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Do Jumbo–CD Holders Care about Anything?

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Abstract

Uninsured deposits represent a theoretically appealing but relatively untested alternative to subordinated debt for incorporating market discipline into banking supervision. To make the deposit market a useful supervisory tool, it is necessary to know what types of risk are priced by depositors and in what proportions. Using a clustering technique to select from among a large set of potential regressors, as well as a carefully chosen set of control variables, we attempt to determine the types of risk that cause uninsured depositors to react in both the price and quantity dimensions. As a benchmark for economic significance, we estimate similar regressions on supervisory ratings. We find that, in contrast to government supervisors, depositors have not priced most types of risk since 1997. Indeed, the only risk variables that consistently come up as statistically significant are those that measure capital adequacy. Our interpretation of these results is that, because aggregate banking conditions are good, it is not worth depositors' effort to investigate individual bank quality very carefully. We conclude that, in the current economic and regulatory environment, the market is content to delegate most of its monitoring and discipline to the government. To the extent that it does monitor, it only monitors capital. The jumbo-CD market is thus not likely to be of much supervisory use, particularly given that examiners already have good information about capital levels. The depositor emphasis on capital also supports the conjecture that market discipline was responsible for much of the recent capital build-up.

JEL Codes: G21, G28
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Introduction

In recent years, both academics and regulators have recognized the need to give financial markets a larger role in bank supervision. Although the mispricing of the safety net (Berger et al., 1995) and the macroeconomic externalities arising from bank lending (Bernanke, 1983) continue to justify the need for government constraints on bank risk, recent history points to serious problems with traditional supervisory policies. The S&L debacle of the late 1980s, for example, demonstrated that agency problems in supervision can lead to lengthy delays in closing troubled institutions, delays that can cost taxpayers dearly (Kane, 1989; White, 1991). The magnitude of these agency problems has led a number of prominent academics to call for greater reliance on market discipline (Benston, et. al, 1986; Calomiris, 1997). Meanwhile, despite the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) and other reforms, the fast pace of change in banking continues to thwart supervisory attempts to monitor and constrain risk. As fast as supervisors can design new exam procedures and capital charges for large banking organizations, the market renders them obsolete (Bank for International Settlements, 1999). As a result, an increasing number of high-level regulators have called for greater reliance on market feedback about the adequacy of risk controls (Greenspan, 1997; Meyer, 1999; and Stern, 1999).

In theory, the market could contribute to supervision in one of three ways: (1) supervisors could delegate responsibility for constraining risk to the market for bank claims; (2) supervisors could use market signals about changes in risk to schedule and staff on-site examinations; or (3) supervisors could use market feedback to inform the design of examination procedures. Banking economists and regulators around the developed world have now explored strategies for harnessing market pressure to contain bank risk. The Basel capital accord counts market discipline as an explicit pillar of bank supervision—along with supervisory review and capital requirements. In the United States, one popular proposal for enhancing market discipline involves requiring banks to issue a standardized form of subordinated debt (Board of Governors, 1999, 2000). Indeed, the Financial Modernization Act of 1999 (FMA) has taken tentative steps in this direction by requiring the certain large banking organizations to maintain sub-debt issues. Advocates of this proposal argue, first, that high-powered performance incentives in the sub-debt market will lead to accurate assessments of bank risk. And, second, these assessments (expressed for risky institutions in rising yields or difficulties rolling over maturing debt) will pressure bank managers to maintain safety and soundness (Lang and Robertson, 2002). Of course, these are two different hypotheses—representing Bliss and Flannery's (2001) distinction between *monitoring* and *influence*—and the latter is both more suspect and more difficult to assess than the former.[1] Moreover, the thin secondary markets for claims of all but the largest banking institutions make the direct-pressure proposal unworkable for the vast majority of banks.

Still, even if the subordinated-debt market—or any other market for bank claims—applies little direct pressure on bank managers, market-generated risk assessments could still contribute to supervisory review through off-site surveillance and exam emphasis. Off-site surveillance involves the use of accounting data and anecdotal evidence to schedule on-site examinations and to monitor bank progress in addressing previously identified deficiencies. Supervisors can use signals from the prices of traded claims, accounting proxies for these prices, and information on changes in reliance on risk-priced funding to provide an early warning about increasing risk or to decide which types of specialists—liquidity-risk or market-risk specialists, for example—to send out with the regular examination team. In the limit, supervisors could use market feedback to alter exam procedures. For instance, examiners now look at capital protection, asset quality, management competence, earnings strength, liquidity risk, and market risk in on-site examinations. Supervisors could use risk assessments from the market to add to or subtract from this list or to revise the weights placed on individual sources of risk when assessing overall bank condition.

To date, discussions about harnessing sub-debt or other market signals for supervisory purposes have centered on large complex banking organizations because the supervisory benefits are thought to be

[1] Bliss and Flannery (2001) looked for evidence that managers of bank holding companies respond to market pressure to contain risk. They found none, though Rajan (2001) questioned the ability of their framework to unearth strong evidence of managerial responses.

the highest and the compliance costs lowest for these institutions (Emmons et al., 2001). The benefits are perceived as the highest for large banks because of their complexity; these institutions engage in non-bank activities frequently and use derivative instruments heavily. Large banks also account for the lion's share of U.S. banking assets, making the stability of the financial system dependent on their safety and soundness. The compliance costs are thought to be the lowest because most of these institutions already tap national financial markets routinely. For example, at year-end 2002, 41 of the 50 largest commercial banks, and 48 of the 50 largest bank holding companies, had subordinated debt outstanding.

But before forcing all large banking organizations to issue subordinated debt in a standardized form, supervisors should make sure that existing securities do not produce useful risk signals. A mandatory security issue is an implicit capital-structure tax. We know of no evidence suggesting that the welfare loss from such a tax is negligible. That most large banks currently issue sub-debt does not imply a negligible loss. Voluntary issuance varies considerably over time with market conditions. For example, issuance of subordinated debt by the top 50 banking organizations rose from less than 10 per year during 1988-1990, to almost 86 per year during 1995-98, only to fall to 42 during 1999 (Covitz, et al., 2002). At any given time, the banks with no outstanding sub debt may be just those institutions for which issuance is the most costly and risk signals the most valuable. Moreover, those banks now issuing sub debt may not be choosing maturity structures likely to produce the most valuable supervisory signals, so even they would face an implicit tax. The uncertain impact of a sub-debt tax—together with the lack of conclusive evidence of the tax's supervisory value—suggest that supervisors should first try to extract useful signals about safety and soundness from claims banks already issue.[2]

The market for uninsured deposits provides a potentially rich source of information for designing, scheduling, and staffing on-site examinations because these deposits are already an important funding source for both large banks and community financial institutions. At year-end 2002, banks holding more than $500 million in assets (1999 dollars) funded an average of 12.8% of their assets with jumbo CDs. For banks holding less than $500 million in assets—the regulatory asset cutoff for a community financial institution under FMA—the ratio was 11.9%. Jumbo CDs have also become an even more important part of bank capital structure in recent years. The ratios just mentioned are up from a low of 7.2% (average for all banks) at year-end 1993. As with subordinated debt, the structure of payoffs to holders of large CDs and bank supervisors is similar. Uninsured depositors should care only about expected losses from default because returns in non-default states accrue to equity holders. Similarly, supervisors derive few benefits from bank performance in non-default states but are held accountable for failures because of the costs to the deposit insurance fund. Given the similarity in payoff structures, jumbo-CD holders and bank supervisors should be "pricing" the same risk factors. Hence, in theory, bank supervisors could use feedback from the jumbo-CD market to inform the exam process. Before doing so, however, it is necessary (1) to confirm that yields on or quantity flows of uninsured deposits do indeed reflect bank risk and (2) to determine the weights that uninsured depositors place on individual sources of bank risk.

Although some recent work has addressed the former question, little has been done to explore the latter. Previous research comparing accounting data on jumbo CDs to bank risk has found some statistical significance but little in the way of economic significance or reliable magnitudes. However, most recent research along these lines has used a single summary measure of bank risk that could be masking stronger relationships between CD premia and specific *types* of bank risk. Indeed, such relationships have been found in publicly traded subordinated debt in recent studies by Flannery and Sorescu (1996) and Jagtiani et al. (1999).[3]

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[2] Available evidence suggests that holders of bank-issued subordinated-debt do price default risk. Flannery and Sorescu (1996), for example, document increases in the risk sensitivity of sub-debt yields as the U.S. government retreated from "too-big-to-fail" guarantees. This evidence does not, however, imply that sub-debt signals have significant supervisory value. Bliss (2001) argues that the poor microstructure of the sub-debt market renders the risk signals from default spreads unreliable. Evanoff and Wall (2001) provide supporting evidence—finding that sub-debt yields barely outperform regulatory capital ratios—themselves poor proxies for overall supervisory assessments—as predictors of financial distress.

[3] Krainer and Lopez (forthcoming) and Hall et al. (2003) have recently performed similar analyses on equity-market data.

These studies and other recent research on liability-market discipline are listed in Table 1. (For a more extensive summary, see Flannery, 1998.) Although the literature generally confirms the presence of market discipline, note that little work has been done on data subsequent to FDICIA, which may have had a significant effect on liability-holders' incentives to monitor risk. Even among this small group of studies, only our (2002) paper looks at a large sample of bank deposits and examines both the yield and runoff dimensions.[4] Prior to that, one must look back to Park and Peristiani (1998) or Park (1995) to find similar attempts, the data for which papers are now 15 years and several legislative changes behind us. Our prior paper used a summary index measure of bank risk, making it impossible to determine the specific types of risk responsible for the statistically significant but economically small discipline we found in the post-FDICIA period. Similarly, Gilbert et al. (2002) found that jumbo-CD yields had little potential to contribute to a comprehensive early-warning model of banking distress, but they did not examine the possibility that yields might provide useful signals about certain categories of risk. However, in order to rule out the CD market as a source of surveillance information, one must make the case that it cannot add marginal information to *any* aspect of the supervisory process, and this requires a decomposition of bank risk into its various components.

To explore the ways in which information about uninsured deposits may be useful in supervision, we measure the importance that holders of large time deposits place on individual sources of bank risk and then compare these market assessments with concurrent supervisory assessments. Specifically, using a panel dataset with approximately 70,000 quarterly observations between 1997 and 2003, we regress jumbo-CD yields on measures of credit risk, liquidity, capital protection, and other aspects of bank performance. These variables are chosen from a large set of initial candidates using a variable-clustering procedure, and we also compare an alternative set of regressors based on previously developed early-warning models. We control for bank-specific effects such as market access and for other factors that affect CD yields, such as maturity and the level of interest rates, and include dummy variables to control for macroeconomic events and bank location. A regression of composite supervisory (CAMELS) ratings on the same set of explanatory variables allows us to demonstrate that our variables do indeed represent risk factors and to achieve a benchmark for economic significance.

Our evidence informs the market discipline debate in several ways. First, using six years of recent data, we show that, generally speaking, uninsured depositors pay little attention to risk in any form. This result, which is consistent with other recent research, implies that information from this market cannot play a substantial role in supervision. However, uninsured depositors do seem to react to one variable, namely capital. Although this finding suggests that deposit markets may be capable of policing capital levels, this attribute is not especially helpful to supervisors, because capital adequacy is among the most straightforward aspects of a bank's condition to assess. (Indeed, this is likely one reason that the deposit market bothers with this type of risk and no other.) The depositor emphasis on capital also supports Flannery and Rangan's (2002) hypothesis that market discipline was responsible for much of the capital build-up in the late 1990s.

Our interpretation of these results is that, because aggregate banking conditions are good, it is not worth depositors' effort to investigate individual bank quality very carefully. Capital is worth investigating because it can be observed at low cost and is arguably the single best indicator of whether a liability-holder is going to see his funds repaid. Otherwise, we conclude that, given the healthy overall banking sector, the jumbo-deposit market is content to delegate most of its monitoring and discipline to the government.

Research Strategy

We regress measures of both jumbo-CD-market and supervisory assessments of risk on an identical vector of risk and control variables. This empirical framework is similar to the one we use in

[4] Although they did not explicitly test depositor responses to bank risk, Gilbert and Vaughan (2001) found that jumbo-CD holders did not respond, through either yields or runoffs, to supervisory enforcement actions in the early 1990s.

Hall et al. (2003), which in turn was inspired by the approach used by Saunders, Strock, and Travlos (1990). By comparing the economic and statistical significance of the risk coefficients between the supervisory and market equations, we hope to determine whether supervisors and uninsured depositors emphasize the same factors. In choosing our vector of risk variables, we begin with a large set of ratios based on bank-level data and use a hierarchical variable-clustering procedure to select a set of variables that capture as much as possible of the variation in the data while minimizing any multicollinearity. This step is important because we want to examine the relative statistical significance of our variables, and multicollinearity could interfere with this objective.

Our data cover 24 quarters (1997:2 through 2003:1) and include the majority of banks in each quarter.[5] The sample period spans a business cycle but is otherwise notable mainly for its lack of intitutional and regulatory change, relative to the years immediately preceding it. (The primary exception to this statement is FMA, although this legislation has arguably had little effect on the majority of banks so far.) We screen out banks recently involved in mergers and impose a few restrictions to eliminate outliers and other sources of noise. Most importantly, we include only observations on banks that averaged at least $5 million in outstanding jumbo CDs over the quarter, in an attempt to avoid low-base distortions.

To construct the initial set of candidate risk variables, we draw on three strands of literature: previous studies of jumbo-CD yields (Baer and Brewer, 1986; Hannan and Hanweck, 1988; Ellis and Flannery, 1992; James, 1988; Cargill, 1989; James, 1990; Keeley, 1990; Cook and Spellman, 1994; Brewer and Mondschean, 1994; Park, 1995; and Park and Peristiani, 1998), previous studies of market discipline by other uninsured debtholders (Avery et al., 1988; Flannery and Sorescu, 1996; and Jagtiani et al., 1999) and recent studies of the factors responsible for bank failures and CAMEL downgrades (Cole et al., 1995; and Gilbert et al., 1999). The set contains 47 variables, many of which are also ratios commonly used in on- and off-site supervision. Together, they reflect a broad array of risk and operational characteristics, including asset quality, liquidity, capital, balance-sheet composition, operating efficiency, profitability, and off-balance-sheet activity.

The initial set of 47 variables, as well as the outcome of the clustering procedure, is depicted in Figure 1. The variables grouped in the same cluster are all highly correlated with one another and only weakly correlated with the variables in the other clusters. The tree structure represents the sequence in which the clusters break apart, depending on how many clusters we allow. Although any number of clusters from one to 47 is technically possible here, we decided, after some experimenting, that eight clusters permitted an appropriate balance of differentiation among the regressors, while still maintaining parsimony. For use in the regressions, we selected a variable from each cluster based on its correlation with the other variables in and out of its own cluster and on the frequency with which it is used by supervisors and in previous academic studies. The eight risk variables we ultimately selected, together with their summary statistics, are reported in Table 2.

The first variable is the net noninterest margin. This ratio, defined as noninterest expense less noninterest income over total assets, represents, in part, the operating costs and efficiency of a bank. As can be seen in Figure 1, it is correlated with a number of ratios reflecting the basic composition of the bank and, in particular, liability mix. The second variable is delinquent loans (i.e., those 30 to 89 days past due) divided by total assets. Of all the variables, this one proxies most closely for asset quality. Also in its cluster are several variables relating to loan mix, which, of course, is also highly correlated with asset quality. Next is the ratio of equity to assets. This is probably the most common measure of capital adequacy. The other variables in its cluster reflect a hodge-podge of asset-quality and liquidity concerns. The fourth variable is the ratio of commercial-real-estate (CRE) lending to total loans, a forward-looking measure of asset quality. CRE loans suffer among the highest loss rates historically, particularly during recessions. The other variables in this cluster primarily reflect the breakdown of the real-estate portfolio. Fifth, we have return on average assets (ROA), a common measure of profitability. Other measures of

[5] All bank-level data used in this paper come from the Consolidated Reports of Condition and Income (call reports) filed quarterly by every commercial bank with its regulator. We do not extend the sample prior to 1997 because of changes in the structure of the call report that made the computation of consistent series impossible for certain variables.

earnings are also in this cluster, as are some backward-looking asset quality ratios—perhaps because nonperforming loans are likely to affect earnings by becoming losses in the near future. The sixth variable is the log of total assets. Bank size is correlated with many other factors, and may be viewed by both markets and supervisors as a proxy for other types of risk. As can be seen from its clustering behavior, it is most directly correlated with certain loan categories. Seventh, the loan-to-core-deposit ratio is a traditional liquidity measure. The only other variable in this cluster, the ratio of risk-priced to non-risk-priced funding, is also a proxy for liquidity. Finally, the ratio of nonaccruing loans to total assets is another measure of asset quality. Many of the variables in its cluster, however, also appear to reflect liquidity issues.

Because variable selection always requires some judgment and is thus always subject to suspicion and disagreement, we also test a set of variables more widely accepted as reflecting important aspects of bank risk. Specifically, we use the vector of eleven risk variables included in the Fed's official early warning model, the System to Estimate Examination Ratings (SEER), which is described in Cole et al. (1995). The SEER model uses a logistic regression to produce an objective assessment of overall bank condition with financial ratios that have signaled impending problems in the past. The financial ratios in the model include proxies for credit risk, liquidity risk, and leverage risk, along with a control variable for bank size. Extensive in- and out-of-sample validation tests were performed on the SEER model during development in the early 1990s. SEER is also validated annually by the surveillance section at the Board of Governors. Finally, recent research has validated the model in out-of-sample performance tests against other surveillance tools (Gilbert et al., 2002). Summary statistics on the SEER variables are also reported in Table 2. Note that there is a good deal of overlap between the two sets of regressors. This is no doubt due to the fact that both were selected to achieve comprehensive yet parsimonious representations of bank risk.

Because tests of the statistical significance and economic importance of the failure-risk coefficients are central to our work, we conduct an extensive search for appropriate control variables, drawing heavily on our work with jumbo CDs in Hall et al. (2002). We opt for this approach rather than a fixed-effects model because most of the sample variation is between banks, and fixed effects would sweep out much of this variation. Our selection of controls was based on examiner suggestions, previous jumbo-CD research, and related market-discipline studies. The control vector comprises proxies for the yield on Treasuries with maturities matching the issuing bank's jumbo-CD maturities, the average maturity of the issuing bank's jumbo-CD portfolio, the negotiability of the issuing bank's jumbo CDs, the market power of the issuing bank, and the funding demands of the issuing bank. The specification also includes a maturity-weighted-Treasury/average-portfolio-maturity interaction term along with state, quarter, and charter-type dummies.

We use the maturity-weighted risk-free rate for each bank to control for term premia as well as for the general level of interest rates. We obtain this measure by multiplying the proportion of each bank's CDs in each call-report maturity bucket—"less than three months remaining," "three months to one year remaining," "one year to three years remaining," and "over three years remaining"—by the yield on comparable-maturity Treasuries in the same quarter. As a further control for term-structure and liquidity effects, we include the average jumbo-CD maturity for each sample bank. We also add an interactive variable equal to the product of the two-quarter lag of each bank's average jumbo-CD maturity and the most recent two-quarter change in the maturity-adjusted risk-free rate. Because yields equal total quarterly interest expense divided by average balances, they conflate rates paid on seasoned CDs with rates paid on fresh issues. As a result, average yields for banks with shorter average CD maturities adjust faster to changes in market rates—and failure probability—than average yields at banks with longer CD maturities. As a final control for liquidity, we include a control for jumbo-CD negotiability. The call report does not note whether a CD is negotiable, so we rely on a dummy variable equal to one if the issuer has over $10 billion in real assets (in 1999 dollars). We use this dummy because only large, money-center banks routinely issue instruments that trade in a secondary market.

Because power in the local deposit market could enable a bank to pay less than the going jumbo-CD rate (Berger and Hannan, 1989), we include a dummy equaling one for banks in a Metropolitan Statistical Area (MSA) on the premise that urban banks face more competition. To control for funding demand, we include a dummy equal to one if the sample bank uses brokered deposits. Some banks can

satisfy loan demand with locally obtained jumbo CDs, and the yields and runoffs for these CDs may show little sensitivity to money-market conditions or failure risk because of retail adjustment costs (Flannery, 1982). Going to the national market for funding means paying the going risk-adjusted rate. Brokered deposits are blocks of deposits just under the $100,000 insurance ceiling that move around the country in search of the highest yield. The Financial Institutions Reform, Recovery, and Enforcement Act (1989) restricted the use of brokered deposits by weakly capitalized institutions, and examiners frown on them even in healthy banks. Thus, the presence of brokered deposits in the capital structure is strong evidence that a bank's funding needs exceed local supply.

We round out the control vector with state, quarterly, and charter-type time dummies. The state dummies are included to pick up differences in regional economic conditions, state banking laws, and state income-tax laws. We use state-level dummies to control for differences in the regional economic environment because bank conditions in the 1990s were not correlated with county-level economic data (Meyer and Yeager, 2001). State-level controls could also pick up differences in banking concentration not captured by the MSA dummy. The quarterly time dummies control for seasonal fluctuations in deposit and money-market conditions and for business-cycle fluctuations inside of each sample window. The quarterly dummies also control for any differences in the perceived condition of the deposit-insurance fund over time.[6] Finally, the charter-type dummies account primarily for potential differences in emphasis and enforcement between regulatory agencies. Because different regulators are subject to different political pressures and constraints, it is reasonable to believe that they might differ in their supervisory procedures, and this could have differential effects on the performance of their supervised institutions (Berger et al., 2001).

As dependent variables, we use both yields on and growth of large time deposits and composite CAMELS scores assigned by supervisors. The yields are computed as total annualized interest expense divided by the quarterly average of large time deposits outstanding. Obviously, we would prefer to use secondary-market data rather than accounting constructions to measure yields. Unfortunately, only a handful of large banks issue jumbo CDs that are actively traded in secondary markets, so real-time, market-generated yields are not available for most institutions (Morris and Walter, 1993). It is possible, however, to use quarterly financial data to construct average jumbo-CD yields for almost every bank in the country. Indeed, the wide availability of these data are their primary appeal from a supervisory standpoint—secondary-market data can never be a useful surveillance tool for any banks but the few that are large enough to issue liquid, heavily-traded securities. Other researchers have successfully used similar accounting-data-based approaches to test hypotheses about bank risk (for example, James, 1988; Keeley 1990; and, more recently, Martinez-Peria and Schmukler, 2001). Still, proxies based on these yields suffer from two related types of measurement error. First, they are average rather than marginal measures and, therefore, somewhat backward looking. Second, they are quarterly accounting measures rather than real-time economic measures.

Measurement-error problems do not, by themselves, imply that accounting-based jumbo-CD signals are valueless in off-site surveillance. Jumbo-CD runoff—a quantity response to changes in bank risk—can be measured relatively error-free with accounting data. Moreover, financial-distress models based on accounting data have been a cornerstone of regulatory and private-sector surveillance for decades (Altman and Saunders, 1997). For example, these models often give heavy weight to book-value measures of credit risk and capital protection, both of which are known to suffer from serious measurement error (Barth et al., 1996). Finally, and most importantly, the supervisory value of jumbo-CD signals—or any market signal for that matter—depends not on the power of the signal alone, but rather on the power of the signal adjusted for the cost of extracting it. Thus, the value of jumbo-CD data in bank surveillance is ultimately an empirical issue.

The growth rates we use as our other dependent variable are simply the annualized quarterly changes in large time deposits. Park and Peristiani (1998) note that yields completely summarize default

[6] Cook and Spellman (1994) argue that insured funds carry risk premiums because the FDIC sometimes lacks resources to indemnify depositors. With time dummies, they find that risk premiums on insured deposits vary with the condition of the deposit-insurance fund. With a different sample and a different empirical strategy, Cooperman et al. (1992) also find evidence of risk premiums on insured deposits.

risk only when the jumbo-CD market is frictionless. When transaction or information frictions are present, jumbo-CD holders may choose to withdraw their funds from high-risk institutions. In addition, Jordan (2000) and Billett et al. (1998) have documented a tendency for risky banking organizations to substitute insured for uninsured deposits to escape higher default premiums. If such substitution effects are important, then signals about changing risk exposures may show up in jumbo-CD runoffs rather than default premiums.

As our measure of supervisory assessment, we employ composite CAMELS scores, which are ratings assigned by examiners at the conclusion of each onsite examination. (Because not every bank is examined in every quarter, there are fewer observations for these regressions than for the jumbo-CD regressions.) The scores range from 1 (best) to 5 (worst) and reflect six explicit components: capital adequacy (C), asset quality (A), management competence (M), earnings strength (E), liquidity, (L), and market sensitivity (S). Although examiners also rate each of these components on a 1-to-5 scale, the composite score is not a formal aggregation of the components. Rather, it reflects the examiners' assessment of the overall safety and soundness of the institution.

We estimate OLS regressions for each of the three dependent variables using the vectors of risk proxies and controls described above. It is then possible to compare statistical significance by comparing the t statistics across the market and supervisory equations. We also compare economic significance by looking at the standardized coefficients in each regression. Because CAMELS scores take discrete values, we also estimate logistic regressions for the supervisor equations. However, although this is the more appropriate specification, it is difficult to compare its coefficients directly to those in the OLS regressions estimated for the jumbo-CD market. We therefore report it mainly to demonstrate that the statistical significance of the supervisory estimates are not sensitive to the estimation technique.

Statistical Results

We report the results of the regressions in Tables 3 through 5. Table 3 shows the response of jumbo-CD yields to the regressors. These regressions fit the data well, with R^2s of 0.60 in both cases, although, of course, much of the explanatory power comes simply from the Treasury yield variable. Among the variables selected through our clustering procedure, only three variables are statistically significant at the 10% level: the commercial-real-estate ratio, the equity ratio, and the loan-to-core-deposit ratio. The loan-to-core ratio has the opposite sign of what theory predicts (higher values indicate less liquidity), perhaps because uninsured depositors view higher levels of core deposits as senior claims that could eat into their recoveries in the event of default. In any case, only the equity ratio is statistically significant at the 1% level with the expected sign. In the specification using the SEER variables, only the ratio of tangible net worth to total assets is significant at the 1% level, and it has the expected negative sign. This ratio is very similar to the equity-to-assets ratio that is used in the first specification. The ratio of jumbo CDs to total assets is significant at the 10% level and has a negative sign, but this result almost certainly reflects some endogeneity. It is also comforting to note that, in both specifications, the control variables are almost all strongly significant with the theoretically correct signs. (The only puzzle that stands out is that banks in MSAs appear to pay less on their jumbo CDs, in contrast to what the greater competition would seem to demand.) The regressions attempting to explain jumbo-CD runoff are even less successful, achieving R^2s of just 0.02. Although some of the control and dummy variables display moderately high t values, none of the risk variables in either specification achieves even a 10% level of significance.

In the OLS regressions with CAMELS composite scores as the dependent variable, by contrast, almost every risk variable in both the cluster-selected and SEER sets is statistically significant at the 1% level and has the anticipated sign. (The one exception is the net non-interest margin, which is statistically insignificant.) The R^2s of these regressions are about 0.36, but the mediocre fit is due in part to the misspecification of the discrete response as a linear function. When we run the logit models, similar significance patterns obtain (with the exceptions that the residential-real-estate ratio is no longer significant at the 1% level but the net non-interest margin becomes significant). Few of the control variables have much explanatory power for CAMELS scores in either the OLS or logit specifications,

which is not surprising because they were largely selected to account for deposit-market factors. In terms of statistical significance, it appears that ROA and the non-accruing-loan ratio are the most important variables to examiners, with equity also contributing substantially. This finding is intuitive, as earnings, asset quality, and capital are explicit components of the CAMELS framework, and the above-mentioned variables are common measures of these types of risk.

Statistical significance, of course, does not necessarily imply economic significance, so it is important to gauge the size of the impact that each statistically significant risk factor had on CD yields and CAMELS scores. To measure the economic importance of each risk factor to jumbo-CD holders and supervisors, we compute the elasticities of the dependent variables with respect to the independent variables. Specifically, this measure, sometimes known as a "standardized coefficient," is calculated as:

$$\eta_{i,j} = \beta_{i,j}\left(\frac{\sigma_{X_i}}{\sigma_{Y_j}}\right)$$

where $\beta_{i,j}$ is the coefficient estimate of the independent variable X_i in the Y_j regression, and the σ's represent the standard deviations of the subscripted variables. Because of their nonlinear character, the logit specifications do not readily allow for this computation. Indeed, the ability to make this comparison is the primary reason for running the OLS model on the CAMELS scores in addition to the logit. Standardized coefficients for the risk proxies obtained from the full sample appear in the right-hand columns of Tables 3 through 5.

As with statistical significance, the results in the supervisory equations are much stronger than those in the market equations. The magnitude of the standardized coefficients when the CAMELS score is the dependent variable ranges from 0.02 to 0.30. None of the risk variables in the market equations achieves even the lower bound of this range. The equity ratio has the highest economic significance in the yield equations, at about 0.009. To get a sense for what this magnitude means, notice that the (raw) coefficient of -0.003 implies less than a 1-basis-point increase in funding cost for every percentage-point drop in capital. In terms of overall profitability, this response would appear to be insufficient to suppress any risk appetites on the part of management. Indeed, if we take the standardized coefficients in the CAMLES equation to be a benchmark for economic significance, then we must conclude that market discipline in the jumbo-CD market is weak across the board. Although depositors do appear to respond to capital adequacy, the degree of their response is an order of magnitude lower than the response of supervisors.

Although we have tried to be as agnostic and scientific as possible in selecting our reported specification, these basic results stand up to a variety of alternative choices for the independent-variable vector. Whatever combination of variables one includes as regressors, the only one that is consistently strongly significant is the measure of capital. This result does not appear to be driven by large banks—as many findings of market-discipline are. Indeed, splitting the sample at $500 million (not reported) shows a *stronger* response of capital at the small banks than at the large banks. We conclude that there is a robust, but economically weak, pricing response of jumbo-CD holders to capital ratios. No other type of risk appears to be priced consistently, and no growth-rate (runoff) response of any kind is apparent.

Discussion and Conclusion

In recent years, many academics and policy-makers have called for greater reliance on market discipline in bank supervision. An important step towards greater reliance on such discipline is gaining insight into the weights placed on different sources of risk by uninsured depositors and bank supervisors. Jumbo-CD holders and bank supervisors face similar payoff structures (negative return in default states; no return in non-default states), so they should place similar weights on individual sources of risk. Because the market should theoretically be more agile than the government in responding to changes in

risk, the theory indicates that supervisors may be able to rely on depositor behavior for signals about changes in bank condition. Based on the types of risk priced by depositors, these signals could contribute to decisions about the timing, staffing, and focus of on-site examinations.

To identify empirically the risk factors priced by uninsured depositors, we selected a vector of bank condition and income variables through a clustering procedure and then tested whether these variables had significant explanatory power for jumbo-CD yields and growth rates. For robustness, we also used a vector of variables independently selected from the Fed's SEER model. As a benchmark, we tested the same risk vectors against supervisory CAMELS scores. To assess the importance of each variable in each equation, we looked at both statistical significance and economic significance, as measured by standardized coefficients. The sample included pooled quarterly data from 1997:2 through 2003:1, covering nearly 5,000 banks of varying size.

We found that, although supervisors emphasize all types of risk factors (focusing most heavily on earnings, asset quality, and capital), the jumbo-CD market takes little notice of risk in general. This result is consistent with some earlier work uncovering only weak evidence for market discipline among large depositors. The main thing that is new about the current paper—apart from the more recent sample period—is that we decompose risk into its various aspects to see if the pricing of any particular category lurks beneath the surface of these puny composite coefficients. We find strong evidence for the pricing of only one type of risk, that pertaining to capital levels. Although there is weak evidence here and there for price responses to other factors, capital is the only variable that consistently achieves a 1% level of statistical significance, and it also commands the highest level of economic significance (although this level is still much lower than the responses of regulators). Furthermore, all of our results occur in the yield equations: we find no evidence at all that depositors respond through runoff.

Constructing market "prices" from accounting data is always a dicey proposition, particularly when some of these data—such as interest expense—partially reflect bank and market conditions from the continuum of previous quarters over which the instruments were originally issued. The reader would thus be justified in suspecting that measurement error might be responsible for the absence of statistical significance of our risk variables in the market equations. However, our previous investigations into this issue (described at length in Hall et al., 2002) suggest that, as long as maturity structure and other factors are properly dealt with, the measurement error problems are, in fact, minimal. Moreover, the finding that the signs and significance patterns on the control variables are almost exactly what we expect implies that the left-hand-side variable is measured well enough to conform to our ideas about what a yield should behave like. Finally, the growth rates of the jumbo-CD portfolios are measured without error. Even if one believes that the lack of statistical significance in the pricing equation is due to measurement error, one would still be forced to conclude that quantity responses to risk are negligible among large depositors.

Frictions could explain the weak discipline imposed on risky banks by the jumbo-CD market. Jumbo-CD rates may "cluster" around integers and even fractions (Kahn et al., 1999); such clustering would make rates less responsive to changes in bank risk. Similarly, jumbo-CD holders may also receive other services—commercial loans and checking services, for example—from their bank and, thus, price the relationship comprehensively rather than CDs individually. A final possibility is that jumbo-CD holders are simply noise traders, giving little thought to failure-risk when deciding where to place their funds.

However, market frictions are likely not the sole cause of weak discipline in the jumbo-CD market; the long business-cycle expansion of the 1990s probably also plays a role. Over this period, bank profitability, capital, and coverage ratios (i.e., loan loss reserves to problem loans) soared to record highs while failure rates plummeted to record lows. Even during the recent recession, banking conditions have been remarkably resilient. Indeed, during our sample period, the failure rate for U.S. commercial banks was less than one-tenth of one percent per year, and nearly all of the failures were resolved through purchase and assumption, leaving many uninsured depositors fully compensated. In such an environment, jumbo-CD holders have little incentive to engage in costly monitoring, and yields and runoff rates are unlikely to react strongly to failure risk. The incentive is weakened even further by the knowledge that government supervisors are already performing this monitoring. In other words, the market appears to delegate much of its monitoring and disciplining functions to the government. This

story is consistent with the successful use of average yields in bank-risk studies a decade ago, a time when financial distress was fairly common, failures were sharply rising, the supervisory infrastructure was faltering, and depositors consequently had a stronger incentive to pay attention to the condition of their banks.

If only one aspect of risk is to be reflected in jumbo-CD yields, it makes sense that it should be capital adequacy. After all, capital is the uninsured depositor's primary protection against default, and it can be assessed with a few simple ratios at low cost. Flannery and Rangan (2002) have argued that financial markets are indirectly responsible for the capital buildup among large complex banking organizations in the 1990s, i.e., that bank stakeholders have insisted on a greater capital cushion because of the increasing sophistication of risk exposures. Our evidence is consistent with this view. Unfortunately, signals about capital levels are perhaps the least helpful type for off-site surveillance purposes. Capital levels are easy for supervisors to observe as well, and they typically do not change quickly, making market-based early-warning signals about them—even when such signals are reliable—somewhat superfluous. If the market communicated information about, say, changes in interest-rate risk or liquidity, both of which can change a great deal between exams or even call report dates without much obvious outward sign, its marginal contribution to the supervisory process could be positive. But our evidence suggests that CD-market signals do not contain information about such risks.

Thus, the evidence presented here weakens the case for market discipline as a pillar of bank supervision. The price of risk in the jumbo-CD market appears to be so small that even bank managers devoted to maximizing shareholder value will not be deterred from risk taking. Moreover, it does not appear to be possible for supervisors to extract a meaningful signal about bank risk by observing the behavior of uninsured depositors, especially if one believes our argument that depositors are relying on supervisors to do their monitoring for them. Now, it is true that all of the concrete proposals for operationalizing market discipline as a supervisory pillar have concentrated on subordinated debt rather than jumbo CDs. (For example, see Lang and Robertson, 2002; Evanoff and Wall, 2000; and Calomiris, 1997.) Still, forcing banking organizations to issue subordinated debt in a standardized form is an implicit capital-structure tax. Before imposing such a tax, policymakers should adduce evidence that subordinated debt will produce the desired discipline. For most banks, jumbo CDs are a relatively junior liability—like subordinated debt at large banking organizations—and the jumbo-CD market's weak reaction to risk suggests that subordinated debt may not produce an effective check on risk.

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Table 1

Selected Market-Discipline Studies Since 1990

This table summarizes prior research on risk pricing by depository-institution liability holders. (We use the term "bank" to refer to bank holding companies as well as banks. We use the term "risk pricing" to mean a price or quantity response to a change in bank risk.) These studies employ both cross-section and time-series techniques and use a variety of risk proxies and control variables. Overall, the evidence suggests that liability holders price bank risk. Most of this research, however, relies on samples that pre-date the 1990s regulatory changes. A few recent studies that examine information from the equity and federal-funds markets are not included in the table.

Study	Sample Period	Instrument	Number of Institutions	Yield or Runoff?	Discipline?
Gorton and Santomero (1990)	1983 – 84	Bank Sub Debt	XX	Yield	No
Keeley (1990)	1971 – 86	Bank Jumbo CDs	85	Yield	Yes
Ellis and Flannery (1992)	1982 – 88	Bank Jumbo CDs	6	Yield	Yes
Cook and Spellman (1994)	1987 – 88	Thrift Jumbo CDs	~200	Yield	Yes
Crabbe and Post (1994)	1986 – 91	Bank Jumbo CDs	41	Runoff	No
Brewer and Mondschean (1994)	1987 – 89	Thrift Jumbo CDs	4	Yield	Yes
Park (1995)	1985 – 92	Bank Jumbo CDs	~10,000	Both	Yes
Flannery and Sorescu (1996)	1983 – 91	Bank Sub Debt	XX	Yield	Yes
Park and Peristiani (1998)	1986 – 90	Thrift Jumbo CDs	~3,000	Both	Yes
Jagtiani et al. (1999)	1992 – 97	Bank Sub Debt	XX	Yield	Yes
Jordan (2000)	1989 – 95	Bank Jumbo CDs	65	Both	Yes
Evanoff and Wall (2001)	1985 – 99	Bank Sub Debt	100	Yield	Weak
Goldberg and Hudgins (2002)	1984 – 94	Thrift jumbo CDs	619	Runoff	Yes
Hall et al. (2002)	1988 – 95	Bank Jumbo CDs	~4,000	Both	Weak

Table 2. Summary Statistics for Regression Variables

		Mean	Std. Dev.	Min.	Max.
Cluster-Selected Risk Variables	*Net noninterest margin*	2.28%	0.99%	-19.17%	36.82%
	Loans 30-89 days past due / assets	0.97%	0.91%	0.00%	15.78%
	Equity / assets	10.42%	3.93%	0.04%	80.25%
	CRE / loans	27.85%	15.11%	0.00%	99.00%
	ROA	1.16%	0.80%	-21.74%	13.33%
	Log of total assets	11.34	1.26	6.89	19.37
	Loans / core deposits	84.25%	33.21%	0.19%	988.15%
	Nonaccruing loans / assets	0.44%	0.71%	0.00%	17.77%
SEER Risk Variables	*ROA*	1.16%	0.80%	-21.74%	13.33%
	Commercial & industrial loans / assets	9.60%	6.94%	0.00%	80.32%
	Residential RE loans / assets	17.48%	11.16%	0.00%	83.46%
	Jumbo CDs / assets	11.29%	6.83%	0.00%	77.24%
	Tangible net worth / assets	10.19%	3.85%	0.04%	80.25%
	Loans 90+ days past due / assets	0.24%	0.47%	0.00%	13.30%
	Loans 30-89 days past due / assets	0.97%	0.91%	0.00%	15.78%
	Nonaccruing loans / assets	0.44%	0.71%	0.00%	17.77%
	Securities / assets	27.15%	14.00%	0.00%	97.61%
	Other real estate owned / assets	0.14%	0.34%	0.00%	7.48%
	Log of total assets	11.34	1.26	6.89	19.37
Control Variables	*Maturity-weighted Treasury yield*	4.09%	1.68%	1.18%	6.51%
	Large time deposit maturity (months)	9.69	4.81	1.50	58.60
	Maturity-Treasury interactive term	-3.30%	7.71%	-136.23%	68.76%
	Over $10 bil dummy	0.01	0.09	0.00	1.00
	Brokered-deposit dummy	0.18	0.39	0.00	1.00
	State-member-bank dummy	0.11	0.31	0.00	1.00
	National-bank dummy	0.30	0.46	0.00	1.00
	MSA dummy	0.50	0.50	0.00	1.00
Dep. Vars.	*Large time deposit yield*	4.96%	1.28%	0.02%	24.63%
	Large time deposit growth rate	11.83%	33.91%	-50.00%	99.99%
	CAMELS composite rating	1.68	0.67	1	5

Table 3. Regression Results: Deposit Yields

A. Cluster-Selected Variables

		Coefficient (t statistic)		Standardized Coefficient
Risk Variables	*Net noninterest margin*	-0.0033 (-0.840)		-0.0025
	Delinquent loans / assets	0.0014 (0.410)		0.0010
	Equity / assets	-0.0033 (-4.120)	***	-0.0102
	CRE / loans	0.0004 (1.760)	*	0.0047
	ROA	-0.0057 (-1.230)		-0.0035
	Log of total assets	0.0027 (0.800)		0.0026
	Loans / core deposits	-0.0002 (-2.350)	**	-0.0061
	Nonaccruing loans / assets	0.0034 (0.760)		0.0019
Control Variables	*Maturity-weighted Treasury yield*	0.9400 (28.570)	***	1.2377
	Large-CD maturity	0.0233 (25.480)	***	0.0876
	Maturity-Treasury interactive term	-0.0018 (-2.910)	***	-0.0109
	Over $10 bil dummy	0.0138 (0.370)		0.0010
	Brokered-deposit dummy	0.1410 (18.090)	***	0.0427
	National-bank dummy	-0.0567 (-8.750)	***	-0.0204
	State-member-bank dummy	-0.0288 (-2.870)	***	-0.0070
	MSA dummy	-0.0935 (-15.610)	***	-0.0366
R^2			0.630	
Adjusted R^2			0.630	
Observations			68,809	

Notes: This table reports the results of OLS regressions of jumbo-CD yields on the above variables, selected through variable clustering, plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.

Table 3 (continued). Regression Results: Deposit Yields

B. SEER Variables

		Coefficient (t statistic)		Standardized Coefficient
Risk Variables	*ROA*	-0.0040		-0.0025
		(-0.990)		
	C&I Loans / assets	0.0001		0.0004
		(0.150)		
	Residential RE Loans / assets	-0.0002		-0.0014
		(-0.440)		
	Jumbo CDs / assets	-0.0010	**	-0.0051
		(-1.950)		
	Tangible net worth / assets	-0.0031	***	-0.0093
		(-3.500)		
	Loans 90+ days past due / assets	-0.0051		-0.0019
		(-0.740)		
	Loans 30-89 days past due / assets	0.0018		0.0013
		(0.490)		
	Nonaccruing loans / assets	0.0052		0.0029
		(1.140)		
	Securities / assets	0.00004		-0.0004
		(-0.140)		
	Other real estate owned / assets	-0.0178	**	-0.0047
		(-1.900)		
	Log of total assets	0.0030		0.0030
		(0.940)		
Control Variables	*Maturity-weighted Treasury yield*	0.9410	***	1.2384
		(28.580)		
	Large time deposit maturity	0.0232	***	0.0875
		(25.440)		
	Maturity-Treasury interactive term	-0.0018	***	-0.0110
		(-2.920)		
	Over $10 bil dummy	-0.0001		-0.0011
		(-0.400)		
	Brokered-deposit dummy	0.1410	***	0.0428
		(18.110)		
	National-bank dummy	-0.0570	***	-0.0205
		(-8.800)		
	State-Member-bank dummy	-0.0301	***	-0.0073
		(-3.000)		
	MSA dummy	-0.0934	***	-0.0366
		(-15.590)		
R^2			0.603	
Adjusted R^2			0.602	
Observations			68,809	

Notes: This table reports the results of OLS regressions of jumbo-CD yields on the above variables plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.

Table 4. Regression Results: Deposit Growth Rates

A. Cluster-Selected Variables

		Coefficient (t statistic)		Standardized Coefficient
Risk Variables	*Net noninterest margin*	-0.0301 (-0.180)		-0.0009
	Delinquent loans / assets	0.0015 (1.000)		0.0041
	Equity / assets	-0.0252 (-0.720)		-0.0029
	CRE / loans	-0.0059 (-0.600)		-0.0026
	ROA	-0.0510 (-0.260)		-0.0012
	Log of total assets	0.0409 (0.280)		0.0015
	Loans / core deposits	-0.0040 (-0.930)		-0.0039
	Nonaccruing loans / assets	0.0787 (0.410)		0.0017
Control Variables	*Maturity-weighted Treasury yield*	-3.0100 (-2.120)	**	-0.1493
	Large-CD maturity	0.2600 (6.600)	***	0.0369
	Maturity-Treasury interactive term	-0.0378 (-1.410)		-0.0086
	Over $10 bil dummy	0.5190 (0.320)		0.0014
	Brokered-deposit dummy	0.7220 (2.140)	**	0.0082
	National-bank dummy	-1.9120 (-6.840)	***	-0.0259
	State-member-bank dummy	-0.2470 (-0.570)		-0.0023
	MSA dummy	0.2390 (0.920)		0.0035
R^2		0.022		
Adjusted R^2		0.021		
Observations		68,809		

Notes: This table reports the results of OLS regressions of jumbo-CD growth rates on the above variables, selected through variable clustering, plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.

Table 4 (continued). Regression Results: Deposit Growth Rates

B. SEER Variables

		Coefficient (t statistic)		Standardized Coefficient
Risk Variables	*ROA*	-0.0667		-0.0016
		(-0.380)		
	C&I Loans / assets	-0.0001		-0.0014
		(-0.310)		
	Residential RE Loans / assets	-0.0059		-0.0019
		(-0.380)		
	Jumbo CDs / assets	0.0077		0.0016
		(0.360)		
	Equity / assets	0.0091		0.0010
		(0.240)		
	Loans 90+ days past due / assets	0.2460		0.0034
		(0.830)		
	Loans 30-89 days past due / assets	0.0711		0.0019
		(0.450)		
	Nonaccruing loans / assets	0.0413		0.0009
		(0.210)		
	Securities / assets	-0.0169		-0.0070
		(-1.440)		
	Other real estate owned / assets	-0.3380		-0.0034
		(-0.840)		
	Log of total assets	0.0239		0.0009
		(0.170)		
Control Variables	*Maturity-weighted Treasury yield*	-3.0210	**	-0.1499
		(-2.130)		
	Large time deposit maturity	0.2610	***	0.0370
		(6.610)		
	Maturity-Treasury interactive term	-0.0379		-0.0086
		(-1.410)		
	Over $10 bil dummy	0.0032		0.0009
		(0.200)		
	Brokered-deposit dummy	0.7220	**	0.0082
		(2.140)		
	National-bank dummy	-1.9120	***	-0.0259
		(-6.840)		
	State-member-bank dummy	-0.2560		-0.0023
		(-0.590)		
	MSA dummy	0.2360		0.0035
		(0.910)		
R^2			0.023	
Adjusted R^2			0.021	
Observations			68,809	

Notes: This table reports the results of OLS regressions of jumbo-CD growth rates on the above variables plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.

Table 5. Regression Results: CAMELS Composite Scores

A. Cluster-Selected Variables

		OLS			Logit	
		Coefficient (t statistic)		**Standardized Coefficient**	**Coefficient (chi^2 stat)**	
Risk Variables	*Net noninterest margin*	0.0022 (0.450)		0.0034	0.077 (12.033)	***
	Delinquent loans / assets	0.1019 (22.200)	***	0.1444	0.389 (421.304)	***
	Equity / assets	-0.0286 (-25.520)	***	-0.1648	-0.129 (627.562)	***
	CRE / loans	0.0015 (4.890)	***	0.0339	0.007 (36.312)	***
	ROA	-0.2480 (-42.990)	***	-0.3199	-1.261 (1,740.407)	***
	Log of total assets	-0.0660 (-14.560)	***	-0.1261	-0.241 (166.808)	***
	Loans / core deposits	0.0014 (10.880)	***	0.0735	0.007 (141.828)	***
	Nonaccruing loans / assets	0.2282 (40.590)	***	0.2649	0.879 (1,160.615)	***
Control Variables	*Maturity-weighted Treasury yield*	-0.0303 (-0.680)		-0.0762	-0.025 (0.020)	
	Large-CD maturity	-0.0008 (-0.680)		-0.0060	-0.005 (0.943)	
	Maturity-Treasury interactive term	-0.0011 (-1.310)		-0.0127	-0.004 (1.363)	
	Over $10 bil dummy	0.0149 (0.310)		0.0022	0.114 (0.323)	
	Brokered-deposit dummy	0.0144 (1.370)		0.0084	0.030 (0.497)	
	National-bank dummy	-0.0083 (-0.950)		-0.0057	-0.045 (1.640)	
	State-member-bank dummy	-0.0660 (-4.520)	***	-0.0282	-0.275 (21.724)	***
	MSA dummy	0.0006 (0.080)		0.0005	-0.004 (0.012)	
R^2		0.373				
Adjusted R^2		0.370				
Observations		17,643				

Notes: This table reports the results of OLS and logistic regressions of supervisor-assigned CAMELS composite ratings on the above variables, selected through variable clustering, plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.

Table 5 (continued). Regression Results: CAMELS Composite Scores

B. SEER Variables

		OLS			Logit	
		Coefficient (t statistic)		**Standardized Coefficient**	**Coefficient (chi^2 stat)**	
Risk Variables	*ROA*	-0.2330	***	-0.3005	1.223	***
		(-46.290)			(1,939.515)	
	C&I Loans / assets	0.0024	***	0.0251	-0.012	***
		(3.560)			(19.137)	
	Residential RE Loans / assets	-0.0013	***	-0.0219	0.004	*
		(-2.700)			(3.428)	
	Jumbo CDs / assets	0.0075	***	0.0782	-0.030	***
		(11.710)			(127.163)	
	Tangible net worth / assets	-0.0282	***	-0.1601	0.132	***
		(-23.600)			(555.044)	
	Loans 90+ days past due / assets	0.0949	***	0.0663	-0.376	***
		(10.370)			(101.148)	
	Loans 30-89 days past due / assets	0.0763	***	0.1081	-0.305	***
		(16.040)			(237.713)	
	Nonaccruing loans / assets	0.2066	***	0.2399	-0.814	***
		(36.390)			(954.360)	
	Securities / assets	-0.0024	***	-0.0496	0.009	***
		(-6.530)			(35.441)	
	Other real estate owned / assets	0.1700	***	0.0929	-0.704	***
		(14.670)			(205.813)	
	Log of total assets	-0.0605	***	-0.1156	0.233	***
		(-14.290)			(172.482)	
Control Variables	*Maturity-weighted Treasury yield*	-0.0137		-0.0344	-0.037	
		(-0.310)			(0.041)	
	Large-CD maturity	-0.0010		-0.0069	0.005	
		(-0.800)			(0.989)	
	Maturity-Treasury interactive term	-0.0010		-0.0119	0.003	
		(-1.250)			(0.980)	
	Over $10 bil dummy	0.0046		0.0007	-0.041	
		(0.100)			(0.045)	
	Brokered-deposit dummy	0.0194	**	0.0113	-0.057	
		(1.870)			(1.806)	
	National-bank dummy	-0.0092		-0.0063	0.048	
		(-1.070)			(1.811)	
	State-member-bank dummy	-0.0637	***	-0.0272	0.267	***
		(-4.430)			(20.293)	
	MSA dummy	-0.0014		-0.0011	0.012	
		(-0.180)			(0.132)	
R^2			0.392			
Adjusted R^2			0.389			
Observations			17,643			

Notes: This table reports the results of OLS and logistic regressions of supervisor-assigned CAMELS composite ratings on the above variables, selected through variable clustering, plus time and state dummies (not reported). Asterisks indicate statistical significance at the 10% (*), 5% (**), and 1%(***) levels.
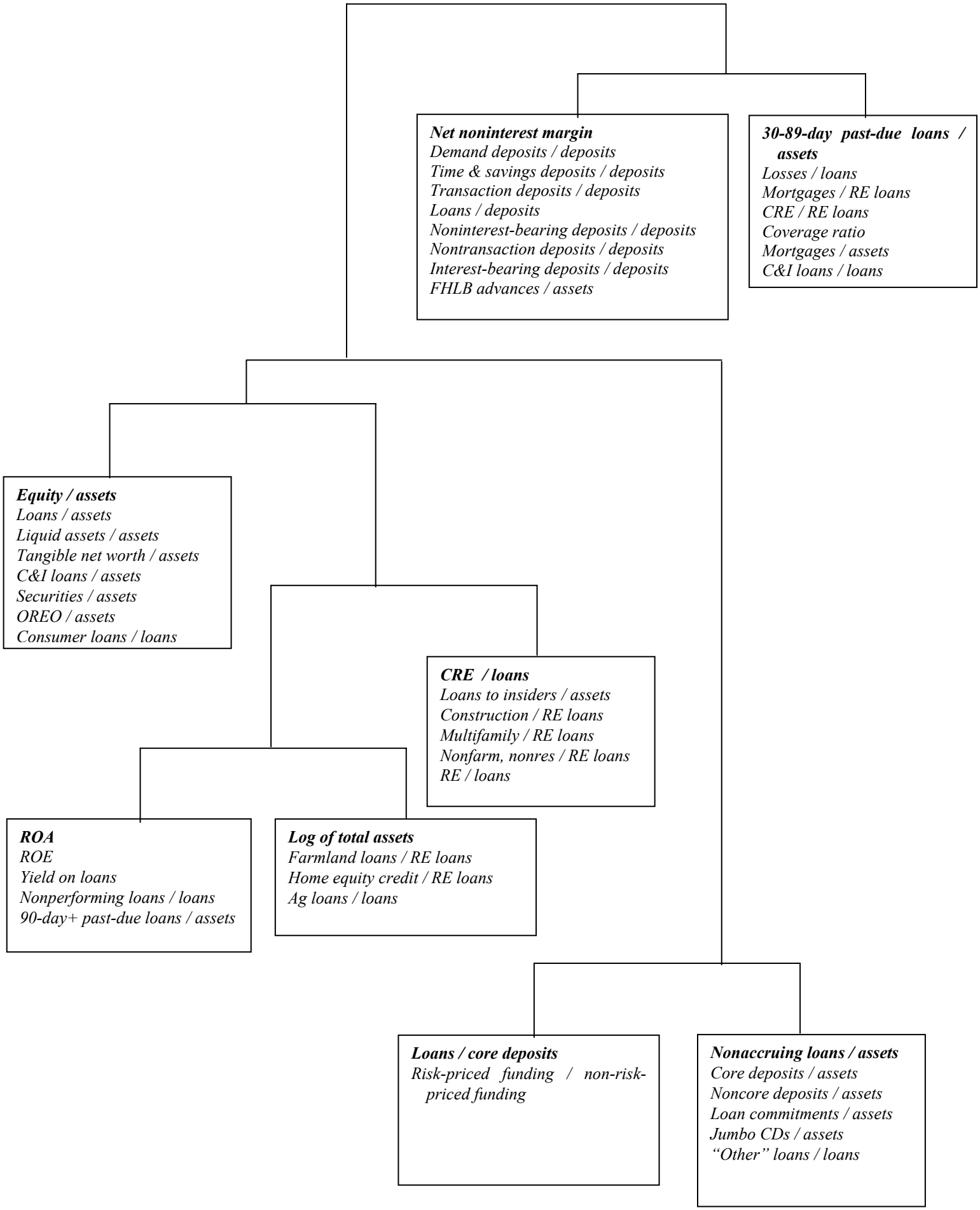
Figure 1. Hierarchical Variable Clustering of Risk Variables