Tax Reform And Bank Asset Quality:
Did 1986 Tax Law Changes Contribute To
Banks' Loan Problems?

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Abstract

The escalation of bank loan losses in the mid/late 1980s, attended by a marked decrease in bank-ing industry profits and an increase in bank failures, has raised numerous questions about the factors contributing to these events. The present study continues this inquiry by examining the effects of the Tax Reform Act of 1986 (TRA86) on the quality of banks' assets in the late 1980s. Specifically, the study seeks to attribute changes in bank asset quality following enactment of TRA86 to 1) the two major provisions of the law targeted at banks, namely, interest expense al-locable to tax-exempt obligations and the tax reserve for bad debts, particularly bad debts of large banks, along with 2) the pre-TRA86 level of real estate loans that were devalued by other provisions of the statute. Using alternative measures of asset quality, a single-equation regres-sion analysis was applied to a sample of 205 large commercial banks. Empirical results indicate some linkage between TRA86 and changes in bank asset quality during the late 1980s, though not in all areas examined.

Introduction

In recent years public attention has focused increasingly on the financial condition of the commercial banking industry. The reason for this heightened interest is the escalation of bank loan losses during the mid/late 1980s, attended by a marked decrease in banking industry profits and an increase in bank failures. Net charge-offs as a percent of total bank loans nearly quadrupled during the 1980s, rising from approximately 0.3 percent in 1979 to almost 1.2 percent in 1989 [U.S. Department of the Treasury 1991]. Over the same period, industry profits as a percent of total assets declined by over one-half, from 0.76 percent, to 0.47 percent, and bank failures (including banks assisted by the FDIC) climbed from less than 50 per year in the early 1980s to over 200 per year in 1987-89 [O'Keefe 1990]. These developments steadily weakened public confidence in the banking system [Garsson 1991] and significantly depleted the resources of the FDIC Bank Insurance Fund.

To date, most explanations for the banking industry's woes have stressed four interrelated factors. These include 1) overcapacity in the industry owing to increased competition stemming from market and regulatory developments, 2) continuing legislative restrictions on bank expansion and diversification into new geographic areas and product lines, 3) incentives for excessive risk taking embedded in the present system of Federal deposit insurance, and 4) inept management.

Another possible factor that has been largely overlooked is the Tax Reform Act of 1986 (TRA86). While TRA86 lowered the overall structure of corporate tax rates, the new law also targeted existing tax provisions perceived as unfairly benefiting the banking industry.[1] In addition, the statute included numerous general provisions that, although not specifically directed at banks, still affected them adversely. As a result, research evidence indicates that, without any portfolio or pricing adjustments by banks, the net effect of TRA86 would have been to raise the tax liability and lower the after-tax income of the banking industry.[2]

Less clear, however, is the net effect of TRA86 after banks have fully responded to the array of direct and indirect incentives provided by the new law. While researchers agree that banks would institute portfolio and/or pricing changes to minimize the adverse effects of the new law,[3] early simulation studies by O'Brien and Gelfand [1987a,b] and Neubig and Sullivan [1987a,b] report contradictory results as to the expected effect of such changes on industry earnings. Specifically, O'Brien and Gelfand projected a modest *decrease* in industry net

income whereas Neubig and Sullivan predicted an *increase* in industry after-tax profits. To date, however, no studies have followed up on these simulation analyses to determine the actual, full effect of TRA86 on bank profitability.

Even less clear is the effect of TRA86 on bank risk exposure. While some observers have suggested that banks might take on riskier assets to recoup after-tax profits lost as a result of TRA86 [Englebrecht and Billings 1987; Baer and Pavel 1988], no studies have specifically addressed the implications of TRA86 for banks' risk postures. Even the simulation works noted above, which depend heavily on banks' substituting taxable assets for tax-exempt securities in response to lower after-tax earnings from holding tax-exempts after TRA86, provide no substantive discussion of the implication of such portfolio adjustments for banks' risk positions.[4] Nor have any studies specifically examined the effect of TRA86 on the quality of banks' existing assets, particularly real estate loans, though analysts have uniformly recognized the adverse effects of TRA86 on the values of multifamily and commercial real estate properties, at least in the short run.

The present study specifically explores changes in bank risk exposure during the late 1980s owing to the combined effects of 1) tax-induced changes in market conditions for banks' existing assets, especially real estate loans, and 2) behavioral responses by banks to lost tax benefits relating to a) interest expense allocable to tax-exempt obligations and b) reserve for bad debts. We are particularly interested in whether these events have added to the industry's problems by worsening bank asset quality.

The next section examines the provisions of TRA86 that adversely affected banks' existing assets, particularly real estate loans, and the implications of these developments for the quality of bank loan portfolios. The third section then looks at tax law changes designed to eliminate preferential treatment of banks in two principal areas---1) interest expense allocable to tax-exempt obligations and 2) tax reserve for bad debts, specifically, bad debts of large banks---and the incentives provided to banks to take on added risk to recoup after-tax income lost as a result of these changes. A regression model to test the effects of these various provisions of TRA86 on bank asset quality is presented in the fourth section, along with empirical results. The last section is a summary and conclusion.

TRA86 Provisions Affecting Real Estate Investments: Implications For Bank Loan Quality

The downturn of the real estate industry in the late 1980s adversely affected many segments of the US economy, especially the banking industry [Browne and

Rosengren 1992]. The national vacancy rate for office space was 18.7 percent in 1991 compared to 4 percent in 1980 [Houlder 1991]. This increased vacancy rate reflected a massive accumulation of commercial properties during the 1980s. One factor that stimulated real estate investments by attracting tax-shelter-oriented syndicators was the generous tax benefits associated with owning real estate investments in the early 1980s. These benefits, ushered in by The Economy Recovery Tax Act of 1981 [ERTA], included 1) an accelerated cost recovery system in which real property could be depreciated using a 175 percent declining-balance method over 15 years, 2) a capital gains rate that taxed gains from the sale of capital assets, including real property, at a maximum 20 percent rate, and 3) loss deductions to investors in real estate partnerships or Subchapter S corporations even though such investors had little capital at risk and did not participate in company operations.

After 1986, however, owning real estate was not so lucrative as in the early 1980s, owing to the elimination of most of the tax-shelter benefits previously accorded to real estate investments by ERTA [Aronsohn 1987]. Under TRA86, real property had to be depreciated using the straight-line method over 31.5 years (27.5 years for residential real property), capital gains from real estate sales became taxable at ordinary income rates, and investors had to have capital "at risk" and to "actively participate" in company operations before even a portion of losses or deductions could offset other (nonpassive) income.[5] The effect of these changes was to reduce the returns on all types of real estate (other than perhaps owner-occupied housing), leading to a decline in real estate values.[6] In that regard, Brueggeman and Thibodeau [1987] predicted that the cumulative effect of TRA86 would be to reduce investment returns on residential development by 300 to 520 basis points and on commercial property by 250 to 470 basis points.[7] According to Brueggeman and Thibodeau, this reduction in after-tax returns would lower residential property values in the short run by 16 to 20 percent and commercial property values by 13 to 17 percent. Similarly, in a worst-case scenario Follain, Hendershott, and Ling [1987] predicted that the value of an income-producing property purchased in early 1987 would decline 8 percent as a result of TRA86, assuming a no-growth area with 20 percent excess capacity. Moreover, because the provisions of TRA86 were enacted at a time when the real estate market was already starting to weaken and vacancy rates were increasing, investors could not recover lost tax benefits simply by increasing rents [Cordato 1991]. In fact, rents actually declined from 1984 to 1990 even though the consumer price index increased by more than 20 percent over the same period [Downs 1990]. The combination of

declining rents and rising expenses, in concert with high vacancy rates, generated negative cash flows on many real estate projects [Downs 1990; Rose and O'Neil 1988]. As a result, investors lost equity in real estate investments and the risk exposure of lenders increased.

The fact that the thrift and banking industries provide much of the financing used by real estate investors means that the increased risk exposure of real estate loan portfolios due to TRA86 directly affected these industries in a negative way. A study by the FDIC Savings Association Insurance Fund (SAIF) Advisory Committee [1991] found that a significant portion of the losses reported by failed savings and loans (S&Ls) can be directly attributed to the adverse effects of TRA86 on real estate returns and values.[8] Likewise, the commercial banking industry also suffered from declining real estate values after 1985, although not so much as S&Ls. Houlter [1991] reports that banks channeled 60 percent of their loan growth into real estate loans between 1984 and 1989, in part because the capital markets had siphoned off much of their traditional corporate lending business. As a result, the proportion of outstanding bank loans in real estate credits increased from 25 percent to 37 percent over this period [Downs 1990]. At the same time, net charge-offs of real estate loans, as a percent of total real estate loans, more than doubled between 1985 and 1987 and remained close to the 1987 level through 1988, even as net charge-offs of other loan types declined or increased only modestly [Wolfson and McLaughlin 1989]. Primarily as a result of the deterioration in their real estate loan portfolios, banks' net charge-offs, as a percent of total loans, increased by over one-third from 1985 to 1988. Thus, it appears that the decline in real estate values owing to TRA86 had an immediate, adverse effect on bank loan quality, presumably in direct proportion to banks' pre-1986 investment in real estate loans.

TRA86 Provisions Targeted At Commercial Banks: Implication For Bank Risk Taking

While TRA86 made numerous revisions to Federal tax law, probably the most significant changes directly affecting the banking industry were provisions designed to eliminate preferential treatment of banks in two areas: 1) interest expense allocable to tax-exempt obligations and 2) tax reserve for bad debts, specifically, bad debts of large banks. In the first two parts of this section we explore the implications of each of these provisions of TRA86 for bank net income. Then in the third part we discuss the incentives for banks to take on added risk to recoup the earnings lost as a result of these changes.

Interest Expense Allocable to Tax-Exempt Obligations

Tax revisions incorporated in TRA86 raised the disallowance of banks' interest expense allocable to tax-exempt obligations acquired after August 7, 1986, from 20 percent to 100 percent. In this part we examine this revision in the context of the history of the disallowance provision and discuss the implications of the 1986 statutory change for bank after-tax income.

The Disallowance Provision and Pre-1986 Tax Law. Prior to 1983 banks generally were permitted to deduct all interest paid on deposits and other short-term borrowings without regard to the amount of tax-exempt securities held.[9] As a result, banks were able to substantially increase their profits by holding only a small fraction of their assets in tax-exempt obligations, primarily state and local bonds [Hendershott and Koch 1980; Neubig and Sullivan 1987a].[10]

Tax revisions enacted by the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), however, reduced the earnings benefit to banks from holding tax-exempt securities. Specifically, TEFRA provided that for tax-exempt obligations acquired by banks after December 31, 1982, fifteen percent of otherwise deductible interest expense allocable to such obligations was disallowed. Subsequently, the disallowance was raised to 20 percent by the Deficit Reduction Act of 1984 as part of a further reduction of corporate tax preferences to trim the Federal budget deficit. Thus, if a bank had total annual interest expense of $5 million, and 10 percent of its total assets, on average, were invested in post-1982 tax-exempts, it would be disallowed $100,000 ($5 million x .10 x .20) of the $5 million interest expense.[11] This, in turn, would increase the bank's tax liability and reduce its net income by $46,000 ($100,000 x .46, the corporate marginal income tax rate in 1982).

TRA86 Provisions and Implications for Bank Net Income. Tax revisions incorporated in TRA86 further reduced the earnings benefit to banks holding tax-exempt obligations by raising the disallowance of banks' interest expense allocable to tax-exempt obligations acquired after August 7, 1986, from 20 percent to 100 percent. This effectively eliminated any interest expense deduction on such obligations. Tax-exempt securities acquired after 1982 and before August 8, 1986, continued to be subject to a 20 percent disallowance. In addition, tax-exempt obligations issued for governmental or charitable purposes by an issuer that reasonably expects to issue no more than $10 million of such non-private activity bonds annually

continue to be subject to only a 20 percent disallowance (the "Qualified small-issuer" exception).[12] The 1986 tax law also lowered corporate income tax rates from a maximum of 46 percent to 34 percent.

Raising the disallowance from 20 percent to 100 percent further reduces the after-tax earnings of banks holding tax-exempts, all other things being equal. Thus, in the case of the bank in the earlier example, it would be disallowed an additional $400,000 [$5 million x .10 x (1.00 - .20)] of its $5 million interest expense. With no change in tax rates, the effect would be to increase the bank's tax liability and reduce its net income by another $184,000 [($500,000 - $100,000) x .46]. Similarly, with the lower marginal tax rate the effect would still be to increase the bank's tax liability and reduce its net income relative to the levels the bank would have enjoyed without the larger disallowance, albeit by a smaller dollar amount owing to the lower tax rate. Thus, in the case of the example cited above in a lower tax rate setting the bank's tax liability would rise and its net income would fall by $136,000 [($500,000 - $100,000) x .34] due to the larger disallowance.

The provision of TRA86 raising the disallowance of banks' interest expense allocable to tax-exempt obligations acquired after August 7, 1986, from 20 percent to 100 percent significantly reduced banks' after-tax income, at least relative to the level banks would have enjoyed without such a change. This, in turn, has given banks an incentive to replace their holdings of tax-exempts subject to the 100 percent disallowance with higher yielding taxables in order to recoup profits lost by the higher disallowance.[13] As evidence of this incentive, FDIC data indicates that bank holdings of tax-exempt (state and local government) bonds declined from 5.9 percent of bank total assets in 1985 to 2.5 percent in 1990.[14] Similarly, Scholes, Wilson, and Wolfson [1990] and Scholes and Wolfson (1992) report that bank holdings of tax-exempt municipal bonds declined as a percentage of banks' marketable securities portfolio in the fourth quarter of 1986 as well as in each quarter of 1987 and in every year through the first three quarters of 1990. As a result, banks' share of total outstanding municipal bonds fell from approximately 35 percent to 15 percent over this period [Fortune, 1991].

Tax Reserve for Bad Debts of Large Banks

TRA86 included two major provisions relating to large banks' tax reserves for bad debts. First, the statute repealed the reserve method of accounting for bad debts for large banks, defined as those with total assets in excess of $500 million. Second, the law mandated that large banks recapture into taxable income their existing tax bad debts reserve. In this part we explore both of these provisions of the new law and their implications for bank net income.

The Reserve Method and Pre-1986 Tax Law. Both generally accepted accounting principles (GAAP) and regulatory accounting principles (RAP) follow basic accrual accounting in recording bad debts of a bank. That is, at the end of each accounting period management evaluates the bank's loan portfolio to determine the amount of losses that will likely occur from existing loans. The reserve for loan losses is then increased by a charge to income to bring the reserve to a level equal to the total amount of estimated losses. As loans become worthless, they are charged off against the loan loss reserve account. This process allows a bank to adjust its earnings in the year in which loans decline in value, rather than waiting until the loans are actually written off the bank's books.

Prior to TRA86 banks were also permitted to use the reserve method of accounting for bad debts in calculating their tax liability. Thus, a deduction was allowed for increases in a bank's reserve for loan losses even though any nonperforming loans had not yet been charged off. These deductions were particularly beneficial to a growing bank because they generally exceeded the loans charged off during the tax year, thereby reducing the bank's tax liability below what it would have been if the deduction had been limited to loans actually charged off.

Use of the loan loss reserve method in determining bank tax liabilities dates back to the Revenue Act of 1921, which permitted banks to deduct additions to their loan loss reserve that reasonably exceeded their actual loan losses for the period [(Conway and Siegenthaler 1987]. The Tax Reform Act of 1969 (TRA69) sanctioned this tradition by specifying alternative procedures --- the percentage procedure and the experience procedure --- for calculating a bank's tax liability under the reserve method and by allowing banks to use whichever procedure generated the greater tax deduction. This law remained in effect for all banks until 1986 and continues to apply to small (under $500 million in total assets) banks.

Banks found the reserve method using the percentage procedure especially attractive during the early 1980s as their loan growth outpaced the growth of their net charge-offs.[15] Banks could take tax deductions based on eligible loans outstanding when, in fact, losses associated with those loans might not occur for several years (or might never occur at the level anticipated by the percentage procedure). The effect of such large tax deductions was to reduce a bank's tax liability and increase its after-tax earnings. As evidence of the attractiveness of the percentage procedure during these years, the Treasury Department [1984] estimated that in 1983 seventy three percent of banks found the percentage procedure more beneficial than the experience procedure.[16] Moreover, this occurred despite the fact that the allowable reserve

percentage of eligible loans had dropped to 0.6 percent by 1983. However, as indicated by aggregate data in Table 1, net charge-offs as a percent of year-end gross loans of banks (which provide the benchmark figures for the experience procedure) remained well below 0.6 percent through 1982 and did not climb significantly above 0.6 percent until 1984.

In addition to the large tax deduction relative to actual loan losses provided by the reserve method/percentage procedure during the early 1980s, banks could expense a smaller provision for loan losses for financial reporting purposes, thereby further improving after-tax earnings. A deferred tax liability was created since the tax expense for financial reporting was larger than the tax actually paid. This tax could be deferred for a number years, or until tax deductions for loan losses became less than the loan loss provision used for financial accounting purposes, which might never occur for a perpetually growing bank.[17]

During the mid-1980s many banks ceased to benefit from the reserve method [Conway and Siegenthaler 1987]. The reason is that net charge-offs accelerated to the point that they exceeded the allowable reserve addition which itself had declined due to the scheduled reduction in the allowable reserve percentage (from 1.8 percent in 1969 to 0.6 percent in 1983-1987). These banks merely increased their tax loan loss reserve by an amount equal to net

charge-offs for the year, which totaled $13.1 billion for the banking industry in 1985 (0.8 percent of aggregate year-end bank loans). In fact, Neubig and Sullivan [1987a] report that in 1984 only five percent of total banking industry bad debt deductions of $11.4 billion was attributable to banks' using the reserve method. The bulk of the deductions was due to net charge-offs.[18]

TRA86 Provisions and Implications for Bank Net Income. Neubig and Sullivan [1987a] argue that repealing the reserve method of accounting for banks' bad debts was one of the most controversial provisions of TRA86 due to the expected decline in loan loss reserves resulting from this provision. The Congress originally intended to repeal the reserve method for all banks but eventually dropped smaller banks from consideration because of a concern that such a change would unfairly affect these institutions [Joint Committee on Taxation 1987]. As a result, TRA86 retained the prior law provision relating to small banks.

However, large banks, defined as those with more than $500 million in assets (or that are part of a consolidated group with more than $500 million in assets), became subject to the general rule applicable to all taxpayers, that is, bad debt deductions can be taken only as they occur. In fact, as noted earlier, this provision would not have affected many banks during the mid-1980s because their net charge-offs typically exceeded the allowable deduction

TABLE 1

Gross Loans And Net Charge-Offs
All Insured Commercial Banks,
1978-1985*

Year -end	Gross Loans ($ millions)	Net Charge-offs ($ millions)	Net Charge-offs/ Gross Loans
1978	850,641	2,497	0.29%
1979	954,896	2,564	0.27
1980	1,023,504	3,599	0.35
1981	1,136,743	3,763	0.33
1982	1,228,590	6,559	0.53
1983	1,318,903	8,435	0.64
1984	1,508,302	10,718	0.71
1985	1,630,782	13,237	0.81

*Data for consolidated (domestic and foreign) offices
Source: FDIC, *Statisics on Banking,* annual issues, 1981-1985, and *Annual Reports,* 1978-1980.

using either the percentage or experience procedure. However, in a future era in which total loan growth might again surpass the growth in net charge-offs the effect of TRA86 would be to reduce a bank's tax deduction, and thus the after-tax earnings of the bank, below the levels the bank would have enjoyed prior to the new tax law.

The second provision of TRA86 relating to large banks' tax reserves for bad debts requires banks to recapture into taxable income (but not into accounting income) their existing tax bad debts reserve over a four-year period beginning in 1987 (or the first year in which a bank is classified as *large*. Ten percent of the reserve recapture is to be included in taxable income in the first tax year; 20 percent, in the second year; 30 percent, in the third year; and 40 percent, in the fourth year.[19]

The previous discussion illustrates that large banks' after-tax earnings could be adversely affected by TRA86's loan loss reserve provisions in two ways: 1) reduced tax deduction owing to the repeal of the reserve method, and 2) recapture of existing tax loan loss reserves into taxable income over a four-year period. In that regard, O'Brien and Gelfand [1987a] projected a $1 billion annual increase in aggregate bank taxable income due to the repeal of the reserve method and a $2 billion increase per year for four years owing to the reserve recapture provision. As noted earlier, however, repealing the reserve method alone likely did *not* adversely affect many banks initially since these banks' annual net charge-offs already exceeded their allowable reserve addition under the reserve method. However, if the ratio of net charge-offs to loans were to decline significantly due, say, to a re-escalation of loan growth, the reserve method/experience procedure could again yield a greater tax deduction than annual net charge-offs. In that case, without access to the reserve method these banks would see their tax liability increase and their net income decline.

Tax Law Changes and Incentives for Bank Risk Taking

The previous discussion of TRA86 provisions targeted at commercial banks has focused on the implications of the 1986 tax law for banks' after-tax income. The findings suggest that without any bank portfolio or pricing changes in response to the new law, TRA86 would have adversely affected all banks' profits through the higher disallowance of interest expense allocable to tax-exempt obligations. In addition, TRA86 would have reduced large banks' profits for a period through the recapture of these banks' tax loan loss reserves into their taxable incomes and may have further reduced large banks' profits through the repeal of the reserve method of loan loss accounting.

Still at issue is the implication of these tax law changes for bank risk taking. Earlier we argued that as a result of the TRA86 provision raising the disallowance of a bank's interest expense allocable to tax-exempts, banks generally would have an incentive to replace their holdings of tax-exempts subject to the 100 percent disallowance with higher yielding taxables in order to recoup profits lost as a result of the increased disallowance. Similarly, to the extent that large banks experienced a temporary decline in profits due to the recapture of their existing tax bad debts reserves into taxable income, they would have an incentive to raise their pretax revenue during the recapture period to maintain after-tax profits. Both incentives imply an increase in bank risk taking following TRA86 as a conscious response to recoup after-tax earnings lost due to TRA86. Moreover, the larger the adverse effect of TRA86 on bank net income, due either to a large pre-TRA86 proportion of tax-exempts or to a large loan loss reserve that had to be recaptured into taxable income, or both, the greater the incentive for a bank to take on added risk to recoup net income.

A Regression Analysis Of Changes In Bank Asset Quality

To examine empirically the effects of TRA86 on bank asset quality, a single-equation regression analysis was applied to a sample of large commercial banks. The analysis seeks to attribute changes in bank asset quality following enactment of TRA86 to 1) the two major provisions of the statute targeted at banks (namely, the disallowance of bank interest expense allocable to tax-exempt obligations and the recapture of large banks' existing tax bad debts reserve into taxable income) along with 2) banks' pre-TRA86 level of real estate loans that were devalued by other provisions of the law.

Asset quality (AQ) of a bank is measured by three alternative ratios, each of which relates an estimate of embedded losses in a bank's loan portfolio to the bank's total assets. Thus, an increase in any of the three ratios indicates a deterioration in the overall quality of the bank's assets. The three ratios are as follows:

AQ_1 = allowance for loan losses/total assets,
AQ_2 = nonperforming loans/total assets,
AQ_3 = nonperforming loans plus other real estate owned/total assets.

The allowance (reserve) for loan losses on the balance sheet is a contra-asset account reflecting management's assessment of the expected losses in a bank's loan portfolio. As such, it is a subjective measure of asset

quality and is often viewed as the lower bound of the true level of embedded losses. This view is based on the argument that banks have an incentive to understate potential losses and the attendant bad debts reserve in order to maximize reported income. Any such downward bias, however, should be lessened as a result of adjustments (specifically, increases to the reserve) mandated by bank examiners. Moreover, to the extent that the stock market views a bank's loan portfolio more negatively than the bank's management views it, then the bank's stock price may actually increase as the bank raises its allowance, giving management an incentive to boost the bad debts reserve. This, too, should lessen any downward bias in the reported allowance.

A second measure of asset quality is the bank's level of nonperforming loans, commonly defined as the sum of 1) loans past due 90 days or more and still accruing and 2) nonaccruing loans. This measure is often preferred by analysts since it is objectively determined and less subject to managerial tampering. However, because banks do not usually have to write off the full amount of their nonperforming loans, this measure tends to be biased upward. Thus, it may be fairly judged as the upper bound of embedded losses in the loan portfolio.

Other real estate owned (OREO) is added to nonperforming loans in the third measure of asset quality. This recognizes the fact that banks that foreclose on nonperforming real estate loans typically just replace one type of nonperforming asset with another.

Changes in asset quality are measured over the period 1984-1989. The year 1984 was selected as the beginning point to minimize portfolio adjustments that might have occurred prior to TRA86 in anticipation of the new law as its provisions began to crystallize in Congressional discussion. The year 1989, in turn, was selected as the ending point in order 1) to allow sufficient time after enactment of the new statute for banks to make substantive portfolio adjustments in response to the various provisions of the law, and 2) to allow for any lags in the effects of such portfolio adjustments on banks' asset quality. Although banks may have quickly adjusted their portfolios in favor of riskier assets following enactment of TRA86, any measured weakening of banks' asset quality, particularly as reflected in their holdings of nonperforming loans, surely would not be expected until after some time lapse.

The remainder of this section consists of three parts. The first part presents the regression equation used to analyze changes in bank asset quality from 1984-1989; the second part discusses sample selection and data; and the third part presents the regression results.

The Regression Equation

The regression equation is as follows:

$$\Delta AQ_i = a + b_1 REL + b_2 COMR + b_3 TES + b_4 TXLR + b_5 TA + b_6 GRA$$

$$+ \sum_{j=2}^{12} b_{j+5} FR_j + b_{18} AQ_i$$

where

ΔAQ_i = change in asset quality of the bank from 1984-1989, where asset quality is measured by one of the three ratios given earlier.

REL = ratio of total real estate loans to total assets of the bank, as of year-end 1984.

COMR = ratio of commercial real estate loans to total real estate loans of the bank, as of year-end 1984, where commercial real estate loans are defined to include construction and land development loans, loans secured by multifamily (5 or more) properties, and loans secured by nonfarm nonresidential properties

TES = ratio of tax-exempt assets, including securities and other obligations of states and political subdivisions in the U.S., to total assets of the bank, as of year-end 1984.

TXLR = ratio of the tax loan loss reserve to total assets of the bank, as of year-end 1984. The tax loan loss reserve is estimated at 0.6 percent of the bank's eligible loans, where "eligible loans" are defined as total loans less 1) loans to other depository institutions and 2) loans to states and political subdivisions in the U.S., in accordance with federal tax law.

TA = total assets of the bank (in $ billions), as of year-end 1984.[20]

GRA = percentage change (in decimal form) in total assets of the bank from 1984-1989.

Fr_j = a series of dichotomous variables for each of the twelve Federal Reserve Districts (less one), starting with District 2 ($j = 2, \ldots, 12$). FR_j is defined as one if the bank is headquartered in that Federal Reserve District, and zero otherwise.

AQ_i = asset quality of the bank, as of year-end 1984, where asset quality is measured by the same ratio used to define ΔAQ_i.

The first four independent variables---REL, COMR, TES, and TXLR---are designed to capture the effects on bank asset quality of the several provisions of TRA86

discussed earlier. The remaining variables are control variables to hold constant other factors that may have affected bank asset quality over the study period.

Variables Linked to Specific Provisions of TRA86. The variables REL and COMR represent the pre-TRA86 level of real estate loans in a bank's asset portfolio. As noted earlier, provisions incorporated in TRA86 served to reduce the returns on all types of real estate (other than perhaps owner-occupied housing), leading to a decline in real estate values. This, in turn, escalated the risk exposure of real estate lenders, leading to a sharp increase in net charge-offs of real estate loans. Thus, to the extent that banks had a sizable portion of their assets in real estate loans prior to TRA86, they should have recorded a large decrease in asset quality following enactment of TRA86, giving a positive coefficient for REL.

Further, to the extent that TRA86 had a larger adverse effect on the value of commercial real estate (including land held for construction and development) than on noncommercial property, as is generally thought to be the case, then the decline in asset quality owing to TRA86 should be even greater for banks with a larger proportion of their real estate loan portfolio in commercial real estate credits. In that case, the coefficient of COMR should also be positive.

An empirical question in this regard is whether any deterioration in the quality of banks' assets held at the time TRA86 was enacted would still be evident in 1989 or would in fact be unobservable owing to the resolution of problem credits over the 1986-1989 period. While we can offer no independent evidence on this issue, we expect that there should still be sufficient amounts of deteriorated credits on banks' books in 1989 to link interbank variations in asset quality deterioration from 1984-89 to banks' pre-TRA86 level of real estate loans. Certainly, a positive, significant coefficient for REL and COMR would be consistent with this expectation.

The variable TES is intended to capture the effect of the higher (100 percent) disallowance of bank interest expense allocable to a bank's holdings of tax-exempt obligations, which was imposed by TRA86. As discussed earlier, the larger a bank's pre-TRA86 holdings of tax-exempt securities, the larger the negative effect on bank net income of the higher disallowance, giving the bank a greater incentive to take on riskier assets to recoup lost income. This assumes, of course, that the higher disallowance applies to all of a bank's tax-exempt holdings. The fact is, however, that this provision applies only to tax-exempts acquired by banks after August 7, 1986. Thus, any tax-exempt securities purchased prior to that date would continue to enjoy the lower (20 percent)

disallowance until they matured (or were sold), at which time they would have to be replaced with assets subject to the higher disallowance. The implication is that not all of a bank's tax-exempt holdings became subject to the higher disallowance at the time TRA86 was enacted, in which case TES cannot be used as a measure of the *absolute* amount of a bank's tax-exempts made subject to the new disallowance. Assuming, however, that the maturity distribution of a bank's tax-exempt securities prior to TRA86 was fairly constant across institutions, then we can still use TES as a measure of *relative* differences in banks' tax-exempt holdings made subject to the provisions of the new law. In that case, the larger a bank's pre-TRA86 portfolio of tax-exempts, the greater the adverse effect on bank net income over any period of time after August 7, 1986, and thus the greater the incentive for the bank to replace its holdings of tax-exempts subject to the 100 percent disallowance with taxables. Assuming that a bank cannot recoup lost earnings with higher yielding taxable assets without also taking on added risk, then as a bank reaches for higher yielding taxables, it should also record a deterioration in asset quality. We conclude, therefore, that the greater the pre-TRA86 level of tax-exempts, the greater the expected increase in bank risk taking to recover lost earnings and thus the greater the expected deterioration in bank asset quality, in which case the coefficient of TES should be positive.

Finally, the variable TXLR represents a bank's pre-TRA86 tax loan loss reserve, which, as noted earlier, must be recaptured into the bank's taxable income over a four-year period beginning in 1987. Thus, the larger the tax reserve prior to 1986, the greater the adverse effect on bank net income over the years 1987-1990 and hence the greater the incentive of banks to take on added risk, leading to a decline in asset quality and a positive coefficient for TXLR.

In fact, banks do not generally report their tax loan loss reserve on any publicly available document. Thus, the figure used in this analysis is estimated at 0.6 percent of "eligible loans," which would have been the maximum allowable tax reserve under the reserve method/percentage procedure, which was the preferred method of most banks to calculate their tax loan loss reserve until the mid-1980s.[21]

Control Variables. In addition to the several variables linked to specific provisions of TRA86, a number of variables are included to control for other factors that may have affected asset quality over the study period. First, we included variables to measure bank asset size (TA) and growth from 1984-1989 (GRA). To the extent that larger banks were more adversely affected than their smaller counterparts during the 1980s by greater competition from

nonbank firms and foreign banking organizations along with increased capital market efficiency, then we might expect to see greater risk taking and thus a greater deterioration in asset quality at these banks during the mid/late 1980s.[22] Such a pattern would be evidenced by a positive coefficient for TA. Also, Clair [1992] argues that large banks may be less aggressive in charging off loans than small banks, owing perhaps to a competitive advantage for large banks in working out troubled credits. This, too, should algebraically increase the coefficient of TA.

Banks that exhibited more rapid growth over the study period may, too, have experienced a greater deterioration in asset quality, depending on whether such growth was internally generated through additional lending to new or existing customers or was generated externally through the acquisition of other banks. Clair [1992] reports that among Texas banks in the 1980's, rapid growth tended to have varying effects on loan quality, depending on the type of growth---internal or external---and the length of time following the rapid growth period. Unfortunately, the data used in this study do not allow us to distinguish between internal and external growth. Nor can any lagged effects of loan growth on loan quality be recognized. Thus, while we include bank growth (GRA) as an independent variable, we posit no specific sign for the coefficient.

Changes in bank asset quality may also be expected to vary across geographic regions due to interregional differences in economic conditions over the study period. Thus, to capture differences in economic conditions across regions, a series of regional dummy variables was included, where the regions are approximated by Federal Reserve Districts (FR_j). To preclude perfect multicollinearity, one of the Federal Reserve Districts was omitted. Excluding FR_1 (Boston), therefore, means that all of the FR_j coefficients must be interpreted relative to the value of ΔAQ_i recorded by banks in New England.

The last control variable is the asset quality of the bank at the beginning of the study period (AQ_i). Because any measure of asset quality involves a random element, one may expect that high and low values of AQ_i will, over time, "regress" toward the mean, while values around the mean will move toward the extremes of the distribution [Prais, 1958]. This phenomenon, commonly referred to as the "regression fallacy," suggests a negative coefficient for AQ_i.[23]

Sample and Data

The sample includes all commercial banks that 1) were in continuous operation from 1984-1989, 2) had total assets above $500 million as of year-end 1984, and 3) had

no foreign offices during 1984-1989, which excludes the money center banks from the sample.[24] The restriction that banks must have been in operation over the entire study period is necessary to examine changes in bank asset quality over that period. In addition, the sample was limited to banks above $500 million in assets since the provisions of TRA86 repealing the reserve method of loan loss accounting and mandating the recapture of tax loan loss reserves into taxable income apply only to such banks.

Finally, banks with foreign offices were excluded to preclude any complications owing to provisions of TRA86 that limited foreign tax credits. This is particularly important since the large-bank-size criterion used in selecting the sample would otherwise have included banks most affected by tax law provisions relating to foreign tax credits.

The resulting sample consists of 218 banks from 43 states and Puerto Rico. However, 13 banks had to be deleted because of missing, incomplete, or questionable data, leaving a usable sample of 205 institutions.

Bank financial data are taken from U.S. Bank Database in SAS Data Format, prepared by the University of Missouri-St. Louis School of Business. This database is assembled from bank Reports of Condition (Call Reports) and Reports of Income submitted to the federal bank regulatory agencies.

Regression Results

Regression results are presented in Table 2 for each of the three measures of asset quality. As shown, the estimating equation performs reasonably well for cross-section analysis, at least with respect to the two objective measures of asset quality---nonperforming loans/total assets and nonperforming loans plus OREO/total assets---for which approximately 35 percent of the variance is explained. In the case of the third measure (allowance for loan losses/total assets), which is a more subjective measure of asset quality, the estimating equation accounts for only about 17 percent of the variance.

Among the variables linked to specific provisions of TRA86, both REL and COMR as well as TXLR, but not TES, have the expected signs with statistically significant coefficients in at least two of the three estimated equations. The positive, significant coefficients for REL and COMR in the equations for ΔAQ_2, and ΔAQ_3 are consistent with the hypothesis that banks with a relatively large pre-TRA86 level of real estate loans, particularly commercial real estate credits, experienced a significant increase in nonperforming loans as well as nonperforming loans plus OREO, owing to the adverse effects of TRA86 on real estate markets and thus on real estate loan portfolios. The

TABLE 2

Regression Results For Changes In Bank Asset Quality (DAQ$_i$), 1984-1989
(t - statistics in parentheses)

	Allowance for Loan Losses/ Total Assets (DAQ$_1$)	Nonperforming Loans/ Total Assets (DAQ$_2$)	Nonperforming Loans plus Other Real Estate Owned/ Total Assets (DAQ$_3$)
REL	0.0010	0.0331	0.0360
	(0.137)	(2.451)**	(2.006)**
COMR	0.0060	0.0213	0.0301
	(1.804)*	(3.294)**	(3.494)***
TES	0.0024	-0.0175	-0.0125
	(0.220)	(-0.828)	(-0.442)
TXLR	2.6763	2.7267	4.1800
	(3.135)***	(1.777)*	(2.061)**
TA	0.0001	0.0028	0.0023
	(0.110)	(1.904)*	(1.177)
GRA	-0.0003	0.0011	-0.0006
	(-0.502)	(0.969)	(-0.390)
FR$_2$	-0.0027	-0.0071	-0.0073
	(-1.113)	(-1.591)	(-1.226)
FR$_3$	-0.0015	-0.0141	-0.0156
	(-0.641)	(-3.210)***	(-2.658)***
FR$_4$	-0.0012	-0.0117	-0.0136
	(-0.500)	(-2.492)**	(-2.171)**
FR$_5$	-0.0046	-0.0212	-0.0222
	(-1.901)*	(-4.546)***	(-3.576)***
FR$_6$	-0.0022	-0.0165	-0.0102
	(-0.965)	(-3.648)***	(-1.693)*
FR$_7$	-0.0021	-0.0139	-0.0160
	(-0.921)	(-3.110)***	(-2.679)***
FR$_8$	-0.0026	-0.0141	-0.0160
	(-0.863)	(-2.390)**	(-2.048)**
FR$_9$	-0.0011	-0.0154	-0.0187
	(-0.288)	(-2.137)**	(-1.957)*
FR$_{10}$	-0.0020	-0.0163	-0.0169
	(-0.713)	(-3.002)***	(-2.347)**
FR$_{11}$	0.0080	-0.0042	0.0105
	(3.006)***	(-0.812)	(1.554)
FR$_{12}$	-0.0038	-0.0210	-0.0241
	(-1.658)*	(-4.538)***	(3.789)***
AQ$_i$	-0.5154	-0.7688	-0.6339
	(-2.554)**	(-6.752)***	(-4.802)***
Intercept	-0.0034	-0.0032	-0.0098
	(-0.797)	(-0.383)	(-0.892)
Adj. R^2	.173	.355	.347

***   Statistically significant at 99 percent level (two-tailed test)
**   Statistically significant at 95 percent level (two-tailed test)
*   Statistically significant at 90 percent level (two-tailed test)

fact that the significance level of both REL and COMR is weaker in the equation for ΔAQ_1, may indicate a failure of banks to increase their allowance for loan losses sufficiently in the early years following TRA86, even as the volume of nonperforming real estate loans was escalating.

The positive, significant coefficient of TXLR in all three equations is also consistent with expectations and indicates that banks with a relatively large tax loan loss reserve prior to 1986 experienced a significant deterioration in asset quality in the early years following TRA86. This result supports the hypothesis that as large banks recaptured their tax bad debts reserve into taxable income over the four-years 1987-1990, the attendant reduction in after-tax net income induced them to take on added risk to recoup lost earnings.

In contrast with the results for REL, COMR, and TXLR, the variable TES has an insignificant coefficient in all three equations. This finding is contrary to expectations and suggests no linkage between a bank's pre-TRA86 level of tax-exempt securities and post-TRA86 changes in bank asset quality. In part, however, this result may reflect differences across banks in the maturity distribution of their pre-TRA86 holdings of tax-exempts, which we earlier assumed to be constant for all institutions. To the extent that two banks had different maturity distributions of tax-exempt securities prior to TRA86, they would record different income effects as a result of the new tax law even if they initially held the same relative amount of tax-exempts. Specifically, the bank with tax-exempts maturing earlier would more quickly lose the benefit of the higher disallowance provision, giving it an incentive to take on added risk sooner to recover lost earnings. Thus, recognizing 1) the possibility of interbank differences in maturity distribution of tax-exempt holdings and 2) our need to relate a banks change in asset quality over the post-TRA86 years to the amount of its tax-exempts becoming subject to the higher disallowance over the same time period, we reestimated the regression equation for all three measures of asset quality, using the observed *change* in a bank's tax-exempt holdings over the 1984-1989 study period (ΔTES) in place of the bank's pre-TRA86 amount of such assets.[25] The larger the amount of tax-exempts becoming subject to the higher disallowance over this period, the larger should be the negative value of ΔTES. Assuming that tax-exempts becoming subject to the higher disallowance provision are replaced with higher yielding, riskier assets (leading to a deterioration in asset quality), the coefficient of ΔTES should also be negative.

In fact, however, regression results with ΔTES (not shown) were not substantially different from those presented in Table 2. The variable ΔTES had an

insignificant coefficient in all three estimated equations, and the overall explanatory power of the regression model was not enhanced. Thus, it remains a mystery as to why no empirical relationship can be established between changes in bank asset quality over the period 1984-1989 and a bank's pre-TRA86 level of tax-exempt securities. This is especially disconcerting since, as noted earlier, banks clearly reduced their holdings of tax-exempt securities after TRA86 was enacted and continue (through 1992) to work down their holdings of tax-exempts as those securities mature [King and Kreps, 1992].

Another possible explanation for the insignificant coefficient of TES (and ΔTES) is that the study period (1984-1989) was too brief and/or the data were inadequate to fully capture lags in the deterioration of asset quality from added risk taking in the post-TRA86 era. However, in light of the generally significant coefficient of TXLR, which we earlier used to relate increased risk taking following TRA86 to income lost from reserve recapture, such an explanation is not totally satisfying.

Turning to the control variables, neither TA nor GRA has a statistically significant coefficient across all three measures of asset quality, although TA does have a positive, significant coefficient (as expected) in the equation for ΔAQ_2. Likewise, most of the regional dummy variables have significant coefficients in selected equations. Of particular note is the positive, significant coefficient for FR_{11} (Dallas) in the equation for ΔAQ_1 and the insignificant coefficient for FR_{11} in the equations for ΔAQ_2 and ΔAQ_3. Taken together, these results suggest two patterns. First, over the 1984-1989 period banks in the Dallas Federal Reserve District generally increased their ratio of allowance for loan losses/total assets (AQ_1) relative to that of their New England counterparts, reflecting the dramatic deterioration of bank loan quality across the Southwest during these years. At the same time, these banks (as well as those in the New York District, FR_2) generally recorded a change similar to that of New England banks in both the ratios of nonperforming loans/total assets (ΔAQ_2) and nonperforming loans plus OREO/total assets (ΔAQ_3), whereas banks in other regions typically reported a decrease in these ratios relative to New England banks. (In fact, New England banks, along with other Northeastern and Southwestern banks, generally recorded a sharp increase in these ratios during this period, but as the regional dummy variables are defined this pattern is captured in significant *negative* coefficients for all of the other FR_j.) Recognizing the subsequent loan problems among banks in the Northeast, therefore, it seems clear that over the study period banks in the Southwest, as well those in the Boston and New York Federal Reserve Districts, were generally recording similar increases in AQ_2 and AQ_3, whereas only banks in the

Southwest were raising their bad debts reserve to absorb the embedded loan losses.

Finally, the negative, significant coefficient for AQ_1 in all three estimated equations is consistent with expectations and supports the "regression fallacy" hypothesis. Moreover, the insignificant intercept indicates that there is no unexplained amount of ΔAQ_i that is constant across all banks.

Conclusions

Most explanations for the banking industry's recent woes have focused on increased competition, restrictions on bank expansion and product diversification, incentives for risk taking due to Federal deposit insurance, and inept management. Another possible explanation that has been largely overlooked is the Tax Reform Act of 1986. TRA86 contained several provisions that potentially weakened the quality of bank assets. The most significant of these provisions were those designed to eliminate preferential treatment of banks in two areas: 1) interest expense allocable to tax-exempt obligations and 2) tax reserve for bad debts, specifically, bad debts of large banks. In addition, banks were indirectly affected by the downturn in the real estate industry during the late 1980s, owing in part to the elimination of tax-sheltered benefits previously accorded to real estate investments. Banks that were heavily invested in real estate loans saw their loan portfolios devalued almost immediately following enactment of TRA86.

Without any bank portfolio or pricing changes in response to the new law, TRA86 would have adversely affected all banks' profits through the higher disallowance of interest expense allocable to tax-exempt obligations. In addition, TRA86 would have reduced large banks' profits for a period through the recapture of these banks' tax loan loss reserve into their taxable income and may have further reduced large banks' profits through the repeal of the reserve method of loan loss accounting. In response to the higher disallowance, banks generally would have an incentive to replace their holdings of tax-exempts subject to the 100 percent disallowance with higher yielding taxables in order to recoup profits lost as a result of the increased disallowance. Similarly, to the extent that large banks experienced a temporary decline in profits due to the recapture of their existing tax bad debts reserve into taxable income, they would have an incentive to raise their pretax revenue during the recapture period to maintain after-tax profits. Both incentives imply an increase in bank risk taking following TRA86 as a conscious response to recoup after-tax earnings lost due to TRA86.

To examine empirically the effects of TRA86 on bank asset quality, a single-equation regression analysis was applied to a sample of 205 large commercial banks. The analysis seeks to attribute changes in bank asset quality following enactment of TRA86 to 1) added risk taking induced by the two major provisions of the statute targeted at banks (namely, the disallowance of bank interest expense allocable to tax-exempt obligations and the recapture of large banks' existing tax bad debts reserve into taxable income) along with 2) banks' pre-TRA86 level of real estate loans that were devalued by other provisions of the law. Asset quality of a bank is measured by three alternative ratios, each of which relates an estimate of embedded losses in a bank's loan portfolio to the bank's total assets.

Among the variables linked to specific provisions of TRA86, both the total real estate loan variable and the commercial real estate loan variable as well as the tax loan loss reserve variable have the expected signs with statistically significant coefficients in at least two of the three estimated equations. The positive, significant coefficients for the real estate variables are consistent with the hypothesis that banks with a relatively large pre-TRA86 level of real estate loans, particularly commercial real estate loans, experienced a significant increase in nonperforming loans owing to the adverse effects of TRA86 on real estate markets and thus on real estate loan portfolios. The positive, significant coefficient for the tax loan loss reserve variable in all three equations is also consistent with expectations and indicates that banks with a relatively large tax loan loss reserve prior to 1986 experienced a significant deterioration in asset quality in the early years following TRA86. This result supports the hypothesis that as large banks recaptured their tax bad debts reserve into taxable income over the four-years 1987-1990, the attendant reduction in after-tax net income induced them to take on added risk to recoup lost earnings. In contrast with the results for real estate loans and tax loan loss reserve, the tax-exempt investment variable has an insignificant coefficient in all three equations. This finding is contrary to expectations and suggests no linkage between a bank's pre-TRA86 level of tax-exempt securities and post-TRA86 changes in bank asset quality. In part, however, this result may reflect the inadequacy of the data to fully capture lags in the deterioration of bank asset quality from added risk taking in the post-TRA86 period.

Suggestions For Future Research

The results of this study raise several questions for future research. First, the observed non-relationship between a bank's pre-TRA86 level of tax- exempt

securities and changes in the quality of the bank's asset portfolio after 1986 is perplexing and begs for further study. Inquiry into this issue might allow for a longer study period and/or involve a direct examination of the risk-return configuration of the assets acquired by banks to replace their maturing tax exempts following enactment of TRA86. In addition, analysts might compare the responses of large and small banks to the higher disallowance of interest expense allocable to tax exempts under the new law. Finally, as bank loan growth re-escalates in a revitalized economy, thereby resurrecting the benefits of the reserve method of accounting for bank bad debts, it should be interesting to examine the effect of the repeal of this method (which was effected by TRA86 for banks with more than $500 million in assets) on the income and risk exposure of large banking organizations.📖

❀❀❀ Footnotes ❀❀❀

1. Prior to TRA86, a number of studies had concluded that large commercial banks had effective tax rates significantly lower than those of other large corporations, owing to specific tax preferences accorded to banks. For a summary and discussion of these studies, see Henderson [1987, esp. Table 1, and references cited].

2. See simulation studies by Gelfand and Hanweck [1986] and Buynak [1987]. Other analysts have reached similar conclusions without presenting detailed quantitative evidence; see, e.g., Cooke[1987] and Ator and Claytor [1987].

3. See, e.g., Gelfand and Hanweck [1986], Buynak [1987], O'Brien and Gelfand [1987a,b], Neubig and Sullivan [1987b,c], Cooke [1987], Henderson [1987], French [1987], Neuberger [1988], Englebrecht and Billings [1987], and Grammatikos and Yourougou [1990].

4. O'Brien and Gelfand [1987b, p. 1324] conclude their simulation analysis by noting that TRA86 is "not likely to have substantially adverse effects on bank soundness." However, this finding is based on their projection of modest reductions in bank after-tax income from TRA86 rather than an explicit analysis of the effect of TRA86 on bank risk exposure. One study by Grammatikos and Yourougou [1990] does have implications for the post-TRA86 level of bank risk exposure even though it does not specifically

address bank risk taking. That study examines the expected effect of tax reform on 1986 bank stock prices and finds no adverse linkage between TRA86 and the stocks of banking institutions. This suggests that the market anticipated that banks could fully recoup after-tax income lost to higher taxes through restructuring and/or repricing their portfolios of assets and liabilities without adversely affecting their risk position.

5. For a detailed discussion of the provisions of TRA86 relating to real estate, see Schwartz [1987].

6. In addition to TRA86, other concurrent developments put downward pressure on real estate values in the late 1980s. Specifically, foreign buyers reduced their investments in real estate due to rising competitive capital demands in Europe and financial adversities in Japan. Also, S&L regulators forced thrifts to virtually withdraw from commercial property loans, and managers of pension funds reduced their investments in real estate due to declining returns [Downs 1991].

7. In a related study, Copley and Garris [1989] examined whether the short-run tax provisions of TRA86 (longer depreciable lives and lower marginal tax rates) would offset the long-run provisions of the law (elimination of accelerated depreciation and preferential capital gains rate) to maintain real estate returns. Their results indicate that TRA86 significantly reduced the expected internal rates of return on real estate investments, including both residential and nonresidential properties. These results are consistent with Huberty's [1986] sensitivity analysis, which found that with moderate leverage (70 percent loan-to-value ratio) the net loss in short-run benefits from TRA86 outweighed the net gain from long-run benefits.

8. Similarly, Rose [1990] attributes the collapse of the thrift industry in part to a general decline in the values of multifamily residential and commercial real estate following TRA86. Also, see Crone [1987].

9. Historically, Federal tax law has disallowed a deduction for interest on indebtedness incurred or continued to purchase or carry tax-exempt obligations. However, the Internal Revenue Service (IRS) and the courts have long interpreted the legislative history of this provision not to apply to deposits and other short-term liabilities incurred by banks in the ordinary course of their day-to-day business. In 1982, however, the Congress amended the tax code (section 291) to provide that a portion of a bank's interest expense allocable to tax-exempt obligations be disallowed as a deduction. (For a fuller discussion of the history of the disallowance provision, see *General Explanation of the Tax Reform Act of 1986* [1987]. See also Madeo and Pincus [1985] for a discussion of a 1980

IRS proposal to eliminate the interest deduction on governmental time deposits collateralized by tax-exempt securities.)

10. For further discussion of bank investment in tax-exempt obligations prior to 1986, see Bedford [1975], Kimball [1977], Konstas [1986], and Proctor and Donahoo [1983-84].

11. Interest expense allocable to a bank's tax-exempt investments was specified by TEFRA to be calculated by multiplying a bank's total interest expense for the year times the ratio of the average adjusted basis of post-1982 tax-exempt obligations held by the bank during the year, to the average adjusted basis of total assets of the bank for the same period.

12. Also, obligations acquired after August 7, 1986, that would otherwise be subject to the 100 percent disallowance but were acquired under a written commitment executed before September 25, 1985, are to be treated as if they were acquired before August 8, 1986, and thus subject to only a 20 percent disallowance.

13. Of course, to the extent that the yields on tax-exempts increased relative to taxable yields after TRA86, owing to a lesser demand for tax-exempts, then the incentive for banks to switch from tax-exempts to taxables would have been muted. In that regard, Petersen [1987] reports that tax-exempt yields generally did rise relative to taxable yields between April 1985 and July 1986 in anticipation of the provisions of TRA86 (which was signed into law in October). Subsequently, however, tax-exempt yields declined, relatively speaking, through December 1986. More recent, longer-term analysis by Fortune [1991] indicates that from 1986-1990 the ratio of tax-exempt to taxable yields increased for 1-year and 5-year bonds, continuing an uptrend begun in 1980. However, these relative yield patterns were not sufficient to generate a renewed interest on the part of banks to invest in tax-exempts.

14. These figures were constructed from data for all commercial banks (domestic and foreign offices), as reported in FDIC, *Statistics on Banking*, 1985 and 1990 editions.

15. The reserve method/percentage procedure allowed banks to establish a loan loss reserve equal to a specified percentage of eligible outstanding loans, including even low-risk loans such as FHA/VA insured mortgages, regardless of the bank's history of loan losses. Banks could then deduct the amount needed to bring the reserve up to the allowable percentage, after recording net charge-offs to the reserve. TRA69 set the allowable reserve percentage at 1.8 percent beginning in 1969 and provided a gradual reduction to 0.6 percent in 1982 (later amended by the Economic Recovery Tax Act of 1981 to 1.0 percent in 1982 and 0.6 percent in 1983-1987).

16. Deductions for additions to the tax loan loss reserve computed under the experience procedure were based on a six-year moving average of bad debt experience.

17. Henderson [1987] reports that from 1978 through 1981, tax loan loss reserves were larger than accounting reserves. But, beginning in 1982 the relationship reversed with accounting reserves exceeding tax reserves. By the end of 1985 aggregate accounting reserves totaled $23.2 billion, compared to only $14.0 billion of tax reserves.

18. In actuality, banks were still using the reserve method, but additions to their tax loan loss reserve were computed by reference to a base-year reserve amount (as established by TRA69 for the percentage procedure and the six-year moving average experience procedure), which typically resulted in an amount equal to net charge-offs.

19. Banks are allowed to include more than 10 percent of their tax bad debts reserve in income during the first year of disqualification, but they have to include 1/9 of the remainder in the second year, 1/3 in the third year, and 4/9 in the fourth year. Thus, banks with net operating losses (NOLs) can accelerate the reserve recapture at little or no tax cost. This is particularly useful to banks that cannot carry back their NOLs to recover prior years' taxes. Also, in lieu of recapture, banks can simply adjust the tax bad debts reserve each year for all net charge-offs that year (until the reserve is exhausted). Any excess charges over the outstanding reserve balance may then be recorded as a deductible expense. However, no deduction is allowed for any addition to the reserve balance. TRA86 attempted to provide some relief in the recapture provision for *financially troubled banks*, defined as banks whose quarterly average of nonperforming loans exceeds 75 percent of its quarterly average of equity capital for a given year. Generally, such banks are not required to include as income any portion of their bad debts reserve in that year. Nonperforming loans are defined as the sum of 1) loans past due 90 days or more and still accruing, 2) nonaccruing loans, and 3) renegotiated troubled debt under the standards of the Federal Financial Institutions Examination Council. French [1987] argues, however, that this provision actually provided little relief to troubled financial institutions. Based on 1986 data, French finds that only 104 banks (out of a total of 398 FDIC problem institutions) were affected by the recapture provision, and only 31 of these had nonperforming loans totaling more than 75 percent of their equity capital. TRA86 also contained other provisions that eroded the tax benefit associated with the loan loss reserve. The corporate alternative minimum tax (AMT) enacted by TRA86 applies to all corporations, but the banking industry was one of the principal

industries affected. As the name implies, the corporate AMT is a tax computed separately from the regular income tax. As such, it focuses on taxing certain items that receive a tax preference under the regular corporate tax system. The amount treated as a tax preference for corporate AMT purposes is the excess of the current-year addition to the reserve over the amount that would have been allowed if the bank had maintained its reserve on the basis of current actual bad debt experience. Thus, the excess (after the 20 percent reduction required by the Deficit Reduction Act of 1984) of the current-year addition over net charge-offs for the year is considered a tax preference item subject to a 20 percent tax if the bank is subject to AMT. The implication of the AMT for the tax benefit associated with the loan loss reserve is that a bank's tax liability may be increased as a result of loan loss additions when the AMT is applicable.

20. Banks commonly report total assets net of any allowance for loan losses but list individual loan categories on a gross basis. To ensure consistency of measurement across variables, therefore, total assets are grossed up to include any such allowance in every variable in which total assets are used, including the several measures of loan quality.

21. It should be noted that "eligible loans" account for the bulk of, and are highly correlated with, a bank's total loans (simple correlation coefficient for the sample used in this analysis is 0.96). Thus, one could argue that over the period of this study, during which bank loan quality was generally deteriorating, we should observe a positive coefficient for TXLR simply because banks with a larger amount of total (and eligible) loans in 1984 recorded larger increases in the several measures of loan quality, irrespective of any effect from tax loan loss reserve recapture. In fact, however, the observed deterioration in overall loan quality over this period was due largely to a worsening of the quality of real estate loans. All other loans aggregated together registered no worsening in quality over this period, based on FDIC data for large (over $300 million in assets) domestic banks. Because real estate loans are included as a separate independent variable (REL) in the regression equation, therefore, we may reasonably view TXLR as a measure of tax loan loss reserve recapture without significant concern for spurious correlation.

22. For a discussion of the competitive pressures on banks, especially large banks, during the 1980s and banks' response to those pressures, see Rose [1993].

23. Because of the "regression fallacy" it is common practice in structuring a regression equation for analyzing the change in some variable over a period of time to include the value of that variable at the beginning of the study period as a control variable. See, e.g., Rose [1982] and Rose and Wolken [1990].

24. It should be emphasized that the sample consists solely of chartered commercial banks. Bank holding companies are not included although many, if not most, of the sample institutions are subsidiaries of bank holding companies. In effect, we assume that bank asset quality changes in response to the provisions of TRA86 can be measured on an individual bank basis even though the tax liabilities of the various subsidiaries of a bank holding company are commonly computed on a consolidated holding company basis.

25. Substituting ΔTES for TES also recognizes that banks may have replaced some maturing tax-exempt securities with new tax-exempts issued by "qualified small issuers" and thus still subject to the lower (20 percent) disallowance. In that case, no increase in bank risk taking should be expected except to the extent that the bank actually reduced its total tax-exempt holdings, as measured by ΔTES. Finally, substituting ΔTES for TES recognizes that some banks may have had net-operating-loss carryforwards for some years of the study period, giving them a zero marginal tax rate for those years and possibly for the subsequent, carryforward years as well. In that case, such banks would have an even greater incentive to substitute taxables for tax-exempts [Scholes, Wilson, and Wolfson 1990]. To the extent that the taxable investments are riskier than the tax-exempts being replaced, we should thus observe an increase in bank risk taking related to ΔTES though not necessarily to TES. In fact, some sample banks did record net operating losses for one or more years of the study period. In most cases, however, banks should be able to absorb such losses as carrybacks. Only in the case of several years of net operating losses would a bank likely accumulate sufficient carryforwards to reduce the effective yield on tax-exempts and thus affect its mix of taxable and tax-exempt securities. In that regard, only about 5 percent of the sample institutions recorded net operating losses for three or more years of the study period.

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