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Deposit Insurance, Moral Hazard and Bank Risk

Abstract

Using evidence from Russia, we explore the effect of the introduction of deposit insurance on bank risk. Drawing on variation in the ratio of firm deposits to total household and firm deposits before the announcement of deposit insurance, so as to capture the magnitude of the decrease in market discipline after the introduction of deposit insurance, we demonstrate that larger declines in market discipline generate larger increases in traditional measures of risk. These results hold in a difference-in-difference setting in which private domestic banks serve as the treatment group and state and foreign-owned banks, whose deposit insurance regime does not change, serve as a control group.

JEL-Codes: G650, G210, G280, P340.

Keywords: deposit insurance, market discipline, moral hazard, risk taking, banks, Russia.

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1. Introduction

Architects of modern financial safety nets face a challenge if policies designed to stabilize the banking sector weaken stabilizing forces already in place (Calomiris, 1999). The introduction of explicit deposit insurance poses just such a dilemma. Its potential for limiting bank runs (Diamond & Dybvig, 1983) explains its adoption throughout the world over the past generation (Demirgüç & Kane, 2002). But its capacity for desensitizing depositors to the consequences of bank failure may relax an important, market-disciplining, constraint, and thereby contribute to systemic instability (Demirgüç-Kunt & Detragiache, 2002). These potentially offsetting effects raise the stakes for empirical analysis, giving greater urgency to the question of how deposit insurance in fact affects bank risk.

Much of the published research on whether explicit deposit insurance actually relaxes market discipline and increases bank risk draws on comparisons across banks or countries that vary with respect to deposit insurance coverage. But correlations identified through cross-sectional variation are open to criticisms of omitted variable bias and reverse causation. Some studies infer the impact of deposit insurance on market discipline and bank risk by comparing the behavior of a well-defined group before and after the introduction of explicit deposit insurance. This approach, however, cannot dismiss the possibility that results are driven by time-specific factors other than the introduction of insurance. In an earlier paper (Karas et al., 2013), we exploited what amounted to a quasi-experiment from the introduction in 2004 of explicit deposit insurance in Russia to circumvent these identification problems. In a manner unique to the literature, we explored how deposit insurance affected the deposits of households relative to those of firms, a still uninsured "control" group. Using a difference-in-difference estimator, we demonstrated that insured household depositors' sensitivity to bank capitalization diminished markedly after the introduction of deposit insurance. The quasi-experimental setting, in other words, turned up strong evidence of deposit insurance causing a decline in market discipline.

This earlier paper, however, did not explore whether a greater deposit-insurance-induced decrease in market discipline actually led to greater bank risk. It is to this question that we turn in this paper. To answer it, we begin from an assumption, well-grounded in the empirical and theoretical literature (Karas et al., 2013; Gropp & Vesala, 2004), that the bank-level treatment effect of deposit insurance – *i.e.*, the magnitude of the decline in market discipline – can be proxied for by the ratio of firm deposits to the sum of firm and household deposits. A greater relative dependence on insured household deposits, *ceteris paribus*, implies a greater decline in market discipline.

Drawing on bank variation in this deposit ratio before the announcement of explicit deposit insurance, we demonstrate that weaker market discipline translates into increases in a number of traditional measures of bank risk, including a higher rate of failure. These basic results are robust to the inclusion of bank-specific controls. Moreover, they hold in a difference-in-difference setting in which state and foreign-owned banks, whose deposit insurance regime did not change over our period of analysis, serve as a control.

Our findings make the following contributions to the literature. First, our data allow us to carry out what we believe to be the cleanest test heretofore of the direct impact of deposit insurance's introduction on bank risk. Second, we bring together in one analysis two related literatures as to the moral hazard costs of deposit insurance. Some articles explore the correlation between the introduction of deposit insurance and changes in market discipline but only by implication suggest consequences for bank risk. Other articles highlight the relationship between the introduction of deposit insurance and later changes in bank risk but only by implication identify a shift in market discipline as the intervening factor. Here, our analysis explicitly integrates market discipline and bank risk. A bank-specific measure of a deposit-insurance-induced decrease in the former is shown to be robustly related, with a multi-year lag, to an increase in the latter.

Our article is organized as follows. Section 2 reviews prior research on the relationship between deposit insurance, market discipline and bank risk. Section 3 covers the relevant histories of deposit markets and deposit insurance in Russia. Section 4 introduces our data and methodology. Section 5 explores, for private, domestic banks, the relationship between deposit insurance and changes in risk as a function of their deposit mix. Section 6 introduces a difference-in-difference estimator in which state and foreign banks serve as a control. Section 7 offers concluding thoughts.

2. Deposit Insurance, Market Discipline and Bank Risk

Compared to much of the literature, our quasi-experimental setting allows for relatively clean identification of deposit insurance's moral hazard effect. Noteworthy initial studies draw primarily on cross-sectional variation. Some, for instance, exploit individual country caps on coverage to compare fully-insured bank deposits with those above the cap and thus only partially insured (Park & Peristiani, 1998; Martinez Peria & Schmukler, 2001). As a way to identify deposit insurance's effect, this approach presents problems in so far as small, fully-insured depositors may systematically differ from large, partially-insured ones in ways related to market discipline. The latter, for instance, may be more risk averse or better informed about bank fundamentals.

Other studies draw on multi-country bank-level data and cross-country variation in deposit insurance policies (Demirgüç-Kunt & Huizinga, 2004; Nier & Baumann, 2006; Anginer et al., 2014). As with within-country comparisons of insured and uninsured depositors, this approach relies largely on inferring market-disciplining effects of deposit insurance from a potentially diverse group of depositors. Those in countries with, say, more generous deposit insurance, however, may be fundamentally different from those in countries with less. As such, comparing these groups' behavior may be uninformative as to how the introduction of deposit insurance affects the propensity of a given group of depositors to engage in market discipline.

To avoid drawing conclusions from a contemporaneous comparison of fundamentally different groups, a test for the effect of deposit insurance, ideally, should involve a pre-and-post assessment. For a given group of depositors and/or banks, that is, we would like to compare behavior both prior to and after a change in the deposit insurance regime. For instance, a recent study using Bolivian data from 1999 to 2003 demonstrates that after the introduction of deposit insurance in 2001, banks, in line with a decrease in market discipline, began making riskier loans (Ioannidou & Penas, 2010). Below, our analysis initially follows this basic approach; that is, we track a well-defined group – *i.e.*, private, domestic banks – before and after the introduction of deposit insurance. This type of comparison, however, can offer, at best, only suggestive evidence as to an actual effect. It cannot distinguish changes in behavior driven by the deposit insurance regime from those due to other time-contingent factors.

The most convincing evidence for a deposit-insurance-induced moral hazard effect comes from applying a difference-in-difference estimator in a quasi-experimental setting. To our knowledge, Karas et al. (2013) first adopted this approach, demonstrating that flows of newly insured household deposits in Russia became, relative to those of uninsured firms, less sensitive to bank capitalization after the introduction of deposit insurance. Lambert et al. (2017) apply this approach in assessing the connection between deposit insurance and bank risk. Exploiting a dramatic increase in per-deposit insurance coverage ushered in by the 2008 U.S. Emergency Economic Stabilization Act, the authors demonstrate that banks whose share of insured deposits increased the most after the new policy's introduction experienced the largest increase in risky lending. Like Lambert et al. (2017), we apply a difference-in-difference estimator in a quasi-experimental setting to assess the effect of deposit insurance on bank risk. Our empirical setting, however, allows us to extend their approach in several meaningful ways. First, we can assess the effect of deposit insurance's introduction as opposed to its expansion. Second, we can explore the robustness of our findings to a wider array of bank risk measures. Third, we can delineate our treatment and control groups more clearly by comparing risk at banks affected by deposit insurance's introduction (*i.e.*, private domestic banks) with risk at (foreign and state-owned) banks wholly unaffected by the policy change.

Much of the empirical literature as to the moral hazard costs of deposit insurance can effectively be divided into two categories. One highlights the relationship between deposit insurance and market disciplining behavior, suggesting, but not demonstrating, that any evidence for the hypothesized relationship would necessarily hold implications for bank risk. The other focuses on the relationship between deposit insurance and bank risk, assuming, either implicitly or explicitly, that any relationship between the two can be understood as the consequence of a change in market discipline. Both literatures, in other words, recognize a potential two-link causal chain from deposit insurance through market discipline to bank risk, but each effectively ignores one of the links.

Our article contributes to the literature by explicitly bringing these two links together. In Karas et al. (2013), we used a difference-in-difference estimator to demonstrate that Russian households' market disciplining behavior, relative to that of firms, abated after the introduction of deposit insurance. Here, we also use a difference-in-difference estimator, but to assess the relationship between deposit insurance and bank risk. In so doing, we connect the two aforementioned links by highlighting the relationship between an explicitly defined bank-specific, deposit-insurance-induced decrease in market discipline and the increase in bank risk over a multi-year period.

3. The Russian Context

Russia's modern experience with liberalized deposit markets has been relatively brief. When financial markets were first permitted in the early 1990s, bank deposits, particularly those of households, were held almost exclusively by *Sberbank*, the state-owned savings bank. But lax entry policies in the early post-communist period contributed to the quick development of a relatively competitive market for deposits. By 1994, private banks had captured over half of the household deposit market. The mix of liberalized deposit rates, naive depositors and over-burdened regulators proved destabilizing. System-wide crises, including a particularly large one in 1998, led to the insolvency of many of the largest banks on the retail market. Obligations to tens of thousands of depositors went unmet (Perotti, 2002; Radaev, 2000; Schoors, 2001; Spicer & Pyle, 2000). These experiences quickly heightened Russians' awareness of the private costs of bank failure and thus the value of carefully monitoring their financial institutions. Karas et al. (2010) provide evidence for the existence of market discipline in the half decade after the 1998 crisis, but before the introduction of explicit deposit insurance. Flows of household and firm deposits during this period were consistent with quantity-based sanctioning of weaker banks; more poorly capitalized banks, that is, were less successful in attracting the deposits of households and firms. Evidence for the standard form of price discipline (*i.e.*, depositors requiring a deposit rate premium from less stable banks) was mixed.

Ending years of uncertainty, a full decade after the first proposals had been introduced in the national legislature, the act creating Russia's Deposit Insurance Agency (DIA) was finally signed into law on December 23rd 2003. Formally beginning operations that January, the DIA assumed responsibility for administering all aspects of the national deposit insurance fund: determining bank premiums, making any necessary payouts to depositors, and overseeing the liquidation of insolvent banks (Tompson, 2004). The Russian government provided initial seed capital but premiums – payable quarterly and assessed on the daily averages of a bank's insured deposits – quickly became the fund's primary source of financing. The deposits of households, but not firms, were to be covered. And all banks that accepted household deposits were required to participate. All deposits up to 100,000 rubles were fully insured from when banks were first admitted into the system in September 2004 until August 2006 (Camara & Montes-Negret, 2006). From then until March 2007, up to 190,000 rubles per deposit were insured, with amounts above 100,000 insured at a 90 percent rate . After March 2007, the 190 thousand ruble ceiling was increased to 400 thousand rubles. A further increase in October 2008 took the ceiling to 700 thousand rubles.

By January 1, 2005, 381 banks and a bit more than 32 million deposit accounts, with an average deposit size of 13.6 thousand rubles (roughly $500), were insured by the system. Of these accounts, 98 percent were under 100,000 rubles and thus fully insured. Three years later, 934 banks were covered by the program. The share of fully insured depositors exceeded 95 percent.

Subsequent to the introduction of deposit insurance, we generally observe rapid growth in household deposits, much of which was accounted for by term deposits with maturities between half a year and three years. Sberbank's market share declined as did the combined market share of the thirty largest banks, suggesting that deposit insurance contributed to greater competition within the retail banking market (Camara & Montes-Negret, 2006; Chernykh & Cole, 2011).

Russia was struck by a small banking crisis during the spring and summer of 2004 (Degryse et al., 2019). In response, Russia's State Duma swiftly modified the arrangements governing deposit insurance (Tompson, 2004). Household deposits with failed institutions that were outside the deposit insurance system would be temporarily covered for sums of up to 100,000 rubles. In other words, from the middle of July 2004, all household deposits were covered by temporary insurance (Federal Law No. 96-FZ). This emergency coverage was subsequently replaced by that from the general deposit insurance program for those banks that were admitted. Banks not admitted to the general program lost the right to attract new household deposits and renew existing deposit contracts, thus leading to a progressive deterioration in their household deposit base.

Whereas 2004 ushered in a fundamental change in the protection of household deposits at private, domestic banks, the deposit insurance regime at foreign as well as state-owned banks remained fundamentally unaltered. Although an explicit guarantee on retail deposits at state-owned banks (Civil Code art. 840.1) was removed (Federal Law No. 182-FZ) and state-owned banks were required to enter the newly created deposit insurance scheme, their implicit guarantees and support continued much like before. State-owned banks continued to enjoy privileged access to state funds, *de facto* exemptions from some regulatory norms and, on occasion, financial support from the state (Tompson, 2004). This support was reflected in the relatively low rates they paid to depositors. Foreign banks have consistently been perceived as being backed by the deep pockets of their (typically Western) mother organizations. De Graeve & Karas (2014), in fact, show that during bank runs Russian depositors have treated state and foreign-owned banks as equally safe.

In early 2004, there were nearly 1200 registered private domestic banks in Russia, over 900 of which would soon be admitted into the deposit insurance program. The number of state- and foreign-owned institutions – 40 and 37, respectively – was much smaller (Karas & Vernikov, 2016). The state banks were on average larger than the foreign banks and significantly larger than the private banks. In sum, they accounted for 44 percent of the sector's assets and took in 69 percent of all household deposits, most notably at *Sberbank*. *Sberbank*, along with three other state-owned giants (*Vneshtorgbank*, *Gazprombank*, and the Bank of Moscow), were the largest four Russian banks in the mid 2000s. Foreign banks' share of all assets and household deposits in early 2004 amounted to 7 and 2 percent, respectively. The corresponding figures for the private domestic banks were 49 and 29 percent.

In much of the period covered by our analysis, the Russian economy was recovering from the extended trauma of transitioning from communism. After declining consistently throughout the 1990s, GDP grew each year by at least 5% between 1999 and 2008. Bank lending expanded dramatically during this period, particularly during the middle of the first decade of the new century. For each of three successive years between 2005 and 2007, for example, bank credit to households increased by over 50 percent. Capitalization did not keep pace. Between the third quarter of 2004 and the first quarter of 2008, average capital-to-asset ratios at private, foreign, and state banks declined from 29, 26, and 20 percent to 19, 20, and 14 percent, respectively.

In parallel with the expanding economy, the quality of banking sector regulation was widely recognized as improving. In 2008, the International Monetary Fund (2010) concluded that even though it found the rate of credit expansion concerning and believed there were still important regulatory measures to implement (e.g., tightening loan-loss provisioning requirements and expanding the Central Bank's capacity to intervene in weakening banks earlier), the "overall system of supervision is of high quality, well resourced, and staff has a high level of professionalism." In 2009, the global financial crisis interrupted Russia's upward trajectory and GDP shrank by eight percent. Russian banks, frozen out of international wholesale markets and suffering from declining asset performance, experienced an extended period of hardship. Many traditional measures of bank risk took a significant turn for the worse.

4. Data and Methodology

To explore the connection between deposit insurance and bank risk, we use quarterly bank balance sheets and income statements purchased from Interfax (`www.interfax.ru`) and Mobile (`www.mobile.ru`), two private financial information agencies. Karas & Schoors (2005, 2010) describe these datasets and confirm their compatibility; some indicators appear exclusively in one, some exclusively in the other. The resulting panel spans 1999q2-2010q1, and because of bank foundings, mergers, and failures, is unbalanced. When one bank acquires another, the former gets a new identifier in our panel and is treated as a new entity.

An additional dataset assembled by and described in Karas & Vernikov (2016) documents historical timelines for all banks in Russia, including years for their founding, entrance to the deposit insurance system, loss of license, merger, acquisition, liquidation, *etc.* These records span 1988q1-2016q2. In addition, for 1999q1-2016q2, the dataset provides a time-varying classification of ownership, characterizing a bank in a particular quarter as state-controlled, foreign-controlled, or private-domestic-controlled.[1]

We estimate regressions of the following general form:

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + Controls_{i,t-l} + e_{i,t} \tag{1}$$

$\Delta Y_{i,t+\delta}$ represents the change in a risk measure of bank i between quarters t and $t+\delta$. Two considerations come into play in choosing δ. On the one hand, it will inevitably take time for any change in market disciplining behavior to reveal itself in measures of bank health, generally, and loan performance, specifically. In our sample, the majority of outstanding loans have maturities exceeding one year. In 2010, over 70 percent of loans to households and 40 percent of loans to firms exceeded three years. A sufficiently large δ is thus needed to account for the possibility that loans made under altered incentives might go bad. On the other hand, increasing δ reduces the number of observations available for estimation.

$F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households of bank i at time $t-l$, with l representing the number of quarters preceding the one from which the change in risk taking, ΔY, is measured.

We use four measures of bank risk.[2] The first two capture credit risk. These are the log of loan loss reserves, $\ln LLR$, and the log of non-performing loans, $\ln NPL$. The third risk measure is the bank's probability of failure, $PFail$, estimated from a logit regression of a license loss dummy on a set of balance sheet variables (see Appendix A). Capturing the change in, and not the level of, risk, our dependent variable, $\Delta Y_{i,t+\delta}$, is the difference in a particular measure between quarters t and $t+\delta$: $\Delta \ln LLR$, $\Delta \ln NPL$, and $\Delta PFail$.

Our fourth measure of risk is not based on accounting data. It is a dummy, $Fail$, which takes the value of 1 if the bank loses its license or gets liquidated between periods t and $t+\delta+4$. Risk, here, is assessed over four quarters more than the other measures because failure requires more steps than loans turning sour (e.g., attempts to replenish capital fail, the Bank of Russia reviews whether or not to withdraw a license). This failure dummy, which can be said to represent the most extreme form of risk realization, may of course also reflect factors external to the bank (e.g., political).

Controls vary across specifications. To control for changes in the macroeconomic environment, we include time fixed effects. To control for unobserved, time-invariant bank heterogeneity, we include bank fixed effects. To control for time-varying bank balance sheet structure, we include deposits over assets, loans over assets, and liquid assets over demand liabilities. Enough uncontrolled balance categories remain to avoid mechanical dependencies between the included balance sheet controls.

The coefficient of interest, β, measures the sensitivity of incremental risk taking, ΔY, to the deposit mix, F. In what follows, we present specifications that explore how β varies over time and across groups of banks.

We start by estimating a cross-sectional version of equation 1 in which $t = 2004q4$, $\delta = 21$ and $l = 3$. The change in risk taking, ΔY, is thus measured over our entire post-deposit insurance (DI) sample period $[2004q4, 2010q1]$. The deposit mix, F, is measured on January 1, 2004, concurrent to the launch of DIA's

[1] Specifically, we use records *os50* and *of50* from the dataset described by Karas & Vernikov (2016). We backfill missing 1999 records of *os50* with the first available records from 2000q1.

[2] In section 7 we use another set of four risk measures to test robustness. The results tend to get stronger.

operations and three quarters prior to t.[3] We expect $\beta < 0$. That is, a bank with a higher share of firm deposits in its deposit mix (i.e., a higher F) just prior to the announcement of the deposit insurance program should exhibit less of a post-deposit-insurance increase in risk-taking.

Interpreting a negative β from specification 1 as the direct effect of deposit insurance on bank risk is problematic. A higher F, after all, may be associated with less incremental risk taking for reasons unrelated to deposit insurance. For instance, firms, relative to households, may engage more vigorously in market discipline (Karas et al., 2010). To more cleanly identify the direct effect of deposit insurance, we estimate an alternative specification in which we explicitly focus on how β changes in response to the introduction of deposit insurance:

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^I I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t} \tag{2}$$

As before, $\delta = 21$, but now $t \in \{1999\text{q}2, 2004\text{q}4\}$. With $t = 2004q4$, ΔY is measured over the entire post-DI sample period $[2004q4, 2010q1]$, and F is as before measured on January 1, 2004 (i.e., $l = 3$). With $t = 1999q2$, ΔY is measured over the entire pre-DI sample period $[1999q2, 2004q3]$, while F is measured on April 1, 1999 (i.e., $l = 0$). By necessity, $l = 0$ here because April 1, 1999 marks the beginning of our sample period. The deposit insurance dummy, I_t, switches from 0 to 1 in 2004q4. β measures the sensitivity of risk taking, ΔY, to F before deposit insurance. The coefficient of interest, β^I, captures how much this sensitivity changes after household deposits become insured in 2004q4.

We expect F to determine how strongly the introduction of deposit insurance affects market discipline and, hence, incremental risk taking. That is, we expect $\beta^I < 0$. To clarify further why, define β_F and β_H as measures of market discipline exercised by firms and households, respectively. Specifically, say β_F (β_H) is the sensitivity of firm (household) deposit growth to bank capitalization. Total market discipline experienced by a bank would thus be a weighted average of the two: $\beta_F F + \beta_H(1 - F)$, or after rearranging, $\beta_H + (\beta_F - \beta_H)F$. As shown by Karas et al. (2013), the differential $\beta_F - \beta_H$ rises after the introduction of deposit insurance, because it reduces households' incentives to monitor their banks. It follows that the effect of deposit insurance on *bank-level* market discipline, and, ultimately, incremental risk taking, depends on the deposit mix F. Lower F results in less market discipline, and, therefore, more risk taking – i.e., $\beta^I < 0$.

So far, we have limited t to a maximum of two values. To address the concern that our results are specific to $t \in \{1999q2, 2004q4\}$, we expand the set of values t can assume and re-estimate equation 2. Specifically, we set t to take the first six values in the pre-DI period and, symmetrically, the first six values in the post-DI period: $t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. In addition, we set $\delta = 16$, thus assuring that the interval $[t, t + \delta]$ over which we measure incremental risk taking in the pre-DI period ends before the introduction of deposit insurance. Specifically, with $t = 2000q3$, the interval ends right before the introduction of deposit insurance in the fourth quarter of 2004: $[t, t + 16] = [2000q3, 2004q3]$. In these specifications, we set $l = 0$ and thus measure F in quarter t.

Table 1 reports summary statistics, starting with our four risk measures. The average 16-quarter increase in loan loss reserves and non-performing loans amounts to, respectively, about 122% and 89%, but the standard deviations are relatively large. Some banks, that is, exhibit high increases in the level of risk, reflecting, in part, the sample's retention of banks up to, and including, the quarter of their failure. The change in the one-period ahead predicted probability of failure, has an average of 0%, and a more moderate standard deviation. The actual probability of failure over the full 21 quarters is left skewed and, on average, 13%.

With respect to the time varying independent variables, the liquidity measure averages 0.8, and the loans to assets and deposits to assets ratios average 0.49 and 0.51, respectively. The minimum for the deposits to assets ratio, 0.1, reflects a decision to exclude observations with lower values. To be able to exercise effective market discipline, after all, depositors must control a non-trivial share of the bank's funding.

[3] As noted above, the legislation creating DIA was signed only a week before January 1, resolving over ten years of uncertainty as to the Agency's creation.

Our independent variable of interest, the deposit mix F, has a mean of 69%, indicating that the average Russian bank sources more than two-thirds of its deposits from firms, and the remaining part from households. As suggested by the minimum and maximum values, some banks, at least for a time, draw wholly from either one or the other.

5. Deposit insurance, moral hazard and bank risk in private domestic banks

Table 2 presents the results from estimating equation 1 for four risk measures, with and without balance sheet controls, with $t = 2004q4$, $\delta = 21$ and $l = 3$. From this cross-section of banks in the post-DI period, we observe $\beta < 0$ in all eight regressions and is statistically significant in seven of them. That is, banks with more household deposits in their deposit mix (i.e., a lower F) before the announcement of deposit insurance experience a greater increase in risk after the introduction of deposit insurance. The last two rows give a sense of magnitudes: they report the average predicted value of the dependent variable when F is fixed at its average of 0.69 or at $0.45 = 0.69 - 0.24$, where 0.24 is the standard deviation of F (see Table 1). For example, from columns 1-2 we see that the lower F is associated with a bigger post-DI increase in loan loss reserves by $11\% = (1.89 - 1.78)100\%$ and a bigger increase in non-performing loans by $14\% = (2.01 - 1.87)100\%$. Though in line with our hypothesis, these results should not be interpreted as evidence of causation. They may result from systematic differences, unrelated to deposit insurance, across banks with different levels of F.

Table 3 presents the results from estimating equation 2 with $t \in \{1999q2, 2004q4\}$. Here, we go beyond the cross-sectional analysis of banks in the post-DI period to assess the relationship between F and measures of bank risk both prior to and after the introduction of deposit insurance. In the first row, we report our estimates of β, the sensitivity of risk taking ΔY to F before deposit insurance. In the second row, we report our coefficient of interest, β^I, which captures changes in said sensitivity in the aftermath of deposit insurance's introduction in 2004q4. Columns 1-4 present our baseline specifications for the four risk measures, columns 5-8 add bank fixed effects, and columns 9-12 add balance sheet controls.

We observe $\beta^I < 0$ in all 12 specifications, and is significantly so in 9 out of the 12. These results are in line with our hypothesis that the sensitivity of bank risk to the deposit mix changes once deposit insurance is introduced. After deposit insurance, that is, a higher F leads to less of an increase in measures of risk. We attribute this outcome to the moral hazard effect of insured household deposits.

The last four rows give a sense of magnitudes. The last two report the average predicted value of the dependent variable when I is fixed at 1 while F is fixed at 0.69 or at 0.45. For example, from columns 9-10 we see that the lower F is associated with a bigger post-DI increase in loan loss reserves by $25\% = (1.14 - 0.89)100\%$ and a bigger increase in non-performing loans by $13\% = (0.84 - 0.71)100\%$. In contrast, the two rows above show average predictions when I is fixed at zero. Here we see that the lower F is associated with a smaller pre-DI increase in loan loss reserves (by 17%) and in non-performing loans (by 16%).

Table 4 presents the results from estimating equation 2 with $t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$, $\delta = 16$ and $l = 0$. That is, it builds on Table 3 by making fuller use of the time variation in the data. The evidence connecting the deposit mix to the hypothesized post-DI change in risk continues to be strong. Across 11 of 12 specifications β^I is negative and in 8 it is statistically significant.

The consistency of our main finding across specifications is precisely what we would expect if deposit insurance both (1) reduces household-imposed market discipline, and (2) relaxes a constraint on a bank's risk-taking in direct proportion to its relative reliance on the deposits of insured households.

6. A Difference-in-differences approach

Our discussion to this point has implied that the dummy I captures the effect of the introduction of deposit insurance. There may, however, be other time-varying factors, correlated with I, whose impact on banks varies with the deposit mix, F. To address this concern, we expand our analysis by comparing two groups of banks in a quasi-experiment. The private domestic banks covered by the deposit insurance program — *i.e.*, the banks analyzed in section 5 — are our treatment group. The control group includes the state- and foreign-owned banks. These banks were largely unaffected by the introduction of deposit insurance, because they were already covered by other explicit government guarantees (state banks) or by either implicit guarantees from the foreign mother bank and/or explicit foreign deposit guarantee systems (foreign banks). In Table 5 we show the summary statistics of the control group. The means are broadly comparable to those of the treatment group's in Table 1, with the notable exception of the actual probability of failure over the full 21 quarters, which at 4% is, not surprisingly, a lot lower for state-owned and foreign banks than for private domestic banks.

Demonstrating that the sensitivity of bank risk to the deposit mix F is affected more by the introduction of deposit insurance for private domestic banks than for government- and foreign-owned banks would mitigate concerns that an unobserved time-varying factor drives the results in section 5. To that end, we estimate the following difference-in-differences extension of equation 2:

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t} \tag{3}$$

The treatment dummy, T_{it}, equals 1 for all banks in the treatment group and 0 for all those in the control group. The deposit insurance dummy, I_t, equals 1 for all observations from 2004q4 onward. The main coefficient of interest, β^{TI}, measures whether the post-deposit-insurance change in the sensitivity of risk-taking, ΔY, to the deposit mix, F, of the treatment group differs from that of the control group.

Table 6 presents the results from estimating equation 3 with $t \in \{1999q2, 2004q4\}$.[4] Table 7 presents the results from estimating equation 3 with $t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. Across the 18 specifications in the two tables, β^{TI} is negative and statistically significant in 11 of them. At private domestic banks, that is, the relationship between the deposit mix and incremental risk intensifies relative to both the control group and the pre-deposit insurance period. Private domestic banks reliant on household deposits displayed increasing measures of risk in the manner hypothesized after 2004q4. For the control group of state and foreign banks, however, the generally insignificant results on β^I suggest that the relationship between the deposit mix, F, and risk did not change after the introduction of deposit insurance.

The consistency of this finding on β^{TI} is what we would expect if the introduction of deposit insurance at private domestic banks reduces the household-imposed market discipline they experience, thereby relaxing a constraint on risk-taking in direct proportion to their reliance on households for deposits. These results, thus, strongly support the presence of a causal chain that passes from deposit insurance to increased bank risk by way of reduced depositor discipline.

We also estimate a time varying version of equation 3 for the 12-period sample:

$$\Delta Y_{i,t+\delta} = intercept + \beta_t^C C_{it} \lambda_t F_{i,t} + \beta_t^T T_{it} \lambda_t F_{i,t} + Controls_{i,t} + e_{i,t} \tag{4}$$

This allows us to plot the difference across quarters of the estimated β_t^T's and β_t^C's (*i.e.*, $\widehat{\beta_t^T} - \widehat{\beta_t^C}$) for the treatment ($T$) and control ($C$) groups, respectively.

We present the estimates from equation 4 in Figure 1. Two important observations emerge from this dynamic perspective. First, the parallel trends assumption holds. That is, $\widehat{\beta_t^T} - \widehat{\beta_t^C}$ is effectively flat for all three risk measures before the introduction of deposit insurance (i.e., before $t = 2000q3$, with the interval over which the change in risk is measured being $[t, t+16] = [2000q3, 2004q3]$). Second, $\widehat{\beta_t^T} - \widehat{\beta_t^C}$, particularly for non-performing loans and loan loss reserves, exhibits a downward secular trend after deposit insurance is introduced, a pattern consistent with the progressive, as opposed to the immediate, build-up of risk at low-F private domestic banks.

[4] We cannot run these regressions for $Fail$ because no banks in the control group fail prior to deposit insurance's introduction.

7. Robustness Checks

7.1. Alternative risk measures

We repeat our analysis for an alternative set of risk measures: loan loss reserves over total assets, $\frac{LLR}{TA}$, non-performing loans over total assets, $\frac{NPL}{TA}$, log of loan loss reserves over capital, $\ln(1+\frac{LLR}{Cap})$, and log of non-performing loans over capital, $\ln(1+\frac{NPL}{Cap})$. We take the log transformation in the case of the latter two measures in order to reduce the effect of extreme values produced by dividing through by capital. As before, our dependent variable is a difference in a particular measure between periods t and $t+\delta$: $\Delta\frac{LLR}{TA}$, $\Delta\frac{NPL}{TA}$, $\Delta\ln(1+\frac{LLR}{Cap})$, and $\Delta\ln(1+\frac{NPL}{Cap})$.

Tables 8 and 9 present the results of estimating equation 2 with two sets of time periods: $t \in \{1999q2, 2004q4\}$ and $t \in \{1999q2 \dots 2000q3, 2004q4 \dots 2006q1\}$. Tables 10 and 11 present the results of estimating equation 3 with $t \in \{1999q2, 2004q4\}$ and $t \in \{1999q2 \dots 2000q3, 2004q4 \dots 2006q1\}$, respectively. We observe in Tables 8 and 9 that β^I is significantly negative across all specifications, both for the 2-period and the 12-period specifications. Moreover, the difference-in-difference results are reasonably robust to employing alternative risk measures. In Tables 10 and 11, we see that β^{TI} is consistently negative and statistically significant in 14 of the 24 specifications, comparable to the results in Tables 6 and 7. In sum, our baseline and difference-in-difference results are robust to these alternative measures of incremental risk taking.

7.2. Dropping the Largest State-owned Banks

We next check that our difference-in-difference results survive the exclusion of the largest, most dominant state banks. To that end, we rank all banks by assets in 2004q3 and in 2008q1 and observe that the four biggest state-owned banks remain the same: *Sberbank*, *Vneshtorgbank*, *Gazprombank*, and Bank of Moscow.[5]

Table 12 reports the results from estimating equation 3 for $t \in \{1999q2, 2004q4\}$ with a control group that omits these four banks. The results look similar to those in Table 6. Across all nine specifications, β^{TI} remains negative, while being statistically significant in 5 of the 9. In other words, our earlier findings were not driven by depositor behavior at a few state-owned behemoths.

7.3. Mahalanobis Matching

Finally, we carry out a matching exercise to confirm that our difference-in-difference results were not an artefact of systematic differences in observable characteristics between the treatment and control groups prior to the introduction of deposit insurance. Having already dropped the largest four state-owned banks, we match the remaining banks in the control group with those in the treated group. Specifically, we perform Mahalanobis-metric matching with replacement (Leuven & Sianesi, 2018) on the 1^{st} of July 2004 values of $PFail$, F and three balance sheet controls: deposits over assets, loans over assets, and liquid assets over demand liabilities.

This procedure preserves only those private domestic banks in the sample that are similar to ones in the control group, thereby mitigating concerns that our difference-in-difference results are driven by observable differences between the treatment group and the control group. Table 13 reports the means and standard deviations of the matching variables for the control and the matched treatment sample. The means of all variables are very similar across groups; none of the small differences are statistically significant.

Table 14 reports the results from estimating equation 3 on the matched sample for $t \in \{1999q2, 2004q4\}$. Though Mahalanobis-metric matching dramatically reduces the number of observations, the results look quite similar to those in Table 6. For six of the nine specifications, not only does β^{TI} remain negative and statistically significant, it actually is greater in absolute value terms.

We also estimated equation 4 for our matched sample. The resulting figure that plots $\widehat{\beta_t^T} - \widehat{\beta_t^C}$ over the 12 time periods for the matched sample is available on request. Results are strongly robust.

[5]For comparison, in 2004q3 the fifth biggest state bank (Khanty-Mansiysk bank) is almost five times smaller than the fourth biggest state bank (Bank of Moscow).

8. Conclusion

Using evidence from Russia, we explore the effect of the introduction of household deposit insurance on bank risk. We introduce the deposit mix – *i.e.*, the ratio of firm deposits to the sum of firm and household deposits – as a proxy for the magnitude of the insurance-induced decline in market discipline. Drawing on variation in this deposit mix before the announcement of deposit insurance, so as to capture the magnitude of the decrease in market discipline after the introduction of deposit insurance, we demonstrate that larger declines in market discipline generate larger increases in traditional measures of risk. Using data from what amounts to a quasi-experiment, we show that these results hold in a difference-in-difference setting in which private domestic banks serve as the treatment group and state and foreign-owned banks serve as the control. Our evidence confirms the presence of a causal chain from deposit insurance to greater risk by way of increased moral hazard and decreased market discipline. The greater a bank's dependence on the deposits of households, the more policies to expand the insurance of their deposits will undermine their willingness to limit bank risk. Banks, in turn, alter their behavior, assuming more risk, as this market disciplining constraint weakens. These results confirm what regulators hopefully already understand – that they should exercise particular vigilance over banks that have come to rely excessively on the savings of insured depositors.

So described, our article amounts to a revisiting of an old question in a new empirical setting. This new setting allows us to do more, however, than simply confirm deposit insurance's effect on bank risk. It allows us to test for that effect in a fundamentally different market setting. That is, in a macro-institutional sense, Russia in the first decade of the twenty-first century was not obviously similar to the more mature market environments in which the relationship between deposit insurance and bank risk has traditionally been investigated. Russian depositors had had only a decade of experience monitoring market-oriented financial institutions. Similarly, the informational and regulatory infrastructures that had been developed to guide depositors and oversee banks, were relatively young and untested. It was by no means obvious that in this nascent institutional setting, we would confirm the existence of a causal chain from the introduction of deposit insurance to a reduction in market discipline to an increase in bank risk.

References

References

Anginer, D., Demirguc-Kunt, A., & Zhu, M. (2014). How does deposit insurance affect bank risk? Evidence from the recent crisis. *Journal of Banking & Finance*, 48, 312–321.

Calomiris, C. W. (1999). Building an incentive-compatible safety net. *Journal of Banking & Finance*, 23(10), 1499–1519.

Camara, M. K. & Montes-Negret, F. (2006). *Deposit Insurance And Banking Reform In Russia*. Policy Research Working Papers. The World Bank.

Chernykh, L. & Cole, R. A. (2011). Does deposit insurance improve financial intermediation? Evidence from the Russian experiment. *Journal of Banking & Finance*, 35(2), 388–402.

De Graeve, F. & Karas, A. (2014). Evaluating theories of bank runs with heterogeneity restrictions. *Journal of the European Economic Association*, 12(4), 969–996.

Degryse, H., Karas, A., & Schoors, K. (2019). Relationship lending during a trust crisis on the interbank market: A friend in need is a friend indeed. *Economics Letters*, 182, 1–4.

Demirgüç, A. & Kane, E. J. (2002). Deposit Insurance Around the Globe: Where Does It Work? *Journal of Economic Perspectives*, 16(2), 175–195.

Demirgüç-Kunt, A. & Detragiache, E. (2002). Does deposit insurance increase banking system stability? An empirical investigation. *Journal of Monetary Economics*, 49(7), 1373–1406.

Demirgüç-Kunt, A. & Huizinga, H. (2004). Market discipline and deposit insurance. *Journal of Monetary Economics*, 51(2), 375–399.

Diamond, D. W. & Dybvig, P. H. (1983). Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy*, 91(3), 401–419.

Gropp, R. & Vesala, J. (2004). Deposit Insurance, Moral Hazard and Market Monitoring. *Review of Finance*, 8(4), 571–602.

Hosmer, D. W. & Lemeshow, S. (2000). *Applied logistic regression*. Wiley.

International Monetary Fund (2010). Russian Federation: Financial Sector Stability Assessment Update. *IMF Country Report*, 10(96).

Ioannidou, V. P. & Penas, M. F. (2010). Deposit insurance and bank risk-taking: Evidence from internal loan ratings. *Journal of Financial Intermediation*, 19(1), 95–115.

Karas, A., Pyle, W., & Schoors, K. (2010). How do Russian depositors discipline their banks? Evidence of a backward bending deposit supply function. *Oxford Economic Papers*, 62(1), 36–61.

Karas, A., Pyle, W., & Schoors, K. (2013). Deposit Insurance, Banking Crises, and Market Discipline: Evidence from a Natural Experiment on Deposit Flows and Rates. *Journal of Money, Credit and Banking*, 45(1), 179–200.

Karas, A. & Schoors, K. (2005). Heracles or Sisyphus? Finding, cleaning and reconstructing a database of Russian banks. *Ghent University Working Paper Series*, 327.

Karas, A. & Schoors, K. J. L. (2010). A Guide to Russian Banks Data. *SSRN Electronic Journal*.

Karas, A. & Vernikov, A. (2016). Russian Bank Database: Birth and Death, Location, Mergers, Deposit Insurance Participation, State and Foreign Ownership. *Utrecht School of Economics Working Paper Series*, 16(04).

Lambert, C., Noth, F., & Schüwer, U. (2017). How do insured deposits affect bank risk? Evidence from the 2008 Emergency Economic Stabilization Act. *Journal of Financial Intermediation*, 29, 81–102.

Leuven, E. & Sianesi, B. (2018). PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing. *Statistical Software Components*.

Martinez Peria, M. S. & Schmukler, S. L. (2001). Do Depositors Punish Banks for Bad Behavior? Market Discipline, Deposit Insurance, and Banking Crises. *The Journal of Finance*, 56(3), 1029–1051.

Nier, E. & Baumann, U. (2006). Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation*, 15(3), 332–361.

Park, S. & Peristiani, S. (1998). Market Discipline by Thrift Depositors. *Journal of Money, Credit and Banking*, 30(3), 347.

Perotti, E. (2002). Lessons from the Russian Meltdown: The Economics of Soft Legal Constraints. *International Finance*, 5(3), 359–399.

Radaev, V. (2000). RETURN OF THE CROWDS AND RATIONALITY OF ACTION: A history of Russian 'financial bubbles' in the mid-1990s. *European Societies*, 2(3), 271–294.

Schoors, K. (2001). The credit squeeze during Russia's early transition: A bank-based view. *The Economics of Transition*, 9(1), 205–228.

Spicer, A. & Pyle, W. (2000). Institutions and the vicious circle of distrust in the Russian household deposit market, 1992-1999. In *The New Institutionalism in Strategic Management*, volume 19 of *Advances in Strategic Management* (pp. 373–398). Emerald Group Publishing Limited.

Tompson, W. (2004). Banking Reform in Russia: Problems and Prospects. *OECD Economics Department Working Papers*.

Tables and Figures

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
$\Delta \ln LLR$	9311	1.22	1.22	-3.92	7.01
$\Delta \ln NPL$	9311	.89	1.52	-3.89	7.04
$\Delta PFail$	9279	0	.03	-.58	.87
$Fail$	10906	.13	.33	0	1
F	10906	.69	.24	.01	1
LiqA/DL	10860	.8	.59	0	9.04
Lns/TA	10906	.49	.21	0	1
Dep/TA	10904	.51	.2	.1	.99

Table 2. Baseline cross-sectional results

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t = 2004q4$. $\delta = 21$. $l = 3$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[2004q4, 2010q1]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households on Jan 1, 2004. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$
F	-0.44**	-0.59**	-0.0084***	-0.12**	-0.47**	-0.50	-0.0090***	-0.11*
	(0.22)	(0.28)	(0.0019)	(0.058)	(0.24)	(0.32)	(0.0021)	(0.064)
LiqA/DL					0.034	-0.21	-0.00018	0.0046
					(0.13)	(0.19)	(0.00075)	(0.033)
Lns/TA					-0.063	0.055	-0.0031*	-0.032
					(0.31)	(0.44)	(0.0018)	(0.081)
Dep/TA					0.018	-0.22	0.0062***	0.0051
					(0.26)	(0.37)	(0.0020)	(0.071)
Observations	713	713	711	875	712	712	710	872
R^2	0.006	0.006	0.043	0.005	0.006	0.010	0.069	0.004
Bank FE	No	No	No	No	No	No	No	No
Banks	713	713	711	875	712	712	710	872
$\widehat{\Delta Y}(F = 0.69)$	1.78	1.87	-0.0014	0.16	1.78	1.87	-0.0015	0.16
$\widehat{\Delta Y}(F = 0.45)$	1.89	2.01	0.00059	0.19	1.90	1.99	0.00070	0.19

Table 3. Baseline 2-period results

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^I I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$
F	0.97***	0.73***	0.00083	-0.034	1.00***	0.72*	-0.0034	-0.053	0.71*	0.65	-0.0054	-0.059
	(0.22)	(0.22)	(0.0039)	(0.052)	(0.38)	(0.43)	(0.0051)	(0.057)	(0.39)	(0.45)	(0.0049)	(0.059)
1.I#c.F	-1.41***	-1.32***	-0.0092**	-0.081	-1.77***	-1.23**	-0.020***	-0.050	-1.76***	-1.18**	-0.021***	-0.017
	(0.31)	(0.37)	(0.0043)	(0.078)	(0.41)	(0.48)	(0.0064)	(0.073)	(0.41)	(0.49)	(0.0063)	(0.072)
LiqA/DL									0.089	0.080	0.0045**	-0.0040
									(0.12)	(0.14)	(0.0019)	(0.020)
Lns/TA									-1.29***	-0.15	-0.017***	0.036
									(0.38)	(0.41)	(0.0039)	(0.061)
Dep/TA									1.40***	0.83*	0.0088**	-0.027
									(0.40)	(0.46)	(0.0039)	(0.069)
Observations	1,501	1,501	1,493	1,855	1,501	1,501	1,493	1,855	1,494	1,494	1,492	1,843
R^2	0.044	0.172	0.043	0.003	0.086	0.292	0.117	0.156	0.139	0.297	0.200	0.156
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	864	864	865	1086	864	864	865	1086	864	864	865	1083
$\widehat{\Delta Y}(I=0, F=0.69)$	1.98	1.56	-0.0010	0.19	2.09	1.53	0.0024	0.18	2.11	1.53	0.0029	0.17
$\widehat{\Delta Y}(I=0, F=0.45)$	1.75	1.39	-0.0012	0.20	1.85	1.36	0.0032	0.19	1.94	1.37	0.0042	0.18
$\widehat{\Delta Y}(I=1, F=0.69)$	1.01	0.65	-0.0074	0.13	0.87	0.68	-0.011	0.14	0.89	0.71	-0.012	0.16
$\widehat{\Delta Y}(I=1, F=0.45)$	1.11	0.79	-0.0054	0.16	1.06	0.81	-0.0056	0.17	1.14	0.84	-0.0053	0.17

Table 4. Baseline 12-period results

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^I I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. $\delta = 16$. $l = 0$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$Fail$
F	0.8***	0.6***	0.002	-0.05	0.7***	0.4	0.001	0.03	0.4*	0.3	-0.001	0.03
	(0.2)	(0.2)	(0.003)	(0.05)	(0.2)	(0.3)	(0.004)	(0.04)	(0.2)	(0.3)	(0.004)	(0.04)
1.I#c.F	-1.1***	-1.0***	-0.005*	0.008	-1.4***	-1.1***	-0.006*	-0.05	-1.2***	-0.8**	-0.002	-0.07
	(0.2)	(0.3)	(0.003)	(0.06)	(0.3)	(0.3)	(0.003)	(0.06)	(0.3)	(0.3)	(0.003)	(0.06)
LiqA/DL									0.07	0.03	0.004***	-0.01
									(0.05)	(0.05)	(0.0010)	(0.008)
Lns/TA									-0.4**	0.4*	-0.004	-0.04
									(0.2)	(0.2)	(0.003)	(0.03)
Dep/TA									1.2***	1.1***	0.010***	-0.06*
									(0.2)	(0.2)	(0.003)	(0.04)
Observations	9,311	9,311	9,279	10,906	9,311	9,311	9,279	10,906	9,272	9,272	9,266	10,858
R^2	0.031	0.120	0.049	0.004	0.054	0.179	0.087	0.112	0.085	0.189	0.099	0.115
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	932	932	931	1124	932	932	931	1124	930	930	930	1121

Table 5. Summary Statistics for the Control Group

Variable	Obs	Mean	Std. Dev.	Min	Max
$\Delta \ln LLR$	665	1.51	1.86	-4.38	8.39
$\Delta \ln NPL$	665	1.25	2.33	-6.57	8.35
$\Delta PFail$	650	0	.03	-.19	.52
$Fail$	665	.04	.2	0	1
F	665	.73	.23	.07	1
LiqA/DL	663	.76	.65	0	7.55
Lns/TA	665	.44	.22	0	.9
Dep/TA	665	.48	.22	.1	.94

Table 6. Deposit insurance and bank risk: A difference in differences approach

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$
F	0.6	-0.3	-0.006	0.04	-3.0	-0.01	0.1	-3.0	-0.008
	(0.7)	(0.9)	(0.010)	(1.9)	(2.4)	(0.02)	(1.9)	(2.3)	(0.02)
1.T#c.F	0.4	1.1	0.007	0.9	3.7	0.007	0.5	3.6	0.002
	(0.8)	(0.9)	(0.01)	(2.0)	(2.4)	(0.02)	(2.0)	(2.3)	(0.02)
1.I#c.F	0.6	3.4**	0.02	0.2	4.1*	0.04	-0.07	4.0*	0.04
	(1.4)	(1.5)	(0.02)	(1.8)	(2.1)	(0.03)	(1.8)	(2.1)	(0.03)
1.T#1.I#c.F	-2.1	-4.8***	-0.02	-2.0	-5.3**	-0.06**	-1.7	-5.2**	-0.06**
	(1.4)	(1.5)	(0.02)	(1.8)	(2.2)	(0.03)	(1.9)	(2.1)	(0.03)
LiqA/DL							0.06	0.02	0.004***
							(0.1)	(0.1)	(0.002)
Lns/TA							-1.6***	-0.6	-0.02***
							(0.4)	(0.4)	(0.004)
Dep/TA							1.0**	0.3	0.007
							(0.4)	(0.5)	(0.005)
Observations	1,632	1,632	1,622	1,632	1,632	1,622	1,625	1,625	1,621
R^2	0.061	0.188	0.029	0.097	0.303	0.125	0.141	0.306	0.190
Bank FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	931	931	931	931	931	931	931	931	931

Table 7. Deposit insurance and bank risk: A difference in differences approach (12-period results)

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. $\delta = 16$. $l = 0$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) $\Delta \ln LLR$	(2) $\Delta \ln NPL$	(3) $\Delta PFail$	(4) $\Delta \ln LLR$	(5) $\Delta \ln NPL$	(6) $\Delta PFail$	(7) $\Delta \ln LLR$	(8) $\Delta \ln NPL$	(9) $\Delta PFail$
F	0.4	-0.3	0.002	1.4	0.6	-0.0008	1.2	0.6	-0.001
	(0.7)	(0.8)	(0.010)	(1.4)	(1.5)	(0.01)	(1.4)	(1.5)	(0.01)
1.T#c.F	0.4	0.9	0.0009	-0.7	-0.2	0.002	-0.8	-0.3	-0.0004
	(0.7)	(0.8)	(0.010)	(1.4)	(1.5)	(0.01)	(1.4)	(1.5)	(0.02)
1.I#c.F	0.8	2.3**	0.01	0.5	1.8	0.03**	0.7	1.9	0.03**
	(1.1)	(1.1)	(0.01)	(1.4)	(1.4)	(0.01)	(1.4)	(1.4)	(0.02)
1.T#1.I#c.F	-2.0*	-3.2***	-0.02	-2.0	-2.9**	-0.04**	-2.1	-2.8*	-0.04**
	(1.1)	(1.2)	(0.01)	(1.4)	(1.4)	(0.01)	(1.4)	(1.5)	(0.02)
LiqA/DL							0.04	0.02	0.004***
							(0.05)	(0.05)	(0.0009)
Lns/TA							-0.6***	0.2	-0.004
							(0.2)	(0.2)	(0.003)
Dep/TA							0.9***	0.8***	0.010***
							(0.2)	(0.2)	(0.003)
Observations	10,148	10,148	10,102	10,148	10,148	10,102	10,107	10,107	10,087
R^2	0.048	0.134	0.053	0.069	0.187	0.089	0.092	0.193	0.101
Bank FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	1008	1008	1007	1008	1008	1007	1005	1005	1005

Table 8. Baseline 2-period results for alternative risk measures

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^I I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) $\Delta\ln(\frac{LLR}{Cap})$	(2) $\Delta\frac{LLR}{TA}$	(3) $\Delta\ln(\frac{NPL}{Cap})$	(4) $\Delta\frac{NPL}{TA}$	(5) $\Delta\ln(\frac{LLR}{Cap})$	(6) $\Delta\frac{LLR}{TA}$	(7) $\Delta\ln(\frac{NPL}{Cap})$	(8) $\Delta\frac{NPL}{TA}$	(9) $\Delta\ln(\frac{LLR}{Cap})$	(10) $\Delta\frac{LLR}{TA}$	(11) $\Delta\ln(\frac{NPL}{Cap})$	(12) $\Delta\frac{NPL}{TA}$
F	0.1***	0.04***	0.1**	0.04**	0.1	0.03	0.1	0.03	0.1	0.02	0.1*	0.03
	(0.04)	(0.01)	(0.05)	(0.02)	(0.08)	(0.02)	(0.07)	(0.02)	(0.08)	(0.02)	(0.07)	(0.02)
1.I#c.F	-0.2***	-0.04***	-0.2***	-0.04***	-0.2**	-0.07***	-0.2***	-0.06**	-0.2**	-0.07***	-0.2***	-0.06***
	(0.06)	(0.01)	(0.06)	(0.02)	(0.08)	(0.02)	(0.07)	(0.02)	(0.08)	(0.02)	(0.08)	(0.02)
LiqA/DL									0.04	0.00006	0.04**	0.005
									(0.02)	(0.007)	(0.02)	(0.005)
Lns/TA									-0.1	-0.06***	-0.04	-0.04**
									(0.07)	(0.02)	(0.05)	(0.02)
Dep/TA									-0.09	0.05***	-0.05	0.03*
									(0.08)	(0.02)	(0.07)	(0.01)
Observations	1,491	1,501	1,491	1,501	1,491	1,501	1,491	1,501	1,484	1,494	1,484	1,494
R^2	0.099	0.091	0.145	0.137	0.161	0.153	0.242	0.234	0.171	0.191	0.251	0.253
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	864	864	864	864	864	864	864	864	864	864	864	864

Table 9. Baseline 12-period results for alternative risk measures

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^I I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. $\delta = 16$. $l = 0$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) $\Delta\ln(\frac{LLR}{Cap})$	(2) $\Delta\frac{LLR}{TA}$	(3) $\Delta\ln(\frac{NPL}{Cap})$	(4) $\Delta\frac{NPL}{TA}$	(5) $\Delta\ln(\frac{LLR}{Cap})$	(6) $\Delta\frac{LLR}{TA}$	(7) $\Delta\ln(\frac{NPL}{Cap})$	(8) $\Delta\frac{NPL}{TA}$	(9) $\Delta\ln(\frac{LLR}{Cap})$	(10) $\Delta\frac{LLR}{TA}$	(11) $\Delta\ln(\frac{NPL}{Cap})$	(12) $\Delta\frac{NPL}{TA}$
F	0.09***	0.03***	0.08**	0.03***	0.04	0.02*	0.05	0.02*	0.04	0.010	0.05	0.02
	(0.03)	(0.009)	(0.03)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)
1.I#c.F	-0.1***	-0.03***	-0.1***	-0.03***	-0.1***	-0.04***	-0.1***	-0.04***	-0.1**	-0.03***	-0.1***	-0.03**
	(0.04)	(0.01)	(0.04)	(0.01)	(0.05)	(0.01)	(0.04)	(0.01)	(0.05)	(0.01)	(0.04)	(0.01)
LiqA/DL									0.02**	0.0005	0.02***	0.003*
									(0.008)	(0.002)	(0.007)	(0.002)
Lns/TA									0.02	-0.02**	0.05**	-0.006
									(0.03)	(0.009)	(0.02)	(0.008)
Dep/TA									0.04	0.04***	0.05	0.03***
									(0.04)	(0.009)	(0.03)	(0.008)
Observations	9,219	9,311	9,219	9,311	9,219	9,311	9,219	9,311	9,186	9,272	9,186	9,272
R^2	0.065	0.060	0.094	0.082	0.091	0.096	0.130	0.128	0.093	0.118	0.134	0.139
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	928	932	928	932	928	932	928	932	926	930	926	930

Table 10. Difference in differences 2-period results for alternative risk measures

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) $\Delta\ln(\frac{LLR}{Cap})$	(2) $\Delta\frac{LLR}{TA}$	(3) $\Delta\ln(\frac{NPL}{Cap})$	(4) $\Delta\frac{NPL}{TA}$	(5) $\Delta\ln(\frac{LLR}{Cap})$	(6) $\Delta\frac{LLR}{TA}$	(7) $\Delta\ln(\frac{NPL}{Cap})$	(8) $\Delta\frac{NPL}{TA}$	(9) $\Delta\ln(\frac{LLR}{Cap})$	(10) $\Delta\frac{LLR}{TA}$	(11) $\Delta\ln(\frac{NPL}{Cap})$	(12) $\Delta\frac{NPL}{TA}$
F	-0.3	0.02	-0.3	0.005	-0.5**	-0.02	-0.7**	-0.06	-0.5*	-0.02	-0.7**	-0.05
	(0.2)	(0.02)	(0.2)	(0.02)	(0.2)	(0.03)	(0.4)	(0.04)	(0.3)	(0.05)	(0.3)	(0.04)
1.T#c.F	0.4*	0.02	0.4**	0.03	0.6**	0.05	0.8**	0.09**	0.6**	0.04	0.8**	0.08*
	(0.2)	(0.02)	(0.2)	(0.03)	(0.3)	(0.04)	(0.4)	(0.04)	(0.3)	(0.05)	(0.4)	(0.05)
1.I#c.F	0.2	-0.02	0.3	0.01	0.006	-0.03	0.4	0.02	0.01	-0.04	0.4	0.010
	(0.2)	(0.03)	(0.2)	(0.02)	(0.2)	(0.02)	(0.3)	(0.02)	(0.2)	(0.04)	(0.3)	(0.03)
1.T#1.I#c.F	-0.5**	-0.03	-0.6***	-0.06**	-0.2	-0.04	-0.7**	-0.08***	-0.3	-0.03	-0.7**	-0.08**
	(0.2)	(0.03)	(0.2)	(0.03)	(0.2)	(0.03)	(0.3)	(0.03)	(0.2)	(0.04)	(0.3)	(0.04)
LiqA/DL									0.03*	0.0003	0.04**	0.005
									(0.02)	(0.006)	(0.02)	(0.005)
Lns/TA									-0.1*	-0.05**	-0.1	-0.04**
									(0.08)	(0.02)	(0.08)	(0.02)
Dep/TA									-0.1	0.04**	-0.1*	0.02
									(0.08)	(0.02)	(0.07)	(0.01)
Observations	1,617	1,632	1,617	1,632	1,617	1,632	1,617	1,632	1,610	1,625	1,610	1,625
R^2	0.106	0.097	0.126	0.143	0.172	0.161	0.216	0.245	0.186	0.191	0.230	0.264
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	931	931	931	931	931	931	931	931	931	931	931	931

Table 11. Difference in differences 12-period results for alternative risk measures

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2 \ldots 2000q3, 2004q4 \ldots 2006q1\}$. $\delta = 16$. $l = 0$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) $\Delta\ln(\frac{LLR}{Cap})$	(2) $\Delta\frac{LLR}{TA}$	(3) $\Delta\ln(\frac{NPL}{Cap})$	(4) $\Delta\frac{NPL}{TA}$	(5) $\Delta\ln(\frac{LLR}{Cap})$	(6) $\Delta\frac{LLR}{TA}$	(7) $\Delta\ln(\frac{NPL}{Cap})$	(8) $\Delta\frac{NPL}{TA}$	(9) $\Delta\ln(\frac{LLR}{Cap})$	(10) $\Delta\frac{LLR}{TA}$	(11) $\Delta\ln(\frac{NPL}{Cap})$	(12) $\Delta\frac{NPL}{TA}$
F	-0.1	0.01	-0.2	0.003	-0.1	0.01	-0.1	0.02	-0.1	0.007	-0.1	0.02
	(0.1)	(0.01)	(0.1)	(0.01)	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)
1.T#c.F	0.2**	0.02	0.2**	0.02	0.2	0.007	0.2	0.002	0.2	0.006	0.2	0.002
	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)	(0.1)	(0.02)
1.I#c.F	0.2*	-0.003	0.3**	0.02	0.2	-0.02	0.2	-0.010	0.2	-0.01	0.2	-0.006
	(0.1)	(0.02)	(0.1)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)
1.T#1.I#c.F	-0.3**	-0.03	-0.4***	-0.05**	-0.4**	-0.02	-0.4**	-0.03	-0.4**	-0.02	-0.4**	-0.03
	(0.1)	(0.02)	(0.1)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)	(0.2)	(0.02)
LiqA/DL									0.02**	0.0005	0.02***	0.003*
									(0.007)	(0.002)	(0.006)	(0.002)
Lns/TA									0.004	-0.02**	0.03	-0.006
									(0.03)	(0.008)	(0.03)	(0.008)
Dep/TA									0.02	0.04***	0.03	0.03***
									(0.04)	(0.008)	(0.03)	(0.007)
Observations	10,038	10,148	10,038	10,148	10,038	10,148	10,038	10,148	10,003	10,107	10,003	10,107
R^2	0.072	0.064	0.097	0.088	0.097	0.100	0.130	0.133	0.099	0.119	0.134	0.142
Bank FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	1004	1008	1004	1008	1004	1008	1004	1008	1001	1005	1001	1005

Table 12. Robustness for dropping the four largest state banks

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$
F	0.6	-0.3	-0.006	0.04	-3.0	-0.01	0.1	-3.0	-0.008
	(0.7)	(0.9)	(0.010)	(1.9)	(2.4)	(0.02)	(1.9)	(2.3)	(0.02)
1.T#c.F	0.4	1.1	0.007	0.9	3.7	0.007	0.5	3.6	0.002
	(0.8)	(0.9)	(0.01)	(2.0)	(2.4)	(0.02)	(2.0)	(2.3)	(0.02)
1.I#c.F	0.6	3.4**	0.02	0.2	4.1*	0.04	-0.07	4.0*	0.04
	(1.4)	(1.5)	(0.02)	(1.8)	(2.1)	(0.03)	(1.8)	(2.1)	(0.03)
1.T#1.I#c.F	-2.1	-4.8***	-0.02	-2.0	-5.3**	-0.06**	-1.7	-5.2**	-0.06**
	(1.4)	(1.5)	(0.02)	(1.8)	(2.2)	(0.03)	(1.9)	(2.1)	(0.03)
LiqA/DL							0.06	0.02	0.004***
							(0.1)	(0.1)	(0.002)
Lns/TA							-1.6***	-0.6	-0.02***
							(0.4)	(0.4)	(0.004)
Dep/TA							1.0**	0.3	0.007
							(0.4)	(0.5)	(0.005)
Observations	1,632	1,632	1,622	1,632	1,632	1,622	1,625	1,625	1,621
R^2	0.061	0.188	0.029	0.097	0.303	0.125	0.141	0.306	0.190
Bank FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	931	931	931	931	931	931	931	931	931

Table 13. Means and Standard Deviations of Matched Banks

	(1)	(2)	(3)	(4)
	Treated		Control	
VARIABLES	mean	sd	mean	sd
F	0.74	0.22	0.79	0.23
LiqA/DL	0.70	0.74	0.57	0.45
Lns/TA	0.39	0.21	0.41	0.21
Dep/TA	0.47	0.21	0.47	0.22
$PFail$	0.0085	0.0098	0.0092	0.015

Table 14. Matched sample results

$$\Delta Y_{i,t+\delta} = intercept + \beta F_{i,t-l} + \beta^T T_{it} F_{i,t-l} + \beta^I I_t F_{i,t-l} + \beta^{TI} T_{it} I_t F_{i,t-l} + Controls_{i,t-l} + e_{i,t}$$

$t \in \{1999q2, 2004q4\}$. $\delta = 21$. $l = 0$ if $t = 1999q2$; $l = 3$ if $t = 2004q4$. $\Delta Y_{i,t+\delta}$, reported in column headings, is a measure of bank risk taking over the period $[t, t+\delta]$. $F_{i,t-l}$ is the share of firm deposits in total deposits of firms and households at time $t-l$. Dummy I_t equals 1 if $t \geq 2004q4$; 0 otherwise. Dummy $T_{i,t}$ equals 1 for private domestic banks; 0 for state- and foreign-controlled. Standard errors, reported in parentheses, are clustered at bank level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$	$\Delta \ln LLR$	$\Delta \ln NPL$	$\Delta PFail$
F	0.7	-0.3	-0.004	1.1	-3.6	-0.02	0.6	-3.9	-0.01
	(0.8)	(1.0)	(0.01)	(2.5)	(3.0)	(0.02)	(2.2)	(2.5)	(0.02)
1.T#c.F	1.9	2.9**	0.01	0.09	4.4	0.03	-0.4	4.3	0.02
	(1.2)	(1.3)	(0.01)	(2.9)	(3.6)	(0.03)	(2.6)	(3.0)	(0.03)
1.I#c.F	1.2	4.4**	0.02	0.5	5.2*	0.05	0.6	5.4**	0.05
	(1.7)	(1.7)	(0.02)	(2.5)	(2.9)	(0.04)	(2.5)	(2.5)	(0.04)
1.T#1.I#c.F	-4.8**	-7.5***	-0.03	-4.2	-6.9*	-0.08*	-4.7	-7.4**	-0.07*
	(2.1)	(2.3)	(0.02)	(3.1)	(3.7)	(0.04)	(3.2)	(3.5)	(0.04)
LiqA/DL							-0.4	-0.5*	0.004*
							(0.3)	(0.3)	(0.002)
Lns/TA							-3.0**	-2.4	-0.01
							(1.4)	(1.5)	(0.01)
Dep/TA							0.4	-1.1	-0.004
							(1.6)	(1.3)	(0.03)
Observations	191	191	187	191	191	187	189	189	187
R^2	0.147	0.257	0.056	0.188	0.358	0.153	0.250	0.385	0.181
Bank FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Banks	114	114	113	114	114	113	114	114	113

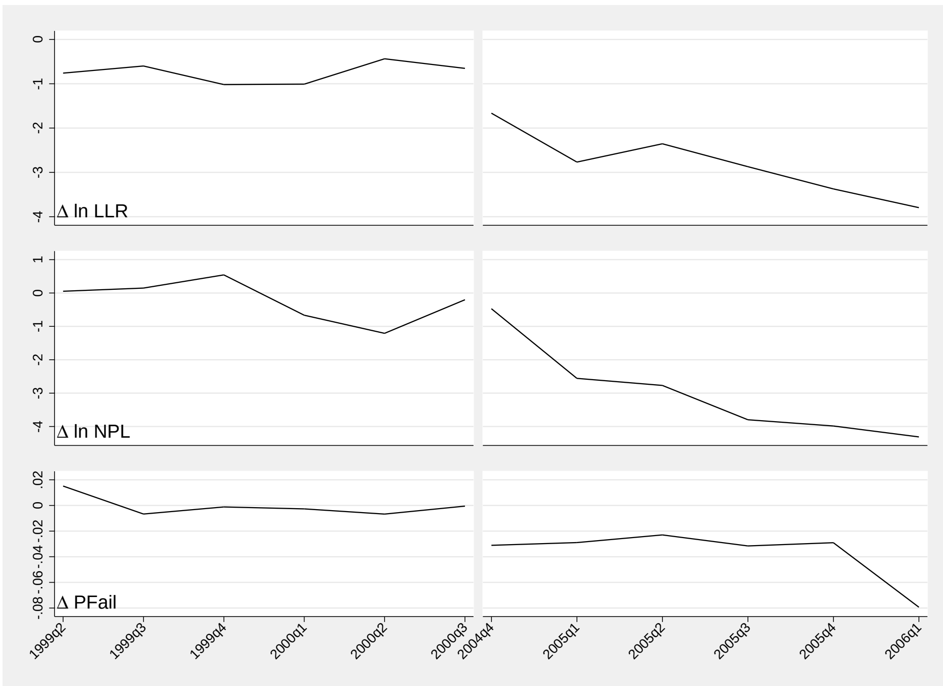

Figure 1. $\hat{\beta_t^T} - \hat{\beta_t^C}$ from Equation 4 over Time.

Appendix A. Default Prediction Model

Following De Graeve & Karas (2014), we estimate a logit regression of a dummy equal to 1 if a bank loses its license in quarter t, on a set of bank balance sheet variables measured at the end of quarter $t-1$. All coefficients have intuitive signs and are significant at 1%. The area under the ROC curve (AUR) exceeds 0.8 and thus signifies a very good fit (Hosmer & Lemeshow, 2000).

VARIABLES	(1) revdum
Log (Assets)	-0.17***
	(0.036)
Capital/Assets	-2.13***
	(0.38)
ROA	-9.44***
	(1.15)
Liquid Assets/Assets	-3.50***
	(0.83)
Non-performing Loans/Assets	4.19***
	(0.94)
Non-Government Securities/Assets	2.71***
	(0.34)
Term Deposits of Firms/Assets	-5.89***
	(1.51)
Term Deposits of Households/Assets	-6.49***
	(1.07)
Observations	51,275
# Failures	358
Pseudo R2	0.19
AUR	0.82