

The Texas Banking Crisis and the Payments System

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The purpose of this article is to establish empirically the significant effect the Texas banking crisis had on check-clearing within and outside the Federal Reserve System. Historically, banking crises often caused or exacerbated a decline in real economic activity, resulting in lost jobs and income. The Federal Reserve System, along with other government programs, limited the damage from the Texas banking crisis.

As our nation's central bank, the Federal Reserve System plays a vital role in promoting a smoothly functioning economy. The Federal Reserve pursues basic macroeconomic goals of price stability and full employment in fulfilling its responsibilities for monetary policy, banking supervision, and payments-system operations. By providing payments-system services, such as electronic transfers and check-processing, the Federal Reserve facilitates the exchange of funds that is necessary to complete economic transactions. This third role, to provide efficient clearing of payments, frequently goes unnoticed. Most individuals do not know how the checks they deposit are collected. And if the system keeps on working as well as it has in the recent past, they probably never will.

Completing the payments required in economic transactions involves risks.¹ Banks expose themselves to financial risks by accepting for deposit checks drawn on other banks, especially when the banks clear these payments among themselves through clearinghouses or correspondent banks.² These risks increase during periods of economic and financial stress.

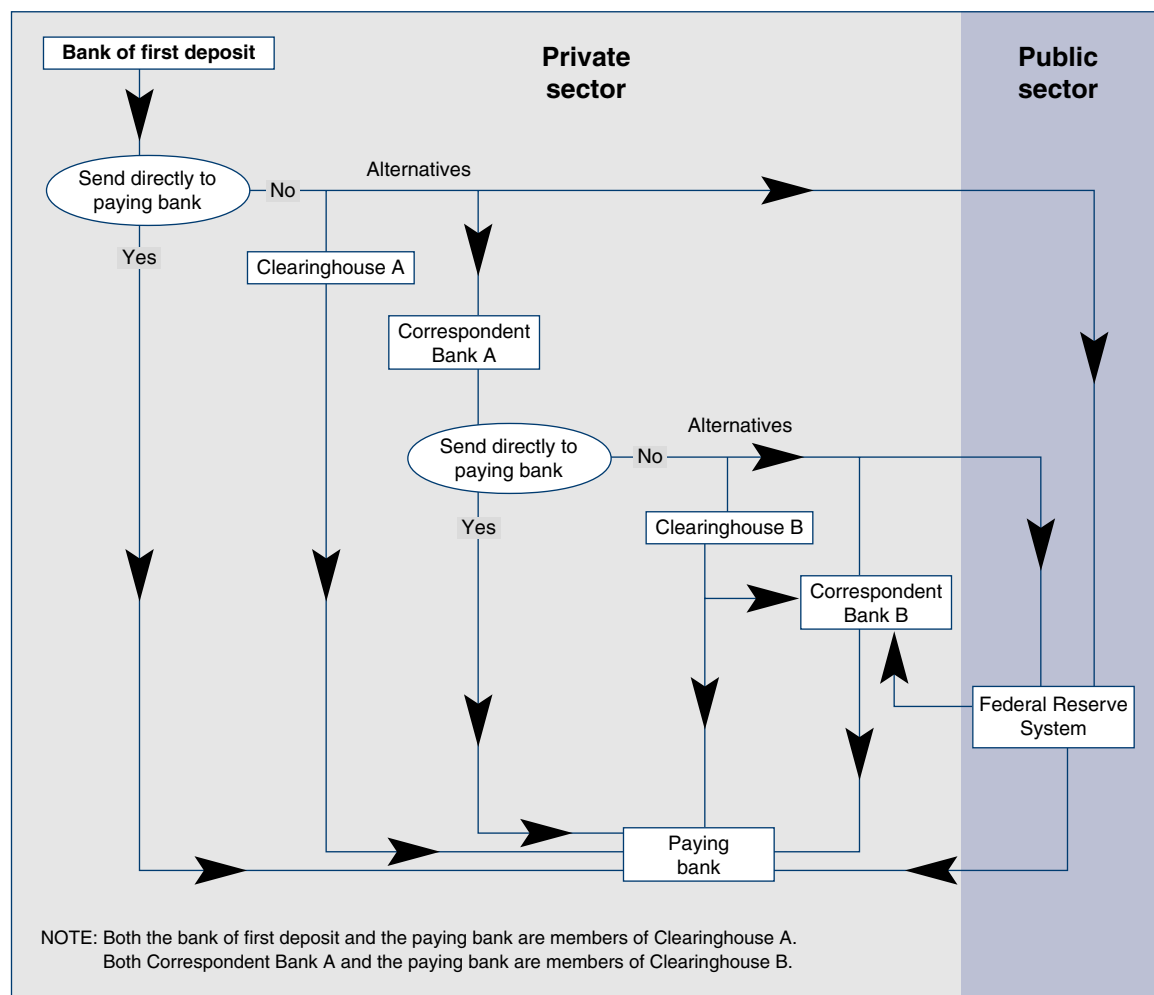
The Federal Reserve System offers an alternative to clearing payments through clearinghouses and private wire transfer networks. Banks that use the Fed's payment services reduce their risk exposure. Therefore, during periods of financial stress, the Federal Reserve provides a safer means of completing payments, permitting economic transactions to continue without worry about how the payments will clear.

The purpose of this article is to establish empirically the significant effect the Texas banking crisis had on check-clearing within and outside the Federal Reserve System. Historically, banking crises often caused or exacerbated a decline in real economic activity, resulting in lost jobs and income. The Federal Reserve System, along with other government programs, limited the damage from the Texas banking crisis. One factor minimizing the spillover effect of the banking crisis to the nonfinancial sectors was the Fed's providing a safer method of clearing payments.

How checks are cleared

A check can be cleared—that is, presented to the bank on which it was drawn—by several different methods in the private sector. The bank that receives the check in deposit is called the *bank of first deposit* (BOFD); the bank on which the check is drawn is called the *paying bank*. The BOFD can present the check directly to the paying bank, present the check through a clearinghouse, or engage the services of a correspondent

Figure 1
Alternative Ways to Present a Check for Collection



bank to present the check to the paying bank.³ The collecting bank could physically present the check directly to the paying bank and demand payment in what is called *direct presentment* (Figure 1). But with nearly 27,000 depository institutions in the United States, it would be highly inefficient and costly to deliver checks to every paying bank nationally or even regionally. To improve efficiency, banks within a city or region often form clearinghouses where participating banks present the checks drawn on all the other participating banks (Clearinghouse A in Figure 1). About 20 percent of all U.S. financial institutions are members of clearinghouses, which range in size from two to more than 600 members.⁴ Membership in a clearinghouse association offers a financial institution a low-cost alternative to paying an intermediary for check collection services. Member institutions in the generally nonprofit associations establish rules regarding how and when they present checks and credit/debit accounts through the exchange.

When a BOFD receives a check for deposit drawn on a bank that is not a member of its clearinghouse, it must use an alternate method to present the check. Direct presentment is still an option, but it could be costly. The BOFD often deposits the check at a correspondent bank (Correspondent Bank A in Figure 1). Correspondent banks, often called simply *correspondents*, are usually large commercial banks that clear substantial volumes of checks. These banks have established extensive arrangements to clear checks, maintain equipment to sort checks, and contract for air and ground transportation to deliver checks regionally or nationally. A bank using the services of a correspondent is called a *respondent bank* or a *respondent*. Staying within the private sector, the correspondent can present the check directly to the paying bank, or indirectly through a clearinghouse where both the correspondent and the paying bank are members (Clearinghouse B in Figure 1), or it can present the check to another correspondent (Correspondent Bank B in Figure

1) that services the paying bank, either directly or through a clearinghouse.

The Federal Reserve Banks offer check-clearing services similar to those correspondents offer. Any U.S. depository institution can purchase payment-clearing services from the Federal Reserve.⁵ The Fed presents the checks either directly to the paying bank or the paying bank's correspondent (or third-party processor) or transports the checks to another Federal Reserve facility for direct presentment to the paying bank or the paying bank's correspondent (or processor). The Fed operates a network of forty-six Federal Reserve Banks, branches, and Regional Check Processing Centers to clear checks. This system supports the Federal Reserve's task of providing sorting and transportation of checks drawn on any depository institution in the country. The Federal Reserve clears approximately one-third of the total checks written and presented for collection to institutions.

In check collection, the Federal Reserve competes most directly with correspondents. The Federal Reserve Banks' largest competitors, however, are also their largest customers. Correspondents often use the Federal Reserve to collect checks drawn on paying banks that are not members of a mutual clearinghouse or that can be presented more economically by being passed to the Federal Reserve for handling.

A closer look at correspondent banking relationships

Many smaller institutions clear most or all payments through correspondents. Correspondents typically operate on either a regional or national basis. Regional correspondents rely on either the Federal Reserve Banks or national correspondents to collect checks on more remote banks. National correspondents compete with the Federal Reserve on a national level, presenting checks for payment to as many as 200 other institutions.⁶ A correspondent also may handle wire transfers and provide automated clearinghouse (ACH) services for other institutions.

Correspondents provide a variety of services in addition to payment processing and clearing. These include currency and coin services, Treasury tax and loan (TT&L) clearing, securities safekeeping and clearing, securities purchase, federal funds purchase and sales, cash management, investment services, credit card services, data processing, international banking, trust services, and loan participations. The Federal Reserve provides only some of these services. Service bureaus and third-party processors are alternative service providers in payment-clearing,

data processing, international banking, safekeeping, and credit card services.

In a correspondent relationship, the respondent typically keeps balances with the correspondent for the purpose of clearing payments. The respondent's primary risk in this relationship is that the correspondent could fail, and the respondent could lose the uninsured portion of the clearing account. Furthermore, if the respondent has lent federal funds to the correspondent, these uninsured funds could be lost. Even if the funds are not lost, access to them could be disrupted while the federal deposit insurer is closing the correspondent.

The risk exposure of the correspondent to a respondent's failure is less than that of the respondent to the correspondent's failure. Correspondents expose themselves to risk if they are providing credit to the respondent, usually as very short-term credit, such as federal funds sold. If the respondent were to fail, the correspondent would return the checks drawn on the respondent to the bank of first deposit. Thus, the correspondent protects itself from risk of loss, but it may incur a significant cost in returning these checks.

Probably the most important event in making respondents aware of their risk exposures was the collapse of Continental Illinois National Bank in 1984. While no respondent lost funds in Continental, the respondents became aware that losses were possible, depending on the Federal Deposit Insurance Corporation's (FDIC) method of resolving the bank failure.

Continental's financial condition deteriorated rapidly during spring 1984. On May 17, the FDIC, the Federal Reserve System, and the Comptroller of the Currency announced a temporary assistance program. In June 1984, the FDIC estimated that 2,299 commercial banks held deposits at Continental and that 179 of these banks might fail if Continental failed. Furthermore, Continental had been active in international financial markets, prompting concerns that its failure could trigger an international financial crisis. The FDIC designed an assistance program for the Continental collapse that protected all of Continental's respondents and correspondents from loss.

Continental's collapse made banks much more aware of their risk exposure in correspondent banking relationships, although preliminary reports seriously overestimated the problem's severity.⁷ While regulators treated Continental's continued operation as essential to maintaining stable financial markets, small banks were concerned that other correspondents might not be considered "too big to fail." Alternative FDIC responses to bank failures, such as liquidation,

might cause respondents with deposits above the insured limits to lose the uninsured portions of their deposits.

In times of financial stress, such as occurred in the Eleventh Federal Reserve District in the late 1980s, banks seek to lower their risk exposure.⁸ The Federal Reserve offers a risk-free alternative method of collecting payments. While the Federal Reserve requires banks to maintain an account, there is no risk that the Fed could fail. Therefore, the balances in these Fed accounts are safer than if respondents deposited them at correspondents. By risk-free, we mean there is no danger the Federal Reserve will fail as the payment processor. The party seeking payment still may not be paid if the bank on which the payment is drawn refuses to honor the check because it is drawn on insufficient funds, has an invalid endorsement, is forged, or for a variety of other legal reasons. But these reasons have a well-established precedent in law, and the procedures to return the payment are well-defined.

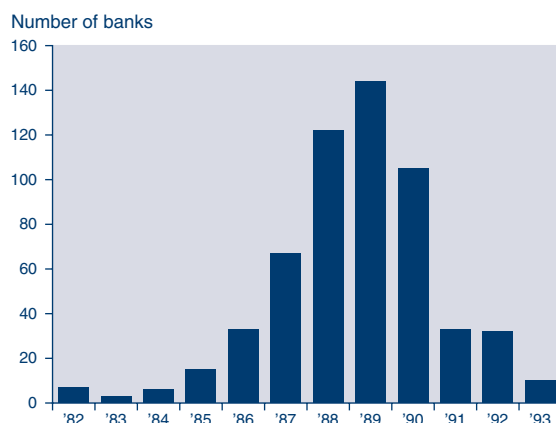
If respondents become concerned that their correspondent might fail, they could present their checks for collection through the Federal Reserve and avoid the risk exposure associated with clearing through the correspondents. Similarly, if the financial condition of a broad cross-section of respondents were to deteriorate, correspondents could decide their risk exposure in providing correspondent services is too large and exit the business. Their exit would leave some respondents and their customers with limited access to wholesale banking services.

Breakdown in correspondent banking during the Texas banking crisis

Financial institutions in the Eleventh District suffered unprecedented upheaval in the 1980s. Oil prices weakened in 1982 and virtually collapsed in 1986, precipitating a host of asset-quality problems at the District's financial institutions. In addition, severe overbuilding created a glut of commercial real estate space. Return on average assets of District commercial banks turned negative in 1986. Problems with business loans surfaced initially, but problem real estate loans eventually overshadowed them. Commercial bank failures in the Eleventh District rose sharply in the latter half of the 1980s, as shown in Figure 2.⁹

Thrift institutions in the Eleventh District suffered even more severe losses during this period. Nearly half of all District thrifts were insolvent at the end of 1988. At the end of 1989, less than one-fourth of the thrifts in the District were both profitable and solvent. The number of thrift closures would have been extremely high,

Figure 2
Eleventh District Commercial Bank Failures, 1982–93



but inadequate funding of the Federal Savings and Loan Insurance Corporation (FSLIC) prevented thrift regulators from aggressively closing insolvent thrifts through most of the 1980s.

Financial-sector difficulties in the Eleventh District reached heights not observed since the Great Depression. Unlike the events that occurred during the 1930s, though, widespread financial panic was not evident. Depositor confidence in the latter half of the 1980s was maintained, primarily due to the existence of federal deposit insurance. While not without serious unintended consequences, the federal guarantee of deposits was successful in averting widespread financial market instability, despite epidemic commercial bank and thrift failures.¹⁰ However, as evidence mounted that several large financial institutions in the Eleventh District were facing severe problems, some large, uninsured depositors moved their funds elsewhere. This movement of funds presumably reflected the fear that deposits in excess of insured limits might be lost.¹¹

Widespread instability was also averted by several innovative techniques for resolving financial-sector distress. New resolution techniques implemented by the FSLIC and the FDIC were often successful in achieving an orderly transition in cases of thrift and commercial bank insolvencies.¹² Moreover, legislation passed in 1980 extended Federal Reserve discount window privileges to all depository institutions, providing an additional tool for averting a financial crisis.

As conditions in the Eleventh District's financial community began to erode, correspondent banking relationships became strained and sometimes broken. After several small institutions failed during the early years of decline, correspondents closely monitored respondents.

Any negative speculation about a respondent's condition often caused a correspondent to stop payment-processing or sever the relationship with the respondent completely. The Federal Reserve frequently became the payments processor for these respondents.

As the decline continued and the financial health of larger institutions deteriorated, the concerns reversed. The financial instability of many of the District's large correspondents caused respondents to seek other payment-processing arrangements. The number of changes in payment-processing arrangements increased by 57 percent in the years following the failures of the largest District banks.¹³

An empirical test

While anecdotal evidence is interesting, a statistical test of the effect of bank conditions on Federal Reserve check-clearing volumes is necessary to control for other factors that might have affected Fed check-clearing operations. We therefore constructed and estimated a model of check-processing volumes at the twelve Federal Reserve Districts.

In the model, Federal Reserve check-processing volumes are assumed to be related to the level of economic activity within each Federal Reserve District and the state of the banking industry within each District. The following regression equation is estimated:

$$(1) \quad CHECKS = \beta_0 + \beta_1 * ECONOMY + \beta_2 * FINANCIAL + E,$$

where *CHECKS* represents the total volume of checks processed at each Federal Reserve.¹⁴ *ECONOMY* is an employment measure included to control for business-cycle effects on the volume of check-clearing. *FINANCIAL* represents variables used to proxy for the financial condition of the banking industry, and *E* is a random error. The number of checks processed by each Federal Reserve District is published in the Planning and Control System Quarterly Data, Division of Federal Reserve Bank Operations, Board of Governors of the Federal Reserve System.¹⁵

The economic activity variable, *ECONOMY*, is nonagricultural employment in each Federal Reserve District.¹⁶ This variable is estimated by the Federal Reserve Bank of Dallas, using annual county-level data and monthly state-level data, with an adjustment for industrial mix by county. The number of checks processed is expected to be positively correlated with economic activity.

Three different measures of financial-sector condition are tested. First, the ratio of nonper-

forming loans to total loans at District commercial banks is expected to have a positive impact on the volume of checks processed by the Federal Reserve. That is, as nonperforming loans increase, indicating a deteriorating banking sector, the volume of checks processed by the Federal Reserve should rise. Second, the capital ratio of District commercial banks is also used to gauge the strength of the banking sector.¹⁷ Here, a negative relationship is expected. As the capital ratio declines, the volume of checks processed should rise, if indeed the Federal Reserve is acting as the "processor of last resort." Third, the number of bank failures in each District is included as an explanatory variable to measure financial turmoil. The expected sign on the bank failure variable is positive. We obtained the bank financial ratios from the Report of Condition and Income and the number of bank failures from the Federal Deposit Insurance Corporation.

The data are a pooled time series cross-section utilizing the twelve Federal Reserve Districts over the period from fourth-quarter 1982 to fourth-quarter 1993. Using cross-section data should improve the quality of the test by increasing the variability of explanatory variables. Furthermore, the Eleventh District was not the only District that experienced a weak financial sector. Including other Districts decreases the likelihood that an increase in Federal Reserve check-processing volume would be inappropriately attributed to financial-sector weakness.

Because pooled data are used, an error components model was assumed in the estimation procedure. The assumption underlying this model is that the disturbance term in the regression is composed of three independent components: one component associated with time, one associated with the cross-section units, and the third component is assumed to vary in both time and spatial dimensions.

In the following model:

$$y_{it} = \sum_{k=1}^p X_{itk} \beta_k + \epsilon_{it}; \quad i = 1, \dots, N; \quad t = 1, \dots, T,$$

N is the number of cross-sections, *T* is the length of the time series, and *p* is the number of independent variables. Under the error components model, the random errors, ϵ_{it} , are assumed to have the following decomposition:

$$\begin{aligned} \epsilon_{it} &= u_i + v_t + w_{it}, \\ u_i &\sim N(0, \sigma_u^2), \\ v_t &\sim N(0, \sigma_v^2), \text{ and} \\ w_{it} &\sim N(0, \sigma_w^2). \end{aligned}$$

The individual error components are assumed to

satisfy the following conditions:

$$\begin{aligned} E(u_i v_i) &= E(u_i w_{it}) = E(v_i w_{it}) = 0, \\ E(u_i u_j) &= 0 \quad (i \neq j), \\ E(v_i v_s) &= 0 \quad (t \neq s), \\ E(w_{it} w_{is}) &= E(w_{it} w_{jt}) = E(w_{it} w_{js}) = 0 \\ &\quad (i \neq j; t \neq s). \end{aligned}$$

Generalized least squares estimation produces consistent parameter estimates.¹⁸ Because the estimates of the first-order autocorrelation coefficients are very close to 1, first differences of all the variables (in logs) are used in the estimation (with the exception of the bank failure variable).¹⁹

Several different tests are conducted for determining the appropriate pooling method. The tests show that the error components approach is statistically superior to the hypothesis that no differences existed across Federal Reserve Districts, and it is superior to the hypothesis that the inter-District differences are fixed effects.

The results of estimating equation 1 appear in Table 1. Four models are tested, all of which show that Federal Reserve check-processing volumes are positively correlated with the level of economic activity. Models 3 and 4 utilize the capital ratio as the indicator of bank financial condition; it is significant, with the expected sign in both cases. Models 1 and 2 use nonperforming loans as the indicator of bank condition; it is insignificant in explaining Federal Reserve check-processing volumes. Similarly, bank failures, which are included in models 1 and 3, are insignificant as an explanatory variable.

These results support the hypothesis that banks increase their use of Federal Reserve check-clearing services when banking conditions deteriorate. Banks appear to be most concerned about bank capitalization.²⁰ This implies that banks have foresight and act in anticipation of potential bank failures. The insignificance of the bank failure variable suggests that respondent and correspondent banks respond before the banks actually fail. This evidence is consistent with Federal Reserve attempts to maintain a smoothly functioning payments system in the face of unprecedented financial-sector distress.

The insignificance of nonperforming loan ratios in models 1 and 2 suggests that banks are more focused on the immediate indicator of failure, bank capitalization, rather than on an indicator of potential future reductions in capital. Nonperforming loans may be an indicator of future declines in capital, but a well-capitalized bank could sustain higher than average nonperforming loans and remain solvent.

A final test is conducted to determine if the

relationship between the financial condition of banks and the volume of Federal Reserve check-clearing existed only in those Federal Reserve Districts that could be characterized as suffering severe banking crises. This is done by including an interaction term, which is the cross-product of the measure of banking difficulties with a dummy variable for each of the Federal Reserve Districts. The results are not affected. In models that included nonperforming loans (1 and 2), the employment variable remains significant, and the only interaction terms that are significant are for the Eighth and Tenth Districts. For models with capital ratios (3 and 4), the employment variable and capital variable are statistically significant, while none of the interaction terms is significant. This test implies that banks across the country were sensitive to the financial condition of the banking industry in their Districts when deciding on a check-processing arrangement.

The impact of the Texas banking crisis on Federal Reserve payment services

The financial industry problems not only caused an increase in checks processed by the Fed's Eleventh District operations, as shown above, but also increased the amount of handling these checks required. Eleventh District check-processing volume increased by 9.8 percent from 1987 to 1989, while the other Federal Reserve Districts averaged only a 2.8-percent increase. The above-average increase in the Eleventh District was largely attributed to increased check volume from banks with total deposits between \$30 million and \$500 million. Check volume from these banks cleared through the Fed increased by more than 50 percent between 1987 and 1989 and accounted for 64 percent of the total increase in all checks processed by the Eleventh District Fed.

These small to mid-size institutions were most often respondents that previously cleared payments through correspondents. Often, these institutions viewed their processing with the Federal Reserve as only a temporary arrangement. Because the Fed does not supply all correspondent services, these banks intended to resume payment-processing with a new correspondent. The increase in Eleventh District processed check volume was particularly significant because of the associated check-handling requirements. The Fed's new customers sent most of the additional volume with limited presorting done to the checks. This meant more sorting and handling of the checks by the Reserve Banks.

Various check-processing support areas also faced increased demands and pressures. Frequently, banks requested check collection ser-

Table 1
Determinants of Federal Reserve Check-Processing Volume

Independent variables	Dependent variable: <i>CHECKS</i>			
	Model			
	1	2	3	4
<i>INTERCEPT</i>	.0044 (.004)	.0046 (.005)	.0047 (.004)	.0051 (.004)
<i>EMPLOYMENT</i>	.4792* (.206)	.4697* (.206)	.5758** (.1954)	.5650** (.1953)
<i>NONPERFORMING</i>	-.006 (.012)	-.007 (.012)		
<i>CAPITAL</i>			-.1655** (.0340)	-.1638** (.0340)
<i>FAIL</i>	0 (0)		0 (0)	
Summary Statistic				
SSE	.2035	.2035	.1981	.1982

* = Significant at the 5-percent level.

** = Significant at the 1-percent level.

vices from the Fed on short notice. The Fed often had to handle these checks on an exception basis until databases could be updated, forms could be delivered, and notifications completed. The new management of failed banks that had been acquired often requested changes in delivery of processed checks and associated accounting information. If the FDIC liquidated a failed paying bank, the Fed had to intercept and return these checks to the BOFD. The additive effect of ownership changes, correspondent changes, liquidations, and branching meant three to four changes daily in sorting procedures for Dallas Office check operations. The updating required to the District's Customer Information System (CIS) database increased significantly from 1986 to 1990. By 1988, updates to the CIS required about four hours of clerical time daily at the Federal Reserve Dallas Office, and half of the requested changes required same-day handling.

Outlook for the future

The Eleventh District banking industry has recovered from its financial difficulties; therefore, the pressure on the payments system has been reduced. The improvement in performance, coupled with the resolution of failed commercial banks, has resulted in a substantial improvement in the health of District commercial banks. Assets held by healthy commercial banks rose from less

than 30 percent of total Eleventh District commercial banking assets in 1988 to 97 percent in third-quarter 1994.²¹ By the end of third-quarter 1994, only 9 percent of the Eleventh District's commercial banks could be characterized as unhealthy, and these were smaller than average banks holding only 3 percent of total commercial banking assets in the District.

The improvement in the health of the Eleventh District commercial banking industry has resulted in increased correspondent banking activity in payment-processing and other services. With consolidated operations and improved efficiencies, the correspondents have improved their competitive position and have seen opportunities to generate fee income. In addition, the risk of providing correspondent services has declined as banking conditions have improved.

As banks have established new correspondent relationships, Federal Reserve service trends again have changed. From 1990 to 1993, the Eleventh District saw a 1.3-percent increase in checks submitted for processing and collection, versus a 12-percent increase from 1985 to 1989. As correspondents attempt to avoid costs and optimize use of existing check-processing capability, the Eleventh District has received more checks that require little or no machine sorting.

The other significant change resulted from statewide branching of the large holding compa-

nies. As bank holding companies consolidated their affiliated banks into branches, they changed their check routing numbers to that of the lead bank in the holding company. This change created a substantial shift in workload at the Dallas Fed, with additional checks deposited early in the day for processing. The workload shift required changes in personnel, work schedules, and assigned duties.

The Federal Reserve provides a needed safety valve

The Federal Reserve System provides a risk-free method of clearing payments. The account balances held at the Federal Reserve that are necessary to clear payments are not exposed to risk even during periods of financial crisis. Some have called the Federal Reserve the “processor of last resort.” A more accurate description would be that in a financial crisis, there is a “flight to quality.” Our empirical test demonstrates that Federal Reserve check-processing volumes rose when banking conditions deteriorated.²² The Fed represents the safest method of clearing payments.

If the Federal Reserve could not provide this risk-free payment-clearing service, then turmoil in the financial markets could have negative effects on the economy. Difficulty in determining how the payment for a transaction would clear might hamper the sales of goods and services. Such problems would place an additional cost on businesses and could slow an already weak economy. At a minimum, without the Federal Reserve’s payment operations as a backstop, businesses and banks would have to invest in reducing payments-system risk. Banks might need to maintain multiple correspondent relationships, and businesses might alter their policies for accepting payment, such as requiring payments to clear before delivery of goods.

For the Federal Reserve to maintain the ability to respond to a financial crisis, it must maintain an ongoing payment-clearing operation that can be expanded as necessary. Such operations are complex and cannot be established overnight. A financial crisis can develop faster than the Fed could establish a payment-clearing operation from scratch.

The banking crisis in the Eleventh District is an example of the Federal Reserve’s response to the temporary needs of financial institutions during a crisis. Now that the Eleventh District’s economy and its banking industry have recovered, the Fed’s role in clearing payments has diminished. Perhaps the one positive result of the regional economic downturn and the banking crisis that followed was the test of the Federal

Reserve System’s ability to clear payments and minimize spillover from the banking crisis to the payments system.

Notes

- ¹ Before the creation of the Fed, the risk involved in accepting a check as payment was more explicit. Parties accepting checks often discounted the face value to reflect the cost and risk of clearing. One reason for creating the Fed was to establish on-par clearing of checks. On-par clearing requires that a check not be discounted—that is, that it be accepted for its full face value.
- ² The term *bank* is used in this article to refer to any depository institution, including commercial banks, savings and loan associations, mutual savings banks, and credit unions. Where necessary to make a distinction, the term *commercial bank* is used to refer to institutions chartered by the Office of the Comptroller of the Currency or state banking agencies and typically insured by the Bank Insurance Fund managed by the Federal Deposit Insurance Corporation (FDIC).
- ³ If a check drawn on one bank is deposited by another customer of the same bank, then there is no collection process. The bank simply debits the account of the party that wrote the check and credits the account of the party that deposited the check.
- ⁴ U.S. General Accounting Office (1989, 37).
- ⁵ The Depository Institution Deregulation and Monetary Control Act of 1980 mandates that Federal Reserve services be available to all U.S. depository institutions and that the Fed charge an appropriate price for these services. Fed pricing is set as a markup over costs, with an adjustment factor for the profits the private sector would require and the taxes the private sector must pay.
- ⁶ U.S. General Accounting Office (1989, 12).
- ⁷ For a detailed analysis of the number of likely commercial bank failures that might have resulted from the Continental failure, see the staff report entitled “Continental Illinois National Bank Failure and Its Potential Impact on Correspondent Banks” in U.S. House of Representatives (1984).
- ⁸ The Eleventh Federal Reserve District includes Texas, northern Louisiana, and southern New Mexico.
- ⁹ For more on the performance of Eleventh District financial institutions in the past decade, see Robinson (1990).
- ¹⁰ For more on the problems associated with federal deposit insurance, see Kane (1989, 1985). Subsidized deposit insurance with uniform premiums encouraged bankers to take greater risks and discouraged depositors from carefully monitoring banks’ risks.
- ¹¹ For example, as FirstRepublic Bank’s troubles became increasingly apparent, depositors began shifting their

funds to safer institutions. From December 1987 to mid-February 1988, FirstRepublic lost a total of \$1.14 billion in average deposits (Apcar 1988).

¹² For a discussion of these new techniques and their related problems, see Cole (1990) and Kane (1989).

¹³ Each change in processing arrangement required an update to the Eleventh District's Customer Information System (CIS). Numerous updates to the CIS reflected the shift of clearing arrangements and the commercial bank merger activity driven largely by commercial bank failures. In the two years before 1988, the average annual number of changes in correspondent banking relationships was 237.5 in the Dallas Office of the Eleventh District. The failures of major Eleventh District commercial banks began in 1988. In the following three years, the average number of changes in correspondent bank relationships rose to an estimated 373 in the Dallas Office. By comparison, in 1993, there were only 184 changes in the Dallas Office's correspondent banking relationships.

¹⁴ While the optimal dependent variable would probably be market share, such data do not exist.

¹⁵ One variable that would have improved the model is, of course, the price of Federal Reserve check-clearing services relative to private-sector prices. Unfortunately, such pricing data do not exist. Anecdotal evidence indicates that the Fed was receiving the costlier checks to clear, which would drive up the Fed's prices relative to the private sector. This relative price effect would be in the opposite direction of the empirically significant effect that banks seek safer clearing arrangements in chaotic times.

¹⁶ Retail sales may be a better measure of economic activity that would correspond to the need to clear checks. Unfortunately, it is not possible to construct a retail sales variable by Federal Reserve District. A test of this model based solely on Texas retail sales data and Eleventh Federal Reserve District check-clearing was not materially different in results. Furthermore, the Pearson correlation coefficient between retail sales in Texas and employment in Texas was 0.97.

¹⁷ The capital ratio is the Tier I equity-to-asset ratio.

¹⁸ See Fuller and Battese (1974).

¹⁹ While there may be some concern that the model is picking up a secular trend of declining capital ratios and increasing Federal Reserve check-clearing volumes, the fact that the model is estimated in first differences and that there is no evidence of residual autocorrelation alleviates such concerns.

²⁰ Current capital ratios are released on a lagged basis, especially for small banks. Tests with lagged values of capital ratios were insignificant. This result suggests that banks have knowledge of the financial condition of their correspondents and respondents, and the current capital ratio is a reasonable proxy for this knowledge.

²¹ A simple definition of a healthy commercial bank is one

with a capital ratio at least a half of a percent above regulatory minimums, troubled assets less than 3 percent of total assets, and profits.

²² The Eleventh Federal Reserve District is not the only example. See Clair, Kolson, and Robinson (1994) for details of the effects of the Rhode Island crisis and the failure of the Bank of New England on Federal Reserve check-clearing.

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