Wharton

Financial Institutions Center

Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital and Earnings

by
Anne Beatty
Sandra L. Chamberlain
Joseph Magliolo

94-02

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

Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital and Earnings [1]

Version 3: August 10, 1993

Abstract: This paper examines whether managerial discretion over loan loss accruals, accounting related transactions such as sales of investment securities, and financing transactions are used to manage capital, earnings or taxes. We model discretion over these decisions using a system of five equations generated from an underlying cost minimization problem. The estimated parameters of the system suggest that banks manage both capital and earnings using accounting, investment, and financing discretion. Tax management appears to be relatively unimportant in the discretion exercised over these transactions. The framework we use highlights trade-offs among accounting and financing transactions. We find that accounting sources of capital in part determine banks' propensity to issue new securities, and that the positive reported capital effects of gains from transactions such as asset sales in part determine manager's willingness to charge-off loans.

[1]Anne Beatty, Sandra L. Chamberlain and Joseph Magliolo are the Wharton School of the University of Pennsylvania, Department of Accounting, Steinberg Hall-Dietrich Hall Suite 2400, Philadelphia, PA 19104.

We have benefitted from the comments of Andrew Alford, Linda Bamber, Randy Beatty, John Elliott, Paul Healy, Dave Larcker, Carol Marquardt, Rick Morton, Gerald Salamon, Doug Schackelford, Richard Sloan, Peter Wilson and Jerald Zimmerman. We also thank seminar participants at Cornell University, The Federal Reserve Bank of St. Louis, Indiana University, Massachusetts Institute of Technology, The Michigan Tax Conference, Pennsylvania State, Southern Methodist University, University of California at Irvine, University of Georgia, University of Texas at Austin, University of Santa Clara, Vanderbilt University, Virginia Polytechnic, Washington University, and the Wharton School. The third author acknowledges the partial support of this research by the KPMG Peat Marwick Foundation. We are grateful for support provided the University Research Foundation at the University of Pennsylvania, and the Wharton Financial Institutions Center Sloan Foundation Grant.

1 Introduction

This paper investigates if banks alter the timing and magnitude of transactions such as asset sales, loan loss accruals, pension settlements and securities issues in response to primary capital, tax and earnings goals. At least three recent studies, Moyer [1990]; Scholes, Wilson, and Wolfson [1990]; and Collins, Shackelford and Wahlen [1993] provide evidence that banks execute transactions and manage accruals to achieve some or all of these objectives. However, a common feature of all of these studies is an implicit assumption that when managers exercise discretion over a particular decision, all other decisions are fixed. We relax this assumption and allow those decisions to be determined simultaneously.

We hypothesize that each year bank managers face a cost minimization problem that encompasses the costs of deviating from primary capital, tax and earnings goals, as well as the costs of exercising discretion over loan loss accruals, transactions such as assets sales, and securities issues. The solution to the cost minimization problem is a system of five equations, one for the optimal level of each of the items over which the manager can exercise discretion to achieve the three goals. We estimate the system, first taking account of simultaneity and then using ordinary least squares (which does not take account of simultaneity). The use of different estimation techniques allows us to compare our results with those of prior studies, to test formally for simultaneity, and to examine whether the system is well-specified.

This paper provides a convenient framework which can be applied to other settings where managers make trade-offs among accounting, financing and operating decisions with tax, political or other contracting cost implications. In addition, the paper contributes to the literature that focuses on tax, financing and accounting trade-offs in banks. Assuming that the proposed cost minimization problem is appropriate, our systems estimation provides two distinct advantages. First, if firms choose among the discretionary transactions simultaneously, the system approach provides consistent parameter estimates whereas ordinary least squares does not. Second, our model allows for a richer interpretation of the coefficients

yielded from the estimation than would otherwise be possible. For example, we show how our parameter estimates translate into measures of the relative costs of exercising discretion over any of the five choices and of deviating from any of the three goals.

We are able to demonstrate that taking account of simultaneity is important for three of the modelled choices but not for the other two. Specifically, we reject the hypothesis that loan charge-offs, loan loss provisions, and the decision to issue securities are independent of the other decisions. However, we fail to reject this hypothesis for a set of miscellaneous gains and losses[1] and for pension settlement gains.

The parameter estimates yielded from the simultaneous estimation suggest that pension settlement gains are used exclusively to manage earnings. Miscellaneous gains (losses) are used primarily to manage earnings, and there is weaker evidence that they are used to manage capital. In selected specifications, where miscellaneous gains are defined as investment securities gains (corresponding to prior studies), we find evidence that taxes play a role in the timing of securities gains prior to the adoption of the 1986 Tax Act. We find no evidence that taxes play a role in securities transactions following the Tax Act and no evidence that they play a role in the timing of loan charge-offs. The provision for loan losses, loan charge-offs and issuances of securities are all used to manage primary capital ratios. In addition, discretion in each of these choices depends on the level of the other two, as well as on the level of miscellaneous gains (losses). Thus we find interactions between accrual, investment, and financing decisions which have intriguing policy implications. For example, limiting the manager's ability to strategically time gains from sales of securities (an implication of the mark-to-market rule) may simply induce the manager to substitute an alternative form of discretion, e.g. delaying or accelerating charge-offs and loan loss provisions.

Section 2 provides a detailed motivation for the systems approach adopted in this paper.

[1]See the discussion in appendix A. Miscellaneous gains and losses include several transactions whose timing appears to be affected by financial statement considerations. For example this item includes, but is not limited to, gains and losses realized from sales of securities, gains from sales of physical assets, and gains from debt retirements.

Formal development of the model is contained in section 3. Section 4 reviews the estimation techniques, and describes our sample. Section 5 discusses the main results, specification tests and sensitivity analyses. Section 6 summarizes the results, suggests extensions, and discusses the accounting implications of our findings.

2 Motivation

We examine the use of discretion over loan charge-offs *(Chgo),* loan loss provisions *(Prov),* miscellaneous gains (losses) *(Miscg),* gains on settling pension plans *(Pen),* and issuances of securities *(Chfund)*[2] to achieve three, potentially conflicting goals: earnings, capital and tax management. Table 1 summarizes the effect each of these transactions has over each of the three goals. As discussed below, all three goals and all forms of discretion, are studied in prior or concurrent research.

Tax incentives arise because firms can reduce the present value of tax payments by judiciously timing transactions (e.g., selling an appreciated asset and recognizing an accounting gain in a net operating loss period). Capital incentives arise because regulators monitor banks using accounting-based capital measures. During our sample period, bank holding companies are required to maintain a primary capital ratio of 5.5%.[3] Approaching the minimum is costly because it increases the probability of regulatory intervention[4] while exceeding the minimum is costly since excess capital could otherwise be used to expand earning assets or could be returned to investors. Thus bank managers have incentives to use discretion over accruals, the timing of transactions such as asset sales, and issuances of securities to balance expected regulatory costs with the opportunity costs of maintaining excess capital.

---

[2] See appendix A for details on how these are measured.

[3] The primary capital ratio equals the sum of retained earnings, the allowance for loan losses and qualifying securities divided by assets plus the allowance for loan losses. Securities included in primary capital are common equity, certain types of preferred stock, and certain types of subordinated and convertible debt.

[4] Banks failing to meet regulatory capital guidelines can be taken over by regulators. These takeovers can involve the dismissal of the current management, and other forms of participation in management activities (e.g., disallowing merger activity, or reducing dividend payments).

In contrast to capital and tax management, the economic intuition for earnings management is less obvious. Although bank managers make statements consistent with earnings management, their motivations are rarely articulated.[5] One potential explanation is the communication of favorable future cash flow information through earnings that mimic (or outperform) earnings of other banks. Consistent with this conjecture, regulators monitor a variety of financial ratios for each bank compared to its peer group, including the ratio of pre-tax net operating income to assets.[6] An extreme rating based on these financial ratios can result in regulatory intervention, creating an incentive to manage ratios to a peer group mean value. It is possible that analysts other than regulators also use peer-adjusted earnings levels to evaluate banks. If so, deviations of earnings from peer group means could affect the bank's cost of capital.

Various methods of achieving these goals are investigated in prior studies. Scholes et al. [1990] find evidence of earnings management, capital management and tax management in their analysis of income from investment security transactions. Moyer [1990] finds that both loan loss provisions and securities gains are used to manage capital. However, she finds no evidence that loan charge-offs are used to manage capital. She also finds somewhat mixed evidence that securities gains are used to manage taxes.[7] Haw, Jung and Lilien [1991] find that income from pension settlements is used to smooth earnings (but not manage capital). Similarly, Clinch and Magliolo [1993] conclude that income from a portfolio of discretionary

[5]Consider for example, the following language used in Citicorp's Management Discussion in its 1987 annual report:

> **Other revenue totalled $1,585 million in 1987, largely as a result of steps taken to offset the effects of the $3.0 billion addition to the allowance for possible credit losses.**

This statement could imply that earnings management is an important reason for discretionary transactions, although the motivation is left unstated.

[6]Peer groups are defined primarily by asset size. Each quarter a Uniform Performance Report is produced for each bank. These reports are used as an early warning system by regulatory analysts. Each bank's ratios are compared to their respective peer group both in the current quarter and with the prior two year's results.

[7]Moyer [1990] uses tax operating expense to measure marginal tax rates while Scholes et al. [1990] use the existence of net operating loss carryforwards.

transactions (similar to our miscellaneous gains and losses variable) is realized to manage earnings. Finally, Collins et al. [1993] find that loan loss provisions, loan charge-offs, and securities issuances are all used to manage primary capital, and that loan loss provisions and income from securities transactions are used to manage earnings.

These studies do not examine the interactions among transactions that might arise for two reasons. First, when earnings, tax, and capital management objectives conflict, they are likely to be traded off against one another. Second, if the cost of exercising discretion over transactions depends on the amount of discretion used, then different forms of discretionary behavior will interact (e.g., the use of the loan loss provision to achieve capital objectives will depend on how costly it is to issue new securities). Thus, there is potential for a complex dependence among different discretionary transactions. Our approach explicitly allows for such complex interactions.

The potential for joint determination of these variables although acknowledged in some previous studies, has not been explicitly incorporated in the research design. For example, Moyer [1990] examines discretion over securities gains, loan loss provisions, and loan charge-offs, but does not explicitly consider the interdependencies among these three items. She separately regresses each item on tax, capital, and other variables, but the other dependent variables are not assumed to interact with one another.[8] In their cross-sectional analysis of securities transactions, Scholes et al. [1990] assume that income from investment securities sales depends on the provision for loan losses, but they do not allow securities gains to affect the size of the provision. Haw et al. [1991] make the opposite assumption, regressing loan loss provisions on securities gains and pension settlement income (for a cross-section of banks); they implicitly assume that pension settlement income and income from securities sales are exogenous with respect to the provision for loan losses.

The differences in exogeneity assumptions across these papers highlight the difficulty

[8]Moyer [1990] does allow for dependence of residuals across three equations.

in determining which transactions are exogenous (i.e. fixed) on theoretical grounds, and suggest the need for empirical analysis that allows for interdependence of all of the examined variables. Allowing for interdependence requires that we make explicit the structure of the problem; this structure is discussed in the next section.

3 Description of Research Design

3.1 Model Specification

The system of equations we estimate is consistent with managers assessing their position relative to a capital goal ($\widetilde{Pcr}$) , an earnings goal ($\widetilde{Roa}$) and a tax goal prior to year-end and selecting among discretionary transactions to achieve these three goals. We assume that the three goals are constant across firms and across the sample time period, and that the discretionary transactions are loan loss accruals *(Chgo* and *Prov),* miscellaneous gains (losses) *(Miscg),* pension settlements *(Pen),* and new securities issues *(Chfund).* In addition, we assume there is as an optimal level for each of these choices (in the absence of the three goals) corresponding to its non-discretionary component. For example, auditing standards require that firms set their charge-offs and loan loss provisions based on the underlying riskiness of the loan portfolio. If bank managers choose some level other than that required by auditing standards then they run the risk of not receiving clean opinions. The non-discretionary component for each choice is designated by a bar (e.g. $\overline{Chgo_{it}}$). Finally, the cost of deviating from a goal or non-discretionary component (x) is denoted $\mathbf{C}_x()$. The cost minimization problem facing managers can be written as follows:

Minimize Cost
Chgo, Prov, Miscg, Pen, Chfund

$$
\begin{aligned}
= \; & \mathbf{C}_{pcr}(Pcr_{it} - \widetilde{Pcr}) + \mathbf{C}_{roa}(Roa_{it} - \widetilde{Roa}) + (\tau_{it} \times Txe_{it}) \\
& + \mathbf{C}_{chgo}(Chgo_{it} - \overline{Chgo_{it}}) + \mathbf{C}_{prov}(Prov_{it} - \overline{Prov_{it}}) + \mathbf{C}_{miscg}(Miscg_{it} - \overline{Miscg_{it}}) \quad (1) \\
& + \mathbf{C}_{pen}(Pen_{it} - \overline{Pen_{it}}) + \mathbf{C}_{chfund}(Chfund_{it} - \overline{Chfund_{it}})
\end{aligned}
$$

$$
\begin{aligned}
s.t. \quad & Pcr_{it} = Pcap_{it} - \gamma_1 Chgo_{it} + \gamma_2, Prov_{it} + \gamma_3 Miscg_{it} + \gamma_4 Pen_{it} + \gamma_5 Chfund_{it} \quad (2) \\
& Roa_{it} = Earn_{it} - \phi_1 Prov_{it} + \phi_2 Miscg_{it} + \phi_3 Pen_{it} \quad (3) \\
& Txe_{it} = Txearn_{it} - \delta_1 Chgo_{it} + \delta_2 Miscg_{it} \quad (4)
\end{aligned}
$$

Other terms are defined as follows:

Pcr_{it} – the year-end primary capital measure evaluated by bank regulators
Txe_{it} – taxable income influenced by managers
Roa_{it} – the year-end pre-tax earnings measure evaluated by regulators and investors
τ_{it} – the marginal tax rate for firm i in period t
$Pcap_{it}$ – primary capital before endogenous transactions
$Earn_{it}$ – pre-tax earnings before endogenous transactions
$Txearn_{it}$ – taxable income before endogenous transactions.

Differentiating this objective function results in a set of five first order conditions that forms the basis for our system of equations. The possibility of jointly determined decisions arises through equations (2), (3), and (4) which link Pcr_{it}, Roa_{it} and Txe_{it} to the endogenous variables. These equations originate from the following accounting identities[9]:

Primary Capital ≡ *Primary Capital Before Transactions – Charge offs + (Tax Rate × Provision) + After-tax Gains on Miscellaneous Transactions + After-tax Pension Settlement Gains + Issues* of *Securities*

Pre-tax Earnings ≡ *Pre-tax Earnings Before Transactions – Provision + Gains on Miscellaneous Transactions + Pension Settlement Gains*

Taxable Earnings ≡ *Taxable Earnings Before Transactions – Charge-offs + Gains on Miscellaneous Transactions*

There are four important features of our formulation. First, we assume that, in addition to the non-discretionary components of our endogenous variables, there are other components of capital and earnings that are exogenous ($Pcap_{it}$ and $Earn_{it}$). This assumption is based on the intuition that at year-end these components are excessively costly to alter. For example, we assume that the manager has no control over the net interest margin. We admit that, given enough time, influence can be exerted over almost any transaction. Although we assume that large components of earnings and balance sheet variables are beyond the manager's control, our model relaxes the exogeneity restrictions used in previous studies, which assume

[9]The loan loss provision has a positive effect on primary capital because it is deducted from earnings on an after-tax basis, but is added back to the loan loss reserve on a *before-* tax basis.

that all transactions other than the one examined are exogenously determined.[10]

Second, we do not restrict the coefficients in equations (2)-(4) to be equal to the weightings in the accounting identities. This allows us to estimate the measure of earnings, tax, and capital that managers use. For example, if firms manage earnings before gains on sales of securities because industry analysts routinely adjust earnings for securities gains, then our estimate of ϕ_2 will equal zero, (even though the accounting definition of pre-tax earnings includes securities gains.)

Third, endogenous variables not included in the accounting definition of earnings or taxable earnings, are excluded from the associated cost function (e.g. the charge-off variable is not included in the C_{roa} function.) Later, this assumption allows us to restrict the coefficients both on $Earn_{it}$ and τ_{it} to be zero in some of the five equations. Although these zero restrictions are economically motivated, they help us to identify the system.[11]

Finally, as shown in table 1, two of our modelled choices: *Miscg* and *Chfund* combine potentially non-homogenous discretionary transactions, whereas the other three endogenous variables, *Chgo, Prov* and *Pen* contain only one transaction type. We group the different components of *Miscg* and *Chfund* to keep the system as parsimonious as possible. Table 1 shows that the selection of these five endogenous variables reflects the smallest number of equations possible consistent with all grouped variables having the same assumed directional effect on capital, earnings, and tax goals. Although the components of the grouped variables have comparable primary capital and earnings effects, we admit, that the different components of *Miscg* and *Chfund* may have different tax implications. Moreover, an additional

[10]The cost of relaxing the exogeneity restriction is that our estimator is less efficient if the variable is truly exogenous. The cost of imposing the exogeneity restriction is that the estimator is inconsistent if the variable is not exogenous.

[11]We do examine the robustness of results to altering some of these zero restrictions in section 5. We thank Peter Wilson for pointing out the need for this type of sensitivity analysis. Using the accounting definitions of primary capital, earnings and taxable earnings to generate zero restrictions can reflect fallacious reasoning. For example, suppose that earnings and charge-offs are jointly evaluated by stock analysts in assessing firm health. If so, exercising discretion over charge-offs may be conditioned on expected earnings even though charge-offs do not affect earnings through the accounting definition.

assumption made in combining these variables is that the costs associated with deviating from the non-discretionary component are the same across the grouped variables. In section 5, we examine the sensitivity of our findings to these assumptions.

To obtain linear first-order conditions, we assume that each bank is close enough to the minimum of each cost function that we can use a quadratic approximation and that each target is associated with a mean zero unobserved error (ξ) representing firm-specific uncertainty regarding the target. Specifically, we assume that equation (1) can be re-written as follows:

$$\begin{aligned}\textbf{Minimize Cost}_{\textbf{\{Chgo, Prov, Miscg, Pen, Chfund\}}} = \; & \frac{1}{2}\left(\lambda_1\left[Pcr_{it} - \widetilde{Pcr} + \xi_{1it}\right]^2 + \lambda_2\left[Roa_{it} - \widetilde{Roa} + \xi_{2it}\right]^2\right) \\ & + \tau_{it}\left[Txearn + \xi_{8it}\right] + \frac{1}{2}\left(\lambda_3\left[Chgo_{it} - \overline{Chgo}_{it} + \xi_{3it}\right]^2\right. \\ & + \lambda_4\left[Prov_{it} - \overline{Prov}_{it} + \xi_{4it}\right]^2 + \lambda_5\left[Miscg_{it} - \overline{Miscg}_{it} + \xi_{5it}\right]^2 \\ & \left. + \lambda_6\left[Pen_{it} - \overline{Pen}_{it} + \xi_{6it}\right]^2 + \lambda_7\left[Chfund_{it} - \overline{Chfund}_{it} + \xi_{7it}\right]^2\right)\end{aligned}$$

Here, λ_1 and λ_2 measure the cost of deviating from the capital and earnings goals, and λ_3 through λ_7 measure the cost of exercising discretion over the five choices. Minimizing the objective function with respect to each of the five choices results in a system of five simultaneously determined equations:

$$\begin{aligned}Chgo_{it} = \alpha_1 \; & + \beta_{12}Prov_{it} + \beta_{13}Miscg_{it} + \beta_{14}Pen_{it} + \beta_{15}Chfund_{it} \\ & + \beta_{16}Pcap_{it} + \beta_{17}\tau_{it} + \beta_{18}\overline{Chfund}_{it} + \epsilon_{1it}\end{aligned}$$

$$\begin{aligned}Prov_{it} = \alpha_2 \; & + \beta_{21}Chgo_{it} + \beta_{23}Miscg_{it} + \beta_{24}Pen_{it} + \beta_{25}Chfund_{it} \\ & + \beta_{26}Pcap_{it} + \beta_{27}Earn_{it} + \beta_{29}\overline{Prov}_{it} + \epsilon_{2it}\end{aligned}$$

$$\begin{aligned}Miscg_{it} = \alpha_3 \; & + \beta_{31}Chgo_{it} + \beta_{32}Prov_{it} + \beta_{34}Pen_{it} + \beta_{35}Chfund_{it} \\ & + \beta_{36}Pcap_{it} + \beta_{37}Earn_{it} + \beta_{38}\tau_{it} + \beta_{39}\overline{Miscg}_{it} + \epsilon_{3it}\end{aligned}$$

$$\begin{aligned}Pen_{it} = \alpha_4 \; & + \beta_{41}Chgo_{it} + \beta_{42}Prov_{it} + \beta_{43}Miscg_{it} + \beta_{45}Chfund_{it} \\ & + \beta_{46}Pcap_{it} + \beta_{47}Earn_{it} + \beta_{49}\overline{Pen}_{it} + \epsilon_{4it}\end{aligned}$$

$$Chfund_{it} = \alpha_5 + \beta_{51}Chgo_{it} + \beta_{52}Prov_{it} + \beta_{53}Miscg_{it} + \beta_{54}Pen_{it} + \beta_{56}Pcap_{it} + \beta_{57}\overline{Chfund}_{it} + \epsilon_{5it}$$

This system is estimated using the techniques described in section 4. As shown in table 2, the estimated coefficients from this system provide information about the parameters of the underlying cost model. First, the coefficients on $Pcap_{it}$, $Earn_{it}$, and τ_{it} can be used to test the hypotheses that discretion over the transaction is used to achieve the capital, earnings and tax goals. A zero coefficient on these variables indicates either that it is costless to deviate from a goal or that the examined transaction is not used to achieve that goal. For example, β_{16} will be zero if either λ_1 is zero (it is costless to deviate from the primary capital goal) or if γ_1 is zero (charge-offs are not used to manage primary capital.)

Second, the partial correlations among the endogenous variables provide information about whether the endogenous variables are jointly determined or instead are determined sequentially (i.e., a given variable is chosen without regard to the other decisions.) For example, if β_{32} (the coefficient on *Prov* in the *Miscg* equation) is zero and β_{23} (the coefficient on *Miscg* in the *Prov* equation) is non-zero, then this would suggest that miscellaneous gains (losses) are selected without regard to the level of the provision for loan losses. One scenario generating this sequential relationship is if it were costless to manage the provision for loan losses, costless to manage loan charge-offs, and if tax consequences of all decisions were ignored. Note that under these conditions, the primary capital goal could be attained using *Chgo* (since managers are unconcerned with $\overline{Chgo}$ when managing charge-offs is costless) and the earnings management objective could be achieved through *Prov* (because analogously, managers are unconcerned with $\overline{Prov}$). Since taxes are unimportant, managers set *Miscg* equal to $\overline{Miscg}_{it}$. Both *Chgo* and *Prov* would depend on *Miscg* (because $\overline{Miscg}_{it}$ affects year-end primary capital and earnings), but *Miscg* would not depend on either *Chgo* or *Prov*.

Finally, assuming that the endogenous variables are jointly determined, the magnitude of the coefficients on the endogenous variables will depend on the relative costs of any shared

goals. For example, table 2 shows that the coefficient on *Prov* in the *Miscg* equation, β_{32}, can be either positive or negative depending on the importance of earnings management and capital management in choosing miscellaneous gains (losses) and the provision. If earnings management is more important (i.e. λ_2 is large), then β_{32} will be positive and if capital management is important (i.e. λ_1 is large), then β_{32} will be negative.

3.2 Measurement of Variables

3.2.1 Measurement of Marginal Tax Rate

We face the usual problem that firms' marginal tax rates are unobservable. In addition, the 1986 Tax Act (Tax Act) creates other challenges. First, the Tax Act affected the marginal tax rate both by lowering the corporate tax rate and by disallowing the deduction of interest on loans supporting tax-free bonds. Second, the Tax Act changed the role of charge-offs in managing taxes. After 1986 all large banks must adopt the specific charge-off method. This method ties loan charge-offs more directly to taxable income than the previously allowed reserve methods. Finally, the Tax Act changed the net operating loss carryover rules for banks. Prior to 1986, banks were allowed to carry losses back ten years and forward five. After 1986, losses generated by anything other than bad debt expense could only be carried back three years and forward for fifteen years.[12]

We use a discrete proxy for firm-specific marginal tax rates that equals one if the bank has a net operating loss carryforward and zero otherwise. This proxy has been used in a number of other studies, including Scholes et al. [1990]. However, because of the changes in the tax law, we allow the coefficient on this variable to differ for the 1985-1986 and 1987-1989 subperiods. The two dummy variables are called $Tax_{bf,af}$ for the period before (*bf*) and after *(af)* the Tax Act. Both variables separate low marginal tax rate firms from high

[12]Banks having losses generated by bad debt expense have the option to choose the back-three, forward-fifteen schedule if desired. The Tax Act stipulates that by 1992 banks are required to use the back-three forward-fifteen schedule for bad debt expense as well.

marginal tax rate firms. Based on equation (3), we expect that banks with net operating loss-carryforwards will incur more (fewer) miscellaneous gains (charge-offs) than banks without tax operating loss-carryforwards.

3.2.2 Measuring Non-discretionary Components

Our estimation technique requires that each equation exclude at least four of the exogenous variables (one for each included endogenous variable). Incorporating the non-discretionary component of each decision variable (e.g., $\overline{Chgo_{it}}$) in only their respective equations insures that this condition is satisfied,[13] and it is therefore critical that we find suitable measures of these non-discretionary components.

To measure these components: we rely loosely on arguments developed in Moyer [1990] and Wahlen [1992] for loan loss provisions and charge-offs, and on Moyer [1990] for gains (losses) on sales of investment securities. The reliance on these papers is loose because our needs are slightly different. In particular, to be consistent with our framework, the proxies for non-discretionary components should be firm-specific and exogenous to the modelled variable. In addition, the proxies should satisfy the zero restrictions required for identification.[14] We develop our own measures of non-discretionary components for the pension settlement and change in external financing equations.

Loan charge-offs and the provision for loan losses are expected to be partly non-discretionary due to Statement of Financial Accounting Standards (SFAS) No.5, which requires the allowance for loan losses to be sufficient to cover probable and estimable losses. Following Moyer [1990] we assume that the non-discretionary provision reflects primarily the change in the default rate on the loan portfolio, and that the non-discretionary charge-off reflects pri-

[13]To the extent that the true underlying parameters on $Earn_{it}$ and $Tax_{bf,af}$ are non-zero where they are included in the system, zero restrictions in the remaining equations also aid us in identifying the system.

[14]A zero restriction means that the coefficient on an exogenous variable is constrained to be zero in a given equation.

marily lagged default values.[15] However, unlike Moyer [1990] who constructs lagged default values of the loan portfolio using macroeconomic data, we try to measure the firm-specific lagged default values using the level of prior period non-performing loans (Npl_{t-1}).[16] Analogously, we measure the change in the default value on the loan portfolio by the change from the prior to current period in non-performing loans (ΔNpl).

Following Wahlen [1992], we include the prior period loan loss reserve (Llr_{it-1}) as an additional loan loss determinant. The loan loss reserve summarizes past decisions regarding charge-offs and loan loss provisions, and is therefore exogenous to this period's decisions. Since provisioned loans ultimately are charged-off, loan charge-offs are expected to be higher when the loan loss reserve is higher. Similarly, if in prior periods managers exercised discretion to over- (under-) provide for expected loan losses, the loan loss provision is expected to be lower (higher) in this period.

To summarize, the non-discretionary components of loan loss provisions and loan charge-offs can be expressed as follows:

$$\begin{aligned} \overline{Chgo_{it}} &= \omega_1 Npl_{it-1} + \omega_2 Llr_{it-1} \\ \overline{Prov_{it}} &= \omega_3 \Delta Npl_{it} + \omega_4 Llr_{it-1} \end{aligned}$$

For many of our firm-years, *Miscg* is primarily income from investment securities sales. Because these securities are used to manage liquidity and interest rate risk, we assume that some percentage of the investment securities portfolio turns over each year. Non-discretionary gains or losses realized from this turn-over are expected to be a percentage of the overall implied gain or loss on the portfolio. We estimate the overall gains or losses using the formula proposed by Moyer [1990] (*Yldbv*). Under this formulation, the cost of taking

---

[15]This is based on our own interpretation of her equations (3) and (5) on pages 136 and 137. More accurately, Moyer's model would argue for including lagged default values, squared lagged default values and changes in the default value of the loan portfolio in the loan loss provision equation and only lagged default values in the charge-off equation. We choose a more parsimonious specification for the loan loss equations, but, we do examine the sensitivity of our model to a variation on the specification of the non-discretionary components.

[16]We credit Wahlen [1993] for this idea.

securities gains or losses different from the non-discretionary amount is the cost of deviating from the productive optimum.

We assume that the non-discretionary pension settlement gain is a fraction of the difference between pension assets and pension liabilities *(Apens).* Under SFAS 87, the income statement effects of overfunding can be realized in one of two ways. First, the gain can be amortized onto the income statement over a number of years using the expense smoothing rules prescribed by the accounting standard; this corresponds to our notion of the non-discretionary component of the pension settlement. Alternatively, some larger portion of the gain can be recognized in the current period by settling the plan assets (implying the use of discretion).[17] The cost of deviating from the non-discretionary settlement component is the opportunity cost of eliminating the option to manage income in a future period.[18]

To model the non-discretionary component of the change in external funds variable, we assume that the firm has financing demands each period (e.g. for liquidity reasons). In the absence of primary capital demands, the portion provided by common and preferred equity and capital notes $\overline{Chfund_{it}}$ is hypothesized to depend on the overall demand for funds and the relative expense of using capital notes and equity to meet those demands. We do not attempt to model the demand for funds, but instead include variables that proxy for the cost of issuing capital notes and equity. In particular, we assume that banks which have issued large quantities of common equity in the past are firms that face lower costs. In contrast, we assume that the costs of issuing new securities will be higher if the firm has issued primary capital notes or preferred stock in the past. Primary capital rules limit the amount of debt and preferred stock that can be counted as primary capital. Firms that have issued notes in the past are therefore expected to have exhausted some of their financial slack. Based on this

[17]Since there are no instances of the sample banks taking losses on settling pension assets, we assign *Apens* the value of zero if the difference between pension assets and projected benefit obligations is negative.

[18]Pension settlements also generate other costs such as the payment to an insurance company to take on additional risk.

reasoning, we model $\overline{Chund_{it}}$ in terms of the sum of prior period's capital notes and preferred stock (denoted $Note_{it}$), and prior period common equity (common stock plus additional paid in capital (denoted Eq_{it}).

To summarize, the non-discretionary components of *Miscg, Pen* and *Chfund* can be expressed as follows:

$$\begin{aligned} \overline{Miscg_{it}} &= \omega_5 Yldbv_{it} \\ \overline{Pen_{it}} &= \omega_6 Apens_{it} \\ \overline{Chfund_{it}} &= \omega_7 Note_{it-1} + \omega_8 Eq_{it-1} \end{aligned}$$

3.2.3 Other Explanators

As stated, our model assumes the decision process is the same for all banks. In our estimation we alter this assumption by including two other explanatory dummy variables in all five equations. The first is a dummy variable which takes on a value of one for any of the twelve money center banks (MC).[19] Other studies such as Scholes et al. [1990] also allow their model intercepts to vary for this category. Collins et al. [1993] note that money center banks negotiated their own capital requirements in the early 1980's, suggesting that for at least some period, the targeted primary capital ratio and possibly earnings goals differed for this subset of firms.

The second dummy variable takes on a value of one in 1987 to 1989 if the bank has non-performing loan exposure to lesser developed countries (denoted *Ldc).* Both Elliott, et al. [1991], and Griffin and Wallach [1991], discuss how the 1987 Latin American debt crisis led such banks to take substantial increases in their loan loss provisions and subsequently in their loan charge-offs. One interpretation of this behavior is that the non-discretionary component of charge-offs and provisions (and potentially other decisions) are likely to differ for banks with and without these exposures.

[19]We use the twelve banks listed in Elliott, Hanna, and Shaw [1991] pg 850.

4 Empirical Method and Sample

4.1 Estimation

If any of our endogenous variables are jointly determined, ordinary least squares yields inconsistent parameter estimates due to correlation of some of the explanatory variables with the equation errors. To handle potential simultaneity, we use a two-stage and three-stage, instrumental variables approach. The first stage regresses each endogenous variable on all exogenous variables. Because the exogenous variables are assumed independent of the unobserved errors, and correlated with the endogenous variables, the predicted values of the endogenous variables from the first stage are independent of the unobserved errors. In the second stage, these predicted values replace the right-hand-side endogenous variables, yielding consistent parameter estimates. Efficient estimators are obtained by extending the instrumental variable estimation done equation by equation (2SLS) to an estimation on all equations allowing for cross-equation correlation using three-stage least squares (3SLS).

If the assumed endogenous variables are independently determined, both the two-stage and ordinary least squares estimates are consistent. However, the two-stage estimates are not as efficient. This relation between two-stage least squares and ordinary least squares allows us to test the hypothesis that the five discretionary variables are simultaneously determined (Hausman [1978]). Under the null hypothesis (i.e. the five decision variables are independently determined), a Hausman test requires that one estimator be both consistent and efficient (the OLS estimator), and that one be consistent but not efficient (2SLS). Under the alternative that the decision variables are jointly determined, only the 2SLS estimates will be consistent. The Hausman test simply compares the vector of coefficients under the two estimations. A similar relation between the three stage least squares estimates and the two stage least square estimates allows us to perform a specification test for the system.[20]

[20]Under 3SLS, if any single equation is misspecified, this misspecification is transmitted to all equations, due to using an inconsistently estimated covariance matrix in the third stage. Under 2SLS, only the single equation that is misspecified is affected by the misspecification. Under the null of no misspecification, the

4.2 Sample Selection

Table 3 shows that our sample derives from the population of 752 domestic bank years contained on the 1987 (1986 year-end) and 1990 (1989 year-end) Bank Compustat tapes. Two tapes are used to mitigate any survivorship bias.[21] Since many of our variables can be collected only from annual reports, we obtained annual reports for as many bank years as possible. We were unable to obtain such reports, or failed to find particular data items for 70 firm years. In addition, because we believe that regulatory-supervised banks face different objective functions, we deleted thirty-three observations comprising banks operating under some form of agreement with bank regulators. We deleted eleven other bank years for a variety of other reasons, listed on the bottom of table 3. The resulting sample consists of 638 firm years representing 148 different bank holding companies.[22]

Table 4 shows that banks in our sample range from under $200 million to over $200 billion in assets with the mean size at about $15 billion. Our sample banks are generally profitable and well capitalized, although there is variability across years (e.g. in 1987 many sample banks experienced losses due in part to the Latin American debt crisis). In every year but 1989, all sample banks report primary capital ratios above the required minimum, and the highest primary capital ratio reported is twice the regulatory minimum.[23] The average primary capital ratio sharply increases during the period from approximately 7.1% to 7.9%. This increase is due both to a .4% increase in the loan loss reserves during this period and to a .4% increase in securities qualifying as primary capital.

Descriptive information about the endogenous variables is reported in table 5, which

---

three-stage least squares results are efficient and consistent and the 2SLS results are consistent but not efficient.

[21]Bank Compustat deletes observations which do not exist at the time the data are compiled. For example, the 1990 tape would not include any banks acquired in 1988, whereas the 1987 tape would include such banks. For such cases, we hand-collect data from the annual reports (after 1986) until the bank is acquired.

[22]The list of bank-years included in our sample is available on request.

[23]The set of banks under regulatory agreements includes many banks with capital below the 5.5% minimum, and a few banks (primarily domiciled in Texas) with negative primary capital ratios.

reports statistics about the variable distributions for all firm years combined and table 6 which provides means and medians for the endogenous (and exogenous) variables for each sample year. All endogenous variables are scaled by primary capital to provide an indication of their importance in capital management.

An after-tax comparison of the values reported in table 5 can be made using the accounting definition of primary capital on page 7, and assuming a marginal tax rate for all firms of 34%. On an after-tax basis, net income has a relatively large effect on primary capital, increasing it by approximately 8.3%. Charge-offs reduce capital by approximately 5.1%. The provision for loan losses offsets this reduction by about 2.4%, and issuances of securities *Chfund,* increase capital by a mean (median) of 3.84% (.77%). Finally, miscellaneous gains (losses) and pension settlement gains have relatively small mean effects on capital, .9% and .08% on average, respectively.

Table 6 panel A shows that the level of the endogenous variables varies from year to year. In particular growth in the loan loss provision is interrupted by a large increase in levels in 1987 and a sharp decline in 1988.[24] Miscellaneous gains (losses) declined during the period, with the largest transactions occurring in 1986. Changes in external funds were dramatically lower in 1988-1989 than they were in 1985-1987. Although the variability exhibited in tables 4 and 6 is beneficial in our estimation, we are concerned with stability of the decision process. We therefore discuss in section 5 the sensitivity of our findings to time period specific factors.

Panel B of table 6 provides a profile of the exogenous variables by year. The percentage of firms with tax loss carryforwards is approximately 10% per year. Primary capital before endogenous transactions is lower than the ending period level in 1985-1987, and vice versa for 1988-1989. In contrast earnings before endogenous transactions are higher per year then their counterparts in table 4, reflecting primarily the negative effects and loan loss provisions. Both non-performing loans and the change in non-performing loans increased

[24]As mentioned, the 1987 increase in the provision is due to the Latin American debt crisis.

in 1987, possibly due to the debt crisis. Approximately 35% of our sample firms had non-performing loan exposure to lesser developed countries. The percentage of common equity (capital notes plus preferred stock) increased as a percentage of assets from approximately 2.5% (.5%) to 2.9% (.7%) over the sample period.

Panel A of table 7 reports correlations of the endogenous variables with our measures of exogenous capital ($Pcap$), earnings ($Earn$) and marginal tax rates ($Tax_{bf,af}$), and with one another. Charge-offs, stock and debt issuances, shown in table 6 to have the largest capital effects, are most highly correlated with *Pcap* (correlations of .21, -.44 and -.22). The remaining endogenous variables are more highly correlated with *Earn* than with *Pcap*. Table 7 panel A also shows significant correlations between the endogenous variables. Not surprisingly, the simple correlation between charge-offs and the provision of .77 is the highest of the correlations among endogenous variables.

Table 7, panel B provides evidence that the exogenous determinants of non-discretionary components are generally highly correlated with their respective dependent variables. Loan charge-offs and loan loss provisions exhibit correlations of higher than 40% with the lagged non-performing loans and changes in non-performing loans. Both are also significantly correlated with the lagged loan loss reserve. Significant correlations, of .25 and .28, exist for net pension assets *(Apens)* with the pension settlement gains and for *Yldbv* with gains on sales of securities. Similarly, the lagged level of capital notes plus preferred stock exhibit a correlation of -.32 with current changes in preferred plus capital notes, and lagged levels of common stock exhibit a correlation of .11 with issuances of common.

5 Results

5.1 Overview

Our main results are summarized in tables 8, 9 and 10 which present the two stage, three stage and ordinary least squares estimates of our five equations. For the full sample, the Hausman

test comparing the coefficients yielded under three-stage least squares with those yielded under two-stage least squares rejects, suggesting that our system has some misspecification. We explore likely sources of misspecification at the end of this section. However, as discussed below, most of our results are robust to reasonable permutations on model specification.

5.1.1 Investigation of Capital Management

Recall from table 2 that the estimated coefficient on *Pcap* (primary capital measured before the endogenous transactions) in each equation provides a joint test that capital management is costly (λ_1 is positive) and that the modelled variable is used to manage capital (the relevant γ in equation (2) is non-zero.) Tables 8 and 9 show that the estimated coefficients on *Pcap* in all equations except the pension settlement equation support this joint hypothesis. In all four equations, the sign of the coefficient on *Pcap* suggests a positive cost of deviating from the capital goal. The three stage estimated parameters reject the null hypothesis of no relation at greater than the 5% levels (one-tailed tests) in all four equations; in the two stage estimation the parameters reject the null in all but the *Miscg* equation. Given the support for the hypothesis that deviating from the capital target is costly, the statistically insignificant coefficient on *Pcap* in the Pen equation suggests that pension settlement gains are not used to manage primary capital, e.g., γ_4 equals zero.

The importance of capital management is also supported by the coefficients on the right-hand-side endogenous variables in the five equations. For example, we predict positive partial correlations of charge-offs with the other variables used to manage capital. The partial correlations are positive for all but the pension settlement gain; and, we have already argued that pension settlement gains are *not* used to manage capital. Similarly, the capital management hypothesis predicts a positive partial correlation of *Chfund* with *Chgo* and a negative partial correlation of *Chfund* with the other three endogenous variables. These predictions are also supported in both the two stage and three stage results.

The partial correlations of *Prov* with *Miscg* or *Pen* are expected to be negative if the primary capital goal is particularly costly, and positive if the earnings management goal is costly. (If the two goals were equally expensive, these partial correlations would be zero.) The partial correlation between *Prov* and *Miscg* is negative, although the coefficient is not statistically different from zero in the *Miscg* equation. The positive partial correlation between *Prov* and *Pen* (especially in, the pension settlement equation) is consistent with earnings management and is discussed below.

Finally, a negative partial correlation between *Miscg* and *Pen* would be consistent with either capital management or earnings management. Table 8 shows that these partial correlations are negative, but the standard errors are large. The weak evidence of a statistical relation between *Pen* and *Miscg* suggests that these two choices are independent of one another. This conclusion is supported by the Hausman test discussed later.

5.1.2 Investigation of Earnings Management

The coefficients-on *Earn* in the *Miscg* and *Pen* equations are negative and statistically significant in both the two and three-stage results. This is consistent with the joint hypotheses that deviating from the earnings goal is costly (λ_2 is positive) and that both pension settlements and miscellaneous gains are used to mitigate this deviation (ϕ_2 and ϕ_3 are non-zero.) Other evidence of earnings management is manifested in the positive and statistically significant coefficient on *Prov* in the *Pen* equation, which suggests that pension settlement gains are used to offset the negative earnings effect of the provision for loan losses. Note that this coefficient will be negative if primary capital is important (λ_1, γ_2 and γ_4 are large) and positive if earnings management is important (λ_2, ϕ_1 and ϕ_3 are large). Assuming ϕ_1 is not zero, the positive coefficient on *Prov* in the *Pen* equation supports our earlier conclusion that pension settlements are not used to manage capital, e.g. γ_4 is equal to zero.

Evidence from the provision equation is, however, slightly in conflict with this explanation for the positive coefficient on *Prov* in the *Pen* equation. The provision for loan losses is

unrelated to *Earn*, which indicates (table 2) that managers do not exercise discretion over the loan loss provision for earnings management, (ϕ_1 equal to zero).[25] If both γ_4 and ϕ_1 are zero, the we would expect the partial correlation between *Prov* and *Pen* to be zero in both equations. We are unable to fully reconcile this disparity in the two equations, but we do explore sources of misspecification below.

5.1.3 Investigation of Tax Planning

We find no support for the tax planning hypothesis in either the charge-off or the miscellaneous gains equations for the two-stage formulation. In both equations, the coefficients on the $Tax_{bf,af}$ have the wrong sign. The only evidence of tax management appears in the three stage results where we find that banks with low marginal tax rates took larger miscellaneous gains in 1985-1986.[26]

5.2 Comparison of Results with OLS and 2SLS

We report the results of estimating each equation separately using ordinary least squares (OLS) in table 10. The OLS estimates are not consistent if the endogenous variables are chosen simultaneously.

A comparison of tables 8 and 10 shows that the conclusions drawn from the OLS regressions for three of the five equations, *Prov, Chgo,* and *Chfund* are quite different from those of the 2SLS estimations. The OLS results provide no evidence that the loan loss provision is used to manage capital. Instead, based on the coefficients on *Pen* and *Miscg,* this equation suggests that *Prov* is used to manage earnings. In contrast, under 2SLS the partial corre-

[25]Moreover, the inference that ϕ_1 is zero is supported by the signs of all other partial correlations between *Prov* and the endogenous variables (except *Pen* which is statistically unrelated to *Prov* in this equation); these partial correlations are consistent with capital management and not earnings management.

[26]The fact that the estimated coefficients on $Tax_{bf,af}$ are of the wrong sign may indicate that tax loss carryforwards are correlated with other firm characteristics, such as financial distress. Given this, we explore the sensitivity of our estimated parameters to both including and excluding this variable from all equations in section 5.3.

lations in the *Prov* equation are consistent with capital management. Turning to the *Chgo* and *Chfund* equations, we find variations in the magnitude of coefficients on *Pcap* and on the right-hand-side endogenous variables across the two methods. In some cases, such as the coefficient on *Chfund* in the *Chgo* equation, both the sign and significance of the coefficient differ under the two methods.

On the other hand, in the *Miscg* and *Pen* equations, the differences between OLS and 2SLS are more minor. Although many of the coefficients reflect changes in magnitude across the two methods, in most cases signs do not change; in addition, coefficients which are (are not) statistically different from zero in the OLS, remain so in 2SLS. For example, the sign and significance of the estimated coefficients on *Earn*, in both OLS and 2SLS, suggest that *Miscg* and *Pen* are used to manage earnings. Apparently, taking account of simultaneity in these two equations does not greatly affect their interpretation.

Differences in the vector of coefficients yielded from OLS and 2SLS can be due to misspecification due to simultaneity. We test the joint endogeneity assumption using the Hausman test. The test is implemented by regressing each dependent endogenous variable on the relevant instrumented endogenous variables, actual endogenous variables, and exogenous variables.[27] If the variables assumed endogenous are actually exogenous, then the coefficients on the instrumented endogenous variables will (jointly) equal zero. We reject this null hypothesis at conventional levels in the *Chgo, Prov,* and *Chfund* equations; however, the null cannot be rejected in the *Pen* and *Miscg* equations.[28]

The validity of this specification test depends on the assumption that the instruments are uncorrelated with the error, and the power of the test depends on how highly correlated

[27] *Instrumented* endogenous variable means the predicted value of the variable after regressing it on all the exogenous variables.

[28] In each F-test, there are 4 and approximately 624 degrees of freedom. Four restrictions are tested in each equation (one for each instrumented endogenous variable included in the equation). The F-value and significance level at which the null hypothesis could be rejected are as follows for each equation: *Chgo* equation: 9.54, 0.0001 level; *Prov* equation: 11.66, 0.0001 level; *Miscg* equation: 1.02, 0.399 level; *Pen* equation: 1.25, 0.288 level; and *Chfund* equation: 3.37, 0.0001 level.

the instruments are with the independent variables. Note that the requirement that the instruments are independent of the error is also necessary for proper specification of the OLS estimation. Rejection of the test suggests that the instrumental variable method used to estimate our system is more appropriate than OLS. We add that instrumental variable estimation corrects many forms of misspecification, so the difference between the OLS and two stage least squares results can be due to something other than endogeneity. Regardless of the source of the misspecification however, OLS estimation appears to be inappropriate.

The failure to reject the null hypothesis in the *Miscg* and *Pen* equations could indicate that these two decisions truly are not jointly determined with the others. However, the positive and significant coefficients on *Prov* in the *Pen* equation, on *Chgo* in the *Miscg* equation, and on *Miscg* in the *Chgo* equation are difficult to explain if this is the case.[29] Alternatively, the failure to reject could reflect low power due to the use of instruments that are not highly correlated with the endogenous variables. This seems more likely in modelling *Miscg,* because *Yldbv* is expected to only measure the non-discretionary component of gains on sales of securities. (Recall from table 7 that the correlation between *Yldbv* and gains on sales of securities *Sg* is .25 whereas the correlation of *Yldbv* with the other components of *Miscg* is -.07). Finally, some other misspecification may induce these somewhat contradictory findings. As mentioned, the rejection of the Hausman test comparing 2SLS with 3SLS suggests that there is some misspecification in our system. We attempt to locate sources of this in the next section.

5.3 Investigation of Alternative Specifications

For tractability, our model makes a number of simplifying assumptions. The components of *Chfund* and *Miscg* are assumed to have the same tax implications and the same relation to

[29] One explanation, consistent with our findings, is that *Prov* is considered by managers to be a part of pre-determined earnings (Earn). If so, given our definition of *Earn*, *Prov* and *Earn* would have the same coefficient but with opposite signs. However, we are unable to explain the positive partial correlation of *Chgo* with *Miscg* in the context of our model.

their measures of non-discretionary components. We assume that the model coefficients are constant across time and across firms. Finally, we have imposed zero restrictions for some variables which may not hold. This section reports the effects of re-formulating our model to relax these assumptions.

To allow for non-homogenous components of *Chfund*, we re-estimate the model, substituting separate equations for issuances of capital notes and issuances of common stock plus preferred stock;[30] both equations include tax dummy variables. We find evidence supporting our original simplifying assumptions. Specifically, the estimated coefficients on the $Tax_{bf.af}$ are statistically insignificant, and the other results are very similar to those reported above.

We examine the specification of *Miscg* by redefining it to comprise only income from sales of investment securities. The assumption that *Miscg* is homogenous with respect to its non-discretionary determinants and with respect to tax objectives is more likely to hold under this definition. Under this specification, an important change is that there is evidence of tax management in the period prior to the Tax Act. In particular, the coefficient on Tax_{bf} is positive, and we can reject the hypothesis that the coefficient equals zero (t = 2.26) in the two stage results. We still find evidence of capital management in the *Miscg* equation, and we cannot reject the null hypothesis that securities gains are independently determined.[31] On balance, this formulation provides results loosely consistent with the findings observed in Scholes et al. [1990], e.g. there is evidence of capital, tax and earnings management in the decision to realized securities gains. While the failure to reject that securities gains are independently determined suggests that the differences between OLS and simultaneous methods are not large, we point out that the evidence of capital management is confined to the system approach. Finally, the changes in the results which occur when we redefine *Miscg* suggest that the misspecification in our system is likely to be linked to this equation.

[30]We use the prior period level of these variables as measures of the non-discretionary components.

[31]The t-statistic on *Pcap* is -1.25 (-2.23) in the two-stage (three-stage) results. The Hausman test of the null of no misspecification, e.g. the 2SLS versus 3SLS comparison, rejects at conventional levels.

To allow for potential instability in our parameters across time, we expand each equation to allow for different intercepts for each year. In each equation, one or more of these dummy variables yields coefficients which are statistically distinguishable from zero. In addition, this modification weakens the capital management results in the *Miscg* equation. Under both 2SLS and 3SLS, the evidence suggests that banks use *Miscg* primarily to manage earnings.[32] In this model, the earnings management results in the *Pen* equation are somewhat weaker, especially in the two stage least squares estimation. The remaining equations provide evidence of capital management similar to our original formulation.[33]

We relax the assumption that coefficients are stable across firms by adding peer group dummy variables to the specification with time varying intercepts. Since regulators monitor by peer groupings, banks in different groups might manage earnings and primary capital to different goals. Allowing intercepts in each equation to vary by peer group, essentially lets $\widetilde{Pcr}$ and $\widetilde{Roa}$ vary by group.[34] Consistent with peer groups managing to different targets, the coefficients on the dummy variables are statistically significant in the *Prov* and *Chgo* equations. However, the other results remain qualitatively unchanged. We also find that if we confine our sample to larger banks, (e.g. greater than $2 billion in assets, 591 bank years) that the 2SLS versus 3SLS specification test fails to reject the hypothesis of no misspecification. These results suggest that another likely source of misspecification in our full sample is the

[32]However, if we add year dummies to the specification where *Miscg* is confined to gains on sales of securities, the capital management hypothesis is supported in the 3SLS estimation.

[33]Estimations of our model over various subperiods are difficult to characterize because they change depending on whether *Miscg* is restricted to gains on sales of securities or whether it is defined more broadly. This instability is exacerbated by the small number of observations for a subperiod (approximately 250) in comparison to the number of estimated parameters (53). However, whether we define *Miscg* to include all transactions or just gains on sales of investment securities, we find no evidence that *Miscg* during the 1987-1989 is used to manage earnings (i.e. the coefficient on *Earn* does not differ statistically from zero).

[34]Peer groups are defined according to the federal reserve definitions as of 1988: peer group 1, banks with greater than $l0 billion in assets (221 bank years), group 2 with between $3 billion and $10 billion in assets (308 bank years), group 3 with between $1 billion and $3 billion in assets (77 bank years) and peer group 4 between $500 million and $1 billion (9 bank years). Twenty-three banks have assets of less than $500 million.

grouping of banks together which have slightly different decision processes.[35]

Finally, we examine model sensitivity to changes in the set of zero restrictions employed. First, we re-estimate the model including *Earn.* in all five equations. The coefficient on *Earn* is negative and marginally significant in the *Chgo* equation (*t* of -1.64 in the two stage least squares estimation) and is not statistically significant (*t* of .59) in the *Chfund* equation. Relaxing this restriction has virtually no effect on the other parameter values. Second, because its coefficient is consistently opposite to what would be predicted from our model, we delete (include) $Tax_{bf,af}$ from (in) all equations. The results are qualitatively similar to our original specification.

We change the assumed determinants of the non-discretionary components of *Prov* by relaxing the restriction that the coefficient on prior period's non-performing loans be the same as the coefficient on this period's non-performing loans. Rather than using ΔNpl to measure the non-discretionary component, we use Npl_{t-1} and Npl_t as separate explanatory variables.[36] This modification increases the standard errors of the coefficient on *Pcap* in the *Prov* equation for both two and three stage estimations, (*t*'s of -1.24 and -1.82 respectively). This formulation also results in slightly larger standard errors for the coefficient on the *Chfund* regressor in the *Prov* equation. Other results remain essentially unchanged.

Finally, we test the overidentifying restrictions using the lagrange multiplier test described in Kennedy [1992] pg 172. Consistent with our formulation of the model, we fail to reject the extra zero restrictions at conventional levels in all five equations.

---

[35]We find that estimated parameters of the full model by peer groups are sensitive to the definition of *Miscg.* Again, there are relatively few observations per parameter limiting our ability to draw conclusions from these subsamples.

[36]This makes our model more consistent with Moyer [1990]. Note that adding both Npl_{t-1} and Npl_t to the provision equation is equivalent to adding ΔNpl and Npl_{t-1} to the provision equation.

6 Summary and Accounting Implications

6.1 Summary

Generally we find that loan charge-offs, loan loss provisions, and the decision to issue securities are jointly determined. Apparently, this interaction results from the use of all three transactions to manage primary capital ratios. We cannot reject the hypothesis that pension settlement gains and gains from miscellaneous transactions are determined independently of the other four decisions, although both appear to be used to manage end-of-period earnings. The results concerning the use of *Miscg* to manage capital and taxes are less robust. Under some specifications, we find evidence that gains from miscellaneous transactions are used to manage capital, and that gains from sales of investment securities are used to manage taxes.

Although our conclusions are not dissimilar from prior and concurrent studies using research designs that do not account for the joint decision making, e.g. Moyer [1990], Scholes et al. [1990], Haw et al. [1991] and Collins et al. [1993], our analysis suggests that taking account of simultaneity is important. The distinction is especially important in analyzing loan loss provisions, loan charge-offs and financing decisions. To the extent we can generalize to the samples used in prior studies,[37] our results suggest that accounting for simultaneity could change conclusions of those studies.

Our evidence is fairly consistent with the framework used to generate our system of equations; we find broad support for the hypotheses that deviating from capital and earnings goals is costly, and that bank managers trade-off costly accrual and financing discretion to meet these goals. However, the model is not completely adequate along all dimensions. Hausman tests comparing OLS and 2SLS parameter estimates reject the hypothesis that pension settlement gains and miscellaneous gains are jointly determined, and under most specifications, the Hausman test comparing 2SLS with 3SLS rejects the null hypothesis of

[37]Scholes et al. [1990] and Moyer [1990] both draw samples from 1981-1986. Collins et al. [1993] analyze data from 1971-1991.

no misspecification. In addition, in at least one case, the estimated coefficients seem to violate restrictions implied by our model (i.e. the partial correlations of *Pen* and *Prov).*

Sensitivity analysis indicates that misspecification possibly derives from decision parameters that vary across time (or across banks), possibly due to changes in underlying economic events. For example, risk based capital standards likely changed the way in which banks manage the provision for loan losses since the new definitions of capital do not include the reserve for loan losses. We also find evidence that misspecification could be due to how *Miscg* is constructed.

Misspecification could also derive from other untested assumptions of our model. Discontinuities in the cost function could be important. For example, we do not relax the assumption that the costs associated with deviating from target are symmetric above and below. In addition, we do not consider constraints on the discretion available to managers.[38] Models incorporating such discontinuities would require to non-linear estimation techniques. Finally, we assume that all discretion occurs at year-end even though banks issue quarterly statements to capital markets and regulators. Failing to take account of quarterly management of accounting reports could lead us to conclude that sequential decisions are jointly determined.

6.2 Accounting Implications

Taken together with other studies, several of the results are provocative. Our evidence suggests that banks choose loan charge-offs and provisions to manage capital as opposed to their setting these accruals to reflect estimates of loan quality. Moreover, there is evidence that both the provision and charge-offs are traded off with miscellaneous gains and issues of securities for capital management purposes. All this suggests that managers make a complex determination about both accruals in light of other capital-raising activities. Although we

[38]For example the discretion available to mangers to realize gains from securities is limited by the difference between market and book value for the portfolio of securities held. Once these gains have been exhausted, managers face infinite costs of realizing more.

have strong evidence that banks manage their loan loss accruals, we have not attempted to assess the magnitude of this manipulation relative to auditing standards, which would be of key interest to accounting policy makers and bank regulators.

Consistent with the contention of mark-to market advocates, that banks will selectively sell-off securities for the accounting side-effects, we find that banks appear to execute the investment decisions underlying *Miscg* to manage income. However, we also find that the level of loan loss accruals and financing choices depend on the level of miscellaneous gains that firms realize. This means that marking investment securities to market value can have consequences that regulators may not have anticipated. In particular, removing the ability to exercise discretion along this dimension is likely to increase discretion along another. Our results suggest that without other constraints on managerial behavior, the mark-to-market rule could change the way in which managers report loan loss provisions, loan charge-offs, and how they time decisions to sell other assets with unrealized gains or losses.

Finally, we find evidence that the decision to issue equity, capital notes, and preferred stock depends on miscellaneous gains and loan loss accruals. This evidence combined with our other findings suggests that firm financing decisions can depend on the level of accounting discretion managers are able to exercise and vice versa. Although there are many studies in the costly contracting and monitoring literature postulating that leverage levels affect accounting choices, there are few which attempt to document if this relation works in reverse, e.g. that decisions about accounting affect the timing of securities issuances. Our framework proposes and our evidence supports the notion that accrual, investment, and financing decisions are not independent. In the context of contracting and monitoring motivations for accounting choices, this means that focusing solely on the accounting system's role in mitigating these costs potentially omits important correlated factors.

Appendix A

This appendix describes how the variables used in the empirical work are determined. If the variable is obtained from Bank Compustat, we list the data item number following its description. Otherwise, the data are identified as hand-collected. All of the variables, except dummy variables, are deflated by end-of-year reported assets for the purposes of estimating our system of equations.

A.1 Endogenous Variables

1. *Loan Loss Provision (Prov)*- This is an expense, giving income recognition to loan losses. The loan loss provision increases the reserve for loan losses. (Bank Compustat Item 135)

2. *Charge-Offs (Chgo)* - These are the amount of loans determined to be uncollectible during the period less recoveries. Loan charge-offs reduce the reserve for loan losses. (Bank Compustat Item 190)

3. *Change in External Funds (Chfund) - Chfund* is the amount of primary capital *issued* during the year, i.e. the sum of common stock, preferred stock, and capital notes issued. Issuances of preferred plus capital notes are based on hand-collected primary capital figures. We back out the level of preferred plus capital notes using the primary capital ratio in the annual report and data from Bank Compustat as follows:

$$(Capital\ Notes + Preferred\ Stock)/(Tot\ Assets + Llr) =$$
$$(Primary\ Capital\ Ratio) - (Shrhldr's\ Equity + Llr)/(Tot\ Assets + Llr)$$

The level of capital notes plus preferred in a period can then be calculated by multiplying this difference by sum of assets and the loan loss reserve.

Issuances of common equity is estimated as the change in the sum of Compustat items 88 and 95 from period *t-1* to *t*. This change will be higher, mechanically, if a bank engages in a pooling transaction. We view poolings not as financing decisions, but as investment decisions. Accordingly we code the change in equity associated with large pooling transactions to be zero. To identify large poolings, we calculated the percentage change in common shares per Bank Compustat. If this percentage change was greater than l0%, we searched the financial statement in that year for pooling transactions.

4. *Pension Settlement Gains (Pen)- Pen* measures the pre-tax amount of pension settlement gains reported. A pension settlement occurs when a firm with a defined benefit pension plan pays another firm (typically an insurance company) to assume part of its pension liability. Under SFAS 88, firms with overfunded plans can recognize gains on these transactions in proportion to the fraction of the projected benefit obligation discharged in the year of the transaction. When the obligation is discharged, assets and liabilities related to the transactions are effectively defeased.[32] Under SFAS 87, the effects of the overfunding would

[32]In substance these transactions are much like pension plan terminations, except that the excess assets do not revert to the firm, and the firm does not incur any current tax liability from the settlement. In addition, the excise tax surcharges on pension plan reversions are also avoided. A reversion occurs when the firm appropriates (i.e., takes control of) the excess assets remaining after the obligation is settled.

eventually surface in the income statement, but the important feature for our purposes is that the settlement accelerates the income effects of the overfunding into the current period. These amounts were hand-collected, in general from the management discussion.

5. *Miscellaneous Gain Items (Miscg)* - The income effects of a variety of transactions are identified by reading the income statements of the sample firms, and by reading the *Management Discussion and Analysis* sections of the annual reports. As suggested in the text, the income from these transactions are included based on the judgment that their timing is determined in part by accounting considerations. We include items that have both positive and negative effects on income. The *Miscg* items are as follows:

   (a) Income from investment security transactions *Sg* - Income from sales of securities in banks' investment portfolios is recognized when securities are sold. In contrast to the accounting for securities held by industrial companies (and accounted for under SFAS 12), in banks it is based on historical cost (adjusted for interest amortization in the case of bonds). Thus, gains and losses from sales can be used to time income recognition for each individual security. This is the only *Miscg* item that could be collected from Compustat. (Bank Compustat Item 153)

   (b) Income from sales of assets - The most common of these is the sale of facilities, e.g., the sale of a headquarters building. Only the current-year income effects of sale-leasebacks are recorded.

   (c) Income from sales of investments/subsidiaries - In addition to items in their investment portfolios, firms have other investments that they sell during the sample period. These include income from sales of equity investments and venture capital investments. These items are reported separately from income from securities gains and losses. In addition, we include income from the sales of subsidiaries.

   (d) Income from selected loan securitizations - Loan securitization transactions are not unlike loan sales. These transactions differ from outright loan sales, in that banks sell special securities that are backed by loans receivable (or future loans receivable) of the bank. Investors purchase these securities, thereby obtaining rights to (part of the) interest and (all of the) principal repayment on the loan. From an accounting standpoint, the transaction is like a sale.

   (e) Income from sales of servicing rights - Banks that originate mortgage loans often sell the loans, but retain what are called servicing rights. The bank selling the loan processes loan payments and passes payments through to the loan purchaser. The bank sells the loan at a lower yield than the rate charged to the borrower, so that the spread between these two rates represents a valuable asset. Banks sometimes sell these servicing rights, triggering recognition of a gain or loss on the sale.

   (f) Income from sales of credit card portfolios - Income effects of the sale of credit card operations are recorded.[33]

[33]A number of banks have recently sold or are trying to sell their credit card operations. For banks other than the largest money center banks, such sales can have an enormous effect on the financial statements. For example, Michigan National Corporation's sale of its credit card portfolio to Chase Manhattan in 1989 resulted in a pre-tax gain of $225 million. The 1989 income for Michigan National was $187 million, meaning

(g) Accruals related to restructuring/termination programs - If firms give income statement recognition to items related to staff reduction or restructuring, the income effects are recorded. In general, these items have a negative effect on income. Although we generally include items in *Miscg* that are accompanied by immediate cash flow effects, we expect that cash flow effects of these accruals, if not immediate, are virtually immediate.

(h) Income effects of debt retirements - Income effects of early debt retirements are recorded, on a before-tax basis.

A.2 Exogenous Variables

1. *Primary Capital Before Endogenous Items (Pcap)* - This is the primary capital before the effects of discretionary items. In general primary capital equals the sum of retained earnings, the allowance for loan losses, preferred and common stock, and eligible debt securities, all scaled by the sum of assets and the allowance for loan losses. We hand-collected end of the year primary capital, from the financial statements of the sample firms. We then back-out the effects of the endogenous variables. (We assume a tax rate of 34%.)

2. *Earnings Before Endogenous Items(Earn)* - We start with operating earnings (Bank Compustat Item 145) net of *Miscg* and pension settlement gains that also are included in operating items. To this we add back the current loan loss provision (Bank Compustat Item 135). As defined by Bank Compustat, operating earnings includes the effects of the loan loss provision, but excludes the effects of securities gains and losses. Thus, to obtain *Earn* from item 145, we add back the loan loss provision and certain *Miscg* components, but do not add back securities gains and losses.

3. *Tax Variables* (Tax_{bf} and Tax_{af})- These are dummy variables that capture the tax status of the firm. If the firm has a net operating loss carryforward at the end of 1985 or 1986, the value of Tax_{bf} for that firm is 1; otherwise the variable assumes a value of 0. Tax_{af} assumes a value of 1 if the firm has a net operating loss in the current year, where the year is 1987, 1988, or 1989. If the firm has no net operating loss in the current year, this variable assumes a value of 0. The net operating loss carryforwards were hand-collected from the tax footnote in the financial statements.

4. *Money Center Indicator (MC)* - This is a dummy variable, assuming a value of 1 if the bank is Citicorp, Chase Manhattan, First Chicago, First Interstate, BankAmerica, Wells Fargo, Manufacturers Hanover, J.P. Morgan, Bankers Trust, Security Pacific, or Chemical Bank. (Continental Illinois is not in our sample due to regulatory supervision.)

5. *Loans to Developing Country Indicator (Ldc)*- This is a dummy variable taking on a value of 1 from 1987-1989 if the bank has non-performing loans to lesser developed countries. These banks were identified using *Statistics 1992 U S Bank Holding Companies* published by IBCA Inc in 1993.

---

that a substantial portion of the firm's income for the year was generated by the sale. Note also that this gain amounts to approximately 20 percent of the firm's 1989 owner's equity, so this one transaction had a very large impact on the firm's regulatory capital position.

6. *Apens* - This item models the supply of pension settlement gains available. It is calculated as the current year-end pension assets plus pension settlement gains during the year minus the current year-end benefit obligation. Since none of the sample firms settled pensions for losses, if this difference is negative, *Apens* is set to zero. These data are hand-collected from the pension footnote.

7. Npl_{t-1} - This is defined as the level of non-performing loans in a given year. Non-performing loans includes so-called non-accruing loans (loans on which the firm does not accrue any interest revenue, even if interest is being paid) and restructured loans (loans on which the bank is collecting interest at a lower rate than originally stipulated in the loan contract). Non-performing loans are hand-collected from the financial statements of the sample firms.

8. Δ *Npl* - This is the change in non-performing loans, and it is calculated based on the year-to-year change in *Npl* (item 7 above).

9. Llr_{t-1}– The prior year's ending balance in the loan loss reserve. This item is collected from Compustat. (Bank Compustat 78)

10. *Yldbv*- the book value of investment securities multiplied by the change in the yield on debt securities for the year, calculated using Moyer's [1990] formula. The formula assumes that all investments mature in one year:

$$Yldbv = \left[(1 + Yld_{t-1})^2(1 + Yld_t)^{-1} - 1 - Yld_{t-1}\right] I_{t-1}$$

where

Yld_{t-1}	=	Average yield on a portfolio of 20 long term bonds in prior year. (This series is collected from *Bond Buyer Yearbook 1990* by the American Banker.)
Yld_t	=	Average yield on a portfolio of 20 long term bonds in current year.
I_{t-1}	=	Beginning of the year book value of investment securities from Bank Compustat item 8

11. $Note_{t-1}$– the amount of outstanding capital notes and preferred stock at prior year-end. This is hand-collected from the primary capital disclosures as discussed in section A.l, 3) above.

12. Eq_{t-1}– the amount of common equity outstanding at prior year-end, collected from Compustat (Bank Compustat items 88 and 95)

REFERENCES

CLINCH, G. and J. MAGLIOLO. "CEO Compensation and Components of Earnings in Bank Holding Companies." forthcoming *Journal of Accounting* and *Economics* 1992.

COLLINS, J. H., D. A. SHACKELFORD, and J. M. WAHLEN. "The Coordination of Regulatory Capital, Earnings and Taxes for Banks." Working Paper, University of North Carolina, 1993.

ELLIOTT, J. A., J. D. HANNA, and W.H. SHAW. "The Evaluation by the Financial Markets of Changes in Bank Loan Loss Reserve Levels." *The Accounting Review* 66 (October 1991): 847-861.

GRIFFIN, P. A. and S. J. R. WALLACH. "Latin American Lending by Major U.S. Banks: The Effects of Disclosures about Nonaccrual Loans and Loan Loss Provisions." *The Accounting Review* 66 (October 1991): 830-859.

HAUSMAN, J. A. "Specification Tests in Econometrics." *Econometrica* 46 (November 1978): 1251-1271.

HAW, I., K. JUNG, and S. B. LILIEN. "Overfunded Defined Benefit Pension Plan Settlements Without Asset Reversions." *Journal of Accounting and Economics* 14 (September 1991): 296-320.

MOYER, S.E. "Capital Adequacy Ratio Regulations and Accounting Choices in Commercial Banks." *Journal of Accounting and Economics* 13 (July 1990): 123-154.

SCHOLES, M., G. P. WILSON and M. A. WOLFSON. "Tax Planning, Regulatory Capital Planning and Financial Reporting Strategy for Commercial Banks." *The Review of Financial Studies* 3 (Number 4 1990): 625-650.

WAHLEN, J. M. "The Nature of Information in Commercial Bank Loan Loss Disclosures." Working Paper, University of North Carolina, 1992.

TABLE 1: EXPECTED EFFECTS OF ENDOGENOUS VARIABLES ON GOALS

Transaction Type	Assumed Effect On Goals		
	Primary Capital	*Tax*	*Earnings*
Loan Charge-offs (*Chgo*)	Decreases	Decreases	0
Loan Loss Provision (*Prov*)	Increases	0	Decreases
Miscellaneous Gains (*Miscg*) *Gains on Sales of Securities* *Gains on Sales of Fixed Assets* *Gains on Sales of Loans* *Gains from Credit Card Port. Sales* *... etc.*	Increases	Increases[a]	Increases
Pension Settlement Gain (*Pen*)	Increase	0	Increase
Change in External Financing (*Chfund*) *Issuance of Common Equity* *Issuance of Preferred* *Issuance of Capital Notes*	Increase	0[b]	0

Detailed explanations of the computation of these transactions are contained in appendix A.

a) For certain miscellaneous gains, such as restructuring charges, tax effects may occur over a number of years.

b) As discussed in Scholes et al. [1990], due to their interest deduction, capital notes are tax favored relative to common stock and preferred. This tax effect is likely to be second order when compared to the direct effects of charge-offs and miscellaneous gains. Therefore we assume *Chfund* has no effect on taxes or earnings.

TABLE 2: RELATION OF ESTIMATED COEFFICIENTS TO COST PARAMETERS

	Chgo	*Prov*	*Miscg*	*Pen*	*Chfund*
	Coefficients in each column are multiplied by the following factors				
	$\frac{1}{\gamma_1^2\lambda_1+\lambda_3}$	$\frac{1}{\gamma_2^2\lambda_1+\phi_1^2\lambda_2+\lambda_4}$	$\frac{1}{\gamma_3^2\lambda_1+\phi_2^2\lambda_2+\lambda_5}$	$\frac{1}{\gamma_4^2\lambda_1+\phi_3^2\lambda_2+\lambda_6}$	$\frac{1}{\gamma_5^2\lambda_1+\lambda_7}$
Intercept	$-\gamma_1\lambda_1\overline{Pcr}$	$\gamma_2\lambda_1\overline{Pcr}-\phi_1\lambda_2\overline{Roa}$	$\gamma_3\lambda_1\overline{Pcr}+\phi_2\lambda_2\overline{Roa}$	$\gamma_4\lambda_1\overline{Pcr}+\phi_3\lambda_2\overline{Roa}$	$\gamma_5\lambda_1\overline{Pcr}$
Chgo		$\gamma_1\gamma_2\lambda_1$	$\gamma_1\gamma_3\lambda_1$	$\gamma_1\gamma_4\lambda_1$	$\gamma_1\gamma_5\lambda_1$
Prov	$\gamma_1\gamma_2\lambda_1$		$-[\gamma_2\gamma_3\lambda_1-\phi_1\phi_2\lambda_2]$	$-[\gamma_2\gamma_4\lambda_1-\phi_1\phi_3\lambda_2]$	$-\gamma_2\gamma_5\lambda_1$
Miscg	$\gamma_1\gamma_3\lambda_1$	$-[\gamma_2\gamma_3\lambda_1-\phi_1\phi_2\lambda_2]$		$-[\gamma_3\gamma_4\lambda_1+\phi_2\phi_3\lambda_2]$	$-\gamma_3\gamma_5\lambda_1$
Pen	$\gamma_1\gamma_4\lambda_1$	$-[\gamma_2\gamma_4\lambda_1-\phi_1\phi_3\lambda_2]$	$-[\gamma_3\gamma_4\lambda_1+\phi_2\phi_3\lambda_2]$		$-\gamma_4\gamma_5\lambda_1$
Chfund	$\gamma_1\gamma_5\lambda_1$	$-\gamma_2\gamma_5\lambda_1$	$-\gamma_3\gamma_5\lambda_1$	$-\gamma_4\gamma_5\lambda_1$	
Pcap	$\gamma_1\lambda_1$	$-\gamma_2\lambda_1$	$-\gamma_3\lambda_1$	$-\gamma_4\lambda_1$	$-\gamma_5\lambda_1$
Tax	$-\delta_1\tau_{it}$		$\delta_2\tau_{it}$		
Earn		$\phi_1\lambda_2$	$-\phi_2\lambda_2$	$-\phi_3\lambda_2$	
$\overline{Chgo_{it}}$	λ_3				
$\overline{Prov_{it}}$		λ_4			
$\overline{Miscg_{it}}$			λ_5		
$\overline{Pen_{it}}$				λ_6	
$\overline{Chfund_{it}}$					λ_7
$\epsilon_i =$	$-\gamma_1\lambda_1\xi_{1it}-\lambda_3\xi_{3it}$	$-\gamma_2\lambda_1\xi_{1it}-\phi_1\lambda_2\xi_{2it}-\lambda_4\xi_{4it}$	$-\gamma_3\lambda_1\xi_{1it}-\phi_2\lambda_2\xi_{2it}-\lambda_5\xi_{5it}$	$-\gamma_4\lambda_1\xi_{1it}-\phi_3\lambda_2\xi_{2it}-\lambda_6\xi_{6it}$	$-\gamma_5\lambda_1\xi_{1it}-\lambda_7\xi_{7it}$

The entries below each column correspond to the coefficients linking each endogenous variable to the other endogenous variables and exogenous variables in the five equations listed on page 9 and 10. These equations derive from the following cost minimization problem:

Minimize Cost
{Chgo, Prov, Miscg, Pen, Chfund}

$$
\begin{aligned}
= \; & \frac{1}{2}\left(\lambda_1\left[Pcr_{it}-\widetilde{Pcr}+\xi_{1it}\right]^2+\lambda_2\left[Roa_{it}-\widetilde{Roa}+\xi_{2it}\right]^2\right)+\tau_{it}\left[Txe_{it}+\xi_{8it}\right] \\
& +\frac{1}{2}\left(\lambda_3\left[Chgo_{it}-\overline{Chgo_{it}}+\xi_{3it}\right]^2+\lambda_4\left[Prov_{it}-\overline{Prov_{it}}+\xi_{4it}\right]^2+\lambda_5\left[Miscg_{it}-\overline{Miscg_{it}}+\xi_{5it}\right]^2\right. \\
& \left.+\lambda_6\left[Pen_{it}-\overline{Pen_{it}}+\xi_{6it}\right]^2+\lambda_7\left[Chfund_{it}-\overline{Chfund_{it}}+\xi_{7it}\right]^2\right)
\end{aligned}
$$

$$
\begin{aligned}
s.t. \quad & Pcr_{it} = Pcap_{it}-\gamma_1 Chgo_{it}+\gamma_2 Prov_{it}+\gamma_3 Miscg_{it}+\gamma_4 Pen_{it}+\gamma_5 Chfund_{it} \\
& Roa_{it} = Earn_{it}-\phi_1 Prov_{it}+\phi_2 Miscg_{it}+\phi_3 Pen_{it} \\
& Txe_{it} = Txearn_{it}-\delta_1 Chgo_{it}+\delta_2 Miscg_{it}
\end{aligned}
$$

TABLE 3: SAMPLE SELECTION

	Number of Firm Years
Total Compustat Firm Years Available[a]	752
Annual Reports Not Requested[b]	-34
Additional Missing Firm Years[c]	-36
Total Firm Years with Data	682
Deletions Due to Regulatory Intervention[d]	-29
Deletions Due to Bankruptcy[e]	-4
Other Deletions[f]	-11
Total Firm Years in Sample	638

a) Number of non-overlapping, non-foreign owned firm years available on 1990 and 1987 Bank Compustat tapes.

b) Through an oversight, we did not attempt to obtain annual reports for seven banks, representing 34 firm years. These reports could not be found in the University of Pennsylvania Library, nor could they be obtained from Lexis.

c) For a variety of reasons one or more of the required data items were not available for thirty-six firm years. The most common reason for missing data is a missing annual report. Since we collected the annual reports from the bank holding companies and third party vendors, we did not always successfully obtain reports we requested. In some cases even when we have an annual report, certain items are not disclosed, especially non-performing loans.

d) We delete firms under any kind of agreement with regulators to raise capital. We delete these firms under the assumption that once regulatory intervention occurs, the manager's ability to exercise discretion is hampered.

e) For the same general reason stated for deleting firms undergoing regulatory intervention, we also delete firms which are operating under Chapter 11.

f) We delete three years of data for Arizona Commerce because it went public for the first time in 1987. Two years of data for Mcorp were deleted for a similar reason. Mcorp was formed from the merger of two previously financially distressed organizations. Mcorp itself went bankrupt after just two years of operations. We delete all five years of Sterling Bancorp data because the company maintained very high capital, apparently taking extreme actions to do so. For example, in one year Sterling cut its assets by 50% to maintain its ratio. Finally we delete First Bank System in 1988 due its extraordinarily high loss on sales of securities.

TABLE 4: SAMPLE PROFILE BY YEAR

	Mean	*Std Dev*	*Max*	*Q3*	*Median*	*Q1*	*Min*
Total Assets (in Billion $)							
1985	13.03	22.8	173.6	12.51	5.33	3.12	0.19
1986	14.35	23.83	196.1	14.6	5.98	3.49	0.18
1987	15.25	25.27	203.6	17.79	5.83	3.37	0.20
1988	16.16	25.77	207.7	19.7	6.63	3.57	0.25
1989	17.82	28.45	230.6	22.97	7.15	3.80	0.28
Earnings/Assets(%)							
1985	0.98	0.54	3.49	1.18	0.98	0.81	-2.20
1986	0.91	0.62	2.13	1.20	0.98	0.82	-2.88
1987	0.74	0.84	2.22	1.28	0.91	0.35	-2.71
1988	1.18	0.61	2.82	1.48	1.22	1.00	-1.70
1989	0.99	0.93	3.76	1.47	1.19	0.78	-3.30
Primary Capital Ratio(%)							
1985	7.13	0.95	11.00	7.44	6.97	6.52	5.56
1986	7.31	0.84	10.72	7.78	7.20	6.82	5.66
1987	7.97	0.90	10.87	8.48	7.87	7.37	6.11
1988	7.93	0.87	10.71	8.45	7.89	7.39	6.18
1989	7.90	0.98	11.04	8.34	7.83	7.34	5.28

Distributions are based on 127 observations in 1985, 134 in 1986, 127 in 1987, 127 in 1988 and 123 in 1989 (total of 638 firm years). The primary capital ratio is defined as the sum of shareholders equity, the allowance for loan loss provisions and qualifying debt instruments, scaled by the sum of total assets and the allowance for loan loss provisions. Earnings are measured before tax and extraordinary items.

TABLE 5: DISTRIBUTION OF ENDOGENOUS VARIABLES

Variables Reported as a % of Primary Capital

	Mean	*Std Dev*	*Max*	*Q3*	*Median*	*Q1*	*Min*
*Pre-Tax Earnings**	12.56	9.68	46.36	17.17	14.32	10.54	−57.8
Charge-Offs	6.05	5.17	39.17	7.83	4.54	2.61	−1.5
Provision for Loan Losses	8.26	7.41	66.36	9.61	5.99	3.86	0.05
Security Gains (1)	0.71	1.52	21.06	0.95	0.30	0.04	−6.73
Gains on Other Asset Sales (2)	0.66	1.52	24.14	0.62	0.00	0.00	−2.64
Miscg =Total (1) + (2)	1.37	2.44	22.89	1.76	0.00	0.13	−6.45
Pension Settlement Gains	0.13	0.52	4.86	0.00	0.00	0.00	0.00
Change in Equity= (3)	2.93	5.86	45.74	3.06	0.44	0.00	−7.05
Change in Capital Notes = (4)	0.91	5.44	29.98	0.71	0.00	−0.51	−29.8
Chfund = Total (3) + (4)	3.84	7.73	45.74	6.84	0.77	0.00	-28.7

* *Pre-Tax Earnings* is not an endogenous variable. It is included in this table to allow the reader to gauge the magnitude of the endogenous variables.

The distribution is based on a total of 638 firm years. All variables have been scaled by primary capital and converted to percentages. Primary capital is the sum of shareholder's equity, the allowance for loan losses and qualifying debt instruments. *Gains fr Sales Other Assets* is defined as the net discretionary gains and losses, hand-collected primarily from management discussion of non-interest income and expense in each bank's annual report. *Change in Equity* is the increase (decrease) in par plus paid-in value of common (excluding changes due to large poolings.) *Change in Capital Notes* is the sum of changes in debt and preferred stock qualifying as primary capital. The remaining variables should be self-explanatory. Detailed data definitions are contained in appendix A.

TABLE 6: PROFILE OF VARIABLES BY YEAR

Panel A–Endogenous Variables

Variables Reported as a % of Primary Capital

Variable		*1985*	*1986*	*1987*	*1988*	*1989*
Pre-Tax Earnings	*Mean*	13.71	12.53	9.32	14.88	12.37
	Median	14.24	13.99	11.74	15.65	14.87
Charge-Offs	*Mean*	5.18	6.32	6.03	6.11	6.60
	Median	3.92	4.62	5.05	4.46	4.74
Provision for Loan Losses	*Mean*	7.15	8.54	10.52	6.02	9.08
	Median	5.98	6.03	7.46	5.30	6.19
Security Gains (1)	*Mean*	0.81	1.64	0.62	0.13	0.28
	Median	0.58	0.85	0.30	0.07	0.12
Gains on Other Asset Sales (2)	*Mean*	0.73	0.63	0.53	0.74	0.69
	Median	0.00	0.00	0.00	0.00	0.00
Miscg =Total (1) + (2)	*Mean*	1.54	2.26	1.15	0.87	0.97
	Median	0.93	1.35	0.66	0.32	0.31
Pension Settlement Gains	*Mean*	0.03	0.24	0.21	0.10	0.06
	Median	0.00	0.00	0.00	0.00	0.00
Change in Equity (3)	*Mean*	4.18	4.60	2.01	1.40	2.36
	Median	1.22	0.81	0.25	0.12	0.42
Change in Capital Notes (4)	*Mean*	2.13	0.43	2.89	−0.14	−0.80
	Median	0.03	0.00	0.04	0.00	−0.04
Chfund=Total (3) + (4)	*Mean*	6.31	5.03	4.90	1.26	1.56
	Median	3.94	1.31	1.21	0.08	0.15

The distribution is based on a total of 638 firm years. All variables have been scaled by primary capital and converted to percentages. Primary capital is the sum of shareholder's equity, the allowance for loan losses and qualifying debt instruments. *Gains fr Sales Other Assets* is net gains and losses from miscellaneous transactions, hand-collected primarily from management discussion of non-interest income and expense in each bank's annual report. *Change in Equity* is the increase (decrease) in par plus paid-in value of common (excluding changes due to large poolings.) *Change in Capital Notes* is the sum of changes in debt and preferred stock qualifying as primary capital. The remaining variables should be self-explanatory. Detailed data definitions are contained in appendix A.

Table 6 continues on next page

TABLE 6: PROFILE OF VARIABLES BY YEAR

Panel B–Exogenous Variables
Variables Reported as a % of Assets

Variable		*1985*	*1986*	*1987*	*1988*	*1989*
Pcap	*Mean*	6.85	7.13	7.80	8.18	8.18
	Median	6.66	7.10	7.68	8.15	8.15
$Tax_{bf,af}$	*Mean*	10.24	11.94	8.66	10.24	10.24
	Median	0	0	0	0	0
Earn	*Mean*	1.32	1.30	1.42	1.51	1.51
	Median	1.31	1.27	1.41	1.53	1.53
Npl	*Mean*	1.10	1.08	1.15	1.08	1.08
	Median	0.88	0.80	0.80	0.71	0.71
ΔNpl	*Mean*	0.02	0.03	0.15	-0.05	-0.05
	Median	-0.04	-0.04	0.05	-0.02	-0.02
Llr	*Mean*	0.83	0.91	1.22	1.14	1.14
	Median	0.80	0.84	0.99	0.96	0.96
Ldc	*Mean*	0	0	35.43	31.50	31.50
	Median	0	0	0	0	0
Yldbv	*Mean*	0.16	0.31	-0.06	-0.00	-0.00
	Median	0.15	0.29	-0.06	-0.00	-0.00
Apens	*Mean*	0.22	0.24	0.22	0.20	0.20
	Median	0.04	0.19	0.18	0.16	0.16
Eq_{t-1}	*Mean*	2.54	2.53	2.80	2.97	2.97
	Median	2.52	2.45	2.62	2.72	2.72
$Note_{t-1}$	*Mean*	0.48	0.59	0.51	0.70	0.70
	Median	0.27	0.47	0.28	0.47	0.47

All variables except dummies have been scaled by total assets. Abbreviations are as follows: 1) *Pcap* = Primary capital before the effects of the endogenous variables, 2) $Tax_{bf,af} = 1$ if a bank has tax operating loss carryforwards in 1985-1986 (*bf*) or in 1987-1989 (*af*) and 0 otherwise, 3) *Earn* = pre-tax earnings before the effects of the endogenous transactions, 4) Npl_{t-1} = non-performing loans at prior year-end 5) Δnpl = the change in non-performing loans from prior to current year-end 6) Llr_{t-1} = prior year-end balance of the loan loss reserve 7) *Ldc* = 1 bank has non-performing loans to lesser developed countries (1988-1989), 0 otherwise, 8) *Yldbv* = implied gain or loss on book value of securities based on changes in long term corporate bonds, 9) *Apens* = excess of market value of pension assets over book value, 10) Eq_{t-1} = prior year-end balance of common equity, 11) $Note_{t-1}$ = prior year-end balance of qualifying debt and preferred stock. (See also appendix A)

TABLE 7: PEARSON CORRELATION COEFFICIENTS

Panel A: Endogenous Variables with Earnings, Tax, and Capital Measures

	Chgo	*Prov*	*Sg*	*Mg*	*Pen*	*Cheqty*	*Chcapn*	*Pcap*	Tax_{bf}	Tax_{af}	*Earn*
Chgo	1.000										
Prob > 0	0.000										
Prov	0.774	1.000									
Prob > 0	0.000	0.000									
Sg	0.200	0.195	1.000								
Prob > 0	0.000	0.000	0.000								
Mg	0.218	0.200	0.042	1.000							
Prob > 0	0.000	0.000	0.286	0.000							
Pen	0.193	0.270	0.002	0.065	1.000						
Prob > 0	0.000	0.000	0.966	0.100	0.000						
Cheqty	−0.085	−0.048	0.018	−0.021	−0.028	1.000					
Prob > 0	0.033	0.222	0.659	0.593	0.481	0.000					
Chcapn	0.024	0.081	0.048	0.028	0.067	−0.057	1.000				
Prob > 0	0.544	0.042	0.226	0.474	0.090	0.150	0.000				
Pcap	0.214	0.108	−0.101	−0.010	0.026	−0.436	−0.218	1.000			
Prob > 0	0.000	0.006	0.011	0.795	0.512	0.000	0.000	0.000			
Tax_{bf}	0.246	0.168	0.236	−0.024	0.025	−0.002	0.014	−0.063	1.000		
Prob > 0	0.000	0.000	0.000	0.540	0.537	0.959	0.729	0.114	0.000		
Tax_{af}	0.286	0.268	−0.102	0.117	0.063	−0.011	0.014	0.058	−0.052	1.000	
Prob > 0	0.000	0.000	0.010	0.003	0.111	0.786	0.717	0.143	0.192	0.000	
Earn	−0.264	−0.274	−0.252	−0.176	−0.173	−0.049	−0.088	0.337	−0.248	−0.171	1.000
Prob > 0	0.000	0.000	0.000	0.000	0.000	0.221	0.027	0.000	0.000	0.000	0.000

All variables have been scaled by total assets. Abbreviations are as follows: 1) *Chgo* = charge offs, 2) *Prov* = provision for loan losses 3) *Sg* = gains (losses) from sales of investment securities 4) *Mg* = gains and losses other than from sales of investment securities (collected from management disscussion), 5) *Pen* = the gain from settling pension assets, 6) *Cheqty* = the total increase (decrease) in par plus paid-in common equity excluding changes due to large poolings 7) *Chcapn* = the change in the sum of debt and preferred stock qualifying as primary capital, 8) *Pcap* = primary capital before the effects of the endogenous transactions, 9) Tax_{bf} = 1 if a bank has tax operating loss carryforwards in 1985 and 1986 and 0 otherwise, 10) Tax_{af} = 1 if a bank has tax operating loss carryforwards after 1986 and 0 otherwise, 11) *Earn* = earnings before tax, securities gains, other discretionary gains and losses, and loan loss provision. We have broken down *Miscg* into *Sg* and *Mg* and *Chfund* into *Cheqty* and *Chcapn*. The variables are defined in greater detail in appendix A.

Table 7 continues on next page

TABLE 7: PEARSON CORRELATION COEFFICIENTS–continued

Panel B: Endogenous Variables with Exogenous Variables

	Chgo	*Prov*	*Sg*	*Mg*	*Pen*	*Cheqty*	*Chcapn*
Npl_{t-1}	0.633	0.547	0.086	0.216	0.189	−0.039	−0.001
Prob > 0	0.000	0.000	0.030	0.000	0.000	0.330	0.984
Δnpl	0.118	0.407	0.062	−0.006	0.153	0.019	0.002
Prob > 0	0.003	0.000	0.119	0.876	0.000	0.632	0.959
Llr_{t-1}	0.496	0.321	−0.071	0.218	0.073	−0.047	−0.058
Prob > 0	0.000	0.000	0.071	0.000	0.066	0.239	0.141
Ldc	0.216	0.274	−0.067	0.088	0.094	−0.049	0.044
Prob > 0	0.000	0.000	0.090	0.027	0.017	0.221	0.268
Yldbv	−0.108	−0.126	0.251	−0.074	−0.043	0.161	−0.107
Prob > 0	0.006	0.001	0.000	0.063	0.277	0.000	0.007
Apens	0.032	0.068	−0.007	−0.003	0.281	−0.076	−0.049
Prob > 0	0.418	0.086	0.858	0.936	0.000	0.054	0.216
Eq_{t-1}	−0.099	−0.139	−0.077	−0.108	−0.029	0.114	−0.032
Prob > 0	0.013	0.000	0.053	0.007	0.469	0.004	0.416
$Note_{t-1}$	0.157	0.165	−0.011	0.125	0.089	−0.031	−0.323
Prob > 0	0.000	0.000	0.789	0.002	0.024	0.431	0.000
MC	0.209	0.314	−0.02	0.203	0.088	−0.022	0.04
Prob > 0	0.000	0.000	0.616	0.000	0.027	0.585	0.311

All variables have been scaled by total assets. Abbreviations are: 1) *Chgo* = charge offs, 2) *Prov* = provision for loan losses 3) *Sg* = gains (losses) from sales of investment securities 4)*Mg* = gains and losses other than from sales of investment securities (collected from management disscussion), 5) *Pen* = the gain from settling pension assets, 6) *Cheqty* = the total increase (decrease) in par plus paid-in common equity excluding changes due to large poolings 7) *Chcapn* = the change in the sum of debt and preferred stock qualifying as primary capital, 8) Npl_{t-1} = non-performing loans at prior year-end 9) ΔNpl = the change in non-performing loans from prior to current year-end 10) Llr_{t-1} = prior year-end balance of the loan loss reserve 11)*Ldc* = 1 if the bank has non-performing loans to lesser developed countries (1988-1989), 0 otherwise, 12)*Yldbv* = implied gain or loss on book value of securities based on changes in long term corporate bonds, 13)*Apens* = excess of market value of pension assets over book value, 14) Eq_{t-1} = prior year-end balance of common equity, 15)$Note_{t-1}$ = prior year-end balance of qualifying debt and preferred stock, 16) *MC* = 1 if money center bank and 0 otherwise. (See appendix A)

TABLE 8: TWO STAGE LEAST SQUARES ESTIMATES FOR FIVE EQUATION SYSTEM

	Dependent Variable									
	Charge-off		*Provision*		*Misc Gn*		*Pens Setlmt*		*Chg in Ext Funds*	
Independent Variable	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*
Int	-0.009	-2.74	0.011	2.07	0.004	2.20	0.000	0.47	0.024	12.59
Chgo			1.473	11.22	0.154	2.27	-0.004	-0.24	0.453	2.32
Prov	0.236	3.63			-0.015	-0.33	0.027	2.87	-0.192	-1.45
Miscg	0.939	3.31	-1.120	-1.46			-0.065	-0.90	-0.877	-1.67
Pen	-0.030	-0.03	1.370	0.91	-0.731	-1.06			-0.410	-0.21
Chfund	0.258	1.94	-0.266	-1.40	-0.076	-1.01	-0.004	-0.24		
Pcap	0.110	2.68	-0.102	-1.76	-0.025	-1.07	-0.001	-0.15	-0.287	-12.62
Tax_{bf}	0.002	2.55			-0.000	-0.38				
Tax_{af}	0.001	2.36			-0.000	-1.19				
Earn			-0.060	-0.60	-0.105	-4.15	-0.016	-1.87		
Instr. 1	0.130	4.44	0.225	7.25	0.103	1.86	0.034	6.31	0.033	1.63
Instr. 2	0.080	1.47	-0.241	-3.52					-0.098	-2.70
MC	-0.002	-4.25	0.005	4.55	0.001	2.99	0.000	0.39	0.003	2.57
Ldce	-0.000	-0.06	0.002	3.21	0.000	0.45	0.000	0.15	0.002	2.46
Adj R_2		0.475		0.519		0.113		0.131		0.253

Based on 638 firm years. All variables except dummies have been scaled by total assets. Abbreviations follow.

Endogenous Variables: 1) *Chgo* = charge offs, 2) *Prov* = provision for loan losses 3)*Miscg* = the sum of security gains and other gains and losses (collected from management discussion), 4) *Pen* = the gain from settling pension assets, 5) *Chfund* = the total increase in the sum of debt qualifying as primary capital, preferred stock and common stock.

Exogenous Variables 1) *Pcap* = primary capital before the effects of the endogenous variables, 2) $\text{Tax}_{bf,af}$ = 1 if a bank has tax operating loss carryforwards prior to (*bf*) or after(*af*) 1987 and 0 otherwise, 3) *Earn* = earnings before tax, securities gains, other discretionary gains and losses, and loan loss provision, 4) *MC* = 1 if money center bank and 0 otherwise, 5) *LDC* = 1 if firm has non-performing loans to lesser developed countries in 1987-1989 and 0 otherwise.
Instr 1 and *Instr 2* refer to the variables measuring the non-discretionary component in each equation as follows:

- *Chgo*: non-performing loans at prior year-end,(Npl_{t-1}) and prior period's loan loss reserve (Llr_{t-1},)
- *Prov*: the change in non-performing loans from prior to current year-end,(ΔNpl) and prior period's loan loss reserve (Llr_{t-1}),
- *Miscg*: the implied gain or loss on book value of securities based on changes in long term corporate bonds (*Yldbv*),
- *Pen*: excess of market value of pension assets over book value (*Apens*),
- *Chfund*: (Eq_{t-1}) the prior year-end balance of common equity, and ($Note_{t-1}$) the prior year-end balance of qualifying debt and preferred stock.

TABLE 9: THREE STAGE LEAST SQUARES ESTIMATES FOR FIVE EQUATION SYSTEM

	Dependent Variable									
Independent Variable	*Charge-off*		*Provision*		*Misc Gn*		*Pens Setlmt*		*Chg in Ext Funds*	
	Coefficient	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*
Int	-0.012	-3.87	0.015	3.29	0.006	3.35	0.001	1.30	0.025	13.87
Chgo			1.631	14.00	0.180	2.82	0.007	0.43	0.634	3.36
Prov	0.317	5.49			-0.059	-1.31	0.023	2.50	-0.282	-2.19
Miscg	1.235	4.74	-1.476	-2.71			-0.124	-1.81	-1.325	-2.64
Pen	-0.536	-0.53	1.609	1.16	-0.348	-0.52			0.093	0.05
Chfund	0.355	2.92	-0.415	-2.41	-0.149	-2.10	-0.016	-0.92		
Pcap	0.135	3.66	-0.152	-2.88	-0.047	-2.18	-0.005	-0.84	-0.300	-13.36
Tax_{bf}	0.000	0.88			0.001	2.00				
Tax_{af}	0.001	2.60			-0.000	-0.35				
Earn			-0.027	-0.47	-0.083	-3.59	-0.021	-2.46		
Instr. 1	0.093	4.65	0.176	6.90	0.055	1.40	0.032	5.96	0.025	1.59
Instr. 2	0.104	2.80	-0.288	-5.58					-0.079	-2.51
MC	-0.003	-5.35	0.005	5.97	0.001	3.67	0.000	1.04	0.003	2.88
Ldce	-0.000	-1.06	0.002	3.58	0.000	0.88	0.000	0.31	0.001	2.22

System Weighted R^2 = .4798

Based on 638 firm years. All variables except dummies have been scaled by total assets. Abbreviations follow.

Endogenous Variables: 1) *Chgo* = charge offs, 2) *Prov* = provision for loan losses 3)*Miscg* = the sum of security gains and other gains and losses (collected from management discussion), 4) *Pen* = the gain from settling pension assets, 5) *Chfund* = the total increase in the sum of debt qualifying as primary capital, preferred stock and common stock.

Exogenous Variables 1) *Pcap* = primary capital before the effects of the endogenous variables, 2) $\text{Tax}_{bf,af}$ = 1 if a bank has tax operating loss carryforwards prior to (*bf*) or after(*af*) 1987 and 0 otherwise, 3) *Earn* = earnings before tax, securities gains, other discretionary gains and losses, and loan loss provision, 4) *MC* = 1 if money center bank and 0 otherwise, 5) *LDC* = 1 if firm has non-performing loans to lesser developed countries in 1987-1989 and 0 otherwise.
Instr 1 and *Instr 2* refer to the variables measuring the non-discretionary component in each equation as follows:

- *Chgo*: non-performing loans at prior year-end,(Npl_{t-1}) and prior period's loan loss reserve (Llr_{t-1},)
- *Prov*: the change in non-performing loans from prior to current year-end,(ΔNpl) and prior period's loan loss reserve (Llr_{t-1}),
- *Miscg*: the implied gain or loss on book value of securities based on changes in long term corporate bonds (*Yldbv*),
- *Pen*: excess of market value of pension assets over book value (*Apens*),
- *Chfund*: (Eq_{t-1}) the prior year-end balance of common equity, and ($Note_{t-1}$) the prior year-end balance of qualifying debt and preferred stock.

TABLE 10: OLS ESTIMATES: EQUATION BY EQUATION

Independent Variable	Dependent Variable: *Charge-off*		*Provision*		*Misc Gn*		*Pens Setlmt*		*Chg in Ext Funds*	
	Coefficient	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*	*Coefficient*	*t*
Int	-0.002	-2.92	0.002	2.63	0.002	3.39	-0.000	-0.10	0.021	15.42
Chgo			1.033	27.60	0.097	3.18	-0.005	-0.72	-0.023	-0.27
Prov	0.436	22.59			0.022	1.03	0.018	4.00	0.045	0.75
Miscg	0.137	3.07	0.075	1.18			-0.009	-1.03	-0.014	-0.13
Pen	-0.130	-0.63	0.844	2.97	-0.207	-1.17			0.356	0.70
Chfund	-0.017	-1.05	0.042	1.88	0.002	0.14	0.003	1.08		
Pcap	0.014	1.62	0.010	0.82	-0.002	-0.32	0.002	1.03	-0.257	-14.44
Tax_{bf}	0.002	4.14			-0.000	-0.22				
Tax_{af}	0.001	1.46			-0.000	-1.49				
Earn			-0.075	-2.35	-0.103	-5.20	-0.014	-3.18		
Instr1	0.068	4.15	0.262	13.10	0.120	2.31	0.035	7.02	0.043	2.40
Instr2	0.210	7.16	-0.163	-4.75					-0.101	-3.02
MC	-0.002	-6.31	0.004	7.60	0.001	2.85	0.000	0.31	0.002	1.77
LDC	-0.001	-2.50	0.002	4.70	-0.000	-0.15	0.000	0.53	0.002	2.87
Adj R^2		0.722		0.743		0.146		0.146		0.275

The estimated coefficients in this table are generated from ordinary least squares, which assumes the right-hand-side variables are exogenous.
Based on 638 firm years. All variables except dummies have been scaled by total assets. Abbreviations follow.

Dependent Variables: 1) *Chgo* = charge offs, 2) *Prov* = provision for loan losses 3)*Miscg* = the sum of security gains and other gains and losses (collected from management discussion), 4) *Pen* = the gain from settling pension assets, 5) *Chfund* = the total increase in the sum of debt qualifying as primary capital, preferred stock and common stock.

Independent Variables 1) *Pcap* = primary capital before the effects of the endogenous variables, 2) $\text{Tax}_{bf,af}$ = 1 if a bank has tax operating loss carryforwards prior to (*bf*) or after(*af*) 1987 and 0 otherwise, 3) *Earn* = earnings before tax, securities gains, other discretionary gains and losses, and loan loss provision, 4) *MC* = 1 if money center bank and 0 otherwise, 5) *LDC* = 1 if firm has non-performing loans to lesser developed countries in 1987-1989 and 0 otherwise.
Instr 1 and *Instr 2* refer to the variables measuring the non-discretionary component in each equation as follows:

- *Chgo*: non-performing loans at prior year-end,(Npl_{t-1}) and prior period's loan loss reserve (Llr_{t-1},)
- *Prov*: the change in non-performing loans from prior to current year-end,(ΔNpl) and prior period's loan loss reserve (Llr_{t-1}),
- *Miscg*: the implied gain or loss on book value of securities based on changes in long term corporate bonds ($Yldbv$),
- *Pen*: excess of market value of pension assets over book value ($Apens$),
- *Chfund*: (Eq_{t-1}) the prior year-end balance of common equity, and ($Note_{t-1}$) the prior year-end balance of qualifying debt and preferred stock.