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The effect of deposit insurance on market discipline: Evidence from a natural experiment on deposit flows

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Alexei Karas, William Pyle and Koen Schoors

The effect of deposit insurance on market discipline: Evidence from a natural experiment on deposit flows

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All opinions expressed are those of the author and do not necessarily reflect the views of the Bank of Finland.

Alexei Karas*, William Pyle** and Koen Schoors***

Abstract

We explore how the introduction of explicit deposit insurance affects deposit flows into and out of banks of varying risk levels. Using evidence from a natural experiment in Russia, we employ a difference-in-difference estimator to isolate the change in the deposit flows of a newly insured group (households) relative to an uninsured "control" group (firms). This approach improves on earlier studies seeking to identify the effect of deposit insurance on market discipline. We find that the relative sensitivity of households to bank capitalization diminished markedly with the introduction of an insurance program covering their deposits. This was not true for firms, however. We then show the finding is not an artifact of the two groups responding differently to a minor banking crisis that arose at roughly the same time.

Keywords: Deposit insurance, market discipline
JEL Codes: E65, G21, G28, P34

Alexei Karas**, Roosevelt Academy, William Pyle**, Middlebury Collage, Koen Schoors***, CERISE, Ghent University

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Tiivistelmä

Työssä analysoidaan, kuinka talletusvakuutuksen käyttöönotto vaikuttaa talletusvirtoihin sellaisissa pankeissa, joiden riskitasot poikkeavat toisistaan. Tutkimus käyttää aineistoa ja luonnollista koeasetelmaa Venäjän taloudesta. Erojen erotus (differences in differences) -estimaattori erottelee muutoksen uuden vakuutetun ryhmän talletuksissa (kotitaloudet) suhteessa vakuuttamattomaan kontrolliryhmään (yritykset). Tämä metodologia on parannus aiemmissa tutkimuksissa käytettyyn tapaan, jolla on tutkittu talletusvakuutuksen vaikutusta markkinakuriin. Tutkimustulosten mukaan kotitalouksien suhteellinen herkkyys pankkien pääomien suhteen pieneni merkittävästi, kun niiden talletukset kattava vakuutus otettiin käyttöön. Sama havainto ei kuitenkaan päde yrityksiin. Tutkimuksessa osoitetaan myös, että tulos ei johdu siitä, että kaksi ryhmää olisi reagoinut eri tavalla samaan aikaan tapahtuneeseen pieneen pankkikriisiin.

Asiasanat: talletusvakuutus; markkinakuri

1 Introduction

Architects of modern financial safety nets are challenged by the possibility that their measures to mitigate bank failures may weaken other forces that buttress banking sector stability (Calomiris, 1999). The introduction of explicit deposit insurance presents just such a dilemma. On one hand, it has the potential of stabilizing economies by limiting bank runs. This obvious benefit helps explain the ubiquitous adoption of explicit deposit insurance schemes across OECD countries and its spread in recent years to remote corners of the developing world (Demirgüç-Kunt and Kane, 2002).[1] On the other hand, if depositors are lulled into complacency by the belief they are immune to the consequences of institutional failure, the disincentives that normally would prevent their banks from engaging in excessive risk-taking may weaken and decrease market discipline.

The degree to which depositors are involved in disciplining the market and the extent to which such behavior is curtailed by explicit deposit insurance are questions that should be possible to resolve simply by looking at the empirical record. Yet the data available to previous studies have made it difficult for researchers to cleanly identify and isolate the deposit insurance effect. Most published studies rely on comparisons of uninsured and insured depositors and attribute behavioral differences to the impact of insurance, an approach that ignores other characteristics that may vary across depositor groups in explaining the observed differences in behavior. A smaller group of studies infer the impact of deposit insurance on market discipline by comparing the behavior of a well-defined group before and after the introduction of deposit insurance. This approach cannot dismiss the possibility that results are driven by time-specific factors other than the introduction of insurance.

We are fortunate to have at our disposal data from what effectively amounts to a natural experiment that allows us to explore whether and how the introduction of explicit deposit insurance affected deposit flows into and out of banks of varying risk levels. In 2004, Russia imposed a comprehensive deposit insurance scheme to cover household deposits, while excluding deposits of firms. As the bank-level data report these two categories separately and cover the periods preceding and following the scheme's introduction, we can apply a difference-in-difference estimator to iden-

[1] The United States introduced the first national system of deposit insurance in 1934. Recent years have witnessed a rapid expansion in its use. In 1995, 49 countries offered explicit deposit insurance. By 2003, the number had risen to 87 (Demirgüç-Kunt, Kane and Laeven, 2008).

tify the effect of the policy on households. Using firm deposits as a benchmark, we filter out the effect of any time-specific factors that could influence the behavior of all depositors in a similar manner from the post-deposit-insurance change in household depositor behavior. Our results demonstrate a noteworthy reduction in the relative market-disciplining behavior of households.

We next consider whether this finding might be explained in part or whole by a time-specific factor that impacts the two depositor groups differently. At about the same time Russia introduced deposit insurance in 2004, the country suffered a minor banking crisis. Earlier studies suggest banking crises may provide depositors with a "wake-up call" on the risks of bank insolvency (Martinez-Peria and Schmukler, 2001). In the interest of cleanly identifying the effect of deposit insurance, we therefore compare the relative market-disciplining behavior of firms and households in the aftermath of the 2004 crisis against the behavior of these groups in the preceding 1998 financial meltdown. Following the 1998 crisis, both households and firms demonstrated comparable increases in market discipline, evidence consistent with the "wake-up call" effect. Following the 2004 crisis, however, the market-disciplining behavior of uninsured firms increased, while that of newly insured households did not. The difference in relative disciplining behaviors across crises, we argue, arises directly from the introduction of the deposit insurance scheme.

Our findings contribute to the literature on market discipline and deposit insurance in two ways. First, the data allow us to carry out what we believe to be the cleanest assessment ever on the direct impact of deposit insurance on market discipline. Our findings should bolster or challenge research that posits an implicit relationship between deposit insurance and market discipline and help explore downstream linkages in a potential causal chain leading from deposit insurance to banking crises. Suggested linkages include market discipline and bank risk (Nier and Baumann, 2006), deposit insurance and bank risk (Ioannidou and Penas, 2008), and deposit insurance and banking crises (Demirgüç-Kunt and Detragiache, 2002).

Second, we contribute to the literature on the effect of banking crises on market discipline by comparing the behaviors of insured and uninsured depositors. As Demirgüç-Kunt, Kane and Laeven (2008) observe, explicit deposit insurance programs are often introduced or expanded during periods of financial crisis. Given the recent global downturn, understanding the combined effect of crises and deposit insurance on subsequent market disciplining behavior has broad implications to those designing financial market institutions.

Our article is organized as follows. Section 2 reviews prior research on the relationship between deposit insurance and deposit-market discipline and the downstream effects of both on bank risk and financial crises. Section 3 reviews the relevant histories of deposit markets and deposit in-

surance in Russia. Sections 4 and 5, respectively, introduce our data and methodological approach for identifying the effect of deposit insurance on market discipline. Section 6 presents our results and Section 7 presents an extended robustness check in which we extend the time covered by our analysis to compare the effects of the 1998 and 2004 crises. Section 8 offers concluding thoughts.

2 Deposit insurance, market discipline and bank risk

Depositors are in no position to provide market discipline unless they have access to information on bank risk and expect to bear some of the costs of bank insolvency. Researchers began looking for evidence of market discipline in uninsured niches of markets with a well-developed informational infrastructure, i.e. where the above conditions appeared most clearly met. Investigating partially uninsured large deposits in the United States, Park and Peristiani (1998) demonstrate a negative relationship between thrifts' predicted probability of failure and the subsequent growth of their large uninsured deposits. Others turned up links between U.S. institutions' cost of funds in one period and their prior-period measures of depositor risk: low capital-assets ratios; high variability of return on assets; higher percentages of bad loans and, generally, lower return on assets; and greater exposure to junk bonds (Brewer and Mondschean, 1994; Hannan and Hanweck, 1988; Park and Peristiani, 1998).

Among this first generation of articles, the paper of Park and Peristiani (1998) stands out as it compares the propensity of uninsured and insured depositors to provide market discipline.[2] Given the latter's potential interest in monitoring the behavior of their banks as well, such comparison provides a better sense than an exclusive focus on the uninsured as to how the introduction of explicit insurance affects disciplining behavior. Indeed, the authors find that measures of risk have an adverse effect on the growth and pricing of small insured deposits, although to a lesser extent than on large, partially insured deposits. The difference in disciplining behavior is attributed implicitly to the introduction of deposit insurance.

[2] Insured depositors may feel compelled to monitor their banks if the insurer's guarantee is not ironclad or if they face a cost to recovering funds from a failed institution. Cook and Spellman (1994) show that deposits at institutions insured by the Federal Savings and Loan Insurance Corporation were sensitive to risk measures such as the leverage ratio during a period when the guarantor had been declared insolvent.

Analyzing the behavior of small insured deposits and large uninsured deposits in Argentina and Chile, Martinez-Peria and Schmukler (2001) explicitly present the comparison as a test of deposit insurance's effect on market discipline. They find that both types of deposits are sensitive to bank risk. Unlike Park and Peristiani (1998), they uncover little discernible difference between the disciplining behaviors of the two types of depositor. Explicit deposit insurance apparently had little or no effect in these Latin American countries, so, the researchers conjecture, the protection schemes probably lacked credibility among depositors.

As a test of the effect of explicit deposit insurance on market-disciplining behavior, however, the approach adopted by Park and Peristiani (1998) and Martinez-Peria and Schmukler (2001) presents problems. Notably, small insured depositors may be different from large uninsured depositors in unobservable ways conceivably related to market discipline. Larger depositors, for instance, may be more risk averse or more informed about bank fundamentals than small depositors. As a result, comparison of the contemporaneous behavior of these groups does help in predicting how a given group of depositors is likely to engage in market discipline with the introduction of an explicit insurance scheme.

Another approach that has been taken to infer the effect of deposit insurance on market discipline exploits comprehensive bank-level data and a recently compiled cross-country dataset of deposit insurance policies. Controlling for the presence of explicit insurance in a sample of 30 OECD and developing countries from 1990-1997, Demirgüç-Kunt and Huizinga (2004) uncover a negative relationship between the implicit cost of bank funds and prior-period measures of bank capitalization, profitability, and liquidity. They further demonstrate that explicit deposit insurance significantly reduces interest-rate sensitivity to these measures of bank risk. In deposit growth regressions on a larger group of countries, better capitalized banks are found to be more successful in attracting deposits. In the presence of explicit deposit insurance, however, this relationship is muted − a result consistent with weakened market discipline. As with within-country comparisons of insured and uninsured depositors (Park and Peristiani, 1998; Martinez-Peria and Schmukler, 2001), this cross-country approach (which covers a period in which only two of the countries in the sample introduced explicit deposit insurance) relies on inferring the market-disciplining effect of explicit deposit insurance from a potentially diverse group of depositors. Depositors in countries that already have explicit deposit insurance may be fundamentally different on average from those in countries in which it has not been introduced. It is even possible that a country's policy with respect to deposit insurance is endogenous to the behavioral predispositions of its depositors.

To avoid drawing conclusions from a comparison of fundamentally different depositor groups, a test for the effect of deposit insurance on market discipline should compare the behavior of a given group of depositors before and after the explicit insurance scheme's introduction. Using Bolivian data from 1998-2003, the unpublished study of Ioannidou and de Dreu (2006) finds that the magnitude of the coefficients designed to proxy for market discipline shrank notably after the introduction of explicit deposit insurance in 2001. By providing a "before-and-after" comparison for a specific group of depositors, their approach provides more direct evidence of deposit insurance's effect on market discipline than earlier studies. However, they cannot fully control for time-varying, macro-level factors that can influence market discipline. Thus, they are unable to rule out the possibility that the apparent post-deposit-insurance reduction in market discipline is at least partly (if not wholly) the result of an unobserved macro-level factor confined either to the pre- or post-insurance period.

Recognizing a potential causal chain from the introduction of deposit insurance to the reduction of market discipline to an increase in bank moral hazard to an increase in banking sector instability, several related studies effectively assume the first link and look for evidence of anticipated relationships between other links.[3] Nier and Baumann (2006) demonstrate that banks more prone to be disciplined (e.g. they rely more on uninsured liabilities or face greater disclosure requirements) carry larger capital buffers that make them inherently more stable. Ioannidou and Penas (2008) show that Bolivian banks were more likely to initiate riskier loans after the introduction of deposit insurance. In a cross-country study, Demirgüç-Kunt and Detragiache (2002) determine that generous insurance schemes are related to a greater likelihood of banking crises, particularly in weak rule-of- law environments.[4]

[3] Exploring causation in the opposite direction, Demirgüç-Kunt, Kane and Laeven (2008) use cross-country panel data to demonstrate that countries experiencing banking crises are more likely to introduce deposit insurance.

[4] Gropp and Vesala (2004) lay out a model using corroborating evidence from the European Union that suggests a policy of explicit insurance acts as a commitment device to limit coverage only to those parties explicitly covered. By increasing the monitoring incentives of parties that may otherwise consider themselves implicitly insured, explicit insurance can actually reduce moral hazard.

3 Deposit markets and deposit insurance in Russia

Russia has less than two decades the experience with liberalized deposit markets.[5] Indeed, this relatively short period in which to develop institutions that facilitate depositor monitoring probably explains why Barth et al. (2004, 2006) ranked Russia in the bottom quintile of more than 100 countries on their private-sector monitoring (PSM) index, a measure meant to capture the quality of institutions that facilitate deposit market discipline.[6] Although the ranking raises questions about the ability of Russian depositors to monitor and discipline banks, it provides no sense of whether they might feel compelled to do so. A review of Russia's post-communist financial sector development, however, suggests the intensity of this interest should not be underestimated.

At the start of development of financial markets in the early 1990s, bank deposits, particularly those of households, were held almost exclusively by Sberbank, the state-owned savings bank. Lax entry policies in the early post-communist period contributed to quick emergence of a competitive market for deposits. By 1994, private banks had captured over half of the household deposit market. A volatile mix of liberalized deposit rates, naïve depositors, and over-burdened regulators led to system-wide crises, including the massive financial meltdown in 1998 that saw many of the Russia's largest retail banks go insolvent. Obligations to tens of thousands of depositors went unmet (Perotti, 2003; Radaev, 2000; Schoors, 2001; Spicer and Pyle, 2002). These experiences quickly heightened awareness of average Russians of the private costs of bank failure and the value of carefully monitoring their financial institutions.

In Karas et al. (forthcoming), we demonstrate that in the half-decade after the 1998 crisis and before the introduction of explicit deposit insurance, market discipline in Russia became fairly sophisticated. Flows of household and firm deposits during this period were consistent with quan-

[5] The first part of this section draws on a similar discussion in Karas *et al.* (2009).

[6] The following considerations are factored positively into a country's score on the PSM index: (1) whether a certified external audit of the bank's financial statement is required; (2) whether all of the ten biggest banks are rated by international rating agencies; (3) whether income statements include accrued or unpaid interest or principal on non-performing loans and whether banks are required to produce consolidated financial statements; (4) whether off-balance sheet items are disclosed to the public; (5) whether banks must disclose risk management procedures to the public; and (6) whether subordinated debt is allowable as a part of regulatory capital. The version of the PSM index presented in Barth et al. (2006) is slightly modified to include the percentage of the ten biggest banks rated by domestic rating agencies. As there is no entry for Russia in this sub-category, its PSM index is not reported. The authors' measures of bank transparency paint a similar picture. With respect to quality of bank audit regime and pace in adopting best-practice accounting standards, Russia ranks among the bottom third of countries surveyed.

tity-based sanctioning of weaker banks. Thus, poorly capitalized banks were less successful in attracting the deposits of households and firms. On the other hand, the evidence is weak for the standard form of price discipline (depositors requiring a deposit rate premium from less stable banks).[7] This combination of findings, we argue, is consistent with households and firms interpreting the deposit rate as a complementary proxy of otherwise unobserved bank-level risk. Testing this hypothesis, we estimate the deposit supply function and show that, particularly for poorly capitalized banks, deposit rate increases exhibited diminishing, and eventually negative, returns in terms of deposit attraction (i.e. a backward bending deposit supply curve).[8]

Russia's Deposit Insurance Agency (DIA) was created as an independent agency in January 2004 and given responsibility for administering the national deposit insurance fund. The DIA was charged with determining bank premiums, making necessary payouts to depositors as they arose, and overseeing liquidation of insolvent banks.[9] The Russian government provided initial seed capital, while premia (payable quarterly and assessed according to the daily averages of each bank's insured deposits) quickly became the fund's main source of financing. The deposits of households, not firms, were to be covered. All private 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. From then until March 2007, up to 190,000 rubles per deposit were insured, with amounts above 100,000 insured at a 90% rate (Camara and Montes-Negret, 2006).[10]

By January 1, 2005, several month's into the system's operation, 829 banks and a bit more than 330,000 deposit accounts, with an average deposit size of 7,000 rubles (roughly $252), were insured by the system. Of these accounts, 98.5% were under 100,000 rubles and thus fully insured. Two years later, 934 banks and roughly 366,000 deposit accounts, with an average deposit size of

[7] Ungan et al. (2008) present similar findings for a slightly later period.

[8] A recent geographically representative survey of 1,600 Russians asked "At what annualized interest rate would you refuse to deposit money in a bank because of suspicions as to its stability?" The median response of 24.5% turned out to be quite comparable to the real 6% quarterly rate at which we earlier estimated the deposit supply curve began bending backward (see National Agency for Financial Research 2008 press release "What deposit rate do Russians consider acceptable?").

[9] The DIA's board is composed of seven government-appointed representatives and five representatives from the Central Bank of Russia.

[10] Ruble equivalents in dollar deposits were also covered. The insured maximum was again raised at the end of March 2007.

12,000 rubles (roughly $455) were covered by the program. Of these, 99.6% held deposits under 190,000 rubles and thus were insured at a rate of at least 95.3%.[11] Generally speaking, we observe rapid growth in personal deposits since the introduction of deposit insurance. Much of this growth comes from term deposits with maturities between half a year and three years. Sberbank's market share has eroded somewhat since household deposits became insured and there has been a decline in the combined market share of the 30 largest banks, which suggests that the insurance scheme has contributed to greater competition within the retail banking market (Camara and Montes-Negret, 2006; Chernykh and Cole, 2008).[12]

Russia was struck by a small banking crisis during the spring and summer of 2004.[13] 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).[14] The emergency coverage was subsequently replaced with a general deposit insurance program for qualifying banks. Banks not admitted to the general program lost their rights to attract new household deposits and renew existing deposit contracts, and led to progressive erosion of their household deposit base.

[11] These data and updates are posted at the DIA's website www.asv.org.ru .

[12] Peresetsky (2008) looks at deposit market discipline and the introduction of deposit insurance in Russia. Using monthly observations on deposit interest rates at 100 banks between 2004 and 2006, he finds evidence consistent with decreased discipline by price. In contrast to our study here, he does not exploit the natural experiment potential of comparing household and enterprise deposits with each other before and after the introduction of deposit insurance. Instead, he focuses on comparing household deposits before and after the introduction of insurance.

[13] In May 2004, after the licenses of two small banks were withdrawn on charges of money laundering and failure to comply with prudential regulations, rumors began to circulate that the CBR had blacklisted weak banks, including several large institutions. This set off a rash of deposit withdrawals and liquidity problems at a number of banks. The collapse of a large retail bank in July fueled rumors that Alfa Bank, Russia's largest private retail bank, might be next. Panicked depositors withdrew $160 million in deposits (12% of total deposits) from Alfa Bank over a three-day period. Rapid policy responses of the CBR and the State Duma prevented a further deterioration of the situation and the panic abated. Private deposits in the banking system started to rise again shortly thereafter (Camara and Montes-Negret, 2006).

[14] Such blanket deposit guarantees have become commonplace (Demirgüç-Kunt, Kane and Laeven, 2008) and have been used extensively by governments in their policy responses to the recent global financial crisis.

4 Data

All Russian banks are required to disclose their financial statements to the Central Bank of Russia (CBR). This information is then made available to the public through several channels. Since 1999, an increasing number of banks granted the CBR permission to disclose their detailed balance sheets and income statements online on the CBR's website (http://www.cbr.ru/credit/transparent.asp). Less detailed bank balances for all Russian banks have been provided since 1998 by the private information agency Banksrate.ru at www.banks-rate.ru. Banks publish their balances in the financial press such as the monthly financial periodical *Den'gi i Kredit*. Finally, the most detailed information on all Russian banks can be purchased from private information agencies.

The data used in the analysis in Sections 6 and 7 was made available to the authors by two well-respected private financial information agencies, Interfax and Mobile. The data consists of quarterly bank balances for all Russian banks from 1995q4 through 2007q1.[15] The panel of banks is unbalanced because some banks fail, some merge, and some are founded during the sample period. If a bank is acquired or merged with another bank, we treat the resulting larger bank as a "new" bank.

We use separate measures of a bank's household and firm deposits, employing them as dependent variables in a manner that is critical to our identification strategy. Not only are the two depositor types treated differently under Russia's deposit insurance scheme, there is the further possibility that, independent of deposit insurance, the two may differ in their willingness and/or ability to discipline deposit-taking institutions (Karas et al., forthcoming). Enterprise managers, for instance, might have better access or a better appreciation of the financial information released by banks. Similarly, firms and households might face different sets of costs in transitioning their deposits between banks.

We measure each bank's risk level in terms of its capital assets ratio. Models of bank behavior have long treated this measure of leverage as directly related to default risk (Merton, 1977). More practically, in the wake of the 1988 Basel Accord and the 1996 Market Risk Amendment, banks have increasingly favored capital adjustments as the channel through which they manage threats of insolvency (Nier and Baumann, 2006). Finally, the capital assets ratio is overwhelmingly

[15] For more information on these firms, see their respective websites at www.interfax.ru and www.mobile.ru. Karas and Schoors (2005) provide a detailed description of the datasets and confirm the consistency of various data sources.

the preferred measure for proxying risk exposure in studies of deposit-market discipline (Cook and Spellman, 1994; Hannan and Hanweck, 1988; Park and Peristiani, 1998; Martinez-Peria and Schmukler, 2001; Demirgüç-Kunt and Huizinga, 2004; Karas et al., forthcoming).

As an alternative measure of bank stability, we use its current liquidity ratio, that is, the sum of its liquid assets divided by the sum of its liabilities on demand accounts and accounts up to 30 days. In general, one might expect it to have the same effect as capitalization with respect to market discipline as highly liquid banks should be better able to accommodate sudden runs on deposits (Martinez-Peria and Schmukler, 2001; Demirgüç-Kunt and Huizinga, 2004).

Since depositors are hypothesized to react to observable data, these simple measures of bank-level stability have the appealing characteristic that they can be easily calculated from publicly available information. More sophisticated measures suggested in the literature either cannot be constructed from the available data or do not exist on a comprehensive basis (e.g. bank ratings) over the sample period.[16]

Our analysis is limited to private banks participating in the deposit insurance program. We exclude all state-owned banks, many of which have consistently enjoyed advantages over their private competitors: privileged access to state funds, de facto exemption from certain regulations, and explicit backing for their retail deposits during the entirety of the period covered by our data (Tompson, 2004; Civil Code of Russia, article 840).[17] Banks not admitted to the deposit insurance program are excluded from our analysis since they were ultimately banned from attracting new household deposits and forbidden from renewing existing contracts. Our analysis in Section 6 starts from the first quarter of 1999 and concludes with the first quarter of 2007. We use the fourth quarter of 2004 as the first post-deposit-insurance observation.

In conjunction with a period of rapid economic expansion in Russia, the summary statistics from our sample banks in Table 1 show robust quarterly deposit growth before and after the intro-

[16] Van Soest et al. (2003) report that in October 2001 Fitch IBCA published ratings for only 15 Russian banks, and that Moody's and Standard & Poor's did so for even fewer banks. While Russian rating agencies provided ratings for up to a hundred banks, their data are not readily available.

[17] The list of state-owned banks was compiled from Sherif et al. (2003), Matovnikov (2002) and Mamontov (2005), and includes banks owned by the CBR as well as banks owned by other government entities or by sub-federal governments. Vernikov (2007) identifies 33 state banks, as do we. Most are included on both lists, but ten are different. Some of this may be due to timing; Vernikov takes a snapshot of the banking system as of January 1, 2006, while we measure state ownership in 2001 and 2005. During the interim, obviously, there were new banks established, bank failures, as well as changes in bank ownership. Moreover, one or both lists could be incomplete.

duction of deposit insurance.[18] After 2004, deposits of both firms and households continued to grow, but at slightly lower nominal rates. As a share of total banking assets, household deposits shot up after the introduction of deposit insurance, rising from 13% to 25%. Over the same period, firm deposits as a share of bank assets remained quite stable.

[Table 1]

5 Methodology

We apply a difference-in-difference estimator to identify the effect of deposit insurance on the behavior of depositors. To our knowledge, this approach has not been used to capture the impact of a financial safety net policy on market discipline. Several beneficial features of our data allow us to conduct what is in effect a natural experiment. Explicit deposit insurance covering household deposits was introduced in the middle of the period covered by our data. The deposit holdings of both households (covered) and firms (not covered) are reported separately. We can observe the behavior of each group both before and after the introduction of explicit deposit insurance, and we can distinguish between depositors who receive coverage and those who do not.

Exploiting these features of the data, a difference-in-difference specification allows us to compare the change in market discipline before and after explicit deposit insurance among household depositors against the corresponding change among firm depositors. Comparing changes, or differencing differences, allows us to control for both time-invariant factors that affect households and firms differently and for time-varying factors that affect them in a similar fashion. The change in the disciplining behavior of firms after the introduction of deposit insurance on household deposits is an estimate of the unobserved counterfactual, i.e. what would have happened to the disciplining behavior of households if there had been no policy of explicit insurance introduced.

The difference-in-difference model can be specified in regression form as

$$\Delta \ln(D_{i,j,t}) = b_1 X_{i,t-1} + b_2 X_{i,t-1} I + b_3 X_{i,t-1} H + b_4 X_{i,t-1} IH + Z + \varepsilon_{i,j,t} \qquad (1)$$

with the dependent variable being the first difference of the log of deposits of type *j* (firm or household) for bank *i* during period *t*. Many studies of deposit market discipline use a measure of

[18] Throughout the analysis outliers, with deposit growth below the 0.5 or above the 99.5 percentile, are filtered out.

bank deposit rates as a dependent variable to test whether depositors "demand" a rate premium from riskier banks. In light of our work demonstrating a backward-bending deposit supply curve for Russia (Karas et al., forthcoming), which suggests that the deposit rate itself may be interpreted as a measure of otherwise unobservable risk, we elect to focus on market discipline applied exclusively through quantities (deposit flows) rather than through prices as well.

The right-hand-side variables include a vector of bank-level risk factors, $X_{i,t-1}$, that varies over time and across banks. In our baseline specification, this is a measure of capitalization ($C_{i,t-1}$). In others, we include a measure of liquidity ($L_{i,t-1}$).

The dummy variables, H and I, take on the value of one if, respectively, the observation is for household deposits (as opposed to those of firms) and/or is recorded after the introduction of explicit deposit insurance in the third quarter of 2004. The coefficient b_4 is the difference-in-difference estimate of the impact of explicit deposit insurance. The vector of controls Z changes across specifications. In one, $Z=\lambda_t+\lambda_t H$, where λ_t is a time-specific dummy that controls for time-varying macroeconomic effects that may have a uniform impact across depositors. The inclusion of the interaction term, $\lambda_t H$, allows this common effect to differ depending on whether the depositor is a household or firm.

In a second specification, $Z=\lambda_t+\lambda_t H+\mu_{ij}$, where μ_{ij} is a fixed effect to control for unobserved heterogeneity in the relationship between specific banks ($i=1 \ldots N$) and specific depositor types (j=*household or firm*). Lastly, we control for lagged values of the dependent variable by setting $Z = \lambda_t + \lambda_t H + \sum_1^4 a_l \Delta \ln(D_{i,j,t-l}) + \sum_1^4 a_{lH} \Delta \ln(D_{i,j,t-l}) H$. This allows us to distinguish the relationship between bank-level risk and market discipline from regular deposit dynamics.

6 Results

The results from the difference-in-difference estimations are laid out in Table 2. The specifications in columns 1-3 include controls for time-varying factors that may have a uniform impact on all depositors of a particular type (household or firm). Those in columns 4-6 include bank-depositor-type fixed effects. Models represented in columns 7-9 control for both time fixed effects and deposit dynamics in the previous four periods. In columns 1, 4, and 7, our measure of bank risk is capitalization alone; in columns 2, 5, and 8, bank risk is proxied for by liquidity alone; and in columns 3, 6, and 9, both measures are included.

[Table 2]

We observe that prior to the introduction of deposit insurance, firms were sensitive to bank capitalization (see row 1). This result is robust to the inclusion of a variety of controls.[19] Moreover, we observe that when controlling for time and bank fixed effects, firms became more sensitive to capitalization after the introduction of deposit insurance in the third quarter of 2004 (see row 3, columns 4 and 6). This increase in sensitivity after 2004 is consistent with banking crises providing a wake-up call to depositors, causing them to be more vigilant about the stability of their banks (Martinez-Peria and Schmukler, 2001).

The evidence from rows 1 and 2 further suggests that households were sensitive to bank capitalization levels prior to the introduction of deposit insurance (*i.e.*, $b_1 + b_2 > 0$), but less so than firms as we observe that b_2 is negative and statistically significant across all specifications.

Given our focus here, the most noteworthy observation in row 4 is that the difference-in-difference coefficient, b_4, is negative and statistically significant across all specifications but one. This indicates that the relative sensitivity of households to bank capitalization diminished after the introduction of deposit insurance, and points to deposit insurance having reduced the market disciplining behavior of the insured group. It is robust to the inclusion of bank-depositor-type fixed effects (see column 4), as well as inclusion of a second measure of bank risk, liquidity (see columns 3, 6 and 9).

To visualize the temporal pattern of the difference-in-difference coefficient above, we allow the sensitivity of firm and household deposits to bank capitalization to be different in each time period by estimating:

$$\Delta \ln(D_{i,j,t}) = b_{1,t} C_{i,t-1} \lambda_t + b_{3,t} C_{i,t-1} \lambda_t H + Z + \varepsilon_{i,j,t} \qquad (2)$$

with $Z=\lambda_t+\lambda_t H+\mu_{ij}$. Figure 1 shows how the value of b_3, the relative sensitivity of household deposits drops after the introduction of deposit insurance in the third quarter of 2004 (vertical

[19] In columns 3, 6 and 9, we include a list of (unreported) control variables: change in loan quality, return on assets, excess reserves as a share of total assets, loans to non-banks as a share of total assets, loans to households as a share of loans to non-banks, term deposits as a share of total deposits, and personnel expenses over total assets (see Karas et al, forthcoming, for a motivation of these controls). These controls were allowed to enter the equation with different coefficients for firms and households and for the pre- and post-deposit-insurance periods.

line).[20] Moreover, it demonstrates that our finding for b_4 in equation (1) is not driven exclusively by observations in the periods immediately preceding and/or following this date.

[Figure 1]

The evidence here is mixed as to whether the negative coefficient on b_4 in equation (1) represents a decline in the sensitivity of households to capitalization in an absolute (and not just a relative) sense. In the specifications presented in columns 1, 3 and 9, the decrease in sensitivity appears absolute – b_4 is negative and different from zero in a statistically significant manner but b_3 is not statistically different from zero (see row 3). Specifications in columns 4 and 6, however, present a different story. They suggest that the wake-up call effect felt by all depositors in the aftermath of the crisis had an offsetting effect on the disciplining behavior of household depositors. The two effects work in opposite directions and roughly cancel each other out. What is clear is that the sensitivity of insured households to bank risk decreased markedly relative to the sensitivity of uninsured firms after deposit insurance was introduced.

7 Crises, deposit insurance, and market discipline

Any conclusion that we have identified the effect of deposit insurance on market discipline rests on an assumption that during the period covered by our analysis there are no time-specific factors other than the insurance scheme's introduction that had a differential impact on the two types of depositors. The occurrence of a minor banking crisis in Russia, roughly concurrent to the introduction of deposit insurance, must give pause. Martinez-Peria and Schmukler (2001), for example, present evidence that crisis periods increase market discipline by providing a wake-up call to depositors.[21] If the effect of the 2004 crisis differs across depositor types, then the difference-in-difference

[20] It may we be that some households anticipated the introduction of deposit insurance and adjusted their behavior before the policy's formal introduction. The dynamics presented in Figure 1 cannot rule out or confirm this. Given that depositors typically do not need a much time to switch deposit-taking institutions, particularly for the case of demand deposits, we are not overly concerned by this possibility. If it is the case that household behavior anticipated the policy, the clean break after the formal introduction of deposit insurance is even more impressive.

[21] Using a large cross-country panel data set with banks from 32 countries, covering the period 1993-2000, Nier and Baumann (2006) show that the effect of variables associated with market- disciplining behavior is greater in countries that had experienced a crisis. This, they explain, may be

estimation we have laid out above fails to disentangle the impacts of deposit insurance and the crisis on market discipline. This is a non-trivial matter for reasons that transcend our identification strategy. The introduction or expansion of deposit insurance often occurs concurrent, and indeed in response, to banking crises (Demirgüç-Kunt, Kane and Laeven, 2008).[22] Better understanding their interaction thus carries potential value for policymakers as they evaluate the costs and benefits of financial safety net expansion during periods of systemic instability.

As we cannot a priori rule out the possibility that household depositors may react differently than firms to periods of banking crisis, we return to the Russian data and expand the temporal scope of our analysis to include the period before the 1998 crisis. Essentially, these data offer us yet another natural experiment. In 1998, Russian depositors were subjected to a severe banking panic but the government did not introduce deposit insurance. In 2004, as we have discussed, depositors again suffered through a banking panic, but this time a comprehensive deposit insurance scheme was introduced to cover households alone. The disciplining behavior of households and firms in the aftermath of 1998 serves as benchmark for comparing behaviors in the wake of the 2004 events. The noteworthy difference in the two episodes, of course, is the introduction of deposit insurance.[23]

Both the absolute change of the disciplining behavior of households after the 1998 crisis and its relationship to the change in the behavior of firms serve as an estimate of the unobserved counterfactual: What would have happened to the disciplining behavior of households in a relative and absolute sense if there had been no deposit insurance introduced at roughly the same time as the banking panic of 2004? Evidence that firms responded similarly to the two panics, while households responded differently, would be consistent with deposit insurance having affected the behavior of households.

To carry out what amounts to an extended robustness check of our finding in the prior section, we estimate the sensitivity of deposit flows to bank capitalization, allowing for different sensi-

due to bank franchise values in crisis countries being lower and risk-taking incentives (in the absence of market discipline) being higher.

[22] In the midst of the Great Depression, the U.S. Congress enacted the first national deposit insurance system. In the 1990s, Sweden, Japan, Thailand, Korea, Malaysia, and Indonesia introduced or expanded deposit insurance coverage (Demirgüç-Kunt and Kane, 2002). The recent global crisis has given rise to a similar phenomenon.

[23] Obviously, the two crises differed greatly in magnitude. Yet, while the number of bank failures was minimal in 2004 compared to 1998, the market feared the possibility of bank failures in 2004 on par with those of 1998. In this context, the introduction of deposit insurance in 2004 may have been the policy move that altered the final outcome of the crisis.

tivities across the two depositor types and three distinct periods (before the 1998 crisis, between the 1998 and the 2004 crises, and after the 2004 crisis). Specifically, we estimate:

$$\Delta \ln(D_{ijt}) = f_0 C_{i,t-1} F^0 + f_1 C_{i,t-1} F^1 + f_2 C_{i,t-1} F^2 + h_0 C_{i,t-1} H^0 + h_1 C_{i,t-1} H^1 + h_2 C_{i,t-1} H^2 + Z + \varepsilon_{ijt} \qquad (3)$$

As in equation (1), the dependent variable is the first difference of the log of deposits of type *j* (firm or household) for bank *i* during period *t*. The right-hand-side variables include a lagged measure of bank-level capitalization, $C_{i,t-1}$, that varies over time and across banks and dummies for both firm and household deposits for three specific time periods: F^0=1 and H^0=1 for firm and household deposits, respectively, before 1998q4; F^1=1 and H^1=1 for firm and household deposits, respectively, for the period between 1998q4 and 2004q3; and F^2=1 and H^2=1 for firm and household deposits, respectively, after 2004q3.

As in our first specification above, $Z=\lambda_t+\lambda_t H$, where λ_t is a time-specific dummy that controls for time-varying macroeconomic effects that have a uniform impact across depositors. The inclusion of the interaction term, $\lambda_t H$, allows this effect to differ for households and firms. In a second specification, $Z=\lambda_t+\lambda_t H+\mu_{ij}$, where μ_{ij} is a fixed effect included to control for unobserved time-invariant heterogeneity in the relationship between specific banks ($i=1 \ldots N$) and specific depositor types (*j=household* or *firm*).

[Table 3]

Panel A of Table 3 reports the estimation results exclusive and inclusive of bank-depositor-type fixed effects (columns 1 and 2, respectively). In Panel B, coefficient tests present comparisons of market discipline across time and depositor types.

We observe from rows 1-3 of Panel A that firms were sensitive to bank risk across each sub-period; coefficient estimates are consistently positive and statistically significant. In line with the "wake-up call" hypothesis, the degree of this sensitivity increased in the period after each crisis. For instance, when controlling for time and bank-depositor-type fixed effects, we observe that f_1 is greater than f_0 (Panel B, row 1) and f_2 is greater than f_1 (Panel B, row 4). Using this same specification, we do not observe a statistically significant difference in the changes in firms' disciplining behavior in the wake of the two crises (Panel B, row 6).

Unlike firms, we find no evidence that households were sensitive to bank risk prior to the 1998 crisis but, like firms, they displayed such sensitivity in its aftermath (Panel A, row 5). In row 3

of Panel B, we test the hypothesis that the change in disciplining behavior was the same for households and firms after the 1998 crisis. The results show that we cannot dismiss this possibility. This evidence is consistent with the first crisis having served as a wake-up call for both depositor types.

Referring again to the specification with bank-depositor-type fixed effects, household sensitivity to bank capitalization did not change after the 2004 crisis (Panel B, row 5). Whereas the behavior of firms in the aftermath of the two crises was not dissimilar (Panel B, row 6), the reaction of households was (Panel B, row 7). We can clearly reject the hypothesis that the sensitivity of households and firms to bank capitalization changed in a similar fashion after 2004 (Panel B, row 8), a result that holds whether or not we control for bank-depositor-type fixed effects.

In sum, this extended robustness check presents evidence that suggests that the change in the relative disciplining behaviors of firms and households after 2004 was not due to their responding differently to the banking crisis. We found the sensitivity of household and firm deposit flows to bank capitalization rose in an identical manner after the 1998 crisis. After the 2004 crisis, the sensitivity of uninsured firm deposit flows to bank capitalization again rose markedly and in a manner similar to the that following the 1998 crisis. The sensitivity of insured household deposit flows to bank capitalization, however, remained unchanged or fell after 2004. The early crisis had a similar effect on the two groups; the latter crisis did not. We interpret this evidence as confirming the negative impact of deposit insurance on market discipline.

8 Conclusions

Using data from what amounts to a natural experiment in Russia, we provide the cleanest test to date on the effect of deposit insurance on market discipline. Employing a difference-in-difference estimator to identify the differential effect of deposit insurance on the behaviors of insured households and uninsured firms, we find evidence consistent with hypothesis that introduction of a credible insurance scheme diminishes the sensitivity of insured depositors to bank risk. Moreover, comparing the relationship of risk sensitivity across depositor types and multiple banking crises, we feel confident in dismissing the possibility that our results might be explained by a different reaction of households and firms to a banking crisis that hit at roughly the same time as the insurance scheme was introduced.

Importantly, our findings demonstrate the potential for deposit insurance to increase moral hazard behavior among banks, and speak to the combined effect of deposit insurance and crises on market discipline. Uninsured depositors respond to a crisis by increasing market discipline, thereby providing a potentially valuable check to banks contemplating the assumption of even more risk during a period of systemic instability. While we do not claim that newly insured depositors will be entirely complacent to bank risk in the aftermath of a crisis, the market discipline they impose will clearly be less vigorous than that of uninsured groups. Our results thus could be interpreted to suggest that policymakers exercise caution with respect to any crisis-related expansion of deposit insurance lest incentives for already weak banks to gamble on their state-sponsored resurrection be strengthened.

References

Barth, J., G. Caprio, and R. Levine (2006). "Rethinking Bank Regulation: Till Angels Govern," New York: Cambridge University Press.

Barth, J., G. Caprio, and R. Levine (2004). "Bank regulation and supervision: What works best?" *Journal of Financial Intermediation* 13, 205-248.

Brewer, Elijah, and Thomas Mondschean (1994). "An Empirical Test of the Incentive Effects of Deposit Insurance: The Case of Junk Bonds at Savings and Loan Associations," *Journal of Money, Credit and Banking* 26, 146-164.

Calomiris, C. (1999). "Building an incentive-compatible safety net," *Journal of Banking and Finance* 23, 1499-1519.

Camara, M., and F. Montes-Negret (2006). "Deposit insurance and banking reform in Russia," World Bank Working Paper Series 4056.

Chernykh, L., and R. Cole (2008). "Does deposit insurance improve financial intermediation? Evidence from the Russian experiment." Accessed at http://ssrn.com/abstract=1328444

Cook, D., and L. Spellman (1994). "Repudiation risk and restitution costs: Toward understanding premiums on insured deposits," *Journal of Money, Credit and Banking* 26, 439-459.

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

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

Demirgüç-Kunt, A., and E. Kane (2002). "Deposit insurance around the globe: Where does it work?" *Journal of Economic Perspectives* 16, 175-195.

Gropp, R., and J. Vesala (2004). "Deposit insurance, moral hazard and market monitoring," *Review of Finance* 8, 571-602.

Hannan, Timothy, and Gerald Hanweck (1988). "Bank Insolvency and the Market for Large Certificates of Deposit," *Journal of Money, Credit and Banking* 20, 203-211.

Ioannidou, V., and J. de Dreu (2006). "The impact of explicit deposit insurance on market discipline." Accessed at http://papers.ssrn.com/abstract_id=888681

Karas, A., W. Pyle, and K. Schoors (forthcoming). "How do Russian depositors discipline their banks? Evidence of a backward bending deposit supply function," Oxford Economic Papers.

Karas, A., and K. Schoors (2005). "Heracles or Sisyphus? Finding, cleaning and reconstructing a database of Russian banks," Ghent University Working Paper 05/327.

Mamontov, A. (2005). "*Gosudarstvo v bankakh: zlo ili blago*?" *Natsional'nyi Bankovskii Zhurnal* 12, 24.

Martinez-Peria, M., and S. Schmukler (2001). "Do depositors punish banks for bad behavior? Market discipline, deposit insurance, and banking crises," *Journal of Finance* 56, 1029-1051.

Matovnikov, M. (2002). "*Nadezhnost' banka tesno svyazana so strukturoi ego aktsionernogo kapitala*," Moscow: Tsentr Ekonomicheskogo Analiza-Interfax.

Merton, R. (1977). "An analytic derivation of the cost of deposit insurance loan guarantees," *Journal of Banking and Finance* 1, 3-11.

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

Park, S., and S. Peristiani (1998). "Market discipline by thrift depositors," *Journal of Money, Credit and Banking* 30, 347-364.

Peresetsky A. (2008). "Market discipline and deposit insurance in Russia," BOFIT DP 14. Available at http://www.bof.fi/bofit/tutkimus/tutkimusjulkaisut/dp/2008/dp1408.htm

Perotti, Enrico (2003). "Lessons from the Russian Meltdown: The Economics of Soft Legal Constraints," *International Finance* 5, 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, 271-294.

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

Sherif, K., M. Borish, and A. Gross (2003). "State-owned banks in the transition: Origins, evolution, and policy responses," Washington, D.C.: World Bank.

Spicer, A., and W. Pyle (2002). "Institutions and the vicious circle of distrust in the Russian household deposit market, 1992-1999." In Ingram, P. and B. Silverman (eds.) *Advances in strategic management: the new institutionalism in strategic management*. New York: JAI Press, 371-396.

Tompson, W. (2004). "Banking reform in Russia: problems and prospects," OECD Economics Working Paper 410.

Ungan, E., S. Caner, and S. Ozyildirim (2008). "Depositors' assessment of bank riskiness in the Russian Federation," *Journal of Financial Services Research* 33, 77-110.

Van Soest, A., A. Peresetsky, and A. Karminsky (2003). "An analysis of ratings of Russian banks," Discussion Paper 85, Tilburg University, Center for Economic Research.

Vernikov, A. (2007). "Russia's banking sector transition: Where to?" BOFIT Discussion Paper 5. Available at http://www.bof.fi/bofit/tutkimus/tutkimusjulkaisut/dp/2007/dp0507.htm

What deposit rate do Russians consider acceptable? (*Kakuiu protsentnuiu stavku po vkladam rossianie schitaiut priemlemoi*?), 2008. Press release 28, March 25. National Agency for Financial Research. Accessed at http://nacfin.ru/novosti-i-analitika/press/press/single/9888.html

Table 1 Summary statistics

	1999q1 – 2004q3		2004q4 – 2007q1	
	Mean	**Std. dev.**	**Mean**	**Std. dev.**
Firm deposit growth	0.10	0.54	0.09	0.43
Household deposit growth	0.13	0.50	0.12	0.36
Firm deposits / Assets	0.35	0.20	0.36	0.18
Household deposits / Assets	0.13	0.13	0.25	0.18
Capital / Assets	0.30	0.22	0.23	0.16
Liquid assets / Demand liabilities	0.81	1.22	0.66	0.94

Table 2 Determinants of household and firm deposit flows

$$\Delta \ln(D_{i,j,t}) = b_1 X_{i,t-1} + b_2 X_{i,t-1} I + b_3 X_{i,t-1} H + b_4 X_{i,t-1} IH + Z + \varepsilon_{i,j,t}$$

	$Z=\lambda_t+\lambda_t H$			$Z=\lambda_t+\lambda_t H+\mu_{ij}$			$Z = \lambda_t + \lambda_t H + \sum_1^4 a_l \Delta \ln(D_{i,j,t-l}) + \sum_1^4 a_{lH} \Delta \ln(D_{i,j,t-l}) H$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) $C_{i,t-1}$	0.34***		0.30***	0.62***		0.58***	0.20***		0.19***
	(0.03)		(0.03)	(0.05)		(0.05)	(0.03)		(0.03)
(2) $C_{i,t-1}H$	-0.23***		-0.21***	-0.44***		-0.42***	-0.13***		-0.12***
	(0.04)		(0.04)	(0.06)		(0.06)	(0.04)		(0.04)
(3) $C_{i,t-1}I$	0.06		0.08	0.25***		0.29***	0.01		0.04
	(0.05)		(0.05)	(0.06)		(0.06)	(0.06)		(0.06)
(4) $C_{i,t-1}IH$	-0.18**		-0.19**	-0.20**		-0.24***	-0.10		-0.15*
	(0.08)		(0.07)	(0.08)		(0.08)	(0.08)		(0.08)
(5) $L_{i,t-1}$		0.04***	0.02***		0.05***	0.03***		0.02**	0.01
		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)
(6) $L_{i,t-1}H$		-0.02*	-0.01		-0.02*	-0.01		-0.01	-0.01
		(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)
(7) $L_{i,t-1}I$		-0.01	-0.02		-0.00	-0.03		-0.01	-0.02
		(0.01)	(0.02)		(0.01)	(0.02)		(0.02)	(0.02)
(8) $L_{i,t-1}IH$		-0.01	0.01		0.01	0.02		0.02	0.03
		(0.02)	(0.02)		(0.02)	(0.03)		(0.03)	(0.03)
Observations	54934	54819	54803	54934	54819	54803	44819	44803	44799
R-squared	0.03	0.03	0.03	0.04	0.03	0.04	0.07	0.07	0.07

Note: D = deposits; C = capital / assets; L = liquid assets / demand liabilities; I = deposit insurance dummy ; H = household deposits dummy
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Figure 1 Relative sensitivity of household deposits to bank capitalization over time: coefficient b_3 in equation (2)

Table 3 Crises and the sensitivity of deposits to bank capitalization

$$\Delta \ln(D_{ijt}) = f_0 C_{i,t-1} F^0 + f_1 C_{i,t-1} F^1 + f_2 C_{i,t-1} F^2 + h_0 C_{i,t-1} H^0 + h_1 C_{i,t-1} H^1 + h_2 C_{i,t-1} H^2 + Z + \varepsilon_{ijt}$$

Panel A. Estimation results

	Coefficient	$Z=\lambda_t+\lambda_t H$	$Z=\lambda_t+\lambda_t H+\mu_{ij}$
Firm deposit flows			
(1) 1995q4 – 1998q3	$C_{i,t-1}F^0$	0.18***	0.38***
		(0.03)	(0.05)
(2) 1998q4 – 2004q3	$C_{i,t-1}F^1$	0.36***	0.60***
		(0.03)	(0.04)
(3) 2004q4 – 2007q1	$C_{i,t-1}F^2$	0.40***	0.80***
		(0.05)	(0.06)
Household deposit flows			
(4) 1995q4 – 1998q3	$C_{i,t-1}H^0$	-0.04	-0.05
		(0.03)	(0.05)
(5) 1998q4 – 2004q3	$C_{i,t-1}H^1$	0.14***	0.22***
		(0.02)	(0.03)
(6) 2004q4 – 2007q1	$C_{i,t-1}H^2$	-0.01	0.20***
		(0.05)	(0.06)
Observations		77678	77678
R-squared		0.042	0.046

Note: D = deposits; C = capital / assets; F = firm deposits dummy ; H = household deposits dummy
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Panel B. Hypothesis tests on coefficients

	$Z=\lambda_t+\lambda_t H$	$Z=\lambda_t+\lambda_t H+\mu_{ij}$
(1) Sensitivity of firm deposits to capitalization pre- and post-first crisis: $F_1 - F_0 = 0$.	0.18	0.22
	(0.00)	(0.00)
(2) Sensitivity of household deposits to capitalization pre- and post-first crisis: $H_1 - H_0 = 0$	0.18	0.27
	(0.00)	(0.00)
(3) Relative sensitivity of household and firm deposits to first crisis: $(H_1 - H_0) - (F_1 - F_0) = 0$	**-0.01**	**0.05**
	(0.92)	(0.50)
(4) Sensitivity of firm deposits to capitalization pre- and post-second crisis: $F_2 - F_1 = 0$	0.04	0.20
	(0.47)	(0.00)
(5) Sensitivity of household deposits to capitalization pre- and post-second crisis: $H_2 - H_1 = 0$	-0.15	-0.02
	(0.01)	(0.78)
(6) Relative sensitivity of firm deposits to first and second crisis: $(F_2 - F_1) - (F_1 - F_0) = 0$	-0.14	-0.02
	(0.05)	(0.80)
(7) Relative sensitivity of household deposits to first and second crisis: $(H_2 - H_1) - (H_1 - H_0) = 0$	-0.32	-0.29
	(0.00)	(0.00)
(8) Relative sensitivity of household and firm deposits to second crisis: $(H_2 - H_1) - (F_2 - F_1) = 0$	**-0.18**	**-0.21**
	(0.02)	(0.01)

Note: *p*-values in parentheses

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