Evaluating Risk Preferences in Agricultural Bank Management

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Introduction

Financial economists are increasingly aware that bank managers actively formulate production and diversification plans to control and manage risk. Lucas and McDonald (1994) commented on extensive risk-taking activities by banks, including evidence about the willingness of financial institutions to make risky loans. Banks frequently maintain capital ratios that are close to required minimums and participate in off-balance sheet activities such as selling backup lines of credit and loan commitments.

Examples of bank decisions that are consistent with risk averse behavior are also abundant. Commercial banks in the United States typically invest about one-third of their assets in extremely safe holdings such as government securities and cash. A critical research issue is to assess the implications of risk in a complete behavioral model of banking decisions, rather than cataloguing specific decisions that seem to imply risk-taking or risk-avoiding behavior.

DeYoung, Hughes, and Moon (2001) emphasized that not all risky behavior is imprudent and that some banks may have a comparative advantage in risk taking. Banks that manage risk more efficiently earn higher expected returns for the risks they take. Efficient risk-taking generates a lower probability of financial distress and allows bank managers to mitigate adverse impact of events which produce financial distress. Risk preferences of bank managers and rational bank regulation are explicitly linked, as effective regulation and supervision of commercial banks should ideally distinguish efficient risk taking from ill-informed risk taking.

Hughes (1999) noted that accounting for endogenous risk is critical in detecting risk-related scale economies. Standard dual cost and profit functions typically neglect the impact of risk on the firm's production choices and financial structure. An implicit assumption in duality based production and cost function models of the banking industry, which predominate in studies of agricultural banks is that the market price of risk does not vary based on the firm's production decisions. Firms seek to minimize cost or maximize profits, given input and output prices and the required return on stockholder equity. When these prices implicitly include a risk premium, treating prices as fixed for the firm implies that risk will not vary across production plans. The required return on the firm's debt and equity is independent of the production decision. Firms are assumed to minimize cost or maximize profit and do not pursue value-maximizing strategies. The most preferred production system (MPPS) was developed and applied by Hughes *et al.* (1996, and 1999, hereafter designated as HLMM) to incorporate endogenous risk and value-maximizing behavior.

Previous researchers have evaluated agricultural bank efficiency and productivity to determine the critical regulatory and management decisions that influence the efficient bank operations. Managers are assumed to be unconcerned about risk, seeking to maximize profit subject to fixed resource constraints. Research in the financial economics literature rejects the assumption that bank managers are always risk neutral in pursuing profit maximizing decisions. Managers may forego some expected high level of profit in order to control the bank exposure to risk. When managers are concerned about risk and take steps to reduce levels of risk exposure, then banks may seem to be operating inefficiently when they are not.

Risk averse behavior plays a role in firm level analysis of scale economies and identifying rates of technical change within an industry. Chambers (1983) considered the implications for measuring scale economies using the expected utility model of the risk-averse firm. Without information on the form of the utility function or the production function, scale and rate of technical change measures cannot be simultaneously observed. Omitting risk from the decision model leads to biased estimates of scale elasticities and the evaluation of firm efficiency.

Econometric methods based on profit or cost functions and data envelopment techniques to measure productivity lack the theoretical foundations to account for risk in decision making. Both approaches are commonly used in assessing the efficiency and identifying scale economies in agricultural banking.

Featherstone and Moss (1994) measured economies of scale and scope in agricultural banking using a cost function. Economies of scale are exhausted for banks holding $60 million in total assets with no evidence of economies of scope for any outputs, including agricultural lending. Standard duality techniques to measure scale economies however are unable to account for risk-related scale economies.

Weeratilake and Helmers (2001) used data envelopment analysis to determine comparative productivity and efficiency trends of agricultural and nonagricultural banks. A policy application examined the impact of competitive market conditions and regulatory changes associated with the Deposit Institution Deregulation and Monetary Control Act of 1980. An output-oriented Malmquist index identified sources of productivity growth from 1981-1991 and the effect of post-deregulation structural change on efficiencies of banks.

The results indicated efficiency decreases across all bank sizes, with small banks incurring the largest efficiency declines. The overall impact of deregulation was greater for agricultural banks relative to nonagricultural banks. Overall productivity growth due to bank size was generally insignificant, with the exception of large nonagricultural banks (assets exceeding $500 million).

The main objective of this research is to develop methods to assess the risk preferences of agricultural bank management. If managers are concerned about risk, then risk preferences should be considered when evaluating bank performance. Incorporating managerial risk preferences in evaluating bank performance is useful in determining the most efficient allocation of resources to reduce risk and maximize profit for managers. For managers who are not concerned about risk, their efficient mix of resources can also be identified. Analysts and researchers can then correctly separate banks that are efficiently operated from those that are not.

Modeling Bank Managerial Objectives and Constraints

Developing an integrated model of bank decision making is critical for accurately evaluating bank performance. Specifying a functional form for profit which includes the variance of profit as a measure of risk is inadequate to determine whether managers are concerned about risk. Employing this procedure ignores the possibility that managers might still reduce risk even if they were personally risk-neutral.

Specification of the Banking Technology

The bank’s production plan is represented by a vector of outputs, y, which consist of asset categories such as commercial and industrial loans, consumer loans, real estate loans, and government securities. The input vector x in the production plan is made up of sources of loanable funds, insured and uninsured deposits and other borrowed money, along with the labor and physical capital of the bank. Equity capital in the production plan is denoted by k.

The output price vector, p, represents the interest rates charged on the different components of the asset portfolio. The pricing environment facing the bank is represented by the input price vector, w, the required return on equity capital, w_k, and noninterest and fee income, m. The total revenue of the bank is (**p′y + m**).

With a tax rate on profit of τ, the price of a dollar of after-tax profit in term of before tax dollars is $p_\pi = 1/(1-\tau)$. Before-tax accounting profits is defined as

$$p_\pi \pi = p^{/}y + m - w^{/}x \tag{1}$$

where π represents the amount of real, before-tax accounting profit. The banking technology defines the feasible production plans and is summarized by the transformation function, T(y, x, n, p, r, k) ≤ 0. Measures of asset quality (n, p, r) are included in the transformation function. The amount of nonperforming loans in the bank’s portfolio, n, is viewed as a measure of *ex post* asset quality. The average return on assets, p, accounts for *ex ante* asset quality. Higher interest rates relative to the risk-free rate, r, yield higher risk premiums.

Maximizing a Generalized Managerial Utility Function

The factors that influence the bank manager's utility are combined to accommodate risk-preferences, leading to a model that describes the managerial objectives and the constraints managers face in meeting these objectives. For risk-neutral managers, utility or welfare is based solely on the level of profits. Higher profit levels translate into higher levels of utility.

With risk-averse preferences additional elements enter the bank's cost function as resources are allocated to improve the quality of bank outputs and reduce risk. These additional components in the utility function reflect the managers' preferences for lower levels of risk in addition to higher profit levels.

The generalized managerial objective function of the bank yields the most preferred production plan. Bank managers choose the most preferred subjective conditional probability distribution of profit by maximizing the generalized utility function subject to the profit identity and the transformation function:

$$\max_{\pi, x} \; U(\pi, x; y, p, r, n, k)$$

$$s.t. \quad p'y + m - w'x - p_{\pi}\pi = 0 \qquad (2)$$

$$T(y, n, p, k) \le 0 \quad .$$

The solution defines the manager's most preferred profit function, $\pi^* = \pi(y, n, \nu, m, k)$ and the most preferred input demand functions $x^* = x(y, n, \nu, m, k)$. The bank's pricing environment is represented by vector $\nu = (w, p, r, p_{\pi})$. The solution is conditioned on the output vector, y, to allow the computation of scale economies.

The Empirical Model

Functional forms for the utility-maximizing input demands and profit revenue share equations are derived from the Almost Ideal (AI) Demand System. The managerial expenditure function is defined by the minimum expenditure required to obtain a given level of utility:

$$\min_{\pi, x} \; w'x + p_{\pi}\pi$$

$$s.t. \; U^0 - U(\pi, x; y, p, r, n, k) = 0 \qquad (3)$$

$$T(x; y, k) \le 0 \, ,$$

whose solution yields the constant-utility demand functions $x^u = x^u(y, n, \nu, k, U^0)$ and $\pi^u = \pi^u(y, n, \nu, k, U^0)$. The expenditure function $E(y, n, \boldsymbol{\nu}, k, U^0)$ is obtained by substituting the demand functions into (3). The dual to the utility-maximization problem in (2) yields the expenditure-minimization problem in (3) so that $E(y, n, \nu, k, U^0) = p'y + m$.

The AI System proposed by HLMM (1996) is specified as:

$$\ln E(\cdot) = \ln P + U \cdot \beta_0 \left[\Pi_i y_i^{\beta_i}\right]\left[\Pi_j w_j^{\nu_j}\right] p_\Pi^{\mu} k^{\kappa} \tag{4}$$

where ln P is defined as a translog function of its arguments

$$\ln P = \alpha_0 + \sum_i \alpha_i \ln z_i + \sum_i \sum_j \alpha_{ij} \ln z_i \ln z_j \quad . \tag{5}$$

The vector z contains output, nonperforming loans, equity capital and the subvector of elements defining the firm's pricing environment. Let $z = (y, n, k, \nu)$ and $\nu = (w, p, r, p_\Pi)$.

The indirect utility function based on the expenditure function in (4) is

$$V(\cdot) = \frac{\ln(p'y + m) - \ln P}{\beta_0 \left(\Pi_i y_i^{\beta_i}\right)\left(\Pi_j w_j^{\nu_j}\right) p_\Pi^{\mu} k^{\kappa}} \quad . \tag{6}$$

Shephard's lemma is applied to (4) to obtain the constant-utility input demand equations and profit share equation. The indirect utility function from (6) is substituted into these equations to yield the utility-maximizing demand functions which can be estimated. The input demand functions are expressed as shares of expenditures in total revenue, $p'y + m$:

$$\frac{\partial \ln E}{\partial \ln w_i} = \frac{w_i x_i}{p'y + m} = \frac{\partial \ln P}{\partial \ln w_i} + \nu_i\left[\ln(p'y + m) - \ln P\right] \quad \forall\, i \quad . \tag{7}$$

Optimal before-tax net cash flow as a share of total revenue is

$$\frac{\partial \ln E}{\partial \ln p_\pi} = \frac{p_\pi \Pi}{p'y + m} = \frac{\partial \ln P}{\partial \ln p_\pi} + \mu\left[\ln(p'y + m) - \ln P\right] \quad . \tag{8}$$

The empirical model consists of the input demands and the demand for before-tax net cash flow which are conditioned on the level of financial capital, k.

A second-stage maximization problem determines the demand for financial capital. The optimal level of equity is obtained by maximizing the conditional Lagrangean function for the most preferred production plan, which is evaluated at the conditional optimum:

$$\begin{aligned} V(y,\, q,\, n,\, \nu,\, m,\, k) &= U\left[\pi(\cdot),\, x(\cdot);\, y,\, n,\, \nu,\, k\right] \\ &+ \lambda(\cdot)\left[p'y + m - w'x(\cdot) - p_\pi \pi(\cdot)\right] \\ &+ \gamma\left[T(x(\cdot);\, y,\, k)\right] \quad . \end{aligned} \tag{9}$$

Maximizing with respect to the optimal level of equity capital, k results in:

$$\begin{aligned} \frac{\partial V(\cdot)}{\partial k} &= \frac{\partial V(\cdot)}{\partial \ln k}\,\frac{\partial \ln k}{\partial k} = 0 \\ &= -\frac{1}{k\beta_0\left[\Pi_i y_i^{\beta_i}\right]\left[\Pi_j w_j^{\nu_j}\right] p_\pi^{\mu} k^{\kappa}} \left[\frac{\partial \ln P}{\partial \ln k} + \kappa\left[\ln(p'y + m) - \ln P\right]\right] = 0 \end{aligned} \tag{10}$$

Estimating the Most Preferred Production System

The estimated system of equations consists of the input shares, the profit share, and the first-order condition for equity capital. The input and profit revenue share equations sum to one which implies a set of adding up conditions. Homogeneity of degree zero in (w, p, r, p_{Π}) along with the symmetry restrictions are imposed in estimation. The complete set of restrictions are outlined in Armah (1998). The most preferred production plan is estimated using nonlinear three-stage least squares, which is equivalent to generalized method of moments (Greene, 2000).

Testing for Managerial Objectives

Tests for the managerial preferences of agricultural bank managers are developed based on the most preferred production system (MPPS). Imposing the comparative static restrictions implied by profit maximization on the parameters of the MPPS results in the standard translog profit (cost) function and share equations. Profit maximization is nested within the value maximization model. Both HLMM (1996, 1999) and DeYoung, Hughes, and Moon (2001) have estimated the MPPS using bank and bank holding company data for different years. The parameter restrictions implied by profit maximization or, equivalently, risk neutrality are rejected when imposed on the Almost Ideal input and profit share equations.

Tests for the risk-preferences of agricultural bank managers are presented in this framework. Three criteria are used in examining the risk-preferences of agricultural bank managers. The first criterion evaluates the effects of the effective tax rate on the manager's choice of before-tax accounting profit. The second criterion assesses the impacts of the output price vector on the manager's cost minimizing plan. The third criterion examines the influence of non-interest income on the optimal demands for inputs and profit.

Assume bank managers are solely profit maximizers or are indifferent to risk in their ventures and seek to maximize return on equity. Under this scenario, variations in the effective tax rate **t** and in the real value of before-tax profit, p_{π} will not impact the maximum before-tax level of profit.

Let the level of financial capital or equity provided by shareholders or investors in the bank be represented by **k**. This capital resource could be employed in an alternative activity to generate some other level of revenue. The bank's unit cost of capital, **v** consists of a risk-free component, **r** and a risk premium, $\mathbf{R_p}$.

The economic profit captures the opportunity cost of equity and is a product of the real, before-tax economic profit $\hat{\pi}$ and $\mathbf{p_{\pi}}$, the real value of before-tax profit. The expression for economic profit introduces the return on equity as an additional term to the specification of accounting profit:

$$p_{\Pi}\hat{\Pi} = py + m - wx - vk \quad . \tag{11}$$

Forming an expression for the before-tax return on equity from the definition of accounting profit shows that

$$\frac{p_{\Pi}\Pi}{k} = \frac{p_{\Pi}\hat{\Pi}}{k} + \frac{p_{\Pi} r R_P}{\hat{p}_{\Pi}}(1 - t) \, . \tag{12}$$

For risk-neutral managers the risk-premium $\mathbf{R_P}$ is zero so the second term on the right hand side of equation (12) representing the bank's economic rent disappears. Risk-neutral managers do not require any risk premium in order to participate in a risky venture. The target for these managers is to obtain the required return on equity. Thus, the effective tax rate paid by the bank $\mathbf{t}$ and equivalently the real value of before-tax profit $\mathbf{p_{\Pi}}$ has no influence on the bank's before-tax return on equity.

The risk premium is positive for risk-averse managers so that effective tax rate significantly influences the bank's before-tax return on equity. For the risk-averse agent, the before-tax return on equity is higher than for a risk-neutral agent since the required is supplemented by the risk premium. This condition for risk-neutral managerial preferences imposes some restrictions on the coefficients of the profit share equation being estimated.

For a risk-neutral bank manager $\mathbf{p_{\Pi}}$ has no significant impacts on his or her choice of optimal profit shares, or

$$\eta_{\pi} = \eta_{\pi\pi} = \psi_{p\pi} = \gamma_{j\pi} = \omega_{s\pi} = \eta_{\pi r} = \eta_{\pi n} = \eta_{\pi k} = 0 \qquad \forall\ j,\ s \quad . \tag{13}$$

The second indication of risk-neutrality is that the revenue and risk characteristics of production represented by the output price vector, $\mathbf{p_i}$ will not influence the bank's cost minimizing production plan. Managers with risk-neutral preferences base their decisions to minimize costs of producing outputs solely on input prices and the target output level. The restrictions are:

$$\alpha_{p} = \alpha_{pp} = \theta_{pj} = \varphi_{ps} = \psi_{p\pi} = \psi_{pn} = \psi_{pk} = 0 \qquad \forall\ j,\ s \quad . \tag{14}$$

The output price vector **p** consists of the interest charges on the various loans outstanding. A rate above the risk-free rate **r** signifies greater credit risk and reflects a lower loan quality. Borrowers with good credit ratings seek lenders offering low interest rates. So outputs with higher interest rates improve expected returns on assets but are accompanied by greater levels of risk. Managers who are indifferent to this source of risk will select their optimal inputs, profits, and financial capital to minimize production irrespective of the risk accompanying their target output levels captured by the interest rates.

The third criterion signifying risk-neutrality evaluates the impacts of non-interest income, **m** on the optimal demands for the inputs **x** and financial capital, **k**. For the risk-neutral manager, variations in income from sources other than those accounted for by output or fixed revenue have no marginal significance for the optimal input demands, **x** and **k**.

Risk-neutral bank managers are not concerned about interest rate risk and choose their optimal levels of inputs **x** and financial capital **k** regardless of changes in levels of **m**. For the optimal share-equations being estimated, this translates into

$$\nu_i = -\frac{w_i x_i}{p' y + m}, \qquad \mu = 1 - \frac{p_\pi \pi}{p' y + m}, \qquad \kappa = 0 \quad . \tag{15}$$

Evaluating these restrictions using the estimated parameters of the MPPS provides tests for profit maximization objectives or risk-neutral preferences.

Data and Interpretation of Results

Data is gathered for 1990 to 1995 from Sheshunoff: The Banks of Georgia based on the Consolidated Reports of Condition and Income. The 1139 banks included in the sample are Georgia banks that provided loans to finance agricultural production over the 1990-1995 sample period.

The intermediation approach to bank operations views banks as financial intermediaries between borrowers and lenders of financial resources. Banks use labor, physical capital, and deposits to produce earning assets. Measured costs include both operating and interest expenses. Summary statistics on banking outputs, inputs, nonperforming loans, non-interest income, and the level of financial capital are reported in tables 1 and 2 and discussion of trends in inputs and outputs for agricultural banks in Georgia appears in Armah (1998).

Efficiency estimates for agricultural banks in Georgia are developed which incorporate managerial risk-preferences. The manager's optimization problem is to maximize utility subject to three constraints. These limitations are presented by the production plan and profit levels that are conditional on the definition of profits, the technology that defines the feasible production plans, and the manager's preferred level of financial capital.

A two-step procedure is employed to evaluate the efficiency of agricultural banks accounting for managerial risk-preferences. The first step estimates the production technology using iterative three-stage least squares estimation. The production technology derives from the managers' generalized preferences defined over output levels, output quality, level of financial capital, and profit. The procedure assesses the parameters of the Generalized Almost Ideal (AI) System consisting of input and profit share equations. Factors that influence the optimal demand for financial capital are added to the generalized AIDS model.

Managerial risk-preferences are evaluated using a likelihood ratio test to determine whether managers allocate extra resources to improve the quality of bank outputs and reduce risk. This inquiry will justify the inclusion of additional important elements into managerial utility functions to capture managers' desire to reduce risk.

Tests of Managerial Objectives

Three criteria were employed to examine the risk-preferences of agricultural bank managers. The first criterion evaluated the influence of the effective tax rate on the manager's choice of before-tax accounting. The second criterion assessed the impacts of the output price vector on the manager's cost minimizing. The third criterion examined the influence of non-interest income on the optimal demands for inputs and profit.

Likelihood ratio (LR) tests were employed for the set of restrictions on managerial risk-preferences defined above. The **LR** test is based on assumptions about the difference in values of the likelihood functions for a risk-neutral manager, $\mathbf{L_N}$ and manager who is concerned about risk, $\mathbf{L_A}$.

Table 3 displays the likelihood ratio test statistics for each of the five input share equations, the profit share equation, and the demand for financial capital equation. The test statistics are greater than the critical chi-square value so $\mathbf{L_N}$ is significantly different from $\mathbf{L_A}$. This means that managers of Georgia agricultural banks are concerned about risk.

Agricultural bank managers in Georgia consider their banks' levels of profits and risk.

This outcome is consistent with the results of Hughes and Mester (1998) who reported that managers of U.S. banks in branch-banking states that reported over $1 billion were risk-averse and used the level of financial capital to signal the level of risk. HLMM (1996) confirmed that managers of U.S. bank holding companies ranging in size from $32 million to $249 were concerned about risk and selected inputs and profit levels that increased profits and reduced risk.

This finding implies that managers concerned about risk lend to different industries or make loans to more than one major borrower to reduce the risk of default. They also devote more resources to evaluate their borrowers and monitor their loans more closely to reduce the risk of default. To reduce interest rate risk the decision-makers may likely be engaging in off-balance sheet activities. These include purchasing or selling hedging instruments such as interest rate futures and options.

Managers of Georgia agricultural banks hold large inventories of liquid assets such as Treasury bills and financial capital as a means of controlling liquidity risk. Liquid assets are low yielding assets that reduce the bank's profitability. Financial capital or equity is the dollar amount of capital provided by stockholders or investors in the bank. The level of financial capital held by a bank plays a vital role in mitigating the level of risk in a given loan portfolio. As a source of loanable funds, financial capital provides an alternative to deposits.

Bank capital levels provide a cushion for loan losses to protect it from insolvency. It also signals the level of the bank's riskiness to uninsured depositors. Financial capital serves as a good indicator of how well the bank is protected from excessive liquidity.

Conclusions

In summary, agricultural banks face several sources of risk that could result in bank failure. To manage these risks, risk-averse agricultural bank managers undertake policies that might conflict with the implications of profit-maximizing behavior. The results of the likelihood ratio test of joint restrictions on the parameters of the estimating equations indicate that managers of Georgia agricultural banks are concerned about risk. They maximize their banks' welfare by substituting high profit levels with reduced risk.

One implication of these findings is in evaluating concern about the vulnerability of agricultural banks to major downturns in the agricultural sector. Kliesen and Gilbert (1996) noted that agricultural banks are typically well-capitalized and profitable compared with nonagricultural banks of similar size.

However, limited diversification opportunities in loan portfolios along with specialization in agricultural lending may make these banks vulnerable to external shocks to agriculture. The "vulnerability" of agricultural banks may be better assessed by recognizing that risk is endogenous and that risk-averse bank managers develop expertise to control and deal with uncertainty in all phases of bank operations.

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Table 1 Summary Statistics of Agricultural Bank Outputs from 1990 to 1995

Item	1990	1991	1992	1993	1994	1995
Real est loans						
Arithmetic mean	307.17m[a]	316.70m	305.05m	3.17m	412.61m	398.20m
Max	2.61b[b]	2.77b	2.55b	2.34b	2.56b	4.07b
Min	38.0t[c]	257.0t	87.0t	0	20.09m	661.0t
Business loans						
Arithmetic mean	327.01m	601.16m	572.34m	659.27m	781.74m	851.29m
Max	2.93b	3.12b	2.91b	4.34b	5.10b	5.34b
Min	20.0t	31.0t	32.0t	41.0t	836.0t	56.0t
Consumer loans						
Arithmetic means	198.14m	198.39m	162.67m	203.69m	261.88m	278.47m
Max	1.81b	1.78b	1.77b	2.83b	3.78b	4.54b
Min	533.0t	754.0t	30.0t	489.0t	6.62m	859t
Other loans						
Arithmetic mean	25.95m	22.55m	25.82m	37.15m	414.06m	28.71m
Max	280.37m	395.79m	550.21m	851.73m	95.50m	668.29m
Min	0	0	0	0	0	0
Y_5*						
Arithmetic mean	268.78m	286.45m	298.03m	303.56m	403.37m	404.66m
Max	2.29b	2.98b	2.80b	2.89b	3.70b	4.41b
Min	776.0t	1.4m	176.0t	888.0t	12.94m	1.51m

***** Y_5 is the sum of securities, assets in trading accounts, federal funds sold and securities purchased.

a m implies $ million.

b b implies $ billion.

c t implies $ thousand.

Table 2 Summary Statistics of Agricultural Bank Inputs From 1990 to 1995

Item	1990	1991	1992	1993	1994	1995
Labor						
Arithmetic mean	827.00t	681.00t	649.00t	644.00t	622.00t	586.00t
Max	7.39m[a]	7.07m	6.55m	6.13m	4.40m	4.77m
Min	3.00t[b]	4.00t	4.00t	4.00t	40.00t	4.00t
Physical capital						
Arithmetic mean	21.26m	19.81m	20.65m	20.97m	22.34m	22.69m
Max	174.91m	184.57m	215.29m	217.58m	180.49m	285.99m
Min	0	0	11.00t	8.00t	1.26m	34.00t
Borrowed money						
Arithmetic mean	19.49m	18.68m	111.48m	9.00m	10.43m	17.54m
Max	178.84m	175.34m	104.11m	116.51m	112.34m	227.26m
Min	0	0	0	0	0	0
Uninsured deposit						
Arithmetic mean	132.78m	131.75m	110.26m	84.83m5	85.21m	66.39m
Max	976.64m	882.84m	859.67m	41.71m	527.45m	508.74m
Min	0	100.00t	100.00t	0	0	300.00t
Insured deposit						
Arithmetic mean	244.84m	257.39m	255.00m	282.51m	286.53m	315.43m
Max	2.32m	2.44b[c]	2.41b	2.10b	3.01b	2.64b
Min	951.00t	1.66m	580.00t	512.00t	1.32m	1.77m
Financial capital						
Arithmetic mean	92.35m	93.98m	91.39m	105.41m	136.56m	378.00m
Max	813.91m	881.60m	855.75m	934.05m	1.16b	9.08b
Min	246.00t	380.00t	460.00t	510.00t	435.00t	461.00t
Nonperform loans						
Arithmetic mean	10.83m	4.65m	18.61m	13.06m	10.78m	7.33m
Max	90.87m	55.07m	171.49m	135.45m	150.54m	63.55m
Min	0	0	0	0	63.00t	0

a m implies $ million.
b t implies $ thousand.
c b implies $ billion.

Table 3 Likelihood Ratio Test (LR) Statistics for Managerial Objectives

Equation	LR Test Statistic	χ^2_{19} Value
S_1	2394.82	38.58
S_2	2717.72	38.58
S_3	5210.55	38.58
S_4	488.79	38.58
S_5	3720.60	38.58
S_π	5239.86	38.58
k	2055.88	38.58

S_1 Expenditure share of labor
S_2 Expenditure share of physical capital
S_3 Expenditure share of borrowed money
S_4 Expenditure share of small time deposits
S_5 Expenditure share of large time deposits
S_π Expenditure share of profits
k Demand for financial capital