GAO

United States General Accounting Office

Report to Congressional Committees

November 1991

GOVERNMENT-SPONSORED ENTERPRISES

Using Private Risk Ratings for Exemptions From Federal Regulations

GAO/GGD-92-10

GAO

United States
General Accounting Office
Washington, D.C. 20548

General Government Division

B-246474

November 6, 1991

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United States Senate

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Committee on Banking, Finance and Urban Affairs
House of Representatives

This report compares risk ratings done by bank regulators and nationally recognized statistical rating organizations (NRSRO) such as Standard & Poor's and Moody's Investors Service. We are sending this report because your committees oversee one or more enterprises in which the Treasury Department has proposed that NRSRO ratings qualify an enterprise for a regulatory "safe harbor."

Various changes to the regulation of government-sponsored enterprises have been proposed by the Department of the Treasury, the Congressional Budget Office, and us.[1]

Treasury's regulatory safe-harbor provision would exempt an enterprise from certain regulatory requirements if its risk to the federal government were rated as low as possible by two NRSROs. At least one bill before Congress would expand the safe-harbor provision to include higher-risk categories.

In this report, we examine the available evidence to judge whether NRSRO ratings of enterprises would provide information at least as reliable and timely as that obtained through federal supervision. To make this judgment in the absence of data for enterprises, we (1) evaluated the consistency of regulatory and NRSRO ratings for banks having both types of ratings and (2) compared the timing of rating changes by NRSROs and federal regulators for the same banks.

Background

Congress created government-sponsored enterprises to help make credit readily available to farmers, homeowners, and students. Three enterprises promote agricultural-related lending—Farm Credit Banks, Banks for Cooperatives, and the Federal Agricultural Mortgage Corporation; three promote home lending—Federal Home Loan Banks, the Federal National Mortgage Association, and the Federal Home Loan Mortgage Corporation; and one promotes higher education lending—the Student Loan Marketing Association.

Enterprises make loans, buy loans from other lenders, and/or guarantee financial products, accomplishing their public purposes through private markets. Like any private financial firm, enterprises are subject to financial risks, including the possibility of losses arising from borrowers failing to repay their loans, changes in interest rates, poor management decisions, and unfavorable business conditions.

The federal government has a strong interest in knowing the risks that an enterprise takes because an enterprise's failure would jeopardize the

[1]Government-Sponsored Enterprises: The Government's Exposure to Risks (GAO/GGD-90-97, Aug. 15, 1990) and Government-Sponsored Enterprises: A Framework for Limiting the Government's Exposure to Risks (GAO/GGD-91-90, May 22, 1991).

public purposes of these corporations and perhaps lead to federal assistance. An accurate gauge of enterprise risk would help the federal government use its regulatory authority to prevent enterprise failure and possible federal losses.

This report used bank data to compare the consistency of NRSRO and regulatory ratings and the relative timing of rating changes made by each. Using bank ratings was imperfect because banks and enterprises have different business activities, although they face similar risks. Furthermore, while we could compare a regulator's risk assessment to an NRSRO's assessment, we could not definitively say which was correct because there is no absolute measure of a financial institution's risk, even retrospectively. Despite these limitations, we believe the experience with regulatory and NRSRO bank ratings provides a useful framework with which to assess the possible effects of a safe harbor in the absence of such ratings for government-sponsored enterprises.

To compare regulatory and NRSRO bank ratings, we obtained Moody's and Standard & Poor's credit ratings of all banks that had ratings for long-term certificates of deposit (CD) greater than $100,000 from December 1985 through December 1990. These banks had assets ranging from $100 million to $68 billion in June 1990, with the majority having assets greater than $1 billion. For these same banks and time frame, we obtained the regulatory assessments of risk. In total, 207 banks had both regulatory and NRSRO assessments of risk. Of these 207, 153 had Moody's ratings, 185 had Standard & Poor's ratings, and 131 had both. A detailed description of our scope and methodology, together with limitations, is presented in appendix I.

Regulatory and NRSRO rating schemes differ in the aspects of banks they assess and the language they use to rate risk. Bank regulators assess capital, assets, management, earnings, and liquidity (CAMEL); they rate these aspects of a bank using a best-to-worst unit scale of 1 to 5. In addition, regulators assign an overall composite rating that we call the CAMEL rating. The primary purpose of the CAMEL rating system is to help regulators identify those financial institutions that require special supervisory attention and/or warrant a higher than normal degree of supervisory concern. A CAMEL rating of 3 indicates that the bank is experiencing some weaknesses ranging from moderately severe to unsatisfactory but that failure is still considered a remote possibility given

overall strength and financial capacity.[2] Banks with a CAMEL rating of 5 are expected to fail soon.

NRSROs rate risk using letter designations. The highest ratings (and lowest-risk investments) are designated "AAA" and "Aaa" by Standard & Poor's and Moody's, respectively. In order of increasing risk, the scale moves to double-A, single-A, B, and C designations. Standard & Poor's modifies some of these letter designations by "+" and "−" signs, while Moody's appends a numerical modifier from 1 to 3 to further differentiate the ratings. In total, considering the modified ratings, Moody's and Standard & Poor's both use a scale with 19 risk categories (versus the 5 CAMEL categories). NRSRO ratings are opinions about the credit risk of a particular investment. A rating for CDs is based on the NRSRO's assessment of the bank's ability to redeem the certificates in accordance with the terms specified. Standard & Poor's makes clear in its literature that a rating is not a general-purpose evaluation of an issuer nor a recommendation to purchase, sell, or hold a particular security. Appendix II gives a detailed description of the three rating schemes used in this report.

Results in Brief

While CAMEL and NRSRO ratings were fairly closely related to each other, they differed often enough that one could not be substituted for the other with a great degree of confidence. However, we found no major differences between regulatory and NRSRO ratings for the least-risky (triple-A-rated) banks. In addition, the evidence did not show that either regulators or NRSROs were faster at reporting increased risk at the least-risky end of the rating scale, in which a safe-harbor provision would apply.

Because NRSRO and CAMEL ratings often differed, having both ratings would offer better information to the government than relying on only one. If the evidence available from banks holds true for government-sponsored enterprises, then our analysis suggests that only enterprises receiving the highest possible NRSRO ratings—triple-A as proposed by Treasury—should be eligible for exemption from regulatory requirements.

[2]Even though a CAMEL rating of 3 is at the midpoint in the 1-to-5 CAMEL scale, it does not represent an average-risk bank. Eighty percent of CAMEL ratings were 1 or 2 for the banks we examined.

Private Agency Ratings Do Not Substitute Well for Regulatory Ratings of Banks

While there was a positive association between CAMEL and NRSRO bank ratings, they differed often enough that one could not be readily substituted for the other. We used two analytical techniques to evaluate the association between CAMEL and NRSRO risk assessments—tables of frequency distributions and correlation analysis.

One way we analyzed the difference between regulatory and NRSRO ratings was to look at cases of disagreements. A disagreement suggests that the regulator or the NRSRO misclassified the bank's risk. Table 1 displays the cases when an NRSRO rating was low-risk while the regulatory CAMEL rating was high-risk.

Table 1: Percentage of CAMEL High-Risk Observations That NRSROs Rated as Low-Risk

	CAMEL rating			
Moody's	**3**	**4**	**5**	**Total**
Aaa	0.0%	0.0%	0.0%	**0.0%**
Aa1, Aa2, Aa3	8.6	0.3	0.0	**8.9**
A1, A2	26.0	3.3	0.0	**29.3**
Total	**34.6%**	**3.6%**	**0.0%**	**38.2%**
Standard & Poor's				
AAA	0.0	0.0	0.0	**0.0**
AA+, AA, AA-	8.5	2.9	0.0	**11.4**
A+, A, A-	35.7	7.9	0.0	**43.6**
Total	**44.2%**	**10.8%**	**0.0%**	**55.0%**

Note: For this table, we defined CAMEL 1 and 2 ratings as low-risk. Since these were approximately 80 percent of CAMEL ratings (see appendix III), we defined approximately 80 percent of Moody's and Standard & Poor's ratings as low-risk and approximately 20 percent of their ratings as high-risk. This definition classified the first seven Standard & Poor's ratings but only the first six Moody's ratings as low-risk. Were Moody's A3 rating included, then 89 percent of Moody's ratings would be classified as low-risk and the total disagreement between Moody's and CAMEL ratings would change from 38.2 percent to 57.6 percent in the table.

Source: GAO analysis based on ratings supplied by Moody's, Standard & Poor's, and federal bank regulators.

As table 1 shows, there were no cases where Moody's or Standard & Poor's gave their best credit rating—Aaa or AAA, respectively—when the CAMEL rating indicated that the bank was exhibiting weaknesses. If these results from banks are assumed to be consistent with expected experience for enterprises, then a safe-harbor proposal limited to enterprises receiving two triple-A ratings would be unlikely to result in a misclassification of risk. Were the safe-harbor proposal to incorporate rating categories below this highest level, then the possibility of misclassification would be more likely.

Next, we used correlation analysis to indicate how well NRSRO ratings matched CAMEL ratings. Although they were positively related, the highest correlation—of .67—indicated that the two risk assessments differed a considerable part of the time. Moody's ratings were better correlated with CAMEL than were Standard & Poor's. Moody's and Standard & Poor's were better correlated with each other than either was correlated with CAMEL. Table 2 summarizes the results of our correlation analyses.

Table 2: Correlation of CAMEL and NRSRO Ratings

Ratings correlated	Correlation coefficient
Standard & Poor's and CAMEL	.53
Moody's and CAMEL	.67
Moody's and Standard & Poor's	.86

These results suggest that NRSROs and bank regulators do not have a common view of the risks of a bank's activities. One difference appears to involve the different purposes of regulatory and NRSRO ratings. CAMEL ratings identify and distinguish among banks that need special supervisory attention. The high-risk end of the scale is very important in accomplishing this purpose because high-risk banks may involve deposit insurance losses. However, the NRSROs have a different view of the high-risk end of the scale. In assessing risk, NRSROs typically consider the effects of regulatory intervention in protecting the investors holding CDs. One Moody's official explained that, when Moody's determines that the Federal Deposit Insurance Corporation (FDIC) is likely to provide assistance to a bank that in effect will protect uninsured depositors from losses, Moody's will generally not assign a lower rating than Ba3. Standard & Poor's suggested in its literature that CDs are assigned lower ratings even when regulatory support can be expected. However, Standard & Poor's did not use the highest-risk end of its rating scale for any of the banks that we reviewed.

Neither Rating Agencies Nor Regulators Consistently Detected Risk Changes Earlier

Neither the regulators nor the NRSROs consistently reported changes in risk earlier than the other. We analyzed the timing of rating changes using two techniques—(1) correlation analyses that varied the dates to analyze patterns of early or late reporting of rating changes and (2) event history analysis.

Correlation coefficients were computed using an NRSRO rating at a particular date matched with the CAMEL rating at the same date, at earlier

dates, and at later dates. Our expectation was that if CAMEL ratings changed assessments of risk consistently before the NRSROs, then the highest correlation coefficients would occur when the NRSRO ratings at a particular month were correlated with CAMEL ratings at some consistently earlier date.

We found that correlation coefficients were not significantly different when the series were matched at the same date or when one series was matched with nearby earlier and later dates of another. Our analysis and results are explained further in appendix IV.

The second, more definitive analysis that we did on the question of relative timing of rating changes used a technique called event history analysis. Using statistical tests, we determined whether NRSROs or the regulators were faster in recognizing risk increases. We did this by looking at cases in which both initially agreed on the level of risk; then one said risk had increased, but the other did not; then both eventually agreed that risk had increased. We found that Moody's was neither faster nor slower than the regulators in detecting increases in risk at the lowest-risk end of the rating scale.[3]

Conclusions

Evidence from banks indicated that NRSRO and CAMEL ratings generally agreed but differed often enough that one could not be substituted for the other with a great degree of confidence. Evidence from banks did not suggest that either regulators or NRSROs were faster at detecting increases in risk at the lower-risk end of the rating scale. Of particular interest to the safe-harbor concept, we found no case in which an NRSRO rated a bank triple-A but regulators found the bank's condition to cause supervisory concern. Banks receiving double-A ratings or lower were sometimes the cause of supervisory concern.

Matters for Consideration by Congress

If the experience from banks provides a reasonable basis for assessing how an enterprise safe-harbor would work, then Congress may want to restrict any regulatory safe-harbor to triple-A rated enterprises.

[3]Due to time constraints, the event history analysis was done using only Moody's data.

Agency Comments

Officials from the Office of the Comptroller of the Currency (OCC), the Federal Reserve Board of Governors, FDIC, Moody's Investors Service, and Standard & Poor's reviewed a draft of this report. These officials generally agreed with the contents of this report. We have incorporated their clarifications and comments where appropriate.

We are providing copies of this report to federal bank regulators, executive branch agencies, government-sponsored enterprises, Moody's Investors Service, Standard & Poor's, and other interested parties.

The major contributors to this report are listed in appendix VI. Please contact me at (202) 275-8678 if you or your staff have any questions concerning the report.

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and Markets Issues

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Abbreviations

CAMEL	Capital, Assets, Management, Earnings, and Liquidity
CD	Certificate of Deposit
FDIC	Federal Deposit Insurance Corporation
NRSRO	Nationally-recognized statistical rating organization
OCC	Office of the Comptroller of the Currency

Objective, Scope, and Methodology

Objective

In this report, we examined the available evidence to judge whether NRSRO ratings of government-sponsored enterprises would provide information at least as reliable and timely as that obtained through federal supervision. To make this judgment in the absence of data for enterprises, we (1) evaluated the consistency of regulatory and NRSRO ratings for banks having both types of ratings and (2) compared the timing of rating changes by NRSROs and federal regulators for the same banks.

Scope

We obtained bank ratings from Moody's and Standard & Poor's as far back as they maintained the data in computer-accessible form—from December 1985 through December 1990. We then obtained CAMEL ratings for these banks from each bank's primary regulator—the OCC, the Federal Reserve Board of Governors, or the FDIC.[1]

This gave us a universe of 207 banks that had ratings both from a regulator and at least one NRSRO. These banks had assets ranging in size from $100 million to $68 billion, with the majority having assets greater than $1 billion. Since our analyses compared the ratings from only one NRSRO at a time to the corresponding CAMEL ratings, the effective universe was 153 banks for analyses using Moody's data and 185 banks for analyses using Standard & Poor's data. However, for various reasons, not all banks had ratings spanning the entire time period from December 1985 through December 1990. Moody's or Standard & Poor's may have started rating some banks after December 1985; some banks may have started operations after this date; and others may have ceased operations before December 1990 due to insolvency or a purchase by or merger with another bank.

Since they are similar measures of risk, we chose to use Moody's and Standard & Poor's ratings for bank long-term CDs greater than $100,000 to compare to the bank regulators' CAMEL ratings. Because CD amounts greater than $100,000 are uninsured, NRSRO ratings measured the risk uninsured depositors have of incurring losses if the bank fails. Similarly, CAMEL ratings measured the risk to the federal deposit insurance fund that it would have to cover losses in the event of a bank failure.

Regulators rate bank risk using a unit scale from 1 (low) to 5 (high). Moody's and Standard & Poor's use letter grades to rate the risk of long-term financial instruments. The lowest-risk grades are designated

[1]The bank regulators supplied confidential bank rating data to us with the condition that individual bank ratings not be revealed.

"AAA" and "Aaa" by Standard & Poor's and Moody's, respectively. In order of increasing risk, the scale moves to double-A, single-A, B, and C designations. Standard & Poor's modifies some of these letter designations by "+" and "-" signs, while Moody's appends a numerical modifier from 1 to 3 to further differentiate the ratings. In total, considering the modified ratings, Moody's and Standard & Poor's both use a scale with 19 risk categories. Appendix II gives a detailed description of the three rating schemes.

Only 13 of Moody's ratings (from Aaa to Ba3) and only 16 of Standard & Poor's ratings (from AAA to B-) appeared in their ratings of banks. We assigned a unit scale from 1 (low) to 13 (high) to Moody's ratings and 1 (low) to 16 (high) to Standard & Poor's ratings to compare them to the 1-to-5 CAMEL rating scale.

Because NRSRO and CAMEL ratings often remained unchanged for long periods—months, sometimes years—we transformed the data into monthly observations by extending the rating of a particular day to the month in which it was made and all subsequent months until the occurrence of a new rating. When there was more than one rating given in a month, we assigned the rating in effect on the last day of the month to that entire month. NRSRO ratings were dated when the ratings became public, but the CAMEL ratings were dated either (1) the date of the financial data on which the bank examination was based or (2) the date the examination began. Bank regulators told us that for banks of the sizes in our sample, ratings are actually assigned an average of 3 to 4 months after the recorded dates. However, they cautioned that this rough estimate involved a large variance (i.e., individual cases may be quicker or later). Consequently, we analyzed the data first as originally supplied to us by the regulators and then, with regulatory dates lagged by 3 months.[2]

Methodology

We used two techniques to evaluate the consistency of NRSRO and CAMEL ratings. Correlation analysis was used to indicate how well changes in CAMEL and NRSRO ratings corresponded. Both CAMEL and NRSRO ratings are inherently rank-ordered, so we used a Pearson[3] correlation coefficient to

[2]However, since the regulators found it difficult to supply us with an average figure in which they felt a great degree of confidence, we performed some additional analysis and reported when our results were sensitive to the assumed adjustment.

[3]The Spearman rank correlation coefficient is the Pearson correlation coefficient computed between the ranked values of two series. Both CAMEL and NRSRO ratings are rank-ordered, so we used the Pearson correlation coefficient.

measure the association between CAMEL and NRSRO ratings.[4] We also used a two-dimensional frequency table to examine the relationship between the ratings at varying risk levels. This table allowed us to calculate the percentage of observations that disagreed, suggesting one or both ratings might have misclassified risk (e.g., where Moody's or Standard & Poor's classified risk to be low when regulators classified it to be high).

We also used two techniques to evaluate the relative timing of CAMEL and NRSRO rating changes. Correlation coefficients were computed using the value of an NRSRO rating at a particular date matched with the CAMEL rating at the same date, at earlier dates, and at later dates. Our expectation was that if one rating series (for example, CAMEL) changed assessments of risk consistently before the other, then the highest correlation coefficients would occur when NRSRO ratings were correlated with CAMEL ratings at some consistently earlier date. Again, a Pearson correlation coefficient was the statistic used to measure this association.[5]

Because the correlation analysis technique did not allow us to differentiate among risk levels, we also used event history analysis to determine if one rating series led the other in detecting risk increases at particular levels of risk. We specifically focused on the case where risk was low because this is where the safe-harbor proposal would apply. We used chi-square tests to assess whether either CAMEL leads NRSRO or NRSRO leads CAMEL in assigning higher risk ratings to banks. Specifically, we concluded that CAMEL leads NRSRO when the following two hypotheses were supported based on chi-square tests:

(1) After the two ratings agree that a bank was low-risk in a month, CAMEL was more likely than the NRSRO's ratings to report the bank as "high-risk" the following month.

(2) When the two ratings disagreed in a month (CAMEL "high-risk" and NRSRO "low-risk"), the two ratings were more likely to agree that the bank was "high-risk" in the following month than to agree that the bank was "low-risk" in the following month.

The first hypothesis asserts that CAMEL leads and the second asserts that NRSRO follows. Only when the data supported both CAMEL leads and

[4]In this case, monthly comparative observations were weighted equally.

[5]In this case, each bank was weighted equally when computing the statistic. For example, a bank with 20 months of observations would have been given equal weight as a bank with 40 months of observations in computing an average correlation coefficient.

NRSRO follows did we infer that CAMEL leads the NRSRO in reporting increases in risk. An analogous pair of chi-square tests was used to assess whether the NRSRO leads CAMEL.

The use of the frequency table to identify rating disagreement and the event history analyses required us to define a particular association of CAMEL and NRSRO ratings. Since there was no intrinsically correct way to do this, we used a number of associations by (1) using definitions of the rating schemes as guidelines (see app. II), (2) arranging NRSRO ratings so that they had a similar proportion of more- and less-risky ratings as CAMEL for the banks reviewed, and (3) using regression analysis. We also used associations that fell within the range of those resulting from these methods.

Assumptions and Limitations of the Data and Analysis

A key assumption of our analysis was that the way various factors influenced a bank's NRSRO and CAMEL rating remained constant throughout the period analyzed. In addition, our research had several limitations. First, the two rating schemes do not measure exactly the same thing. Although both measure risk, they do so in different ways and for different purposes. (See app. II for more information on the purposes and definitions of rating schemes.) However, since both ratings indicate a bank's risk level and should move in the same direction at the same time, we concluded that comparisons could provide useful information.

Second, our ability to make judgments at the highest-risk levels was limited because NRSROs reported no bank CDs at their highest-risk levels. NRSROs consider the federal practice of protecting uninsured depositors from losses resulting from large bank failures when they rate CDs. To the degree that NRSROs do not use the full extent of their rating scale because they expect that bank depositors will be protected from losses, the comparisons between CAMEL and NRSRO ratings could be biased at the highest-risk end of the scale. However, we were most interested in the sensitivity of regulators' and NRSROs' ability to detect increases in risk at the less-risky end of the ratings scale where Treasury's "safe-harbor" proposal would apply. Thus, possible bias of NRSRO ratings at the riskier end of the rating scale did not rule out using the ratings for our purpose.

Another limitation was our inability to definitively answer the question of how well the rating systems perform in assessing risk and in recognizing changes in risk because there is no absolute measure of this risk. To overcome this limitation, we used several techniques to compare the

ratings and several plausible ways to establish a correspondence between them; these techniques enabled us to note if and how the results were affected by our choice of analysis technique and correspondence scheme.

Our work was undertaken between December 1990 and October 1991 in accordance wth generally accepted government auditing standards.

Rating Systems for Financial Institutions

This appendix discusses the three rating schemes used in this report:

- the uniform financial institutions rating system, or CAMEL, used by bank regulators;
- Moody's Investors Service long-term CD ratings; and
- Standard & Poor's long-term CD ratings.

CAMEL

The CAMEL rating system provides a general framework for evaluating and assimilating all significant financial, operational, and compliance factors in order to assign a summary or composite rating to each federally regulated commercial bank, savings and loan association, mutual savings bank, and credit union.[1] The purpose of the rating system is to reflect in a comprehensive and uniform fashion an institution's financial condition, compliance with laws and regulations, and overall operating soundness. Financial institution regulators first assess capital, assets, management, earnings, and liquidity. Each of these components is rated individually according to a best-to-worst unit scale of 1 to 5. The regulators then assign an overall composite rating using the same scale.

The primary purpose of the composite rating is to help identify those institutions that require special supervisory attention and/or warrant more than normal supervisory concern. In an effort to accomplish this objective, the rating system identifies certain institutions whose financial, operational, or managerial weaknesses are so severe as to pose a serious threat to continued financial viability. These institutions receive, depending upon degree of risk and supervisory concern, a rating of "4" or "5." Such institutions are generally characterized by unsafe, unsound, or other seriously unsatisfactory conditions and carry a relatively high possibility of failure or insolvency.

The CAMEL rating system also identifies a category of institutions that have some combination of financial or compliance deficiencies that, while posing little or no threat to financial viability under present circumstances, do warrant more than normal supervisory concern. These institutions are not deemed to present a significant risk of failure or loss or hardship to depositors, borrowers, or the public, but do require a higher than normal level of supervision. Institutions that warrant some supervisory concern but do not entail a relatively high possibility of failure or insolvency are generally rated "3."

[1]Information in this section was largely excerpted from the "Uniform Financial Institutions Rating System" recommended by the Federal Financial Institutions Examination Council, Nov. 13, 1979.

Composite ratings are defined and distinguished as follows:

- Composite 1 institutions are basically sound in every respect; any critical findings or comments are of a minor nature and can be handled in a routine manner. Such institutions are resistant to external economic and financial disturbances and more capable of withstanding the vagaries of business conditions than institutions with lower ratings.
- Composite 2 institutions are fundamentally sound but may reflect modest weaknesses correctable in the normal course of business. The nature and severity of deficiencies are not considered material. Therefore, such institutions are stable and also able to withstand business fluctuations quite well.
- Composite 3 institutions exhibit a combination of financial, operational, or compliance weaknesses ranging from moderately severe to unsatisfactory. When weaknesses relate to financial condition, such institutions may be vulnerable to the onset of adverse business conditions and could easily deteriorate if concerted action is not effective in correcting the areas of weakness. Institutions that are in significant noncompliance with laws and regulations may also be accorded this rating. Generally, these institutions give cause for supervisory concern and require more than normal supervision to address deficiencies. Overall strength and financial capacity, however, are still such as to make failure only a remote possibility.
- Composite 4 institutions have an immoderate volume of serious financial weaknesses or a combination of other conditions that are unsatisfactory. Major and serious problems or unsafe and unsound conditions may exist that are not being satisfactorily addressed or resolved. Unless effective action is taken to correct these conditions, they could reasonably develop into a situation that could impair future viability, constitute a threat to the interests of depositors, and/or pose a potential for disbursement of funds by the insuring agency. A higher potential for failure is present but is not yet imminent or pronounced.
- Composite 5 institutions have an extremely high immediate or near-term probability of failure. The volume and severity of weaknesses or unsafe and unsound conditions are so critical as to require urgent aid from stockholders or other public or private sources of financial assistance. In the absence of urgent and decisive corrective measures, these situations will likely require liquidation and the payoff of depositors; disbursement of insurance funds to insured depositors; or some form of emergency assistance, merger, or acquisition.

Moody's Credit Opinions

Moody's Investors Service used the following ratings for senior bank obligations having maturities longer than 1 year.[2]

- Aaa obligations are of the best quality and carry the smallest degree of investment risk. Interest payments are protected by a large or exceptionally stable margin and principal is secure. While the various protective elements are likely to change, such changes as can be visualized are most unlikely to impair the fundamentally strong position of such issues.
- Aa obligations are judged to be of high quality by all standards. Together with the Aaa group they comprise what are generally known as high-grade bonds. They are rated lower than the best obligations because margins of protection may not be as large as in Aaa securities, fluctuation of protective elements may be of greater amplitude, or there may be other elements present that make the long-term risk appear somewhat larger than the Aaa securities.
- A obligations possess many favorable investment attributes and are to be considered as upper-medium-grade obligations. Factors giving security to principal and interest are considered adequate, but elements may be present that suggest a susceptibility to impairment some time in the future.
- Baa obligations are considered medium-grade (i.e., they are neither highly protected nor poorly secured). Interest payments and principal security appear adequate for the present but certain protective elements may be lacking or may be characteristically unreliable over any length of time. Such obligations lack outstanding investment characteristics and in fact have speculative characteristics.
- Ba obligations are judged to have speculative elements; their future cannot be considered well-assured. Often the protection of interest and principal payments may be very moderate, and, thereby, not well safeguarded during both good and bad times over the long term. Uncertainty of position characterizes bonds in this class.
- B obligations lack characteristics of the desirable investment. Assurance of interest and principal payments or of maintenance of other terms of the contract over any long period of time may be small.
- Caa obligations are of poor standing. Such issues may be in default or may have elements of danger with respect to principal or interest.
- Ca obligations are highly speculative. Such issues are often in default or have other marked shortcomings.

[2]Largely excerpted from Moody's Investors Service, Credit Opinions: Financial Institutions, Dec. 1989.

- C obligations are the lowest-rated class and can be regarded as having extremely poor prospects of ever attaining any real investment standing.

Moody's applies numerical modifiers 1, 2, and 3 in each generic rating classification from Aa to B. The modifier of 1 indicates that the investment is in the higher-credit (lower-risk) end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates that the ranking is in the lower-credit (higher-risk) end of the generic category.

Standard & Poor's Bank CD Rating System

Standard & Poor's provides investors with an evaluation of the creditworthiness of CDs issued by U.S. banks, savings and loan institutions, and foreign banks.[3] The rating judgment is a composite of two assessments. Fundamental credit analysis on each company is performed using quantitative analysis to determine an institution's financial position, including portfolio quality, liquidity, profitability, and capital adequacy. The second assessment focuses on subjective factors, such as management depth and quality, risk profile, business aggressiveness, and regulatory support. Where the institution's financial strength is questionable, CDs are assigned lower ratings even when regulatory support can be expected. Standard & Poor's assesses the issuer's ability to redeem the CD in accordance with the terms specified.

The rating definitions and their respective meanings follow:

Long-Term Investment Grades

- AAA represents the highest degree of safety. These issues have an overwhelming repayment capacity.
- AA represents a very high degree of safety and capacity for repayment. These issues differ from higher-rated issues only to a small degree.
- A represents a strong degree of safety and capacity for repayment, but these issues are somewhat more susceptible in the long term to adverse economic conditions than those rated in higher categories.
- BBB represents a satisfactory degree of safety and capacity for repayment, but these issues are more vulnerable to adverse economic conditions or changing circumstances than higher-rated issues.

[3]Largely excerpted from Standard & Poor's, "Bank and Savings & Loan CD Ratings," May 1990 Supplement.

Long-Term Speculative Grades

- BB represents less near-term vulnerability to default than other speculative issues. However, the issues face major ongoing uncertainties or exposures to adverse economic or financial conditions, thus threatening capacity to meet interest or principal payments on a timely basis.
- B represents greater vulnerability to default but currently has the capacity to meet interest and principal repayments. Adverse business, financial, or economic conditions will likely impair capacity to pay interest and repay principal.
- CCC represents issues having currently identifiable vulnerability to default. Adverse business, financial, or economic developments would render repayment capacity unlikely.

Standard & Poor's ratings from AA to CCC may be modified by a plus or minus sign, reflecting the relative standing within the major rating categories. The "+" modifier indicates that the investment is at the higher-credit (lower-risk) end of the major rating category; and the "-" modifier indicates that the investment is in the lower-credit (higher-risk) end of the major rating category.

Frequency Distributions of Ratings by Rating Categories

	CAMEL ratings					
Moody's	**1**	**2**	**3**	**4**	**5**	**Total**
Aaa	3.11	1.40	0	0	0	**4.51**
Aa1	3.60	3.22	.16	0	0	**6.98**
Aa2	5.32	10.17	.60	.01	0	**16.11**
Aa3	3.94	20.02	1.06	.06	0	**25.07**
A1	2.50	13.14	3.58	.10	0	**19.32**
A2	1.30	6.68	1.91	.60	0	**10.49**
A3	.04	2.25	3.21	.88	.01	**6.41**
Baa1	.33	.94	2.77	1.03	0	**5.06**
Baa2	0	.58	1.47	.53	.16	**2.74**
Baa3	0	.04	.40	.41	.23	**1.08**
Ba1	0	.27	.17	.53	.20	**1.17**
Ba2	0	0	0	.21	.26	**.47**
Ba3	0	0	.03	0	.57	**.60**
Total	**20.13**	**58.72**	**15.35**	**4.37**	**1.43**	**100.00**
Standard & Poor's						
AAA	1.30	0	0	0	0	**1.30**
AA+	1.74	2.48	.23	0	0	**4.45**
AA	4.35	7.72	.63	.28	0	**12.97**
AA-	3.94	4.90	.63	.23	0	**9.70**
A+	5.84	10.31	1.28	.13	0	**17.56**
A	4.85	16.70	1.87	.51	0	**23.94**
A-	1.84	9.68	3.11	.74	0	**15.37**
BBB+	1.35	3.40	1.13	.13	.06	**6.07**
BBB	0	.84	1.39	.81	0	**3.04**
BBB-	0	.99	.94	.48	.19	**2.59**
BB+	0	.08	.19	.35	0	**.61**
BB	0	.14	.04	.66	.19	**1.03**
BB-	0	0	.14	.23	.08	**.44**
B+	0	0	0	.03	.06	**.09**
B	0	.01	0	.06	.50	**.57**
B-	0	0	0	0	.27	**.27**
Total	**25.21**	**57.25**	**11.57**	**4.62**	**1.34**	**100.00**

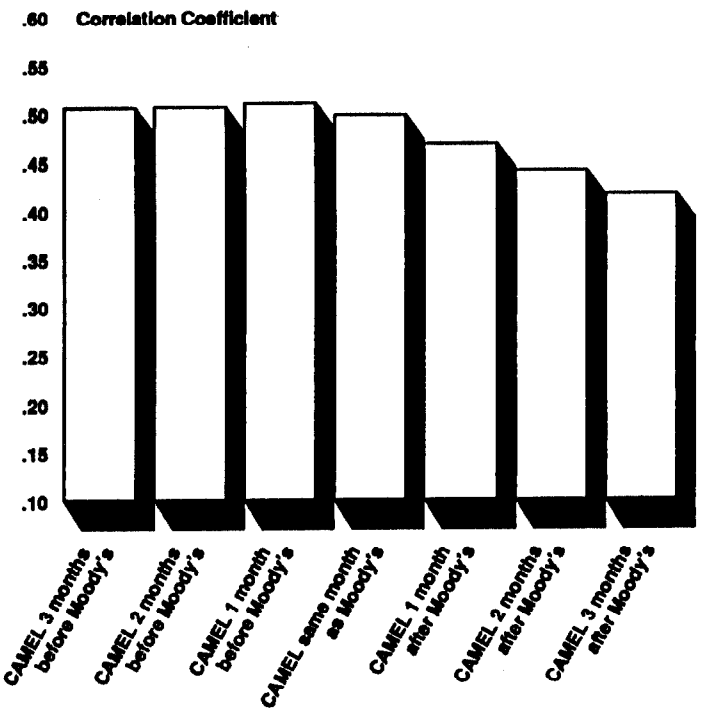
Source: GAO analysis of data supplied by Moody's, Standard & Poor's, FDIC, the Board of Governors of the Federal Reserve System, and OCC.

Correlation Analysis

We used correlation analysis to evaluate the question of relative timing of rating changes—whether NRSROs or regulators reported changes in risk first. Correlation coefficients were computed using the value of NRSRO ratings at a particular date matched with CAMEL ratings as of the same date, earlier dates, and later dates. Our expectation was that if CAMEL changed assessments of risk consistently before Moody's or Standard & Poor's, then the highest correlation coefficients would occur when Moody's or Standard & Poor's values were correlated with CAMEL values at some consistently earlier date.

Figure IV.1 indicates the correlation coefficients between CAMEL ratings and Moody's ratings. The middle bar shows the correlation coefficient when the series were matched at the same dates. Bars to the left of the middle show cases when Moody's ratings were matched with CAMEL ratings of earlier dates by 1 to 3 months. The bars to the right of the middle show Moody's values matched with CAMEL values of 1 to 3 months later.

Figure IV.1: Correlations of Moody's and CAMEL Ratings Matched at Various Points in Time



Note: Monthly data from December 1985 through December 1990 were used.

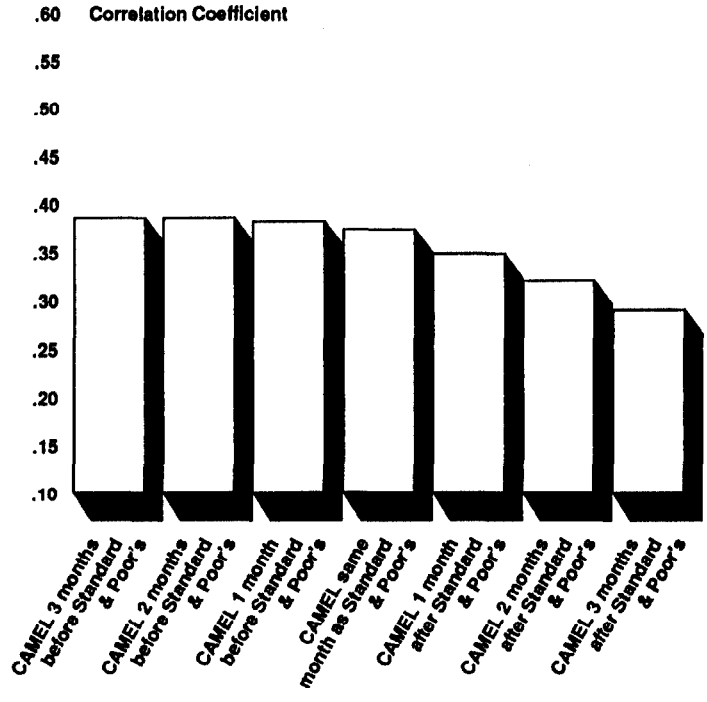
Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

The figure suggests that CAMEL may have reported changes in risk 1 month before Moody's. However, other factors led us to discount this conclusion. First, the correlation coefficients differed only slightly. Second, there was a discrepancy in the way regulators and NRSROs dated their ratings that made the CAMEL ratings appear to be prematurely dated. Regulators dated their CAMEL assessment either the date the examination began or the date of the financial period that was being examined. Both would predate the assignment of a CAMEL rating by an average of about 3 to 4 months, according to regulatory officials. By contrast, private rating agencies used the date that their assessment was made public. Making a 3-month correction for the premature regulatory date would suggest that Moody's reported changes in risk 2 months before CAMEL.[1] However, because the coefficients still differed only slightly, we concluded that there was no significant lead by either Moody's or CAMEL.

[1]Making a correction on fig. IV.1 would amount to shifting the labels on the bars three bars to the left.

Figure IV.2 shows the results obtained by matching CAMEL ratings with Standard & Poor's ratings at various dates. Except for the fact that the correlation coefficients are lower, we otherwise found the results to be comparable to the Moody's case. The differences between bars are minor and the regulatory dating practices falsely suggest that CAMEL reported changes in risk 3 months before Standard & Poor's.

Figure IV.2: Correlations of Standard & Poor's and CAMEL Ratings Matched at Various Points in Time



Note: Monthly data from December 1985 through December 1990 were used.

Source: GAO analysis based on data supplied by Standard & Poor's and federal bank regulators.

Event History Analysis

We used event history analysis[1] to examine whether either CAMEL ratings or Moody's ratings on average were faster in reporting changes in risk.[2] We specifically focused on risk increases because that was the case most relevant to an evaluation of a regulatory safe harbor.

To determine whether Moody's ratings or CAMEL ratings were faster in reporting increases in risk, we devised a three-step test. First, we chose a correspondence between Moody's and CAMEL rating schemes to align the 13 risk categories used by Moody's with CAMEL's five risk categories. This alignment allowed us to recognize when ratings agreed in their assessments of risk.

Second, we identified instances in which both ratings agreed within the same period that risk was low (this instance is the "original level of risk") and, in the subsequent period, one rating indicated a one-level increase in risk while the other did not. We computed a chi-square statistic to test if there was any significant difference between the probability of Moody's rating reporting increased risk with the CAMEL rating reporting no change (condition 1), and the CAMEL rating reporting increased risk with Moody's rating reporting no change (condition 2).

In the third step, we extended our investigation of the condition, if any, that we found significantly more probable. If both ratings agreed in a subsequent period that risk had increased, we would denote the rating that changed first as leading. Otherwise, the results would be considered indeterminate.

We aligned the rating scales and did the analysis several ways, allowing for increasing distinctions between levels of risk, starting with high/low, then with high/medium/low and finally with high, medium/high, medium/low, and low risk. For brevity, we present only examples from the simplest division and an excerpt from a table with the finest division.

[1]This analysis assumes that an event history model called the discrete time Markov chain is appropriate. Classical expositions of this model are in Feller, W., An Introduction to Probability Theory and Its Applications, 3rd ed., New York: John Wiley, 1966; and Karlin, S. and H. Taylor, A First Course in Stochastic processes, New York: Academic Press, 1975. The Markov chain model assumes that the transition probabilities are constant in time and among banks. If these assumptions are incorrect, the dependence on past history is more complex, or exogenous variables affecting the process have been omitted, this model would be wrong.

[2]Because of time constraints, this analysis was completed for Moody's data only, where the correlation with CAMEL data was higher.

The test represented by table V.1 used the high/low distinction and was one of seven trials run using this risk distinction. In this test, which involved no correction for the premature regulatory date, the CAMEL rating seemed to lead.

Table V.1: Frequencies and Associated Probabilities in Moving From One Risk Level to Another (Case 1: CAMEL Leads)

	Next month				
Start month	**Both low**	**Moody's high; CAMEL low**	**CAMEL high; Moody's low**	**Both high**	**Total**
Both low	5074	19	40	1	5134
	(.9883)	(.0037)	(.0078)	(.0002)	(1.0000)
Moody's high;	6	283	0	11	300
CAMEL low	(.0200)	(.9433)	(.0000)	(.0367)	(1.0000)
CAMEL high;	8	0	509	31	548
Moody's low	(.0146)	(.0000)	(.9288)	(.0566)	(1.0000)
Both high	0	4	4	866	874
	(.0000)	(.0046)	(.0046)	(.9908)	(1.0000)

Note: Figures are for the case of CAMEL low-risk defined to be CAMEL 1 or 2 and high-risk defined as CAMEL 3, 4, or 5; Moody's low-risk defined to be ratings from Aaa to A2; high-risk defined to be ratings from A3 to Ba3. Probabilities are in parentheses.

Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

The following paragraphs summarize the statistical analysis for this case. Starting from the condition in which both ratings say risk is low, we tested for significant difference in the probability of moving to the condition of only CAMEL reporting higher risk (40 observations) and to the condition of only Moody's reporting higher risk (19 observations). The calculation was as follows:

$$\text{Chi-square statistic} = \frac{(40 - 29.5)^2 + (19 - 29.5)^2}{29.5} = 7.47$$

The chi-square statistic of 7.47 is greater than 6.64, the chi-square statistic at the .99 level of significance with 1 degree of freedom. Therefore, the CAMEL rating is faster in saying that risk has increased.

We then tested whether in the following period Moody's was more likely to have agreed with CAMEL that risk had increased or whether CAMEL was more likely to return to the less-risky Moody's rating. We examined the values in the cells that denote ratings moving from "CAMEL high; Moody's low" to either "Both high" (31 observations) or "Both low" (8

observations) and tested whether one was significantly larger than the other. Our results were as follows:

$$\text{Chi-square statistic} = \frac{(8 - 19.5)^2 + (31 - 19.5)^2}{19.5} = 13.56$$

The chi-square of 13.56 is greater than 6.64, the chi-square statistic at the .99 level of significance with 1 degree of freedom. Therefore, the number of times that Moody's agreed with CAMEL in the next period that risk had increased was significantly greater than the number of times that CAMEL reverted to saying that risk had not increased. Since they both eventually agreed that risk had increased, we can say that the CAMEL rating was faster in detecting risk increases.

Table V.2 examines the same case with an adjustment for the premature regulatory date. After a correction of the regulatory date by 3 months, the results became indeterminate.[3]

Table V.2: Frequencies and Associated Probabilities in Moving From One Risk Level to Another With a 3-Month Adjustment for Premature Regulatory Date (Case 2: Indeterminate Results)

	Next month				
Start month	**Both low**	**Moody's high; CAMEL low**	**CAMEL high; Moody's low**	**Both high**	**Total**
Both low	5138	29	25	1	5193
	(.9894)	(.0056)	(.0048)	(.0002)	(1.0000)
Moody's high;	5	305	0	20	330
CAMEL low	(.0152)	(.9242)	(.0000)	(.0606)	(1.0000)
CAMEL high;	8	0	445	21	474
Moody's low	(.0169)	(.0000)	(.9388)	(.0443)	(1.0000)
Both high	1	3	4	833	841
	(.0012)	(.0036)	(.0048)	(.9905)	(1.0000)

Note: Figures are for the case of CAMEL low-risk defined to be CAMEL 1 or 2 and high-risk defined as CAMEL 3, 4, or 5; Moody's low-risk defined to be ratings from Aaa to A2; high-risk defined to be ratings from A3 to Ba3. Probabilities are in parentheses.

Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

Starting with the condition of both Moody's and CAMEL rating risk as low, we tested first for significant difference in the probability of

[3]In this case, the results would have remained indeterminate even if the correction for the premature regulatory date had been 2 months.

moving to the condition of only CAMEL saying risk was high (25 observations) and to the condition of only Moody's rating risk as high (29 observations). Results follow:

$$\text{Chi-square statistic} = \frac{(29-27)^2 + (25-27)^2}{27} = .30$$

The chi-square of .30 is less than 3.84, the chi-square statistic at the .95 level of significance with 1 degree of freedom. Therefore, we could not say that the CAMEL rating was faster in detecting increases in risk. After we made a 3-month adjustment for the premature regulatory date, the results became indeterminate. This would have also been the case if we had assumed that the adjustment was 2 months instead of 3.

Table V.3 presents the results of the event history analysis for an alternative association of Moody's ratings with CAMEL ratings. In this case, the results were indeterminate. However, when an adjustment was made for the premature regulatory date, as shown in table V.4, Moody's was shown to lead.

Table V.3: Frequencies and Associated Probabilities in Moving From One Risk Level to Another (Case 3: Indeterminate Results)

	Next month				
Start month	**Both low**	**Moody's high; CAMEL low**	**CAMEL high; Moody's low**	**Both high**	**Total**
Both low	4530	27	29	0	4586
	(.9878)	(.0059)	(.0063)	(.0000)	(1.0000)
Moody's high;	8	817	0	23	848
CAMEL low	(.0094)	(.9634)	(.0000)	(.0271)	(1.0000)
CAMEL high;	5	0	347	25	377
Moody's low	(.0133)	(.0000)	(.9204)	(.0663)	(1.0000)
Both high	0	7	1	1037	1045
	(.0000)	(.0067)	(.0010)	(.9923)	(1.0000)

Note: Figures are for the case of CAMEL low-risk defined to be CAMEL 1 or 2 and high risk defined as CAMEL 3, 4, or 5; Moody's low-risk defined to be ratings from Aaa to A1; high-risk defined to be ratings from A2 to Ba3. Probabilities are in parentheses.

Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

Starting with the condition of both Moody's and CAMEL rating risk as low, we tested first for significant difference in the probability of

moving to the condition of only CAMEL rating risk as high (29 observations) and to the condition of only Moody's rating risk as high (27 observations). Results follow:

$$\text{Chi-square statistic} = \frac{(29-28)^2 + (27-28)^2}{28} = .07$$

The chi-square of .07 is less than the chi-square statistic of 3.84 at the .95 level of significance with 1 degree of freedom. Therefore, we could not say that CAMEL was faster in indicating increases in risk because the difference between 27 and 29 was not large enough. However, when an adjustment was made for the premature regulatory date, the results changed, as shown in table V.4.

Table V.4: Frequencies and Associated Probabilities in Moving From One Risk Level to Another With a 3-Month Adjustment for Premature Regulatory Date (Case 4: Moody's Leads)

	Next month				
Start month	**Both low**	**Moody's high; CAMEL low**	**CAMEL high; Moody's low**	**Both high**	**Total**
Both low	4572	34	18	0	4624
	(.9888)	(.0074)	(.0039)	(.0000)	(1.0000)
Moody's high;	7	864	0	28	899
CAMEL low	(.0078)	(.9611)	(.0000)	(.0311)	(1.0000)
CAMEL high;	5	0	301	18	324
Moody's low	(.0154)	(.0000)	(.9290)	(.0556)	(1.0000)
Both high	1	6	1	983	991
	(.0010)	(.0061)	(.0001)	(.9919)	(1.0000)

Note: Figures are for the case of CAMEL low-risk defined to be CAMEL 1 or 2 and high-risk defined as CAMEL 3, 4, or 5; Moody's low-risk defined to be ratings from Aaa to A1; high-risk defined to be ratings from A2 to Ba3. Probabilities are in parentheses.

Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

Starting with the condition of both Moody's and CAMEL rating risk as low, we tested first for significant difference in the probability of moving to the condition of only CAMEL rating risk as high (18 observations) and to the condition of only Moody's rating risk as high (34 observations), with the following result:

$$\text{Chi-square statistic} = \frac{(34-26)^2 + (18-26)^2}{26} = 4.92$$

A chi-square of 4.92 is greater than the chi-square statistic of 3.84 at the .95 level of significance with 1 degree of freedom. Therefore, Moody's was faster in reporting increased risk.

We then checked whether it was more likely for the CAMEL rating to have agreed with Moody's in the next period that risk had increased (28 observations) or if it was more likely that Moody's would have changed back to saying that risk had not increased (7 observations). The result was as follows:

$$\text{Chi-square statistic} = \frac{(7 - 17.5)^2 + (28 - 17.5)^2}{17.5} = 12.60$$

The 12.60 chi-square is greater than the chi-square statistic of 6.64 at the .99 level of significance with 1 degree of freedom. Therefore, it was more likely that CAMEL would have changed to agree with Moody's that risk had increased than Moody's would have changed to agree with CAMEL that risk had not increased. As a result, for this case, when an adjustment was made for the premature regulatory date, we could say that Moody's reported increases in risk before CAMEL.

We did the analysis several additional ways. We tried a three-way division of low-, medium-, and high-risk; and a four-way division with categories comparable to CAMEL 1, 2, 3, and 4-5—the finest division of risk categories we analyzed.

When the finest-risk breakdown possible was examined, neither CAMEL nor Moody's led in detecting increases in risk at the least-risky end of the ratings scale. This result held whether or not an adjustment was made for the premature regulatory date.

Table V.5 illustrates one of the cases in which we divided risk into four categories corresponding to CAMEL 1, 2, 3, and 4-5. For this example, we divided Moody's ratings using a frequency distribution as close as possible to the CAMEL frequency distribution. As a result, Moody's ratings from Aaa to Aa2 were assumed to correspond to CAMEL 1 and those from Aa3 to A2 were assumed to correspond to CAMEL 2.

Since the complete table would contain a total of 256 cells—16 possible conditions for the start month and 16 possible conditions for the next month, we presented only the data relevant for computing the chi-square statistics needed for our tests. As a result, the total number of observations in the right column is greater than the sum of observations

across the four columns containing the cases we highlighted. The difference is from the columns containing the cases we did not highlight. The same is true for the probabilities.

Table V.5: Frequencies and Associated Probabilities in Moving From One Risk Level to Another (Case 5: Indeterminate Results)

	Next month				
Start month	**Both low**	**Moody's higher; CAMEL low**	**CAMEL higher; Moody's low**	**Both higher**	**Total**
Both low	812	11	13	0	836
	(.9713)	(.0132)	(.0156)	(.0000)	(1.0000)
Moody's higher;	6	506	0	13	530
CAMEL low	(.0113)	(.9547)	(.0000)	(.0245)	(1.0000)
CAMEL higher;	7	0	992	28	1030
Moody's low	(.0068)	(.0000)	(.9631)	(.0272)	(1.0000)
Both higher	0	7	6	2673	2738
	(.0000)	(.0026)	(.0022)	(.9763)	(1.0000)

Note 1: Figures are for the case of CAMEL low-risk defined to be CAMEL 1 and higher-risk defined as CAMEL 2; Moody's lowest-risk defined to be ratings from Aaa to Aa2 and higher-risk defined to be ratings from Aa3 to A2. Probabilities are in parentheses.

Note 2: The total number of observations and probabilities in the right column is greater than the sum of observations across the columns because only data relevant for our tests are given.

Source: GAO analysis based on data supplied by Moody's Investors Service and federal bank regulators.

Starting with the condition of both Moody's and CAMEL rating risk as low, we tested first for significant difference in the probability of moving to the condition of only CAMEL rating risk as higher (13 observations) and to the condition of only Moody's rating risk as higher (11 observations). The result was as follows:

$$\text{Chi-square statistic} = \frac{(13-12)^2 + (11-12)^2}{11} = .18$$

The .18 chi-square is less than the chi-square statistic of 3.84 at the .95 level of significance with 1 degree of freedom. Therefore, we could not say that CAMEL was faster than Moody's in indicating increases in risk. The result was not changed by an adjustment for the premature regulatory date, nor by alternate associations between CAMEL and Moody's ratings.

The results varied for other analyses using cruder breakdowns of risk. For low- and medium-risk breakdowns, when an adjustment was made

for the premature regulatory date, some associations of the ratings resulted in Moody's reporting changes earlier, while other associations gave indeterminate results. In no instance did the CAMEL rating report changes in risk first. Only if no correction had been made for the premature regulatory reporting date would CAMEL ratings have sometimes reported increases in risk first.

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