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The Effect of Banking Crises on Deposit Growth: State-Level Evidence from 1900 to 1930

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Abstract:

Using a newly constructed database of bank failures for the period 1900 to 1930, this paper estimates a dynamic regression model to examine the extent to which banking instability at the state level affects the proportion of state deposits relative to national deposits. The main results indicate that banking failures reduce the proportion of state deposits by approximately 0.04 percent in the short run and by nearly 1 percent in the long run. In the eight states that adopted deposit insurance systems during the late 1910s and the 1920s, however, I find no evidence that banking crises affected deposit growth. Furthermore, I find no evidence that the banking crisis of the 1980s and 1990s had any significant effect on state deposit growth. These results suggest that deposit insurance may have lessened the effects of banking instability on deposit growth.

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I. Introduction

One of the most serious and devastating consequences of banking crises is the loss of deposits from the banking system. In the absence of deposit insurance or any other (privately or publicly implemented) program aimed at restoring confidence in a nation's banking system, bank failures lead to a systemic decline in deposits, not just because the deposits of failed institutions are lost (temporarily or permanently) but also because people may lose confidence in the banking system altogether—they simply stop trusting banks. As a result, they end up adjusting their portfolios of liquid assets away from the banking sector and into more rudimentary forms of savings, such as keeping their money under the mattress, literally or figuratively. That is, they simply take their money out of the banking system. If this happens—if the loss of confidence becomes institutionalized (as it has in many developing countries in recent years)—the systemic loss in deposits leads to long-lasting financial disintermediation and a permanent destruction of bank lending capacity, thereby affecting economic growth.

To empirically examine whether banking crises leads to a long-lasting decline in deposits, one must find instances of sudden financial disintermediation that were not accompanied by broad and direct government intervention aimed at restoring confidence in the banking system. Only in the absence of such government intervention can the direct link between banking crises and long-term deposit growth be discerned. The experience of the United States between 1900 and 1930—in other words, before the Depression—offers a valuable opportunity for examining the issue. This was a period when the United States endured not only several major banking crises (the Panic of 1907, the agricultural crisis of the early 1920s, and others) but also some relatively minor ones

(Wicker 1996, 2000). Such periods of banking crises were common in U.S. history before the 1930s, but three aspects of the period 1900 to 1930 make it particularly useful for our purposes.

First, an important feature of these (pre-Depression Era) crises is that for the most part they were regional in nature. Even the more serious Panic of 1907 was concentrated in New York, with limited fallout elsewhere (Moen and Tallman 1992; Wicker 2000). The regional nature of these crises allows us to identify on a regional basis the effect of banking crises on subsequent deposit growth.

Second, before 1930 the financial system was not subject to an orchestrated effort by the federal government to engage in counter-cyclical fiscal and monetary policy, and therefore the relationship between banking crises and deposit growth was uncontaminated by such intervention. Although the Federal Reserve had been created in 1913, its initial objective was to smooth out the regional credit cycles that were associated with agricultural borrowing demands (Miron 1986; Kupiec and Ramirez 2009). Notwithstanding the agency's impact on the seasonal agricultural cycle, early Federal Reserve policies did not seek an explicit counter-cyclical role for monetary policy. That is, monetary policy was not aimed at smoothing out business cycles (White 1983, 115ff.). In the 1930s, however, this view of monetary policy would change, and the banking crises of the Depression Era would be immediately followed by orchestrated efforts from the federal government that, as noted above, were aimed at restoring the public's confidence in the financial system.

Third, during the sample period eight states made an effort to stop (or at least slow down) the incidence of banking crises by adopting some form of deposit insurance,

and the existence of these deposit schemes should help us identify the effect of banking crises on deposit growth.[1] As discussed in more detail further below, none of these deposit insurance schemes effectively reduced the incidence of banking failures. However, even if they failed in stopping or slowing down banking crises, they could have still been effective in slowing down the contraction in deposits stemming from the crises. If deposit insurance served to assuage depositors that their funds would not be permanently lost, one would expect the relationship between banking failures and deposit contraction in these eight states to be weaker than the relationship in states without deposit insurance.

This combination—the regional nature of the crises, the absence of federal intervention, and the presence of some state deposit insurance schemes—allows for a relatively clean investigation of the hypothesis that sudden episodes of financial disintermediation (financial panics) affected long-term deposit growth. To this end, I make use of a newly constructed database that identifies the incidence of banking crises in every state in the nation between 1900 and 1930 and for all banks, not just national banks. I then fit an Arellano-Bond dynamic panel model to analyze the extent to which bank deposits at the state level were affected by the severity of state banking crises. The evidence suggests that a state that endured a banking crisis also experienced a statistically significant reduction in its share of aggregate deposits—a reduction of about 0.02 to 0.04 percent after one year, with a long-term decline at between 0.4 and 0.8 percent. At first, this effect is seemingly small—less than 1 percent in the long run. However, we must bear in mind that this estimated effect represents the cost in terms of the loss of deposit

[1] Of the eight states, Oklahoma went first, in 1908, and Washington was last, introducing its insurance scheme in 1917. By 1930, however, all of these deposit insurance programs had collapsed (White 1997).

growth per crisis. Hence, in the absence of intervention, the accumulated effects of having repeated crises can be quite significant.

I find further confirmation of this hypothesis by comparing the results for states that had adopted deposit insurance with the results for states that had not. For states with deposit insurance I find that banking crises did not affect state deposits in any systematic manner. For states without deposit insurance, however, the effect of banking crises on deposits is both statistically and economically significant. States that endured banking crises and did not have deposit insurance see a long-term decline in their deposits (relative to deposits nationwide) of almost 1 percent.

As a final confirmation of the hypothesis, I reestimate the same dynamic regressions for the 1975–2008 period. During the entire period, nationwide deposit insurance was in force; but in the 1980s and early 1990s, the U.S. banking system suffered various crises. Just as I found for the eight states with deposit insurance in the earlier period, for the later period I find no evidence that under deposit insurance, banking crises had any systematic effect on state deposits.

Taken together, the results suggest that the costs of financial crises are not negligible and likely affect long-term economic growth through a reduction in deposits. The results further suggest that the establishment of institutions aimed at restoring confidence in the banking system, institutions such as deposit insurance, may help to forestall the effect of banking crises on deposit growth.

Of course, this conclusion does not necessarily imply that deposit insurance is socially desirable. Before drawing the inference that it is, one has to net out the costs of deposit insurance—for it is already well known that deposit insurance is not costless. A

significant strand of the banking and finance literature has documented the fact that when deposit insurance is mispriced, it distorts bank behavior by introducing a moral hazard problem.[2]

The rest of this paper is organized as follows: Section II discusses the underlying data and presents summary statistics. Section III presents the empirical methodology and discusses in more detail the equation to be estimated. Section IV discusses the results. Section V offers concluding remarks.

II. Data and Summary Statistics

The data underlying this paper come from several sources. For the 1900–1930 period, state-level deposits for all banks as well as data (interest expenses, etc.) for national banks are from Flood (1998), and liabilities of failed banks by state are from Kupiec and Ramirez (2009). For the 1975–2008 period, state-level deposits for all banks, interest expense on deposit accounts, and liabilities of failed banks by state are from the *Historical Statistics on Banking*, published online by the FDIC.[3]

Table 1 presents basic summary statistics. "State deposits" is defined as deposits for all banks in state *i* at time *t*, divided by total (national) deposits, also at time *t*, all multiplied by 100. This variable measures the state's deposits as a percentage of national deposits. Naturally, it will vary by the size of the state, with larger proportions in the larger states. This observation can be confirmed by comparing the mean and the median statistics. Over the entire 1900–1930 period, the average comes to a little over 2 percent, while the median is 0.74 percent. A similar pattern can be observed for the 1975–2008

[2] This literature is too large to be listed in a footnote. For a recent paper, see Demirgüç-Kunt and Detragiache (2002) and the references cited therein. For historical evidence, see Calomiris (1990, 2000).
[3] For more details, see http://www2.fdic.gov/hsob/.

period. Of course, this state-to-state variation will have to be controlled for in the regressions. A more detailed discussion of this issue is provided below, in the section on the empirical methodology.

"Crisis" is a constructed indicator variable that measures the incidence of banking crises. Constructing it is tantamount to defining it. Unfortunately, there is no precise definition in the literature of what constitutes a "banking crisis" (Caprio and Klingebiel 1997). Different researchers resort to somewhat different definitions, depending on data availability as well as other issues. For example, Demirguc-Kunt, Detragiache, and Gupta (2000) use a variety of indicators, any one of which could be used to justify the determination that a banking system was in crisis. These indicators include, among others, periods when nonperforming loans are at least 10 percent of total assets, when the cost of rescue operations is at least 2 percent of GDP, when banking troubles result in the nationalization of banks, or when governments implements emergency measures such as bank holidays, and deposit guarantees. Unfortunately, none of these measures can be determined during the sample period covered in this paper. Thus, I must rely on other measures.

Undoubtedly, an excellent candidate for identifying episodes of banking crisis would be the price of bank stocks relative to other stocks in the market. Because stock prices are forward-looking measures, it should be possible to identify the likelihood of a banking crisis from the behavior of bank stock prices. However, bank stock prices are generally not available because most banks during the period 1900 to 1930 were not publicly traded companies. Reinhart and Rogoff (2008) suggest that, in the absence of

stock price data for banks, a viable alternative is to use bankruptcies and bank closures. This is the measure used in this paper.

To that end, I construct an indicator variable entitled "crisis," which equals 1 if, in a particular year, the liabilities of failed banks in the state are above 1 percent of the state's deposits. The choice of 1 percent as the threshold is justified on empirical grounds. The total cost of the S&L crisis during the 1980s and early 1990s, arguably one of the most serious crises in recent history, was approximately $160 billion, or about 0.6 percent of bank deposits.[4] Thus, the 1 percent threshold is a reasonably conservative level. In fact, it delivers nearly identical frequencies across the two different time periods: 0.130 for 1900 to 1930 versus 0.134 for 1975 to 2008.[5]

The last variable in the summary statistics is "spread." This variable is meant to capture the behavior of the interest on deposits in each state, relative to the "general," nationwide level of interest rates. It is possible that, during periods of local (state-level) banking turmoil, the interest rate on deposits may change. This change in deposit rates may, in turn, influence depositor behavior. For this reason, a measure of the spread is included in the empirical analysis.[6]

Because actual deposit rate figures for each state are not available, I construct a proxy for this spread. Specifically, for the 1900–1930 period, the spread is defined as the ratio of total expenses to total deposits for national banks, minus the end-of-year 90-day

[4] Ergungor and Thomson (2005), and author's calculations.
[5] As a robustness check, I redefined the indicator variable "crisis" to equal 1 whenever the proportion of failed banks was above 1 percent of the total number of banks (as opposed to the liabilities of failed institutions relative to total deposits). The empirical results were very similar in terms of magnitude and statistical significance.
[6] A more detailed discussion of the importance of this variable in the regression specification is provided in the empirical methodology section below.

time money rate in New York City.[7] For the 1975–2008 period, this spread is defined as total interest on deposits divided by total deposits, minus the 6-month time money rate, available from the Federal Reserve.

As one would expect, the mean and median spreads are statistically zero.[8] This follows from the fact that the average rate over all states should be reasonably close to the nationwide interest rate.

III. Empirical Methodology

To investigate the long-term effects of banking crises, I estimate a dynamic transfer model where the dependent variable is bank deposits at the state level relative to nationwide deposits (that is, the ratio of state deposits to total national deposits) and the independent variables include factors known to influence the demand for bank deposits, as well as a measure of banking crises. Specifically, the regression model is

$$D_{i,t} = \alpha_0 + \sum_{k=1}^{n_D} \alpha_k D_{i,t-k} + \sum_{k=1}^{n_r} \gamma_k \left(r_{i,t-k} - r_{US,t-k} \right) + \sum_{k=1}^{n_C} \beta_k C_{i,t-k} + \phi_1^T SFE + \phi_2^T YE + \varepsilon_{i,t} \quad (1)$$

where $D_{i,t}$ is the share of state i's deposits in national deposits at time t and, $r_{i,t-k}$ is the ratio of total expenses (primarily interest expenses) to total deposits for national banks. As pointed out above, this variable is a proxy for the interest rates on deposits in state i at time t. $r_{i,t-k} - r_{US,t-k}$ is the spread of the interest rate in state i's deposits relative to the nationwide interest rate at time t. $C_{i,t}$ is an indicator variable equal to 1 if, at time t, the share of state i's failed-bank liabilities in state i's deposits is above 1 percent. This variable picks up whether there is a banking crisis in state i at time t. SFE stands for state

[7] The 90-day time money rate in New York City is available from the NBER macro-history database: http://www.nber.org/databases/macrohistory/contents/chapter13.html.

[8] By a one-sample t-test I fail to reject the null hypothesis that the mean spread is zero for both periods.

fixed effects. YE stands for year effects. The residual term, $\varepsilon_{i,t}$, picks up any remaining unexplained variation of the model.

The intuition for selecting $D_{i,t}$ as the dependent variable is straightforward. With the possible exception of the panics of the 1930s, banking panics in the United States have been essentially regional in nature. For example, as indicated in the introduction, even the more serious Panic of 1907 was concentrated in New York, with limited fallout elsewhere (Moen and Tallman 1992; Wicker 2000). Similarly, the banking problems of the early 1920s originated in the Midwest, and although failures spread throughout most agricultural states, it did not affect all states equally (Wicker 2000; Calomiris 2000). We can exploit this feature of the data to investigate the extent to which deposits in a given state were influenced by banking problems in that state *relative* to nationwide deposits. It is natural to hypothesize that banking problems in state i should affect deposits in state i more strongly than they affect deposits in other states.

It is worth adding that the ratio of state deposits to total deposits also serves to ensure that desirable properties of the dependent variable are maintained when the regression is estimated. For example, any cyclical or seasonal pattern that affects the demand for deposits in levels is unlikely to drive the ratio as long as the pattern applies to all deposits. Similarly, any macroeconomic factor that may influence deposits in levels will not necessarily bias the ratio as long as the shock is truly macroeconomic in nature. That is, as long as the shock affects all states more or less equally. Nonetheless, it is possible that some macro shocks affect deposits in different states differently. It is precisely for such reasons that the regression includes year effects.

There is also justification for the inclusion of state fixed effects when one estimates equation (1). As pointed out in the data section above, the "state deposit" variable varies by state, with the larger states having the largest proportion of national deposits. The state fixed effects control for this source of variation in the regressions.

In order for the model to account for dynamic effects, equation (1) includes a lagged dependent variable. Because past events may have a long-lasting effect on the relative demand for deposits, it is important to consider various lag lengths. To be as comprehensive as possible, I allow the lag length to vary from 1 to 5. The α_k's are the coefficients of the lagged dependent variable. I use these coefficients to compute the long-run effect of crises on deposits.

The standard portfolio choice model motivates the inclusion of $r_{i,t-k} - r_{US,t-k}$ in equation (1). This model assumes that the fraction of wealth invested in a particular asset is a function of all asset returns in the portfolio. Under gross substitutability, the fraction of wealth invested in a particular asset is increasing in that asset's returns, and decreasing in other assets' returns. Hence, the effect of $r_{i,t-k} - r_{US,t-k}$ on relative deposits is expected to be positive. As this spread increases, the demand for deposits in state *i* should also increase, all else held constant. Thus, I expect the γ_k's to be positive. Just as indicated above for the lagged dependent variable, I consider different lag structures to allow for a robust estimate of this effect.

The inclusion of $C_{i,t}$ in equation (1) serves to test the hypothesis of this paper, which is that periods of banking instability should be associated with a long-lasting reduction of deposits in that state. The logic behind this hypothesis relies on an intuitive modification of the standard portfolio choice model. An increase in banking instability

can lead to a behavioral change among depositors if they lose trust in the banking system and there is no credible mechanism for restoring public confidence in it. In a sense, people simply stop trusting banks. Such a loss of confidence would almost surely lead to a decline in relative deposits that is unlikely to disappear in the short term.

It is important to highlight the long-lasting nature of such a decline. Why? Because such protracted declines cannot be attributable only to the bank closures or suspensions that inevitably take place during crises. A reduction in bank deposits stemming *only* from the suspension of banks should be temporary in nature. The intuition behind this argument is straightforward. Pre-Depression banking panics per se tended to be very short-lived events. The majority of banks that suspended operations during pre-Depression panics reopened a few weeks after panics subsided (Wicker 2000; Calomiris 2000). Hence, if public confidence in the banking system were not at stake, once the panic subsided deposits would return to pre-panic levels as suspended banks reopened and de novo institutions arose to pick up the business left behind by the institutions that closed during the crisis.

This argument implies that banking crises that were accompanied by general loss of confidence in the system should result in a long-lasting impact on the ratio of state deposits to national deposits. By contrast, episodes of banking crises that were not accompanied by loss of confidence in the banking system should have, at most, a temporary effect on the decline of state deposits relative to national deposits.

To test this hypothesis, I estimate equation (1) for different regimes: one characterized by the existence of institutions aimed at instilling confidence in the banking system, and one characterized by the lack of such institutions. Comparing these results

will allow us to make appropriate inferences regarding the long-lasting nature of the effect of banking crises on deposits.

The most obvious candidate for an institution designed to instill confidence in the banking system is deposit insurance. By design, deposit insurance is supposed to reassure depositors that their funds will not disappear from the banking system in the event of a bank failure. To the extent that such an institution is credible, it should dampen the effect of banking crises on deposits. This is not to say that deposit insurance is free of negative aspects. Recent research has demonstrated that deposit insurance has had quite a number of drawbacks. In particular, it introduced the well-known and documented issue of moral hazard into the system because it removed depositor discipline from banks, thereby encouraging banks to take on more risk. Nonetheless, depositors' knowledge that their deposits are insured should have alleviated the reservations they had about the viability of the banking system. Thus, it is possible that deposit insurance, although aggravating risky behavior from the banker's perspective, also lessened the depositor's concerns about the viability of the banking system during periods of distress. In fact, there is some empirical support for this claim. Chung and Richardson (2007) provide evidence suggesting that these deposit insurance schemes reduced bank suspensions due to runs, but ended up increasing suspensions due to mismanagement.

As noted above, between 1900 and 1930, deposit insurance existed at the state level for eight states. Oklahoma was first when it introduced its deposit insurance scheme in 1908, and Washington State was last when it introduced it in 1917. These state deposit insurance schemes differed somewhat in their implementation and logistics (insurance

coverage, participation, premium assessment costs, etc.).[9] However, they all shared enough features to justify looking at them as a group. Most importantly and as previously discussed, they all intended to instill depositor confidence in the banking system. But besides having this common objective, they shared other features as well: they all had an insurance fund that was created by assessing premiums on participating institutions (normally state banks). These premiums were not risk-based. When the state deposit insurance fund was below a threshold, banks could be assessed additional premiums until the fund was deemed to be adequate. In fact, it is precisely these common (and arguably ill-conceived) features that researchers highlight as key for understanding their demise.[10]

For the purposes of this empirical exercise, we can use the fact that eight states experimented with deposit insurance between 1908 and 1930, along with the fact that national deposit insurance has been in effect in the United States since 1934. It is this variation in deposit insurance across states and over time that the paper exploits to evaluate the hypothesis that banking crises had a long-term effect on deposits. To that end, I estimate equation (1) for the following four distinct regimes:

(a) 1900 to 1930: No national deposit insurance. Estimated for all states, including those with deposit insurance.

(b) 1900 to 1930: Estimated only for states that had deposit insurance during the time it was in effect.

(c) 1900 to 1930: Estimated only for states that did not have deposit insurance.

[9] For a more in-depth analysis of these deposit insurance schemes see Federal Deposit Insurance Corporation (1956).
[10] See Vaughan and Wheelock (2002) for an analysis of the deficiencies of these insurance schemes.

(d) 1975 to 2008: National deposit insurance in effect. This period saw one of the nation's most severe episodes of bank failure (during the late 1980s and early 1990s). Hence, the period can usefully be compared with the 1900–1930 period.

If the hypothesis set out in the introduction is valid, we should observe banking crises having long-term effects on deposits only under (a) and (c), when deposit insurance was not present. For (b) and (d), the effect of banking crises on deposits should be either nonexistent or temporary at best.

Equation (1) is estimated with panel data, and it contains a lagged dependent variable. It is well known that, under such conditions, OLS estimates are biased, even with the inclusion of fixed and year effects (Holtz-Eakin, Newey, and Rosen, 1986; Arellano and Bond, 1991). For this reason, in estimating equation (1), I make use of Arellano and Bond's (1991) GMM difference estimator.

IV. Empirical results

Table 2 presents the regression results of equation (1) for all states during the 1900–1930 period. The table presents five different regressions, corresponding to different lag lengths.[11] The purpose of including five lags in equation (1) is to obtain a robust result of the short- or long-term effect of banking crises on deposits. Virtually all five regressions demonstrate that banking crises indeed had a long-lasting effect on deposits. The coefficient for the first lag of the banking crisis variable is negative and statistically significant at standard levels, indicating that a year after a crisis began, deposits in that state had declined relative to nationwide deposits.

[11] Tests of autocorrelation show no significant evidence of autocorrelation with 1 or more lags.

To evaluate the hypothesis that banking crises had a long-lasting effect on deposits, I use both the coefficients of the banking crisis variable as well as the autoregressive coefficients of the dependent variable. The long-term effect of the crisis on relative deposits measures the dynamic impact of the crisis shock on relative deposits in the long run, all else held constant. It is calculated at the steady-state in order to identify the implied equilibrium effect. More precisely, if $A(L)D_{i,t} = B(L)C_{i,t} + \varepsilon_{i,t}$, where *A(L)* and *B(L)* are polynomials in the lag operator, the long-term effect is given by the rational polynomial $B(L)/A(L)$.[12] Table 2 shows that the estimated long-term effects are all negative and statistically significant at standard levels. This result implies that a banking crisis in a particular state is associated with a long-term decline in that state's deposits relative to national deposits.

Because the banking crisis variable is an indicator variable, its coefficient can be interpreted as the magnitude by which the proportion of deposits in the state relative to total U.S. deposits is affected. Using the coefficient estimates from regression 5 as an example, we observe that, one year after a banking crisis hits, the typical state initially experiences a decline of 0.041 percent in its proportion of deposits. The autoregressive coefficients as well as the remaining lagged crisis variables indicate that this effect is persistent. Three years after the banking crisis, the decline is approximately 0.24 percent. After five years, it is 0.55. In the long run, it reaches 0.82 percent. Figure 1 displays graphically the dynamic pattern of this effect, along with 95 percent confidence intervals. It is evident that the effect of banking crises on the proportion of state deposits is persistent.

[12] For more details, see Enders (2004), chap. 1.

Table 3 presents the regression results for the eight states that had deposit insurance during the 1900–1930 period. In order to ensure that the regression results are measuring the effect of deposit insurance, I included in this subsample only the years during which the insurance was in effect. Because not all eight states implemented deposit insurance at the same time, and they ended it in different years, this subsample is necessarily unbalanced. Nevertheless, one may still evaluate the extent to which banking crises affected deposits. Table 3 supports the hypothesis that deposit insurance appears to have lessened the effect of banking crises on deposits. In virtually all regressions, the crisis indicator variable is small and statistically insignificant. Indeed, the implied long-run elasticities, while negative, are not as large as those estimated for the states without deposit insurance. In addition, they are not significant in a statistical sense at standard levels.

This result can be graphically confirmed by a plot of the dynamic effects. Figure 2 shows that the effect is negative. However, the 95 percent confidence interval bands include the horizontal axis. Hence, it is not possible to reject the hypothesis that there is no effect. [13]

Table 4 completes the analysis of the 1900–1930 period. It presents the regression results for the states that did not have deposit insurance. As expected, the results mimic those of Table 2: banking crises do lead to long-lasting declines in relative deposits. Indeed, the coefficients presented in Table 4 are nearly identical to those obtained in Table 2. In particular, the implied long-term effects are statistically significant at a standard level in virtually all the regressions. And just as Figure 1 does, Figure 3

[13] Admittedly, it is possible that the weaker statistical significance reported in Table 3 could also be due to the fact that there are fewer degrees of freedom compared to Tables 2 and 4, even though it has an adequate number of observations for estimating regression coefficients.

confirms graphically that the effect of banking crises on state deposits is indeed persistent.

As a robustness check, I also investigate the effect of banking crises on state deposits for the 1975–2008 period.[14] Because deposit insurance at the national level was already implemented during this period, the expectation is that the crises the banking system in the U.S. endured during the 1980s and early 1990s would not have affected state deposits. Table 5 presents these results. They unambiguously indicate that these banking crises did not affect state deposits in any systematic manner. None of the banking crises coefficients is statistically different from zero. Furthermore, none of the estimated long-term effects is statistically significant. This result is consistent with the hypothesis that the existence of credible institutions can lessen or even eliminate the long-lasting effects of banking crises on deposits.

V. Concluding Remarks

This paper investigates the dynamic effects of banking crises on state deposits. In particular, using data from 1900 to 1930, I estimate a dynamic regression model to examine the extent to which banking instability at the state level affects the proportion of state deposits relative to national deposits. The main results indicate that banking failures reduce the proportion of state deposits in national deposits by approximately 0.04 percent in the short run, and by nearly 1 percent in the long run.

[14] The regressions for the period 1975 through 2008 are estimated in changes for the dependent variable, since the Im, Pesaran, and Shin (2003) panel unit root tests show that this variable has a unit root in levels, but it is stationary in differences. It is worth pointing out, however, that regardless of whether the regression is estimated in changes or in levels, the effect of banking instability on deposits is nearly identical.

To evaluate the hypothesis that this long-lasting loss in deposits following a banking crisis is attributable to a loss of confidence in the banking system, I reestimate the dynamic regression model for the eight states that adopted deposit insurance between 1908 and 1929, and compare these results with those obtained for the subsample that did not have deposit insurance. If deposit insurance increased depositor confidence in the banking system, we should observe that the effect of banking troubles on deposits should be smaller or even nonexistent in deposit insurance states.

The results are consistent with this hypothesis: the evidence shows that the adverse effect of banking instability on deposits occurs only for the subsample of states that did not have deposit insurance. By contrast, banking troubles do not appear to have any significant effects on deposits in states that did adopt deposit insurance.

I obtain further confirmation of these findings by comparing the results obtained for the 1900–1930 period with those obtained for the 1975–2008 period. This comparison is illuminating because both periods experience similar frequencies in the incidence of banking troubles, but during the first one, institutions aimed at restoring confidence in the banking system were lacking, whereas during the second one, banking benefited from the existence of nationwide deposit insurance.

Taken together, these results imply that without confidence-building institutions (deposit insurance), banking crises can have long-lasting adverse effects on deposit growth. Straightforward intuition can explain these results. Depositors who lose access to their money, even temporarily, tend to become more apprehensive about keeping their money in the banking system. To the extent that they adjust their liquid portfolios away from banks and into more rudimentary forms of savings, such as hiding the money under

the mattress literally or metaphorically, bank deposits and therefore financial intermediation are compromised in the long run. The long-lasting nature of such shocks is particularly damaging because, by destroying bank capacity, these shocks end up affecting economic growth.[15]

One important policymaking implication of this research is the desirability of implementing policies that prevent the economy from getting bogged down in an inefficient equilibrium, with depositors keeping some or all of their wealth away from the banking system. But identifying and implementing the correct policies is not that simple. Between 1908 and 1930, eight states adopted deposit insurance. Although the results here support the contention that those schemes may have alleviated the effect of banking instability on deposit growth, a large literature has documented that those schemes magnified the incidence of banking crises by introducing the well-known moral hazard problem in banking. Mispriced deposit insurance encourages banks to take on more risk (Merton 1977; Kane 1989; Chan, Greenbaum, and Thakor 1992; and others).[16] Not surprisingly, by 1930 all eight deposit insurance schemes had failed.

In modern times, during periods of serious financial market turmoil, governments face political and social pressure to implement policies whose purpose is to ameliorate the adverse consequences of the crisis as well as try to prevent future crises. In fact, this is an issue of current prominence, given the 2007–09 meltdown of the U.S. (not to mention globally) financial system. But recent history tells us that many such policies may not have completely restored confidence in the banking system. In both Russia and

[15] For evidence that financial disintermediation can have a long-lasting effect on economic growth, see Ramirez (2009).

[16] For evidence on how the deposit insurance schemes of the 1920s distorted bank incentives and encouraged risk taking, see, for example, Calomiris (1990, 2000); Alston, Grove, and Wheelock (1994); Wheelock and Kumbhakar (1994); and White (1983, 1997).

Argentina, for example, a sizable proportion of the population has indicated in recent surveys that it does not trust banks or does not even have a bank account.[17] Evidently the policies adopted by the Russian and Argentine governments in the aftermath of the two countries' crises have not gained complete credibility. Investigating such issues is certainly worthy of further research.

[17] For example, a survey done in Argentina in 2004 revealed that 86 percent of the population does not trust banks (*Russian Business Monitor,* June 2, 2004). On July 28, 2004, *The Moscow Times* reported that according to polling done by the All Russian Public Opinion Survey, approximately two-thirds of the people in Russia do not have bank accounts.

Table 1
Summary Statistics

Statistic	Period	Median	Mean	Standard Dev.
State Deposits	1900-1930	0.74	2.08	4.51
	1975-2008	0.94	1.96	3.31
Crisis	1900-1930	0	0.133	0.340
	1975-2008	0	0.134	0.341
Spread	1900-1930	0.001	-0.0001	0.019
	1975-2008	-0.024	-0.026	0.020

Notes: This table presents basic summary statistics for the variables included in the regressions. See text in the Data section for specific definitions as well as sources.

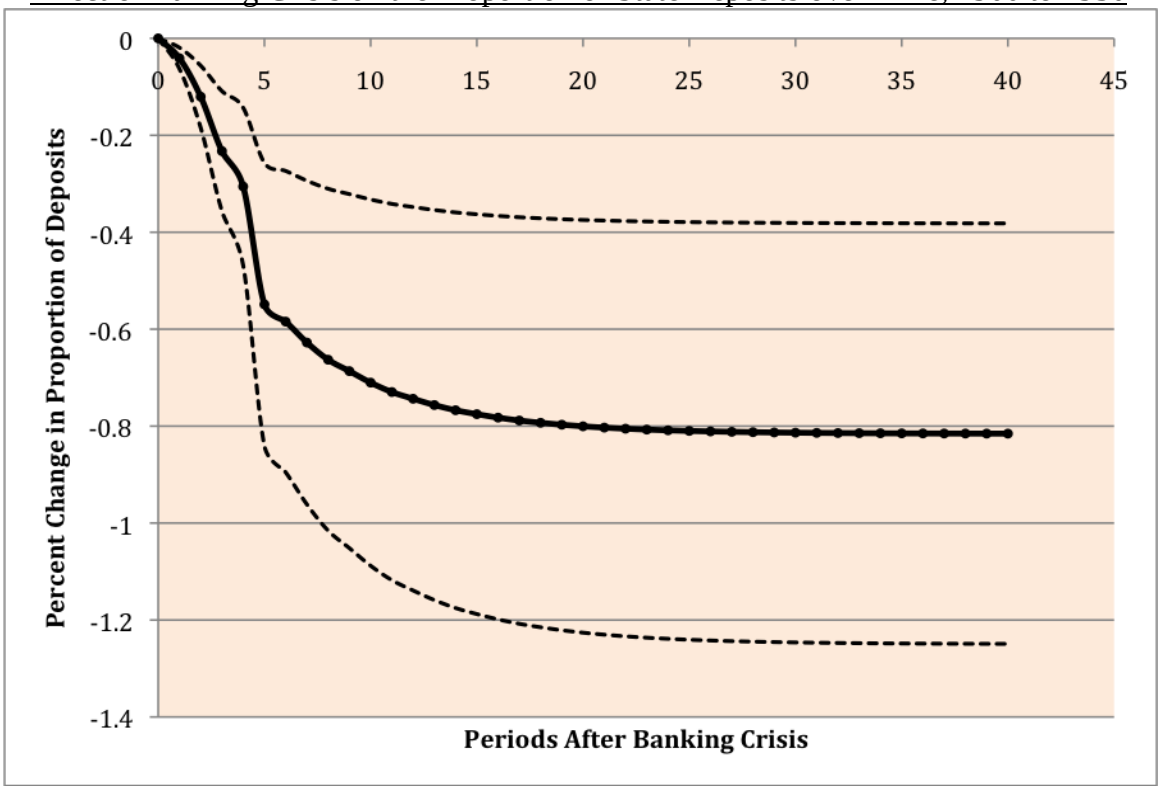
Table 2
GMM Regression Results: 1900 to 1930 for All States

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
$D_{k,t-1}$	0.797***	0.725***	0.732***	0.776***	0.796***
	(0.014)	(0.027)	(0.028)	(0.029)	(0.031)
$D_{k,t-2}$		0.019	-0.243***	-0.227***	-0.276***
		(0.025)	(0.032)	(0.035)	(0.038)
$D_{k,t-3}$			0.286***	0.415***	0.394***
			(0.024)	(0.033)	(0.036)
$D_{k,t-4}$				-0.164***	-0.242***
				(0.026)	(0.036)
$D_{k,t-5}$					0.100***
					(0.027)
$Spread_{k,t-1}$	0.037***	0.031**	0.027***	0.025*	0.023*
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)
$Spread_{k,t-2}$		0.017	-0.011	-0.010	-0.014
		(0.014)	(0.013)	(0.013)	(0.014)
$Spread_{k,t-3}$			0.012	0.026**	0.023*
			(0.013)	(0.013)	(0.014)
$Spread_{k,t-4}$				0.006	-0.007
				(0.013)	(0.014)
$Spread_{k,t-5}$					0.024*
					(0.014)
$Crisis_{k,t-1}$	-0.041*	-0.041**	-0.053***	-0.051**	-0.041**
	(0.022)	(0.020)	(0.019)	(0.020)	(0.021)
$Crisis_{k,t-2}$		-0.025	-0.029	-0.021	-0.026
		(0.021)	(0.019)	(0.019)	(0.021)
$Crisis_{k,t-3}$			-0.048**	-0.036*	-0.041**
			(0.020)	(0.019)	(0.020)
$Crisis_{k,t-4}$				-0.011	-0.009
				(0.021)	(0.021)
$Crisis_{k,t-5}$					-0.069***
					(0.023)
Implied LT Effects	-0.203*	-0.260**	-0.581***	-0.591***	-0.820***
	(0.109)	(0.110)	(0.147)	(0.194)	(0.202)
Year effects?	Yes	Yes	Yes	Yes	Yes
Fixed effects?	Yes	Yes	Yes	Yes	Yes
No. Obs.	1392	1344	1296	1248	1200
Wald Chi-sq	3059.34	2702.67	2653.72	2454.37	2022.01
Prob > Chi-sq	0.000	0.000	0.000	0.000	0.000

Notes: Dependent variable: $D_{k,t}$, which is defined as deposits in state *k* at time *t*, divided by nationwide deposits at time *t*, all multiplied by 100. "$Spread_{k,t}$" is the interest rate spread. "$Crisis_{k,t}$" is the banking crisis indicator variable. "Implied LT Effects" is the implied long-term effect of "$Crisis_{k,t}$" on $D_{k,t}$. Standard errors are provided in parentheses. *** significant at the 1 percent level or better. ** significant at the 5 percent level. * significant at the 10 percent level.

Figure 1

Effect of Banking Crisis on the Proportion of State Deposits over Time, 1900 to 1930



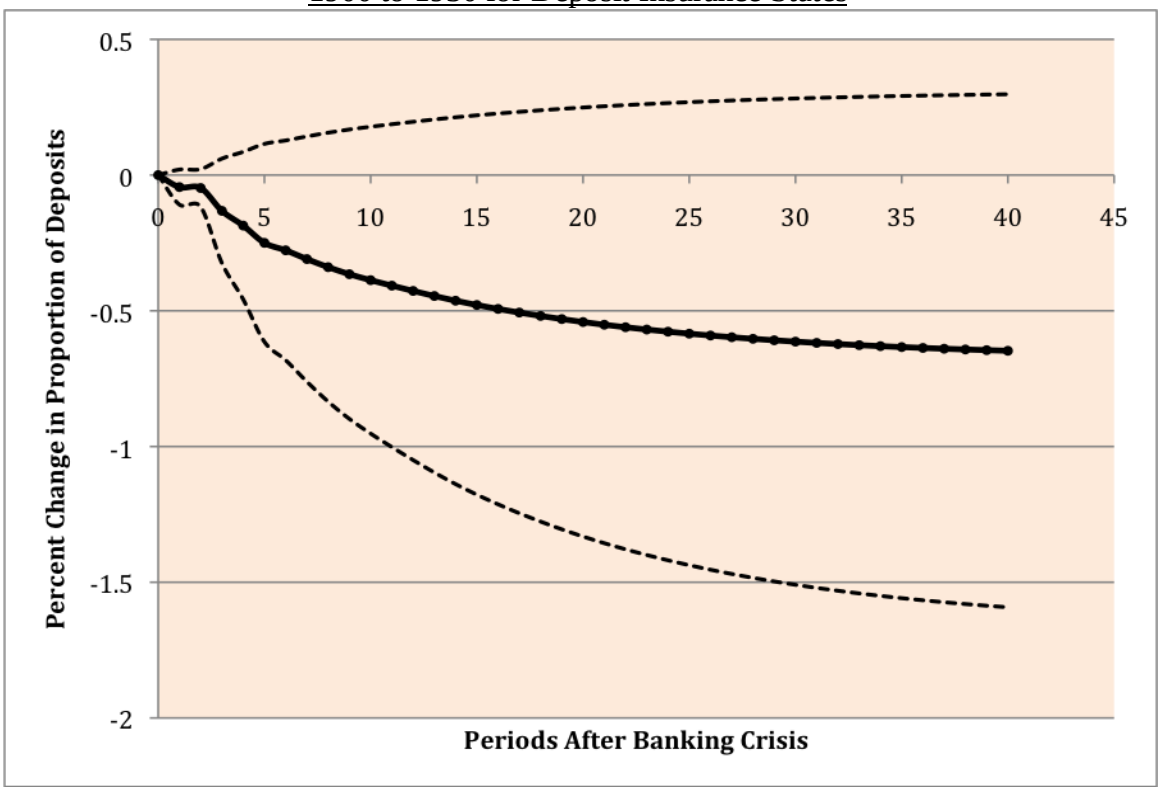
This figure plots the dynamic effects of a banking crisis on state deposits as implied by the regression model. The bands represents 95 percent confidence intervals.

Table 3
GMM Regression Results: 1900 to 1930 for Deposit Insurance States

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
$D_{k,t-1}$	0.820***	0.688***	0.688***	0.690***	0.667***
	(0.064)	(0.111)	(0.114)	(0.029)	(0.119)
$D_{k,t-2}$		0.154	0.193	0.169	0.180
		(0.108)	(0.139)	(0.141)	(0.144)
$D_{k,t-3}$			-0.061	-0.245*	-0.253*
			(0.114)	(0.142)	(0.145)
$D_{k,t-4}$				0.249**	0.171
				(0.115)	(0.143)
$D_{k,t-5}$					0.107
					(0.119)
$Spread_{k,t-1}$	0.016	0.008	0.005	0.006	0.006
	(0.015)	(0.018)	(0.018)	(0.018)	(0.018)
$Spread_{k,t-2}$		0.000	0.006	0.011	0.012
		(0.017)	(0.021)	(0.021)	(0.021)
$Spread_{k,t-3}$			-0.004	-0.024	0.023
			(0.016)	(0.020)	(0.020)
$Spread_{k,t-4}$				0.020	0.011
				(0.017)	(0.020)
$Spread_{k,t-5}$					0.014
					(0.017)
$Crisis_{k,t-1}$	-0.027	-0.032	-0.037*	-0.040*	-0.044*
	(0.020)	(0.021)	(0.022)	(0.022)	(0.023)
$Crisis_{k,t-2}$		0.000	0.010	0.017	0.015
		(0.021)	(0.024)	(0.025)	(0.026)
$Crisis_{k,t-3}$			-0.020	-0.027	-0.029
			(0.024)	(0.026)	(0.027)
$Crisis_{k,t-4}$				-0.014	-0.015
				(0.024)	(0.025)
$Crisis_{k,t-5}$					-0.014
					(0.025)
Implied LT Effects	-0.152	-0.197	-0.262	-0.477	-0.677
	(0.120)	(0.171)	(0.196)	(0.350)	(0.494)
Year effects?	Yes	Yes	Yes	Yes	Yes
Fixed effects?	Yes	Yes	Yes	Yes	Yes
No. Obs.	122	122	122	122	122
Wald Chi-sq	517.77	571.67	553.97	553.71	545.81
Prob > Chi-sq	0.000	0.000	0.000	0.000	0.000

Notes: Dependent variable: $D_{k,t}$, which is defined as deposits in state *k* at time *t*, divided by nationwide deposits at time *t*, all multiplied by 100. "$Spread_{k,t}$" is the interest rate spread. "$Crisis_{k,t}$" is the banking crisis indicator variable. "Implied LT Effects" is the implied long-term effect of "$Crisis_{k,t}$" on $D_{k,t}$. Standard errors are provided in parentheses. *** significant at the 1 percent level or better. ** significant at the 5 percent level. * significant at the 10 percent level.

Figure 2
Effect of Banking Crisis on the Proportion of State Deposits over Time:
1900 to 1930 for Deposit Insurance States



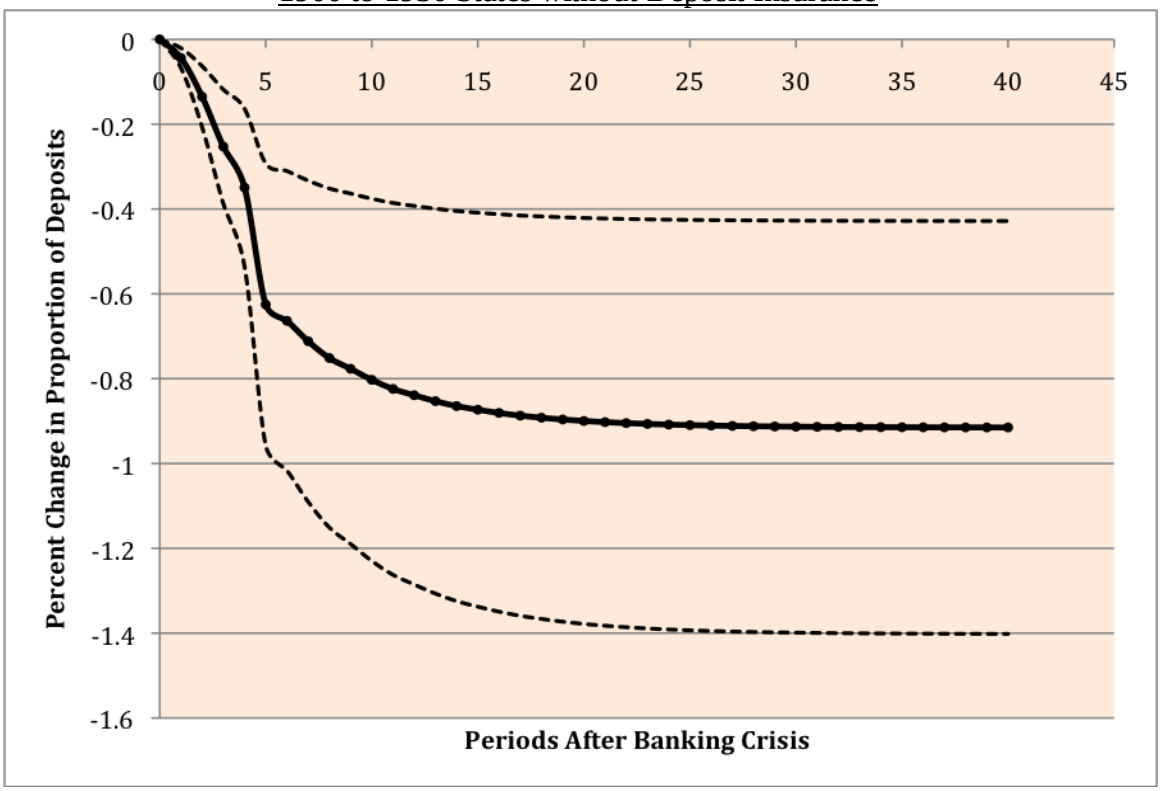
This figure plots the dynamic effects of a banking crisis on state deposits as implied by the regression model. The bands represents 95 percent confidence intervals.

Table 4
GMM Regression Results: 1900–1930 for States without Deposit Insurance

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
$D_{k,t-1}$	0.790***	0.720***	0.729***	0.777***	0.798***
	(0.015)	(0.029)	(0.028)	(0.031)	(0.033)
$D_{k,t-2}$		0.015	-0.249***	-0.237***	-0.287***
		(0.026)	(0.034)	(0.037)	(0.039)
$D_{k,t-3}$			0.291***	0.425***	0.405***
			(0.025)	(0.034)	(0.038)
$D_{k,t-4}$				-0.170***	-0.251***
				(0.027)	(0.037)
$D_{k,t-5}$					0.102***
					(0.029)
$Spread_{k,t-1}$	0.035**	0.031**	0.026*	0.023	0.019
	(0.015)	(0.013)	(0.015)	(0.015)	(0.016)
$Spread_{k,t-2}$		0.019	-0.008	-0.005	-0.009
		(0.015)	(0.015)	(0.015)	(0.016)
$Spread_{k,t-3}$			0.008	0.024	0.020
			(0.015)	(0.015)	(0.016)
$Spread_{k,t-4}$				0.006	-0.005
				(0.015)	(0.015)
$Spread_{k,t-5}$					0.018
					(0.016)
$Crisis_{k,t-1}$	-0.041*	-0.043*	-0.055**	-0.051**	-0.044*
	(0.022)	(0.023)	(0.022)	(0.023)	(0.024)
$Crisis_{k,t-2}$		-0.025	-0.032	-0.024	-0.031
		(0.024)	(0.022)	(0.022)	(0.023)
$Crisis_{k,t-3}$			-0.045*	-0.036	-0.043*
			(0.023)	(0.022)	(0.023)
$Crisis_{k,t-4}$				-0.015	-0.016
				(0.025)	(0.024)
$Crisis_{k,t-5}$					-0.078***
					(0.026)
Implied LT Effects	-0.196*	-0.256**	-0.575***	-0.619***	-0.915***
	(0.119)	(0.125)	(0.171)	(0.229)	(0.243)
Year effects?	Yes	Yes	Yes	Yes	Yes
Fixed effects?	Yes	Yes	Yes	Yes	Yes
No. Obs.	1270	1222	1174	1126	1078
Wald Chi-sq	2655.15	2338.46	2315.42	2148.55	1764.39
Prob > Chi-sq	0.000	0.000	0.000	0.000	0.000

Notes: Dependent variable: $D_{k,t}$, which is defined as deposits in state *k* at time *t*, divided by nationwide deposits at time *t*, all multiplied by 100. "$Spread_{k,t}$" is the interest rate spread. "$Crisis_{k,t}$" is the banking crisis indicator variable. "Implied LT Effects" is the implied long-term effect of "$Crisis_{k,t}$" on $D_{k,t}$. Standard errors are provided in parentheses. *** significant at the 1 percent level or better. ** significant at the 5 percent level. * significant at the 10 percent level.

Figure 3
Effect of Banking Crisis on the Proportion of State Deposits over Time:
1900 to 1930 States without Deposit Insurance



This figure plots the dynamic effects of a banking crisis on state deposits as implied by the regression model. The bands represents 95 percent confidence intervals.

Table 5
GMM Regression Results: 1975–2008

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
$D_{k,t-1}$	0.011	0.010	0.016	-0.005	-0.011
	(0.027)	(0.027)	(0.026)	(0.029)	(0.030)
$D_{k,t-2}$		0.052**	0.058**	0.059	0.050
		(0.026)	(0.026)	(0.027)	(0.030)
$D_{k,t-3}$			-0.087***	-0.088***	-0.088***
			(0.030)	(0.031)	(0.031)
$D_{k,t-4}$				-0.059*	-0.066**
				(0.031)	(0.032)
$D_{k,t-5}$					-0.008
					(0.043)
$Spread_{k,t-1}$	0.153***	0.085	0.017	0.037	0.050
	(0.043)	(0.059)	(0.058)	(0.059)	(0.061)
$Spread_{k,t-2}$		0.087	-0.049	-0.050	-0.047
		(0.058)	(0.066)	(0.068)	(0.071)
$Spread_{k,t-3}$			0.132**	0.100	0.108
			(0.058)	(0.068)	(0.071)
$Spread_{k,t-4}$				0.027	-0.047
				(0.060)	(0.072)
$Spread_{k,t-5}$					0.074
					(0.061)
$Crisis_{k,t-1}$	-0.033	-0.037	-0.031	-0.026	-0.022
	(0.061)	(0.059)	(0.058)	(0.059)	(0.060)
$Crisis_{k,t-2}$		-0.011	-0.018	-0.017	-0.010
		(0.058)	(0.055)	(0.056)	(0.057)
$Crisis_{k,t-3}$			-0.001	-0.003	0.010
			(0.006)	(0.056)	(0.056)
$Crisis_{k,t-4}$				0.053	0.059
				(0.058)	(0.057)
$Crisis_{k,t-5}$					0.081
					(0.059)
Implied LT Effects	-0.033	-0.052	-0.048	0.012	0.106
	(0.061)	(0.088)	(0.097)	(0.108)	(0.124)
Year effects?	Yes	Yes	Yes	Yes	Yes
Fixed effects?	Yes	Yes	Yes	Yes	Yes
No. Obs.	1581	1530	1479	1428	1377
Wald Chi-sq	12.75	18.86	23.44	26.41	26.30
Prob > Chi-sq	0.000	0.000	0.000	0.000	0.000

Notes: Dependent variable: $\Delta D_{k,t}$, which is defined as the change in deposits in state *k* at time *t*, divided by nationwide deposits at time *t*, all multiplied by 100. "$Spread_{k,t}$" is the interest rate spread. "$Crisis_{k,t}$" is the banking crisis indicator variable. "Implied LT Effects" is the implied long-term effect of "$Crisis_{k,t}$" on $D_{k,t}$. Standard errors are provided in parentheses. *** significant at the 1 percent level or better. ** significant at the 5 percent level. * significant at the 10 percent level.

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