8.1	19.9	39.4	90.9
2008	-2.3	8.6	21.3	41.0	87.7
2009	-9.2	9.3	24.5	44.5	97.0
2010	-7.2	4.7	16.9	38.0	91.2
2011	-2.9	8.5	20.2	40.1	76.7
2012	-3.7	8.8	20.5	35.1	56.3
2013	-3.1	6.6	16.4	27.9	44.4
Total	-4.8	6.5	18.0	33.3	65.4

Panel B: Public Sector Branches

Year	P10	P25	P50	P75	P90
1997	0.2	9.9	18.4	26.7	39.1
1998	0.0	8.8	17.1	25.5	38.3
1999	1.4	10.1	17.6	25.5	37.0
2000	2.4	10.2	17.2	24.8	35.7
2001	-0.0	7.9	14.9	22.2	32.4
2002	-1.3	6.5	13.9	22.2	33.9
2003	-1.7	4.8	11.1	19.0	29.3
2004	-2.8	3.5	9.5	17.9	30.0
2005	-5.7	1.7	8.6	17.5	30.4
2006	-3.1	4.2	11.4	21.4	36.3
2007	-0.3	7.6	16.0	26.7	44.6
2008	-0.4	9.3	19.2	31.2	50.3
2009	1.1	11.0	21.3	33.6	55.9
2010	-2.0	7.5	16.4	28.2	50.0
2011	-3.7	6.3	15.1	26.5	44.4
2012	-2.9	7.1	15.8	26.1	40.5
2013	-1.6	7.6	15.5	24.5	36.6
Total	-1.5	6.8	15.2	24.9	39.5

Table III. Summary Statistics: Credit Growth By Year

Summary statistics for all branches in our analysis. Credit growth is calculated from the March of the year indicated relative to March of the previous year.

Panel A: Private Sector Branches

Year	**P10**	**P25**	**P50**	**P75**	**P90**
	credit gwt	credit gwt	credit gwt	credit gwt	credit gwt
1997	-11.8	1.4	18.2	41.3	86.2
1998	-15.0	1.5	19.5	47.8	96.6
1999	-15.0	-0.1	16.4	41.7	95.7
2000	-14.6	0.1	16.3	42.0	92.6
2001	-19.1	-4.8	9.2	34.7	96.3
2002	-19.6	-1.1	14.6	38.7	84.5
2003	-20.8	-4.1	12.4	35.1	96.3
2004	-26.6	-4.7	15.3	40.8	112.4
2005	-12.8	4.8	25.5	61.3	174.9
2006	-13.5	3.7	24.1	61.2	218.9
2007	-20.6	1.7	26.6	70.4	201.4
2008	-21.6	0.6	23.8	72.5	237.6
2009	-28.6	-7.1	12.7	48.2	182.3
2010	-28.2	-3.4	18.0	58.5	302.2
2011	-22.4	3.3	29.2	74.4	254.5
2012	-21.0	3.9	29.5	70.7	215.4
2013	-18.4	3.6	24.0	54.3	127.8
Total	-20.6	0.0	20.5	54.8	161.9

Panel B: Public Sector Branches

Year	**P10**	**P25**	**P50**	**P75**	**P90**
	credit gwt	credit gwt	credit gwt	credit gwt	credit gwt
1997	-16.8	-1.7	10.8	28.6	59.2
1998	-13.0	0.0	13.4	31.1	63.3
1999	-11.8	1.9	16.1	35.2	66.9
2000	-13.7	-0.8	11.9	30.2	62.8
2001	-24.1	-10.2	3.5	20.8	47.2
2002	-11.8	3.8	21.4	43.3	75.4
2003	-7.9	3.0	16.2	33.5	62.8
2004	-9.9	3.2	17.8	35.9	64.7
2005	-1.6	10.2	25.5	44.9	75.3
2006	-2.6	9.7	25.7	46.1	80.3
2007	-6.3	5.7	20.1	38.1	68.5
2008	-5.7	5.1	17.7	33.5	59.7
2009	-10.4	0.3	11.9	28.2	56.2
2010	-4.1	5.7	18.3	36.1	77.3
2011	-8.5	2.1	14.1	31.2	59.9
2012	-10.0	2.4	14.4	30.2	50.3
2013	-7.2	3.0	14.2	28.4	47.4
Total	-10.3	2.2	16.0	34.2	63.6

Table IV. Deposit Growth for Branches with Runs

Dependent variable below is deposit growth from 2008 to 2009. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Further, deposit growth has been calculated separately for the intensive margin (Volume of deposits - Panel A) and extensive margin (Number of accounts - Panel B). For each of the panels, Columns 1, 2, 3 and 4 use the four measures respectively. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Deposit growth - in Rupees

	(1)	(2)	(3)	(4)
Bank Run: Residual	-66.17***			
	(2.727)			
Bank Run: Δ Gwt 08–09		-40.29***		
		(2.349)		
Bank Run: 2008 Distribution			-60.44***	
			(2.064)	
Bank Run (All)				-58.73***
				(2.091)
No. of Obs.	56702	56702	56702	56702
R squared	0.125	0.109	0.0956	0.0932
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y

Panel B: Deposit growth - Number of Accounts

	(1)	(2)	(3)	(4)
Bank Run: Residual	-23.71***			
	(1.704)			
Bank Run: Δ Gwt 08–09		-18.19***		
		(1.314)		
Bank Run: 2008 Distribution			-16.93***	
			(1.940)	
Bank Run (All)				-18.35***
				(1.645)
No. of Obs.	56702	56702	56702	56702
R squared	0.144	0.144	0.138	0.138
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y

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

Table V. Deposit Growth for Branches with Runs: Heterogeneity

Dependent variable below is deposit growth from 08–09 for term deposits, savings deposits and current account deposits. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Columns 1, 2 and 3 and 4 in each of the term, savings and current account columns use the four measures respectively. Panel A shows the deposit growth in volume of deposits for term, savings and current account deposists. Similarly, Panel B tabulates the deposit growth in the number of deposit accounts for each of these deposits. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Volume of Deposits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Term				Savings				Current			
Bank Run: Residual	-80.61***				-36.91***				-89.14***			
	(4.662)				(1.830)				(6.282)			
Bank Run: Δ Gwt 08–09		-53.12***				-26.58***				-73.42***		
		(3.679)				(1.362)				(5.113)		
Bank Run: 2008 Distribution			-73.27***				-28.58***				-76.72***	
			(3.952)				(1.659)				(7.940)	
Bank Run (All)				-72.70***				-28.75***				-88.34***
				(3.999)				(1.589)				(8.423)
No. of Obs.	56566	56566	56566	56566	56579	56579	56579	56579	56517	56517	56517	56517
R sq.	0.129	0.122	0.111	0.110	0.105	0.103	0.0936	0.0933	0.0627	0.0635	0.0601	0.0603
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Panel B: Number of Deposit Accounts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Term				Savings				Current			
Bank Run: Residual	-31.60***				-35.72***				-23.15***			
	(2.584)				(4.230)				(1.718)			
Bank Run: Δ Gwt 08–09		-25.50***				-27.90***				-18.46***		
		(1.894)				(3.172)				(1.486)		
Bank Run: 2008 Distribution			-24.50***				-21.32***				-16.46***	
			(1.926)				(5.480)				(1.703)	
Bank Run (All)				-25.56***				-24.37***				-18.44***
				(1.843)				(5.814)				(1.561)
No. of Obs.	56566	56566	56566	56566	56517	56517	56517	56517	56579	56579	56579	56579
R sq.	0.135	0.136	0.130	0.130	0.195	0.195	0.194	0.194	0.151	0.152	0.146	0.146
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table VI. Spillovers on Deposit Growth for Branches with no Runs

Dependent variable below is deposit growth from 2008 to 2009. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. Columns 1, 2, 3 and 4 use the four measures respectively. Again, the analysis has been divided into two sections - Panel A corresponding to the growth in deposits in rupees and Panel B growth in number of accounts. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Deposit growth - in Rupees

	(1)	(2)	(3)	(4)
Public * Propensity Residual	0.113***			
	(0.0360)			
Public * Propensity Δ Gwt 08–09		0.117**		
		(0.0487)		
Public * Propensity 2008 Distribution			0.167***	
			(0.0318)	
Public * Propensity: All				0.120***
				(0.0282)
No. of Obs.	56702	56702	56702	56702
R sq.	0.0789	0.0788	0.0795	0.0791
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y
No. of Cl.	630	630	630	630

Panel B: Deposit growth - Number of Accounts

	(1)	(2)	(3)	(4)
Public * Propensity Residual	-0.00555			
	(0.0270)			
Public * Propensity Δ Gwt 08–09		-0.0184		
		(0.0303)		
Public * Propensity 2008 Distribution			0.0386	
			(0.0266)	
Public * Propensity: All				0.00792
				(0.0235)
No. of Obs.	56702	56702	56702	56702
R sq.	0.137	0.137	0.137	0.137
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y
No. of Cl.	630	630	630	630

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

Table VII. Spillovers on Deposit Growth for Branches with no Runs: Heterogeneity

Dependent variable below is deposit growth from 08–09 for term deposits, savings deposits and current account deposits. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. Columns 1, 2 and 3 and 4 in each of the term, savings and current account columns use the four measures respectively. Panel A shows the deposit growth in volume of deposits for term, savings and current account deposists. Similarly, Panel B tabulates the deposit growth in the number of deposit accounts for each of these deposits. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Volume of Deposits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Term				Savings				Current			
Public * Propensity Residual	0.206***				0.0717**				0.0796			
	(0.0492)				(0.0287)				(0.0932)			
Public * Propensity Δ Gwt 08–09		0.232***				0.0710**				0.0536		
		(0.0685)				(0.0337)				(0.110)		
Public * Propensity 2008 Distribution			0.281***				0.106***				0.120	
			(0.0483)				(0.0277)				(0.0950)	
Public * Propensity: All				0.205***				0.0795***				0.112
				(0.0421)				(0.0253)				(0.0868)
No. of Obs.	56566	56566	56566	56566	56579	56579	56579	56579	56517	56517	56517	56517
R sq.	0.102	0.102	0.103	0.102	0.0898	0.0898	0.0901	0.0900	0.0588	0.0588	0.0588	0.0588
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Panel B: number of Deposit Accounts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Term				Savings				Current			
Public * Propensity Residual	0.0473				-0.0790				-0.00287			
	(0.0297)				(0.0774)				(0.0260)			
Public * Propensity Δ Gwt 08–09		0.0532				-0.0733				-0.0214		
		(0.0379)				(0.0935)				(0.0274)		
Public * Propensity 2008 Distribution			0.107***				-0.000693				0.0330	
			(0.0341)				(0.0788)				(0.0269)	
Public * Propensity: All				0.0647**				-0.0518				0.00357
				(0.0287)				(0.0693)				(0.0233)
No. of Obs.	56566	56566	56566	56566	56517	56517	56517	56517	56579	56579	56579	56579
R sq.	0.129	0.129	0.129	0.129	0.194	0.194	0.194	0.194	0.145	0.145	0.145	0.145
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Table VIII. Credit Growth at Branches with Runs

Dependent variable below is credit growth from 2008 to 2009. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Columns 1, 2, 3 and 4 use the four measures respectively. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level. The same exercise has been carried out industry wise in Panel B.

Panel A: Credit Growth

	(1)	(2)	(3)	(4)
Bank Run: Residual	-50.74***			
	(4.484)			
Bank Run: Δ Gwt 08–09		-45.33***		
		(3.734)		
Bank Run: 2008 Distribution			-41.43***	
			(6.191)	
Bank Run (All)				-48.34***
				(5.868)
No. of Obs.	56700	56700	56700	56700
R squared	0.0742	0.0773	0.0685	0.0690
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y

Panel B: Across Industries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Services				Industry				Agriculture			
Bank Run: Residual	-11.25***				-3.168				-15.29			
	(3.610)				(14.44)				(26.49)			
Bank Run: Δ Gwt 08–09		-9.458***				-14.06				-31.96**		
		(2.041)				(10.10)				(14.78)		
Bank Run: 2008 Distribution			-17.15***				-30.99				-41.29	
			(4.859)				(30.96)				(26.85)	
Bank Run (All)				-19.75***				-39.24				-57.47**
				(4.548)				(30.99)				(23.28)
No. of Obs.	37854	37854	37854	37854	44013	44013	44013	44013	46678	46678	46678	46678
R sq.	0.118	0.118	0.118	0.118	0.0697	0.0698	0.0697	0.0698	0.0650	0.0652	0.0651	0.0652
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table IX. Spillovers on Credit Growth at Branches with No Runs

Dependent variable below is credit growth from 2008 to 2009 for personal loans, trade loans, loans to the financial sector, agricultural loans, industrial loans, loans to transportation sector, loans to professionals and loans to others. There are 4 measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. Columns 1, 2, 3 and 4 use the four measures respectively. Panel A reports the overall credit growth and across industry values are reported in Panel B. All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Overall Impact

	(1)	(2)	(3)	(4)
Public * Propensity Residual	0.138**			
	(0.0596)			
Public * Propensity Δ Gwt 08–09		0.120		
		(0.0728)		
Public * Propensity 2008 Distribution			0.250***	
			(0.0650)	
Public * Propensity: All				0.192***
				(0.0546)
No. of Obs.	56700	56700	56700	56700
R sq.	0.0663	0.0662	0.0669	0.0667
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y
No. of Cl.	630	630	630	630

Panel B: Across industries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Services				Industry				Agriculture			
Public * Propensity Residual	0.0930*				-0.179				0.346			
	(0.0546)				(0.265)				(0.401)			
Public * Propensity Δ Gwt 08–09		0.0881				-0.346				0.175		
		(0.0748)				(0.270)				(0.518)		
Public * Propensity 2008 Distribution			0.0962**				-0.105				0.423	
			(0.0475)				(0.292)				(0.324)	
Public * Propensity: All				0.106**				-0.196				0.322
				(0.0422)				(0.261)				(0.303)
No. of Obs.	37854	37854	37854	37854	46678	46678	46678	46678	44013	44013	44013	44013
R sq.	0.117	0.117	0.117	0.117	0.0650	0.0651	0.0650	0.0650	0.0698	0.0697	0.0698	0.0698
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Table X. Aggregate Deposit and Credit Growth

Dependent variable below is deposit growth in Rupees in column 1–4, Growth in Number of Deosit Accounts in columns 5–8 and and growth in Credit Volume in columns 9–12. nts in panel B. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Deposit Vol.				Number of Deposit Acc.				Vol. of Credit			
Propensity Residual	-0.143***				-0.105***				0.0579*			
	(0.0338)				(0.0292)				(0.0321)			
Propensity Δ Gwt 08–09		-0.191***				-0.100***				0.0939		
		(0.0542)				(0.0349)				(0.0559)		
Propensity 2008 Distribution			-0.0902***				-0.0701**				0.0721**	
			(0.0306)				(0.0270)				(0.0291)	
Propensity: All				-0.0670**				-0.0625**				0.0305
				(0.0264)				(0.0235)				(0.0235)
No. of Obs.	620	620	620	620	620	620	620	620	620	620	620	620
R sq.	0.387	0.387	0.382	0.378	0.292	0.286	0.288	0.287	0.318	0.320	0.323	0.316
State-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
No. of Cl.	35	35	35	35	35	35	35	35	35	35	35	35

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

Table XI. Internal Capital Markets

Dependent variable below is Δ log of credit growth between period t to $t-1$. $\Delta Log(Deposit)_{t-1,t}$ is the percentage deposit growth between period $t-1$ to t. Crisis is an indicator equal to one for the period after the bank runs, 2009. Public is an indicator for whether a branch belongs to a public sector bank. All columns include district fixed effects and year fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

	(1)	(2)	(3)	(4)	(5)
Δ $Log(Deposit)_{t-1,t}$	0.424***	0.419***	0.384***	0.612***	0.604***
	(0.0104)	(0.0106)	(0.00930)	(0.0229)	(0.0221)
Δ $Log(Deposit)_{t-1,t}$(Other)		0.145***	0.227***	-0.0389	0.0168
		(0.0111)	(0.0162)	(0.0392)	(0.0383)
Crisis * Δ $Log(Deposit)_{t-1,t}$			0.0849***		
			(0.00990)		
Crisis * Δ $Log(Deposit)_{t-1,t}$(Other)			-0.174***		
			(0.0218)		
Public				-0.0453***	-0.0193***
				(0.00676)	(0.00624)
Pulic * Δ $Log(Deposit)_{t-1,t}$				-0.235***	-0.258***
				(0.0163)	(0.0177)
Public * Δ $Log(Deposit)_{t-1,t}$(Other)				0.199***	0.186***
				(0.0425)	(0.0412)
Public *Crisis					-0.0434***
					(0.00656)
Crisis* Public * Δ $Log(Deposit)_{t-1,t}$(Other)					-0.102***
					(0.0201)
Crisis* Public * Δ $Log(Deposit)_{t-1,t}$					0.0789***
					(0.0104)
No. of Obs.	883503	883502	883502	883502	883502
R squared	0.0866	0.0873	0.0881	0.0927	0.0936
Year-FE	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y

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

Table XII. Long-term Deposit Growth for Branches with Runs

Dependent variable below is deposit growth in Rupees in panel A and deposit growth in number of accounts in panel B. Columns 1–3, 4–6, 7–9, 10–12 and 13–15 respectively correspond to growth rates between FY 09–10, FY 10–11, FY 11–12, FY 12–13 and FY 08–13 respectively. We have retained only the public and private sector banks. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

Panel A: Deposit growth - in Rupees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	FY 09-10				FY 10-11				FY 11-12				FY 12-13			
M1	-22.03***				-17.58***				-7.936***				-2.434**			
	(1.858)				(1.545)				(1.552)				(0.960)			
M2		-21.89***				-14.82***				-7.757***				-3.634***		
		(1.500)				(1.190)				(1.079)				(0.611)		
M3			-12.15***				-11.90***				-2.506				-0.0115	
			(2.931)				(2.533)				(2.561)				(1.431)	
M4				-10.73***				-12.44***				-3.020				0.236
				(2.999)				(2.717)				(2.819)				(1.561)
No. of Obs.	61891	61891	61891	61891	60935	60935	60935	60935	60481	60481	60481	60481	60436	60436	60436	60436
R sq.	0.0613	0.0640	0.0571	0.0570	0.0822	0.0828	0.0785	0.0785	0.0656	0.0663	0.0643	0.0643	0.0500	0.0504	0.0498	0.0498
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Panel B: Deposit growth - Number of Accounts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	FY 09-10				FY 10-11				FY 11-12				FY 12-13			
M1	-25.15***				-15.46***				-9.100***				-4.718***			
	(1.346)				(0.987)				(0.757)				(0.450)			
M2		-20.02***				-11.96***				-9.327***				-4.053***		
		(1.215)				(0.856)				(0.745)				(0.413)		
M3			-21.35***				-12.65***				-6.791***				-2.446***	
			(1.659)				(1.486)				(1.030)				(0.582)	
M4				-20.47***				-12.96***				-8.133***				-2.254***
				(1.650)				(1.527)				(0.984)				(0.702)
No. of Obs.	61891	61891	61891	61891	60935	60935	60935	60935	60481	60481	60481	60481	60439	60439	60439	60439
R sq.	0.101	0.101	0.0951	0.0947	0.122	0.121	0.118	0.118	0.229	0.231	0.227	0.227	0.263	0.263	0.262	0.262
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Table XIII. Long-term Credit Growth for Branches with Runs

Dependent variable below is credit growth from 2008 to 2009. We have retained only the public and private sector banks. Columns 1–3, 4–6, 7–9, 10–12 and 13–15 respectively correspond to growth rates between FY 09–10, FY 10–11, FY 11–12, FY 12–13 and FY 08–13 respectively. There are four measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.All columns include district fixed effects and bank fixed-effects. Standard errors are clustered at the district level. Variables have been winsorized at the 2 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	FY 09-10				FY 10-11				FY 11-12				FY 12-13			
M1	-97.21***				-57.06***				-45.76***				-25.02***			
	(5.920)				(5.529)				(5.016)				(3.871)			
M2		-80.75***				-50.79***				-41.46***				-22.81***		
		(5.175)				(3.626)				(2.993)				(2.310)		
M3			-84.47***				-52.81***				-38.33***				-25.74***	
			(8.779)				(7.118)				(7.208)				(5.102)	
M4				-80.05***				-59.51***				-49.98***				-36.70***
				(6.787)				(6.770)				(6.958)				(4.107)
No. of Obs.	61891	61891	61891	61891	60935	60935	60935	60935	60480	60480	60480	60480	60436	60436	60436	60436
R sq.	0.0836	0.0851	0.0729	0.0721	0.161	0.163	0.155	0.155	0.183	0.186	0.178	0.179	0.101	0.102	0.0989	0.100
Bank-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Table XIV. Births and Deaths

Panel A shows whether the branches that had runs were more likely to be closes between 2009–2013. Panel B sees whether there were more new branches opened in the districts with higher bank runs in the period 2009–2013. Panel C looks at the overall growth rate in number of branches in the period 2009–2013. We have retained only the public and private sector banks. There are 3 measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. Standard errors are clustered at the district level.

Panel A: Dependent variable-Indicator for whether branch closed between FY09–FY13

	(1)	(2)	(3)	(4)
Bank Run: Residual	0.0348***			
	(0.00912)			
Bank Run: Δ Gwt 08–09		0.0599***		
		(0.0109)		
Bank Run: 2008 Distribution			0.0226**	
			(0.0100)	
Bank Run (All)				0.0269**
				(0.0117)
No. of Obs.	62161	62161	62161	62161
R squared	0.170	0.175	0.169	0.169
District-FE	Y	Y	Y	Y

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

Panel B: Dependent variable- Birth of new branches FY09–FY13

	(1)	(2)	(3)	(4)
Propensity Residual	0.718***			
	(0.157)			
Propensity Δ Gwt 08–09		0.900***		
		(0.242)		
Propensity 2008 Distribution			0.537***	
			(0.0879)	
Propensity: All				0.518***
				(0.0884)
No. of Obs.	630	630	630	630
R squared	0.318	0.295	0.296	0.301

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

Panel C: Dependent variable- Growth in number of branches FY09–FY13

	(1)	(2)	(3)	(4)
Propensity Residual	0.00663			
	(0.0176)			
Propensity Δ Gwt 08–09		0.0218		
		(0.0137)		
Propensity 2008 Distribution			0.00849	
			(0.0135)	
Propensity: All				-0.00924
				(0.0151)
No. of Obs.	630	630	630	630
R squared	0.000124	0.000792	0.000339	0.000440

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

Table XV. Real Outcomes: Lights data

The table below looks at the impact of the deposit runs on real outcomes using luminosity as a proxy for real outcomes. The dependent variable is annual growth in luminosity between FY09-FY13. We have retained only the public and private sector banks. There are 3 measures to classify private sector bank branches with runs. The first bankrun flag is 1 if the predicted deposit growth of private sector bank branches is more than the actual growth rate. The prediction equation is the deposit growth rate on size (lagged credit), age, whether rural, lagged credit to deposit ratio and also whether public (allows for PSBs to have on average lower growth rates). We use out-of-sample regression and restrict to before 2006 and predict for remaining years. For the second bankrun flag we do the following. We first identify private sector bank branches which had growth (in 2009) below the 5^{th} percentile of growth rates in 2008. Then we look at the change in growth rates between 2009 (March 2008 to March 2009) and 2008 (March 2007 to March 2008). A private sector branch is classified as having had a run in 2009 if the above is less than zero. For the third bankrun flag simply flag 1 for private sector bank branches which had a growth (in 2009) below the 5^{th} percentile of growth rates in 2008 but with deposit growth rate above this threshold in 2008. The fourth bankrun flag is 1 for private sector bank branches if all the other three measures are 1. This measure bascially takes the intersection of all the three measures defined above to identify banks with runs.Propensity of private sector branch runs at the district level is calculated as the negative of the deposit growth of the private sector bank branches which were classified as having had "runs". We have three district-level propensity measures corresponding to each of our run measures. All regressions include year-state fixed effects. Standard errors are clustered at the state level.

Dependent variable-Growth in luminosity between FY09-FY13

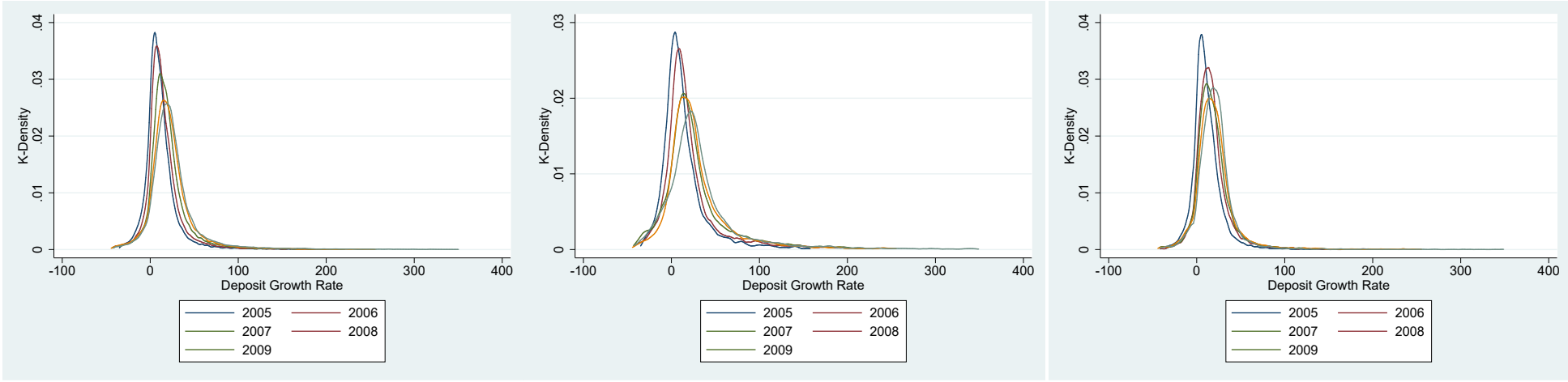
	(1)	(2)	(3)	(4)
Propensity Residual	-0.142***			
	(0.0322)			
Propensity Δ Gwt 08–09		-0.146***		
		(0.0303)		
Propensity 2008 Distribution			-0.109***	
			(0.0221)	
Propensity: All				-0.0890***
				(0.0154)
No. of Obs.	3099	3099	3099	3099
R sq.	0.0191	0.0185	0.0190	0.0187
State-FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
No. of Cl.	35	35	35	35

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

Online Appendix

Figure A1. Distribution of Deposit Growth

Deposit growth dollar values. All below 200% deposit growth. Kernel Epanechnikov kernel function, all years shown



(a) **Public Sector Banks** (b) **Private Sector Banks** (c) **Rural Banks**

Table A1. Placebo: Deposit Growth for Branches with Runs

We now repeat the exercise in Table VI except now instead of the reference years as 2008 and 2009, we define variables with respect to years 2005 and 2006 (Panel A) and 2006 and 2007 (Panel B).

Panel A: Deposit growth 2005–2006

	(1)	(2)	(3)	(4)
Public * Propensity Residual	-0.0583**			
	(0.0265)			
Public * Propensity Δ Gwt 04–05		-0.0570**		
		(0.0284)		
Public * Propensity 2005 Distribution			-0.00864	
			(0.0287)	
Public * Propensity: All				-0.0451
				(0.0280)
No. of Obs.	52448	52448	52448	52448
R sq.	0.128	0.128	0.128	0.128
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y
No. of Cl.	601	601	601	601

Panel B: Deposit growth 2006–2007

	(1)	(2)	(3)	(4)
Public * Propensity Residual	-0.0271			
	(0.0226)			
Public * Propensity Δ Gwt 05–06		-0.0161		
		(0.0211)		
Public * Propensity 2006 Distribution			0.0175	
			(0.0263)	
Public * Propensity: All				-0.0141
				(0.0197)
No. of Obs.	53061	53061	53061	53061
R sq.	0.108	0.108	0.108	0.108
Bank-FE	Y	Y	Y	Y
District-FE	Y	Y	Y	Y
No. of Cl.	608	608	608	608

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