Wharton

Financial Institutions Center

The Effect of TBTF Deregulation on Bank Cost of Funds

by
Lazarus Angbazo
Anthony Saunders

97-25

The Wharton School
University of Pennsylvania

THE WHARTON FINANCIAL INSTITUTIONS CENTER

The Wharton Financial Institutions Center provides a multi-disciplinary research approach to the problems and opportunities facing the financial services industry in its search for competitive excellence. The Center's research focuses on the issues related to managing risk at the firm level as well as ways to improve productivity and performance.

The Center fosters the development of a community of faculty, visiting scholars and Ph.D. candidates whose research interests complement and support the mission of the Center. The Center works closely with industry executives and practitioners to ensure that its research is informed by the operating realities and competitive demands facing industry participants as they pursue competitive excellence.

Copies of the working papers summarized here are available from the Center. If you would like to learn more about the Center or become a member of our research community, please let us know of your interest.

Anthony M. Santomero
Director

The Working Paper Series is made possible by a generous grant from the Alfred P. Sloan Foundation

The Effect of TBTF Deregulation on Bank Cost of Funds [1]

September 1996

Comments Welcome

Abstract: This paper tests the hypothesis that changes to the "too-big-to-fail" (TBTF) doctrine under the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) increased the risk of deposit loss and the cost of funds for large banks. Furthermore, the paper analyzes the implications of the National Depositor Preference Law of 1993 on the priority, risk, and cost of non-deposit funds in banking. One consistent finding is that the systematic risk coefficient for large banks declined sharply after the passage of FDICIA. In addition, the average cost of deposits and non-deposit funds were lower in the later period, consistent with a generally lower level of interest rates as well as a reduction in the required risk premium. The data did not show a corresponding decline in the systematic risk or cost of funds for small banks. Finally we examined the stock market reaction of the sample banks to the events leading up to FDICIA's passage. In general, the distribution of wealth effects is consistent with the hypothesis that the impact of reduced deposit coverage for failing banks was confined to the large bank segment.

This paper was presented at the Financial Institutions Center's conference on Performance of Financial Institutions, May 8-10, 1997.

[1]Lazarus Angbazo is at the Krannert Graduate School of Management, Purdue University, West Lafayette, IN 47907, Telephone: (317) 494-4504, e-mail: langbazo@vm.cc.purdue.edu.

Anthony Saunders is at the Stern School of Business, New York University, New York, NY 10012, Telephone: (212) 998-0711, e-mail: asaunders@rnd.stern.nyu.edu.

1 Introduction

The purpose of this paper is to determine the impact of the Federal Deposit Insurance Improvement Act of 1991 (FDICIA) and the National Depositor Preference Law of 1993 on the cost of non-deposit liabilities. In particular, we compare the average cost of funds and market values of large banks to that of small banks to determine whether restrictions to the much criticized "too-big-to-fail" (TBTF) policy increased the risk and hence the required rates on large bank deposits. Secondly, we examine the cost and proportion of non-deposit funds in large banks before and after the passage of the Omnibus Budget Reconciliation Act of 1993 (OBRA93) to determine whether the preference law increased the risk and cost of these funds for banking institutions.

The banking literature suggests that deposit insurance, and especially the traditional use of the TBTF doctrine in large bank failures introduced wealth effects directly through a deposit-linked subsidy. Under the policy, all depositors (insured and uninsured) in large banks were implicitly insured beyond the $100,000 limit. The accompanying reduction in risk premium required by depositors amounted to a subsidy which directly increased profits and market values.[1] However the new limits on TBTF may increase the likelihood of deposit loss, causing uninsured depositors to require a higher interest compensation.

There is also an indirect effect stemming from increased risk-taking in-

[1] Likewise, the TBTF banks have traditionally depended on foreign deposits as an important source of funds. These deposits are not included in the base on which premiums are calculated. Therefore, large banks may have been paying disproportionately lower premiums.

centives under the previous too-big-to-fail policy. The 100% deposit coverage eliminated the incentives for depositors to be more sensitive to the financial soundness of their banks. As a result, a shareholder-wealth maximizing TBTF-bank had the incentive to increase portfolio risk and thus increase expected profits. One possible result is that an unexpected announcement of the TBTF option during a particular bank failure will cause an upward revision of share prices of covered banks.[2] Under the new restrictions, however, uninsured depositors are expected to be at a greater risk of loss. This should make them more sensitive to the financial soundness of their banks, and in turn reduce the banks' ability to increase risk. The impact of the new limits on TBTF could therefore be to reduce depositor risk, causing the bank cost of borrowed funds to decline (rather than increase).

The impact of FDICIA, and in particular the amendment to TBTF, on the cost of funds may depend on its interaction with the National Depositor Preference Law of 1993. The preference statute was passed as an amendment to FDICIA to minimize the potential loss to the FDIC during a bank failure. The key feature of the statute was the enhancement of the priority of insured and uninsured depositors' claims and an increase in the risk of loss for general non-deposit creditors of banking institutions. With increased risk of loss, the cost of these funds are likely to increase as general creditors demand higher interest compensation.

This paper has three objectives. First, we examine the impact of TBTF restrictions on the cost of funds of commercial banks. As discussed above,

[2] But for firms that the market already expected 100% deposit coverage, there should be no price effect (see O'Hara and Shaw (1990)). Conversely, banks that were considered too-big-to-fail but were not officially covered may be negatively affected due to upward revision in bankruptcy risk.

if these restrictions increased the risk of deposit loss, we should observe an increase in deposit costs as depositors require higher interest compensation. Conversely, bank risk might decline under increased monitoring, causing bank deposit rates to decline. Secondly, we examine the impact of the depositor preference statute on bank cost of funds. To the extent that changes in the order of depositor priority adversely affect the risk of non-deposit creditors, the cost of these funds will increase. On the other hand, if general creditors respond to protect their claims, the proportion and cost of non-deposit funds may decline. This could increase the risk and cost of deposits, contrary to the objectives of the preference statute. Finally, we examine the changes in market values of commercial banks relative to the changes in TBTF and depositor priority to determine whether these changes had any wealth effects and how the effects were distributed by bank size.

The organization of the paper is as follows. In section 2, we provide some background on the scope and potential impact of the legislative initiatives for ending "too-big-to-fail" and restructuring the order of priority of liabilities in a bank. In section 3, we discuss the implications of these legislative changes for bank cost of funds and market values, and we outline the hypothesis to be tested. We describe the sample used in section 4. Section 5 discusses the results and section 6 concludes the paper.

2 Legislative Background

2.1 Deregulation of TBTF

One of the most controversial pieces of the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) was the provision for ex-

tensive changes to the "too-big-to-fail" option (TBTF) that had been available to depository regulators for resolving failing banks. Previously, regulatory agencies were required to select the resolution method that was less costly than the payoff of insured deposits and liquidation of assets (i.e., the lower-than-liquidation method). This requirement provided the option to selectively extend federal protection of deposits beyond the official limit of $100,000 per account, per institution. The option was justified as necessary for preventing problems at larger banks from spilling to the entire banking system—that is, the so-called "systemic risk" basis. But the conclusion of many banking analysts is that the unwillingness to let big banks to fail, or to let their depositors suffer losses, weakened market discipline by freeing big depositors from monitoring their institutions.

With the passage of FDICIA on December 19, 1991, the TBTF option was changed in at least three ways. First, section 141 of the new law requires the FDIC to choose the "least-cost" alternative in resolving failing banks. By requiring that the least costly method (on a present value basis) be selected, the new law effectively limits the policy of protecting depositors above the maximum amount. The only exception to the "least-cost" criteria are banks whose failure would cause "serious adverse effects on economic conditions and financial stability." Provisions of the reform package also required that exceptions to the least-cost criteria be determined jointly by the FDIC, the Federal Reserve, and the Treasury Secretary in consultation with the President. Furthermore, the law requires that the cost of any bail-out under the rule exception be paid-for by the banking industry through a special premium. The size of the assessment per institution would be proportional to each banks average total assets.

In section 142 of FDICIA, the cap on deposit insurance coverage under the restricted TBTF policy was reinforced by explicit reductions on other subsidies provided to banks. Specifically, this section limited the Federal Reserve discount window advances to 60 days within any 120 day period for undercapitalized banks and 5 days for critically undercapitalized banks. Compliance to the new mandates on discount window lending were enforced by requiring the Fed to share in any increase in costs to the insurance fund caused by delayed foreclosure.

While sections 141 and 142 outlined the procedures for minimizing deposit insurance losses from failed banks, section 131 established the provisions for "prompt regulatory action" as an institution's capital declined (prior to insolvency). The provisions require immediate recapitalization, restrictions on deposit gathering, and prompt closure of banks that are persistently undercapitalized. Regulators' incentives to comply with measures for reducing costly bank failures were enforced by a mandatory ex-post review of any failure that causes significant losses to the insurance fund.

Although FDICIA does not explicitly eliminate either the TBTF option or discount window lending, provisions of the new law elevate what was previously a bureaucratic decision to a much more visible political process. Moreover, specific measures which address the "systemic risk" basis for the use of TBTF, including mandated limits on inter-bank liabilities and the use of final settlement by the FDIC in liquidating banks, suggest that the intent of Congress was total elimination of the use of TBTF policy. Accordingly, the expectation of banking industry analysts is that the changes will discourage even limited use of TBTF policy and cause a revision of market perception of the risk of deposit loss.

2.2 National Depositor Preference Law

A relatively obscure but important aspect of the Omnibus Budget Reconciliation Act of 1993 (OBRA93) is the National Depositor Preference Law which immediately overhauled the order of priority of claims in a failed bank.[3] Under the new law domestic depositors' claims are subordinate only to the claims of secured creditors and the administrative expenses of the bank receiver. By contrast, depositors will receive preference over non-deposit creditors such as unsecured creditors, subordinated debentures holders, and shareholders. That is, depositors—both insured and uninsured—would have first claim, after secured creditors and the receivership's administrative expense, against recoveries until their claims are fully settled. Furthermore, the depositor preference law also moved the FDIC ahead of all other non-deposit unsecured creditors in access to the liquidation proceeds.[4] Although this law was passed with little public debate, many banking analysts expect the change in priority to have far-reaching implications for the risk, market values, and cost of funds of banking institutions.

[3] The law is contained in Title III of OBRA93 as an amendment of section II(d)(11) of the Federal Deposit Insurance Improvement Act of 1991 (FDICIA).

[4] Before the national depositor preference law, the FDIC shared on a pro-rata basis with uninsured depositors and general creditors from the liquidation proceeds, once insured depositors were fully settled. Now, the FDIC's potential losses are limited by the higher priority of their claims relative to general creditors. The FDIC's loss is further mitigated by FDICIA's requirement that all failed banks are to be resolved by the least costly method.

3 Implications for Cost of Funds

3.1 The Effect of TBTF Deregulation

The restrictions on TBTF put uninsured depositors of large banks at increased risk, thereby increasing the risk premium on large deposits and purchased funds. On the other hand, FDICIA increases market discipline by large depositors who would have to pay more attention to the financial health of their banks. To the extent that the cost of deposit is influenced by the risk of loss, banks' risk-taking will be abated as they attempt to control costs.[5] Therefore, we investigate the following null hypothesis:

> HYPOTHESIS: AVERAGE COST OF DEPOSITS INCREASED AFTER TBTF DEREGULATION.

If changes to TBTF have the effect of reducing overall bank risk, the data will be inconsistent with the above null hypothesis.

Critics of the antecedent TBTF policy also argued that the policy re-distributed wealth from small banks (non-TBTF) to large banks (TBTF banks). For example, Kane (1985) hypothesized that because the TBTF subsidy accrued only to the banks large enough to be classified as TBTF, while the costs of deposit insurance accrued evenly to all banks, deposit insurance resulted in a negative wealth transfer from the small banks to large banks. Empirical evidence on the value of TBTF to commercial banks is inconclusive. O'Hara and Shaw (1990) find significant wealth effects accruing

[5] Large banks cannot lower their premiums by concentrating on foreign deposits and expect 100% coverage under the revised policy since premiums (which are still based on domestic deposits) are currently scaled to the riskiness of the banks to ensure that actuarially fair rates are paid by these banks.

to TBTF banks, but significant negative effects on non-included banks. By contrast, Mei and Saunders (1993) estimate the value of the TBTF guarantee using an asset pricing model (GMM) but do not find that significant wealth effects are associated with TBTF.[6] We investigate the hypothesis that the loss of a deposit-linked subsidy caused by restrictions on the use of too-big-to-fail for large bank failures generated abnormal negative stock market returns. Specifically, we test the following null hypothesis:

> HYPOTHESIS: LARGE BANK STOCK PRICES REACTED NEGATIVELY TO THE LOSS OF A TBTF-LINKED SUBSIDY AFTER CHANGES TO TBTF POLICY.

Under the previous policy, small banks were charged the same premium as large banks, but did not benefit from additional coverage available to large banks. If the preferential treatment of large banks provided value then the new limits on the use of TBTF for large banks, and the uniform application of the least-cost criteria under the policy reform, should eliminate the wealth redistribution effects.

3.2 The Effect of Liabilities with Depositor Preference

One possible effect of the depositor preference law is to increase the risk of recovery for non-deposit funds in banks by lowering their priority. Depositor preference effectively reduces the losses of the FDIC and uninsured

[6] In an earlier study, Brickley and James (1986) find indirect evidence that broad regulatory discretion in defining insolvency increase the value of (future) access to deposit insurance. The value of this access, which is the cost of deposits net of premium charged for insurance, is a subsidy which increases profitability, and decreases the co-movement of bank stock prices and with the value of their underlying assets.

depositors by redistributing wealth to them from general non-deposit creditors. With increased risk of loss in a large bank failure, these creditors are likely to require a higher interest compensation for their increased exposure, thereby increasing the cost of funds of banks. Therefore we test the following hypothesis:

> HYPOTHESIS: BANK COST OF NON-DEPOSIT FUNDS INCREASED AFTER OBRA93.

Moreover, since large banks traditionally have a larger proportion of these funds, their increase in the cost of non-deposit funds will increase more than for small banks. The following hypothesis follows:

> HYPOTHESIS: BANK COST OF NON-DEPOSIT FUNDS ARE INCREASING IN THE PROPORTION OF THESE FUNDS.

Another effect of the preference law could be a loss of unsecured liabilities. The proportion of these unsecured funds in banks could decline as creditors move their funds in search of quality or as they demand collateral backing to reflect the increased risk of their claims. The non-deposit creditors could also attempt to mitigate their increased risk by shortening their claims' effective maturity. The net effect of these reactions by general creditors is to reduce the risk shield to the FDIC and uninsured depositors, thereby increasing the latter's risk (instead of decreasing), contrary to the intent of the depositor preference law.

Alternatively, if banks decrease their funding in non-deposit liabilities as the cost of these funds rise relative to deposits, the loss protection provided by the non-deposit liabilities will decline.

4 Data and Hypotheses

4.1 Data

The data consist of daily stock returns for a cross-section of national and state chartered commercial banks which are listed on the New York Stock Exchange (NYSE), the American Stock Exchange (ASE), or Over-the-Counter (OTC). To be included in the analysis we require that the sample of banks have no missing returns, nor have firm-specific events that would confound our ability to estimate the impact of FDICIA. The sample period covers 120 days preceding the first public announcement to 120 days after the President's signing of the banking-law reform package.

The tests examine the excess returns on the dates on which new, major information about the new TBTF policy became public. The sequence of events begins on December 20, 1990 (when the Bush Administration's Plan to scrap TBTF was first revealed) and December 20, 1991 (when President Bush signed the new law restricting TBTF). These dates are identified by searching *The Wall Street Journal* index and FDIC news press releases. We identified the 8 events listed on Table 1. The events correspond to the nature of the proposed changes and the likelihood of passage in both Houses of Congress. Although there was wide-spread belief within the banking community that changes to the existing TBTF policy were inevitable, there was considerable uncertainty concerning the extent of the changes. Event 1 reflects the first official disclosure of plans to limit deposit protection while event 8 relates to the President signing. Events 2 and 4 describe the details of the President's proposal and the counter-proposal by Senate Democrats. Events 3, 5, and 6 describe the challenges and likelihood of passage in the

separate House and Senate committees.

The effects of the new limits on TBTF are examined across three bank portfolios which are constructed according to their size. The first portfolio consists of the official TBTF banks while the other portfolios reflect large regional banks and small banks which were not covered. If the new regulation on too-big-to-fail restricts deposit insurance coverage such that failure of insolvent banks becomes more likely, bank stock risk and prices may be revised. The market revision may have a bigger effect on the banks which the Comptroller of Currency (OCC) classified to be too-big-to-fail since they stand to lose more under the restricted TBTF. However, identification of the banks which satisfy the intended list is complicated by the fact that regulatory announcements regarding TBTF initiatives are accompanied by uncertainty about which banks or how many are fully guaranteed.

The data in table 2 suggests that the proportion of recent bank failures with full deposit guarantees ranged from 70.15% (1986) to 92.18% (1993). Thus the *de-facto* too-big-to-fail policy covered a larger number of banks than was implied in the official announcement. Indeed O'Hara and Shaw (1990) find that the market reaction to TBTF policy depends on the market's belief regarding the firm's need for federal assistance, rather than on whether the bank was "officially" too-big-to-fail.[7]

Therefore, following O'Hara and Shaw (1990), we define the sample of too-big-to-fail banks as those listed by the Wall Street Journal (hereafter

[7]Specifically, O'Hara and Shaw notes that while the OCC announced the eligible TBTF banks without identifying the actual firms, the Wall Street Journal mis-identified the eligible firms as the 11 largest banks in the nation as of that date. This list excluded some officially eligible banks while including some larger state banks. See Table 1 in O'Hara and Shaw (1990).

WSJ banks). While the list originally consisted of the 11 largest banks, the number is reduced to 9 banks in our analysis because Manufacturers Hanover Trust and Security Pacific merged with other banks during our sample period. We construct a sample of center large regional banks with asset size greater than $10 billion. This subsample consists of 40 banks which satisfy our sampling requirements. This sample is used to provide evidence on whether the wealth and risk effects associated with changes in TBTF spilled over to non-TBTF, consistent with a contagion effect. Additional evidence on differences in wealth effects is examined by focusing on a sample of small banks, with assets less than $1 billion which are traded over-the counter. The third subsample consists of 15 banks.

Altogether, our sample is roughly identical to O'Hara and Shaw's in terms of both the number of banks (64) and the individual firms. Table 3 provides a summary of balance sheet characteristics of the banks as of the year-end immediately preceding the introduction of the reform package. The WSJ banks' average asset size is $88 billion, compared to $33.90 billion for regional banks and $0.580 billion for small banks.

4.2 Methodology

We employ the methodology suggested by Schipper and Thompson (1983) to analyze the impact of events leading to the reform of too-big-to-fail doctrine on the market values of commercial banks. The approach conditions the return—generating process on the occurrence or non-occurrence of relevant news events, and employs generalized least squares (GLS) estimation. Since the announcements occur on the same calendar day for all sample firms (event-day clustering), and all sample firms are in the same industry

(industry factors), we cannot rule out the possibility of cross-sectional dependence. Accordingly, the standard event methodology (see Fama *et al* (1969)) is inappropriate in our context.[8]

By contrast, Schipper and Thompson's (1983) explicitly incorporates heteroskedasticity in the estimation process. It also makes more efficient use of the available data and is particularly suitable for studies involving relatively small sample sizes. Another clear advantage of this approach over the standard event study methodology is that it allows testing of joint hypotheses as well as tests about average and cumulative excess returns. The Schipper-Thompson methodology has been applied to studies of the impact of regulatory changes on stock prices. Examples include studies of merger–related regulatory changes (Schipper and Thompson (1983)), bank regulatory changes (Cornett and Tehranian (1989, 1990), Allen and Wilhelm (1988), antitrust and other regulatory changes (Binder (1985, 1988)), and catastrophic shocks in insurance underwriting risk (Angbazo and Narayanan (1996).

Daily firm returns are estimated using an expanded version of the market model with a zero-one dummy variable appended to reflect the announcement or not of the 8 events:

$$\tilde{R}_{it} = \beta_{i0} + \beta_{im}\tilde{R}_{mt} + \sum_{k=1}^{K} \beta_{ik} D_{kt} + \tilde{\epsilon}_{it} \qquad (1)$$

where

[8]For example, Schwert (1981) suggests that firms in the same industry react similarly to the same event. This would lead to cross-sectional dependence in returns around the underlying event. In addition, heteroscedasticity may arise from differences in the systematic risks of the firms. Traditional event studies assume independent abnormal returns in their statistical tests.

$\tilde{R}_{it}$ = rate of return on firm i for day t $(i = 1, 2, \ldots, N)$;

$\tilde{R}_{mt}$ = rate of return on the CRSP equally–weighted index of all common stocks on the NYSE and AMEX on day *t;*

β_{i0} = event–independent constant term;

β_{im} = systematic risk or sensitivity of the firm's rate of return to changes in the market's rate of return;

$\tilde{\epsilon}_{it}$ = random disturbance term which is assumed to be independent of the market return, serially independent and normally distributed;

D_{kt} = dummy variable reflecting the occurrence or non-occurrence of an event; it is equal to one if event *k (k* = 1,2, ..., *K)* occurred on day *t* $(t = 1, 2, \ldots, T)$ and zero otherwise $(K = 8$ in this study);

β_{ik} = sensitivity of firm i's rate of return to event k; it captures the firm's share price reaction to the event.

Following Theil (1971, pp. 306), we can express the regressions in equation (1) as a single regression in partitioned form:

$$\begin{bmatrix} \bar{\mathbf{R}}_1 \\ \bar{\mathbf{R}}_2 \\ \vdots \\ \bar{\mathbf{R}}_N \end{bmatrix} = \begin{bmatrix} \bar{\mathbf{X}} & \mathbf{0} & \ldots & \mathbf{0} \\ \mathbf{0} & \bar{\mathbf{X}} & \ldots & \mathbf{0} \\ \vdots & \vdots & & \vdots \\ \mathbf{0} & \mathbf{0} & \ldots & \bar{\mathbf{X}} \end{bmatrix} \begin{bmatrix} \boldsymbol{\beta}_1 \\ \boldsymbol{\beta}_2 \\ \vdots \\ \boldsymbol{\beta}_N \end{bmatrix} + \begin{bmatrix} \bar{\boldsymbol{\epsilon}}_1 \\ \bar{\boldsymbol{\epsilon}}_2 \\ \vdots \\ \bar{\boldsymbol{\epsilon}}_N \end{bmatrix} \tag{2}$$

where

$\bar{\mathbf{R}}_i = (\tilde{R}_{i1}\ \tilde{R}_{i2}\ \ldots\ \tilde{R}_{iT})$ (a $1 \times T$ vector);

$\bar{\mathbf{X}}$ = a $T \times J$ matrix of independent variables which is the same for each equation in the system

$\boldsymbol{\beta}_i$ = a $J \times 1$ vector of coefficients;

$\bar{\boldsymbol{\epsilon}}_i$ = a $T \times 1$ vector of disturbances;

or more simply

$$\bar{\mathbf{R}} = \bar{\mathbf{X}}\boldsymbol{\beta} + \bar{\boldsymbol{\epsilon}} \tag{3}$$

The multivariate regression model assumes that the disturbances are independent and identically distributed within each equation (firm) in equation (2) but allows the disturbance variance to differ across equations. It also assumes that contemporaneous covariance of the disturbances $E(\tilde{\epsilon}_{it}\tilde{\epsilon}_{jt})$ can be nonzero, but that the noncontemporaneous covariances $E(\tilde{\epsilon}_{it}\tilde{\epsilon}_{j,t-h})$ are zero. These assumptions imply that the covariance matrix in equation (3) is

$$\mathbf{V}(\bar{\boldsymbol{\epsilon}}) = \boldsymbol{\Sigma} \otimes \mathbf{I}$$

where

$\boldsymbol{\Sigma}$ = the $N \times N$ covariance matrix of $(\tilde{\epsilon}_{1t}\ \tilde{\epsilon}_{2t}\ \ldots\ \tilde{\epsilon}_{Nt})$;

I = the T x T identity matrix;

$\otimes$ = the Kronecker product;

Estimation of equation (3) is based on Zellner's (1962) seemingly unrelated regression model. When the covariance matrix $\boldsymbol{\Sigma}$ is known, the GLS estimate of $\boldsymbol{\beta}$ is maximum likelihood and best unbiased. When $\boldsymbol{\Sigma}$ is replaced by the OLS residual covariance matrix, the GLS estimate of $\boldsymbol{\beta}$ is consistent

and asymptotically efficient. These estimates and their t-statistics measure the size and significance of the abnormal return for each firm. But the overall significance of the average abnormal returns is inferred from a set of joint hypotheses on the β_{ik}'s in equation (1). These hypotheses can be expressed as constraints on the coefficients of the form:

$$\mathbf{L}\hat{\boldsymbol{\beta}} = \mathbf{l}$$

where $\mathbf{L}$ is a $P \times J$ matrix of constants with rank P $(\leq K)$, $\hat{\boldsymbol{\beta}}$ is the $NJ \times 1$ vector of coefficients estimated from equation (2), 1 is a P x 1 vector of constants and P is the number of restrictions tested in the system. As described in Theil (1971, pp. 314, 402), the test statistic

$$\frac{NT - NJ}{P}(\mathbf{l} - \mathbf{L}\hat{\boldsymbol{\beta}})'\{\mathbf{L}[\mathbf{X}'(\hat{\boldsymbol{\Sigma}}^{-1} \otimes \mathbf{I})\mathbf{X}]^{-1}\mathbf{L}'\}^{-1}(\mathbf{l} - \mathbf{L}\hat{\boldsymbol{\beta}}) \qquad (4)$$

is asymptotically distributed as $F(P, NT - NJ)$.

4.3 Testable Hypothesis

This section describes three hypotheses concerning the β_{ik} parameter estimates of the stock market reaction to the legislative events. The first hypothesis tests the significance of the total, sample-wide influence of the events. The sample-wide "abnormal returns" for an event k is reflected by the sum (across the firms in each portfolio) of the parameters β_{ik}. Under the null hypothesis of no significant effect, this sum is equal to zero. Hence,

HYPOTHESIS 1: THE SUM (ACROSS SAMPLE FIRMS) OF THE EVENT PARAMETERS IS EQUAL TO ZERO FOR EACH EVENT.

$$H_1 : \sum_{i=1}^{N} \beta_{ik} = 0 \tag{5}$$

While the above hypothesis looks for the overall impact of an event on the portfolio, our second hypothesis tests whether an event had a significant impact on each firm in the portfolio individually, i.e., is each firm's event parameter β_{ik} equal to zero.

$$H_2 : \beta_{1k} = \beta_{2k} = \beta_{3k} = \ldots = \beta_{Nk} = 0 \tag{6}$$

This test is more likely to reject the null hypothesis of zero impact than the test on the sum of parameters if an event influences only a few firms or influences some firms positively and others negatively, thus canceling each other when summed up. If an event influences all firms similarly but not very strongly, the first test is more likely to reject the null hypothesis than the second. The first two hypotheses are tested using the F–test in equation (4). Since the F-test is unsigned, rejection of the null hypothesis in the first two cases does not indicate whether an event had a positive or negative impact on stock returns.

The final hypothesis tests for shifts in the market model systematic risk and constant parameters for banking organizations. The hypothesis is based on the assumption that by restricting deposit coverage, the new policy increases the possibility of failure. This effect should in turn be reflected in revised constant and beta estimates following FDICIA (1991). Conversely, the new policy may indirectly reduce risk. In the absence of 100% coverage, bank costs of funds should reflect the increased likelihood of insolvency. As banks seek to control these costs, the incentive for risk-taking decreases,

suggesting a downward revision in bank risk.

Accordingly, we test for the structural shift in risk parameters by estimating equation (3) separately for the pre- and post-event periods. The pre-event period is the 120 days before event 2 date while the post-event period is the 120 days after event 7. Events 2 and 7 are chosen as the appropriate intervention points as they correspond to the announcement of details of the President's plans and the passage of the policy in Congress. These events reflect the times where uncertainty about the scope and likelihood of the reform package were introduced or resolved respectively. This leads to the following null hypothesis:

HYPOTHESIS 3: THE RETURN MODEL PARAMETERS REMAINED THE SAME DURING THE PRE-FDICIA AND POST-FDICIA PERIODS

$$H_3 : \beta_{pre-FDICIA} = \beta_{post-FDICIA} \& \beta_{pre-FDICIA} = \beta_{post-FDICIA} \qquad (7)$$

A shift in model parameters is determined by an F-statistic which is calculated on the basis of the null hypothesis of constant parameters between the pre-event and post-event periods. The parameter estimates and their t-statistics provide an indication of the size and significance.

As an alternative test, the market model constant and beta are interacted with a dummy D_A which takes values 1.0 (and 0 otherwise) in the post-FDICIA period:

$$\tilde{R}_{it} = \beta_{i0} + \beta_{i0} D_A + \beta_{im} \tilde{R}_{mt} + \beta_{im} * D_A \tilde{R}_{mt} + \tilde{\epsilon}_{it} \qquad (8)$$

The model is applied to the 3 portfolios of WSJ banks, non-money center

banks, small banks. The coefficients of the interaction terms and t-statistics measure the shift in the parameters.

5 The Results

5.1 The Effect of TBTF Deregulation

In this section we summarize the results of our analysis of bank risk estimates, cost of funds before and after the passage of FDICIA, and market values of banks around the regulatory events leading to changes in the too-big-to-fail policy.

Systematic Risk: The risk analysis is based on a test of structural change in the return generating process to determine whether bank risk was influenced by the switch from full insurance for some large banks to partial insurance for all banks. As indicated earlier, a reduction in implicit federal guarantees for deposits larger than $100,000 may increase the risk of failure, causing an upward revision in the systematic risk measure. Conversely, bank risk-taking may be reduced as managers seek to control increases in the cost of funds caused by depositors requiring higher rates. The coefficient estimates for the constant and beta parameters before and after the passage of FDICIA are shown in table 4.

The data show that the constant coefficients across bank sizes were unaffected by FDICIA. While the F-value for the structural change test cannot reject the hypothesis of identical constant coefficients before and after FDICIA, the systematic risk (beta) coefficients were positive and significant for all three portfolios, but the coefficients were significantly smaller in the

post-FDICIA period. The F-value reject the null hypothesis of constant beta coefficients for large (TBTF and regional) bank portfolios. The evidence on the market model parameters for the small bank sample indicate that small banks were relatively unaffected by changes to the too-big-to-fail doctrine.

In Panel B, additional estimates are reported from an alternative test based on equation (8). Coefficients of the interaction terms indicate the parametric shifts in the constant and beta coefficients of the return generating model. A comparison of the constant coefficient with the post-event shift variable shows that shift parameters are positive for all groups, consistent with a gain in value subsequent to FDICIA. By contrast, the beta coefficients for all groups declined, but this was again significant only for the large bank groups. Overall, the results may be interpreted as consistent with the reform-package reducing the systematic risk of large banks.

Cost of Funds: In table 5, we report on the average cost of funds, the cost of deposits, and the average cost of borrowings for our portfolios of TBTF banks, regional banks and small banks. The average cost of funds reflect the weighted average cost of non-deposit short-term funding like federal funds, repos, acceptances, eurodollars and federal reserve advances. This is differentiated from the average cost of borrowings to reflect the fact that the borrowings are longer-term non-deposit liablities. The cost of core deposit funds are measured by the percentage interest expense on deposit liabilities. We also compared the means of the cost measures for the 2 years preceding the banking reform legislation (1989-1990) to the 2-year average following its passage (1992-1993) to test the hypothesis that average cost of deposits increased after TBTF deregulation.

One consistent finding for the large bank portfolios is that all three costs (for funds, deposits, and borrowings) declined sharply in post-FDICIA period. While the general level of interest rates may impact the cost of funds for banks, the finding that the average costs were statistically lower across board for large banks, but not for small banks, could in part be due to a reduction in the risk of deposit loss, thereby causing the risk premium on large bank deposits to decline in the later period. The shift in costs for the large banks is consistent with the hypothesis that restrictions on TBTF had the effect of reducing the overall bank risk.

We also examined the mean differences in net interest margins and the return on equity for the bank samples. Interestingly, there appears to be no difference for the TBTF- and small-bank samples before and after FDICIA, but regional banks, on average, had lower profitability as measured net interest margins and return on equity.

Wealth Effects of TBTF Banks: Table 6 reports summary statistics of the parameter estimates from multivariate regression for the 3 bank groups, viz., the WSJ bank, non-money center large regional banks, and small banks. For each portfolio we run seemingly unrelated regressions of each firm's returns on the equally-weighted market index and dummy variables corresponding to the 8 events. The coefficients of the dummy variables measure the impact of the events. For the sake of brevity, we do not report the event parameters for individual banks, but rather present summary statistics for the 3 portfolios in panels A, B, and C respectively.

The average, median, and the proportion of negative estimates for the WSJ bank portfolio are reported in Columns 2-4 of Table 7, Panel A. There

are significant negative coefficients associated with events 2, 6, and 7. Event 2, the date the Treasury Department submitted its draft bill to the Congress has the largest impact with mean excess return and median of -1.8% and -1.71%, respectively. The t-statistics and p-values of the wilcoxon sign-rank test support the hypothesis that both the mean and median are significantly negative at conventional levels.

The Wall Street Journal article carrying the announcement noted that the Treasury proposal for strengthening banks was viewed as a comprehensive and potentially beneficial package with provisions for nationwide banking, expanded asset powers, and FDIC insurance fund recapitalization. However, the proposed limits on deposit insurance coverage was reportedly disliked by large banks who expected increased scrutiny by large depositors, possibly leading to higher costs of funds. Small banks were disappointed that the limits were not far-reaching enough, and feared that the proposed plan will cause disruptive withdrawals as depositors transferred to the few banks that may benefit from the least-cost rule exception. The negative excess returns associated with Event 2 is consistent with the expectation that reduced coverage hurts banks by more than the gains realized from the reforms.

Event 6, the date the full bill was defeated in the House of Representatives, is also associated with negative excess returns. The WSJ press account suggested that the bill was defeated at the urging of the President and big banks because House Democratic Leaders added provisions that limited banking powers to sell insurance or participate in securities. Given that there was no disagreement on provisions regarding limits on too-big-to-fail or expanded borrowing authority by the FDIC, the defeat was viewed as a temporary

set-back and expectations were that the revised proposal will include sharp limits on too-big-to-fail. Therefore, the negative reaction (mean=-0.98%) may be reflecting diminished expectations concerning expanded asset powers rather than uncertainty about the nature and likelihood of limits on too-big-to-fail.

Event 7 which corresponds to the passage of the bill by the House and Senate is also associated with negative coefficients (mean=-0.92%). The significant reaction reflects uncertainty about differences that remained to be reconciled by the joint conference committee of the two chambers. Although both versions sharply limited the too-big-to-fail doctrine, as expected, the negative coefficients are partly consistent with the surprise provision to regulate credit-card interest rates in the Senate version of the bill. The proposed cap in rates was viewed as a severe impediment to bank profitability and national economic recovery.

By comparison, events 4 and 5 which correspond to the announcement and passage of potentially more restrictive versions of the TBTF in the senate banking committee are associated with positive effects of 2.80% and 0.84% excess returns respectively. Why a less generous bill than was proposed by the Bush Administration would generate positive effects is puzzling. One possibility is that stockholders many have anticipated positive incentive effects from the Senate bill. As was discussed earlier, a loss in the coverage of deposit coverage may reduce bank riskiness as managers seek to control the cost of funds which become more correlated with bank risk. This in turn should lead to improved performance. Another possibility is that stockholders anticipate that the tougher senate version was less likely to pass or be agreed-to by the President, thereby diminishing any expectations

of the loss of TBTF subsidy.

Finally, event 8 which is the President's signing is positive, consistent with the resolution of lingering uncertainty about the President's veto. Subsequent to the temporary defeat of the bill in the House, there were threats of a veto on any bill that contained restrictions on bank activities and nation-wide branching. Therefore, even after the passage in both houses of Congress, the pending reconciliation of the two bills and uncertainty as to whether the President will sign remained. The positive returns suggest that the President's signing was not completely expected.

One caveat about these summary statistics is that any cross-sectional dependence among the events would affect the average parameter estimates and their t-statistics. Accordingly, we complement these results with F-tests of the hypothesis on the overall impact of each event $H_1 : \sum_{i=1}^{N} \beta_{ik} = 0$ and of the hypothesis $H_2 : \beta_{1k} = \beta_{2k} = \beta_{3k} = \ldots = \beta_{Nk} = 0$ on the significance of each event for sample firms individually. From columns 5-6 we can reject the hypothesis H1 for events 2, 4, and 8. Furthermore, we are able to reject hypothesis H2 for event 8 as well. We are able to draw the inference that no firms are individually affected significantly by the other 7 events.

Wealth Effects of Non-TBTF Banks: For the portfolio of large regional banks, the evidence in panel B yield significant abnormal returns associated with six events including 2, 3, 4, 5, 7, and 8. On the basis of F-tests shown in columns 5-6, we are able to reject the hypothesis $H_1 : \sum_{i=1}^{N} \beta_{ik} = 0$ for Events 2, 3, and 7 which correspond to the release of the President's plan, its initial approval in the House Subcommittee, and its passage by the House and Senate. Furthermore the sample mean and median are signifi-

cantly negative at less than 10% for all 3 events. However, we cannot reject the hypothesis H2 that individual parameter estimates for Events 3 and 7 are equal to zero. This is in accord with the evidence in column 4 that the estimates are mostly negative but not significant for individual firms.

On the other hand, the sample mean and median excess returns for events 4, 5, and 8 are positive and significant at less than 5% level. F-tests of the hypothesis H1 reject the null hypothesis of zero overall impact for events 4, 5, and 8, and, in the case of the latter 2 events, the hypothesis that the event coefficients are equal to zero is rejected at less than 10%.

Panel C shows the estimates for non-covered small banks. Overall, there is no evidence of a portfolio wealth effect during any of the 8 events. We fail to reject the hypothesis H1 for zero overall impact of the events. The evidence from tests of H2 are only slightly stronger; we are able to reject the hypothesis H2 that individual estimates for events 6 and 8 are equal to zero. This means that there is at least one firm for which these events were significant. In column 4, approximately half of the firms reacted negatively, with the other half being positive, thus canceling each other when summed up. This leads to the conclusion that wealth effects associated with changes in too-big-to-fail were concentrated among large commercial banks. The lack of market reaction to the switch from full insurance for some to partial insurance for all suggests that either the hypothesized wealth transfer was small or that small banks are not in a position to exploit the fairer cost of deposit insurance under the new system.

The aggregate evidence thus far indicates that the sequence of events leading to bank reform package had significant impact on both the sample of banks officially classified as too-big-to-fail and non-covered large banks.

The similarities in the signs of the coefficients is consistent with the evidence shown in Table 2, where the actual number of bank failures for which all deposits were ex-post guaranteed far exceeded the 11 banks that were mentioned by the Comptroller of Currency. Thus, any loss in subsidy associated with changes to the too-big-to-fail doctrine was not limited to the WSJ banks but to all banks for which the market believed would have received federal assistance in case of failure. The evidence in Panels A and B support this interpretation.

Furthermore, we compare the mean excess returns across the portfolios to test whether the economic impact was the same for portfolios of each type of banks during an announcement period. The mean differences and the F-statistics (in parenthesis) appear in table 5, where the F-statistics are calculated on the basis of the null hypothesis of identical coefficients from seemingly unrelated regressions of equally-weighted portfolio on the market index and dummy variables corresponding to the events, that is $\beta_{pk} = \beta_{sk}$, where p and s are portfolio index, and k=l,.....8. The evidence indicates that the wealth effects are identical for WSJ and non-money center large banks with the exception of event 2. The mean percentage difference is -0.29% which is significant at 5% (F-stats=8.2658). This mean difference suggests that the narrower deposit coverage were expected to hurt the covered banks more, on average, than the large uncovered banks.

The differences become clearer when we compare the two large bank portfolios to the small bank sample. The mean differences are significant for events 2, 3, 4, 6, and 7. A pattern that emerges by comparing columns 3 and 4 is that the differential impact on WSJ banks relative to the small banks is larger than non-money center banks versus small banks. These results

are inconsistent with the hypothesis that large and small banks reacted the same, on average, to the 5 events.

6 Concluding Remarks

The assessment of observers of the banking industry is that the Federal Deposit Insurance Corporation Act of 1991 (FDICIA) was the most significant piece of banking legislation in decades, with provisions for restructuring the industry and reforming deposit insurance and failure resolution policies. In this paper we analyzed the impact of FDICIA's reform of the much-criticized "too-big-to-fail" doctrine on bank systematic risk, cost of funds, and stock market values. The law required that the FDIC resolves all failing banks in the least-cost manner, and that exceptions to the least-cost standard for "systemic risk" reasons be determined openly and be costless to the insurance fund.

The results show that the systematic risk estimate for large banks declined sharply after the passage of FDICIA, indicating that bank risk declined, partly as a result of the banking law reform increasing the incentives of depositors to be sensitive to the financial soundness of their banks. Consistent with the lower systematic risk estimates, the cost of deposits, and non-deposit funds were significantly lower in the post-FDICIA period. Although the general level of interest rates may impact bank cost of funds, the finding that only large bank cost of funds declined is consistent with a reduction of the risk of large bank deposit loss, causing the required risk premium to decline proportionately. In general, neither the systematic risk nor the cost of funds of large banks were affected by the banking law.

The analysis of stock market values shows that the initial release of the President's plan, its initial approval in the House, and its passage by Congress generated negative abnormal returns for large banks and that the announcement of a less generous proposal by the Senate, and the President's final approval produced positive returns. The distribution of the wealth effects is consistent with the hypothesis that the impact of the narrower coverage was confined to the large bank segment.

References

[1] Allen, P.R. and W.J. Wilhelm, 1988, The impact of the 1980 Depository Institutions Deregulation and Monetary Control Act on market value and risk: Evidence from the capital markets, *Journal of Money, Credit and Banking* 20, pp. 364–380.

[2] Angbazo, Lazarus and Ranga Narayanan, 1994, Catastrophic Shocks in the Property-Casualty Insurance Industry: Evidence on Regulatory and Contagion Effects, *Journal of Risk and Insurance*, forthcoming, 1996.

[3] Binder, J. J., 1985, Measuring the effects of regulation with stock price data, *Rand Journal of Economics* 16, pp. 167-183.

[4] ———, 1988, The Sherman Antitrust Act and the railroad cartels, *Journal of Law and Economics* 31, pp. 443-467.

[5] Brickley, J. A. and C.M. James, "Access to Deposit Insurance, Insolvency Rules and the Stock Returns of Financial Institutions," *Journal of Financial Economics* 16 (1986) 345-371.

[6] Brown, S.J. and J.B. Warner, 1985, Using daily stock returns: The case of event studies, *Journal of Financial Economics* 14, pp. 3–31.

[7] Cornett, M.M. and H. Tehranian, 1989, Stock market reactions to the Depository Institutions Deregulation and Monetary Control Act of 1980, *Journal of Banking and Finance* 13, pp. 81–100.

[8] ———, 1990, An examination of the impact of the Garn-St. Germain Depository Institutions Act of 1982 on commercial banks and savings and loans, *Journal of Finance* 45, pp. 95-111.

[9] Fama, E.F., L. Fisher, M.C. Jensen and R. Roll, 1969, The adjustment of stock prices to new information, *International Economic Review* 10, pp. 1-21.

[10] Kane, E., 1985, The Gathering Crises in Federal Deposit Insurance, *MIT Press,* Cambridge, MA

[11] O'Hara, M and W. Shaw, Deposit Insurance and Wealth Effects: The Value of Being "Too-Big-to-Fail," *Journal of Finance* 45, 1990, 1587-1600

[12] Mei, J.P., and A. Saunders, "Bank Risk and Too Big to Fail Guarantees: An Asset Pricing Perspective, " *Working Paper* Solomon Brothers Center, New York University, 1993

[13] Schipper, K. and R. Thompson, 1983, The impact of merger-related regulations on the shareholders of acquiring firms, *Journal of Accounting Research* 21, pp. 184–221.

[14] Schwert, G.W., 1981, Using financial data to measure the effects of regulation, *Journal of Law and Economics* 25, pp. 121–145.

[15] Theil, H., 1971, *Principles of Econometrics,* Wiley, New York, NY.

[16] Wall, Larry, 1993, Too-Big-to-Fail After FDICIA, Federal Reserve Bank of Atlanta, *Economic Review*, (Jan/Feb), pp. 1-14.

[17] Zellner, A., 1962, An efficient method of estimating seemingly unrelated regressions and tests of aggregation bias, *Journal of the American Statistical Association* 57, pp. 348–368.

Table 1: Major Dates and Announcements on "Too-Big-To-Fail" Legislation

This table describes the major events relating to the introduction, legislation, and passage of the Federal Deposit Insurance Improvement Act (1991) provisions pertaining specifically to changes to the "Too-Big-To-Fail" doctrine.[a]

Event	Date	Description
1	12-20-1990	White House plans to seek to reduce scope of "too-big-to-fail" protection for banks
2	2-6-1991	The Treasury asks the Congress to throw out a raft of depression-era laws including limits on deposit insurance coverage
3	5-8-1991	The Financial Institutions Subcommittee of the House of Representatives approves a draft bill; bars FDIC protection in excess of $100,000 starting in 1995
4	7-17-1991	Senate Banking Committee unveils a proposal less generous than Bush Administration for banking reform
5	8-5-1991	Senate Banking Committee passes reform bill curtailing reimbursements over $100,000 after 1994
6	11-5-1991	Banking Bill that includes "too-big-to-fail" is defeated in the House but the revised proposal is likely to include "too-big-to-fail"
7	11-22-1991	Banking Bills to bolster bank deposit insurance fund is passed byCongress; both bills end "too-big-to-fail" after 1994
8	12-20-1991	President Bush signs banking bill that tightens closure rules

Source: Wall Street Journal and FDIC news bulletin.

a: Although there were many other announcements concerning TBTF or other aspects of FDICIA (1991) in the period, only the announcements that emphasized TBTF or had not been mentioned in a previous press account are analyzed in this paper.

Table 2: Bank Failures with Full Deposit Guarantees[a]

This table shows the number of total bank failures and the proportion of failures with 100% deposit guarantees.

Year	Total Failures[b]	Failures with 100% Deposit Guarantees[c]	As percent of Total
1993	64	59	92.18
1992	122	97	79.51
1991	124	103	83.07
1990	168	148	89.10
1989	206	174	84.46
1988	200	164	82.00
1987	184	133	72.39
1986	134	104	70.15
1985	120	91	75.84
1984	80	64	80.00
1983	48	39	81.25
1982	42	35	83.33
1981	10	8	80.0
1980	11	7	72.73

---

a: Source: FDIC Annual Reports

b: Total failures includes all bank closings and assistance transactions but not including financially assisted mergers of failing but open banks or financial assistance from the FDIC to prevent failure.

c: These exclude pay-offs or insured deposit transfers transactions for which uninsured depositors suffered losses. All other types of closings effectively protected all deposits.

Table 3: Summary Statistics of Selected Characteristics of the Sample

This table presents balance sheet characteristics of our sample banks based on call report data immediately prior to the policy change (December 31, 1990)[a].

Variable	WSJ Banks N=9	Non-Money Center Large Banks N= 40	Small Banks N=15
Total Assets	$88.38	$33.90	$5.80
Core Capital / Total Assets	8.397%	6.53%	8.565%
Net Interest Margins / Ave. Earning Assets	4.64%	4.88%	6.337%
Total Liabilities	$83.54	$31.96	$.511B

---

[a]: All dollar figures are in Billions of dollars unless indicated otherwise.

Table 4: Effect of TBTF Deregulation on Bank Risk

This table tests for shifts in the market-model parameters to determine whether banks' risk changed subsequent to the too-big-to-fail legislation. *Panel A* test whether the systematic risks of banks shifted by separately estimating market model parameters during the pre-and post-event periods for equally-weighted portfolios of bank groups. The F-statistics are calculated based on the null hypothesis of constant parameters in the pre-event and post-event periods. *Panel B* estimates provide an alternative test for shifts in the market parameters by interacting the Constant and Beta with dummy D_A set equal to 1.0 (0 otherwise) in the post-event periods.

Panel A: $R_{it} = \beta_{io} + \beta_{im} R_{mt} + \tilde{\epsilon}_{it}$

Portfolio	Period[a]	Constant (t-statistics)	Beta (t-statistics)	F-statistics (p-value)	
WSJ Banks	Pre-event	-0.008	2.475		
		(-0.803)	(18.546)*		
	Post-event	-0.0012	1.858	0.1290	10.974
		(-1.564)	(14.334)*	(0.7195)	(0.0009)
Non-Money Center	Pre-event	-0.0009	2.1601		
Large & Regional Banks		(1.626)**	(28.444)*		
	Post-event	-0.00008	1.193	1.1661	70.757
		(-0.148)	(13.843)*	(0.2802)	(0.0001)
Small Banks	Pre-event	-0.00005	0.705		
		(-0.051)	(4.674)*		
	Post-event	0.0017	0.508	0.576	1.055
		(1.310)	(2.407)*	(0.447)	(0.304)

Panel B: $R_{it} = \beta_{io} + \beta_{io} D_A + \beta_{im} R_{mt} + B_{im} * D_A R_{mt} + \tilde{\epsilon}_{it}$

	Constant		Beta	
Portfolio	Overall	Post-event	Overall	Post-event
WSJ Banks	-0.0024	0.0011	2.1235	-0.2647
	(-4.979)*	(1.144)	(27.311)*	(-1.640)**
Non-Money Center	-0.015	0.0015	1.869	-0.675
Large & Regional Banks	(-5.804)*	(2.565)*	(41.603)*	(-7.243)*
Small Banks	-0.005	0.0024	0.625	-0.1163
	(-.943)	(1.496)	(6.287)*	(-0.564)

[a]: The pre-event period is the 120 days before February 6, 1990 when the Treasury Department's plan was officially submitted to the Congress; the post-event period is the 120 days after November 22, 1991 when the final bill was passed by the joint committee of the U.S. Senate and House of Representatives.

*, **, and *** indicate statistical significance at the 5%, 10% and 1% levels, respectively, for two-sided tests.

Table 5: Effect of TBTF Deregulation on Cost of Funds

This table reports the average Net Interest Margins (NIM), the costs of funds, cost of borrowings, and cost of deposits, and the Return on Equity (ROE) for the portfolios of banks for the year's leading up to, and subsequent to, the passage of too-big-to-fail reforms. The t-statistics are calculated based on the null hypothesis of no difference in means between the pre-event (1989-1990) and post-event (1992-1993) periods.

Variable	Period	WSJ Banks	Non-Money Center Large & Regional Banks	Small Banks
NIM[a]	89-90	4.187	4.079	5.040
	92-93	4.383	4.381	4.559
	t-statistic	(-1.469)	(-2.767)*	(1.085)
Cost of Funds[b]	89-90	8.766	7.889	6.964
	92-93	4.264	3.850	3.693
	t-statistic	(18.476)*	(18.611)*	(6.701)*
Cost of Borrowings[c]	89-90	10.393	9.230	9.545
	92-93	5.383	3.977	3.668
	t-statistic	(18.859)*	(18.507)*	(5.653)
Cost of Deposits	89-90	8.531	7.577	6.901
	92-93	4.068	3.800	3.593
	t-statistic	(13.574)*	(17.991)*	(7.554)
ROE	89-90	10.552	8.685	14.020
	92-93	16.506	14.338	14.537
	t-statistic	(-1.603)	(-3.012)*	(-0.914)

*,**,*** indicate significance at 5%, 10% and 1% respectively.

a: Net interest margins measures the difference between interest revenue and interest expense, expressed as a percentage of average earning assets (i.e., average gross loans plus leases plus investments and trading account securities).

b: Calculated as the weighted average cost of non-deposit short-term funding forms such as Fed Funds, Repos, Acceptances, Eurodollars and Federal Reserve advances.

c: The weighted average cost of borrowings captures longer term non-deposit liabilities.

Table 6: Multivariate Regression Model Event Parameter Estimates

This table presents the summary statistics of the event parameter estimates and the tests of the hypotheses H_1 and H_2 (Equations 5 and 6) using the Schipper-Thompson approach discussed in the text. The summary statistics are based on estimates from seemingly unrelated regression of returns on the equally-weighted market returns and 8 dummy variables corresponding to the announcements, with event parameters β_{ik} for each firm i and event k. The returns time series used comprises all the trading days 120 days before event 1 and 120 days after event 8 .The event window for each event is the Wall Street Journal day of the event and the day before.

Model: $R_{it} = \beta_{io} + \beta_{im} R_{mt} + \sum_{k=1} \beta_{ik} D_{kt} + \tilde{\epsilon}_{it}$

Panel A: WSJ Banks, N=9

Event	Mean Excess Return (t-statistic[b])	Median (p-value[c])	% Negative (z-statistic[d])	H_1: F-Value (p-value)	H_2: F-Value (p-value)
1	0.00001	0.301	44.44	0.0	1.934
	(0.00238)	(0.9102)	(-0.333)	(0.999)	(0.0431)
2	-0.018	-0.0171	100%	3.328	1.139
	(-5.441)*	(0.0039)	(3.00)	(0.068)**	(0.330)
3	-0.0004	-0.003	55.55	0.0014	0.2949
	(-0.1483)	(.7344)	(0.333)	(.970)	(0.9764)
4	0.0288	0.0315	0	5.75	1.5357
	(5.240)*	(0.003)	(-3.000)	(0.0165)*	(0.129)
5	0.0084	0.008	0	0.4940	0.209
	(4.729)*	(0.0039)	(-3.000)	(0.4822)	(0.993)
6	-0.0098	-0.0113	77.77	0.6744	0.4716
	(-3.444)*	(0.0195)	(1.666)	(0.4116)	(0.8945)
7	-0.0092	-0.010	77.77	0.5966	0.7746
	(-2.017)*	(0.097)	(1.666)	(0.440)	(0.6401)
8	0.0327	0.0372	22.22	3.722	3.026
	(2.327)*	(0.0742)	(-1.666)	(0.05)*	(0.001)*

Panel B: Non-money Center Large and Regional Banks, N=40

Event	Mean Excess Return (t-statistic)	Median (p-value)	% Negative (z-statistic)	H_1: F-Value (p-value)	H_2: F-Value (p-value)
1	0.0019	0.0035	32.50	0.5167	1.8154
	(0.6609)	(0.1777)	(-2.135)	(0.4722)	(0.0012)*
2	-0.0151	-0.0107	87.50	31.557	2.1796
	(-4.4622)*	(0.0001)	(4.743)	(0.0001)*	(0.0001)*
3	-0.0059	-0.0067	72.50	3.3228	0.07926
	(-3.4588)*	(0.001)	(2.846)	(0.068)**	(0.8222)
4	0.0191	0.0188	0.0	43.3927	2.0897
	(7.1453)*	(0.001)	(-6.324)	(0.0001)*	(0.0001)*
5	0.0062	0.0054	22.50	3.5699	0.709
	(3.2888)*	(0.007)	(-3.478)	(0.0589)**	(0.9158)
6	-0.0010	-0.0015	52.50	0.0935	0.4277
	(-0.5512)	(0.3817)	(0.316)	(0.7598)	(0.9994)
7	-0.007	-0.0043	60.0	4.5507	0.6137
	(-2.497)*	(0.0074)	(1.264)	(0.0329)*	(0.9738)
8	0.0110	0.0146	17.50	5.6104	0.8468
	(2.329)*	(0.0001)	(-4.110)	(0.0179)*	(0.07413)

Panel C: Small Banks, N=15

Event	Mean Excess Return (t-statistic)	Median (p-value)	% Negative (z-statistic)	H_1: F-Value (p-value)	H_2: F-Value (p-value)
1	-0.0029	-0.0023	66.67	0.2371	1.2278
	(-0.4939)	(0.4697)	(1.154)	(0.6263)	(0.2567)
2	0.0025	-0.0020	58.33	0.1752	1.1745
	(0.5659)	(0.7334)	(0.5773)	(0.6756)	(0.2951)
3	-0.0040	-0.0016	58.33	0.2915	0.2700
	(-0.6992)	(0.9096)	(0.5773)	(0.5893)	(.9936)
4	-0.0026	0.0004	50.00	0.1245	1.4125
	(-0.4074)	(0.9097)	(0.0)	(0.7242)	(0.1519)
5	0.0037	0.00279	25.00	0.2497	0.4354
	(0.9626)	(0.2036)	(-1.732)	(0.6173)	(0.9500)
6	0.0060	-0.0027	58.33	0.6574	5.625
	(0.449)	(0.9696)	(0.5773)	(0.4175)	(0.001)*
7	0.0017	0.0038	33.33	0.0526	0.4238
	(0.3148)	(0.2661)	(-1.194)	(0.8186)	(0.955)
8	0.0108	0.0003	50.00	1.0511	5.8708
	(0.4923)	(0.7334)	(0.0)	(0.3053)	(0.001)*

a: *, **, and *** indicate statistical significance at the 5%, 10%, and 1% levels, respectively, for two-sided tests.

b: This is computed by dividing the mean parameter estimate by the sample cross-sectional standard error.

c: This is from a Wilcoxon signed-ranks test for the zero median null hypothesis.

d: This is given by $\frac{G-N_p}{\sqrt{N_p(1-p)}}$, where G is the number of negative parameter estimates (equivalently, number of firms), N is the total number of parameter estimates, and p is the probability of a negative estimate under the null hypothesis (0.50). See Schipper and Thompson (1983, pg. 205).

Table 7: Mean-Differences In Excess Returns

This table reports mean differences in excess returns during event announcements for the portfolio of Banks. The F-statistics (in parenthesis), are calculated on the basis of the null hypothesis that the excess returns are the same, on average, across portfolios; H: $\beta_{ik} = \beta_{jk}$ where i and j = portfolio index; and k = event index.

Event	WSJ Banks vs. Non-Money Center	WSJ Banks vs. Small Banks	Non-Money Center vs. Small Banks
1	-0.0018 (0.5154)	0.0029 (1.2839)	0.0048 (0.9572)
2	-0.0029 (8.2658)*	-0.0205 (59.126)*	-0.0176 (12.05)*
3	0.0055 (0.466)	0.0036 (5.470)*	-0.0019 (4.97)*
4	0.0191 (1.643)	0.0314 (7.60)*	0.0217 (5.518)*
5	0.0022 (0.263)	0.0047 (1.892)	0.0025 (2.89)
6	-0.0088 (2.3519)	-0.0158 (19.792)*	-0.007 (5.367)*
7	-0.0022 (0.2939)	-0.0109 (9.464)*	-0.0087 (8.023)*
8	0.0217 (0.0404)	0.0219 (2.264)	0.0002 (2.365)

* indicates significance at 5%.