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Derivatives Activity at Troubled Banks

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Abstract

We find that a relatively large number of banks active in the derivatives market have low capital ratios and are considered institutions with a significant risk of failure by bank supervisors. However, we also find no evidence that the volume of derivatives activity at troubled banks affects the probability of formal regulatory intervention or even a downgrade in supervisory rating. While derivatives have become an essential instrument for hedging risks, moral hazard can lead to their misuse by problem banks. Given that the absence of comprehensive data on bank derivatives activities prevents an accurate assessment of bank risk-taking, banks have an opportunity to take unmonitored second bets. Troubled banks have the motive to increase risk, and derivatives provide the means to do so. The role of bank supervisors should be to limit the opportunity through more comprehensive data reporting requirements and closer supervisory scrutiny of derivatives activity at problem banks.

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Explosive growth in derivatives activity has been fueled by financial market innovations and the need to actively manage the interest rate and exchange rate risks inherent in the operations of large financial intermediaries. Derivatives are now an essential element of financial activity, enabling intermediaries to hedge market risks more efficiently. However, they also can entail risks to both the bank and the banking system. These risks are magnified if troubled banks, with a strong incentive to speculate, take derivatives positions that could result in losses sufficient to imperil not only the institution, but also financial markets more generally.

A number of banks actively engaged in derivatives markets have had financial difficulties in recent years. Those difficulties resulted primarily from problem real estate loans rather than derivatives activity. However, whatever the original source of the problem, derivatives offer an opportunity to place large second bets, once a bank has financial difficulties.

The recent losses at Barings, Daiwa, and Sumitomo highlight the fact that derivatives positions are difficult to monitor and that even a few individual traders can generate substantial losses. Thus, although it does not appear that banks have used derivatives to place second bets, the potential for doing so should be a concern. This is particularly the case given that banks active in derivatives markets have been more likely to be undercapitalized, compared to those banks not engaged in

derivatives activity. In addition, a significant percentage of large banks engaged in derivatives activity in the first half of this decade have received a formal regulatory action, which reflects a perception by examiners of a significant risk of failure.

The fact that many financially troubled institutions engage in potentially speculative activities should be of particular concern following the recent savings and loan debacle, in which institutions having low capital and backed by deposit insurance similarly had the motive, the means, and the opportunity to take large risks. The widespread losses in the savings and loan industry led to supervisory and legislative changes intended to reduce moral hazard problems in the future. While these changes have led to more frequent and more comprehensive oversight of banking institutions, their primary focus is on-balance-sheet risks. This increased attention may have been a factor in the subsequent movement of an increasing amount of bank activity off their balance sheets.

We find no evidence that derivatives activity has been a factor in formal regulatory intervention or even in downgrades of supervisory ratings of banks. Typically, derivatives activity is hardly, if at all, mentioned explicitly in formal regulatory actions, while lending activity, loan monitoring, and reserves for problem loans are usually discussed exhaustively. This may reflect the fact that most banking problems in the early 1990s pre-dated some of the more highly publicized problems with

derivatives, and they do not appear to have resulted in the troubled banks using derivatives to place second bets. But, if the purpose of the regulatory action is to reduce the probability that a problem bank will fail, and to limit the cost to the deposit insurance fund if the bank does eventually fail, the omission of any discussion of off-balance-sheet activity in formal actions may be a serious shortcoming.

Insufficient regulatory attention to derivatives activity at problem banks may fail to prevent speculative excesses that are recognized only as a consequence of a bet lost, rather than as the outcome of monitoring that can reveal a bet taken. Bank Call Report data are not sufficiently detailed to reveal the extent to which bank derivatives activity affects the overall risk of bank portfolios. The limitations of off-site monitoring and the lack of attention to derivatives in earlier formal regulatory actions suggest that supervisors should focus greater attention on off-balance-sheet activity of troubled institutions. Troubled banks not only have the motive to place second bets and the means to do so, derivatives, but appear also to have the opportunity.

The first section of this paper discusses the use of off-site and on-site examinations to monitor bank risk, particularly for derivatives. The second section describes the financial health of institutions engaged in derivatives activity. The third section examines whether derivatives activity affects supervisory ratings or supervisory intervention. The final section considers possible policy issues.

I. Overview of Derivatives Activity and Supervisory Oversight

Banks have been aggressively expanding their use of derivatives. Derivatives allow banks to actively manage the interest rate risk and exchange rate risk inherent in the normal course of their business. Holding loans denominated in foreign currencies and making loans funded with deposits of a shorter maturity make banks susceptible to fluctuations in exchange rates or interest rates, and derivatives can provide a cost-effective means to manage such interest rate and exchange rate risk. However, other less benign explanations for the observed expansion have also been suggested.

Boyd and Gertler (1993) have argued that increased competition has caused large banks to adopt riskier portfolios. One way to increase risk (and hopefully return) is through off-balance-sheet activities such as derivatives (Koppenhaver and Stover 1991; Avery and Berger 1991). However, a careful examination of derivatives use as a tool to increase or decrease risk is severely handicapped by the very limited availability of information on bank derivatives activity.

The primary source of information on the derivatives activity of banks is the quarterly Call Report. Unfortunately, Call Report information is inadequate for evaluating the riskiness of derivatives positions (Simons 1995, Gorton and Rosen 1995). The notional values of swaps, futures and forward contracts, and written and purchased options are reported for interest rate contracts and foreign exchange rate contracts.

However, the Call Reports do not report long and short positions of forward and futures contracts separately. Nor do they provide separate information on call and put options written or bought. In addition, the reported categories are very broad. For example, interest rate caps, interest rate floors, and interest rate collars are all included as options contracts, even though the exposure of the bank to interest rate fluctuations is likely to differ for the various instruments. And even if such information were available, it would have to be tied back to on-balance-sheet positions in order to evaluate the effect of these derivatives activities on overall bank risk.

This severely limits the ability of bank supervisors or bank analysts to monitor derivatives positions and determine their effect on bank performance. Supervisors normally conduct off-site monitoring to determine whether a bank's financial condition has deteriorated since its last exam. If it has, a full exam can be scheduled earlier or a targeted exam can be scheduled to address particular concerns. For standard on-balance-sheet items, off-site surveillance involves the calculation of standard ratios to determine whether the institution is deviating from its historical performance or from the performance of peer institutions. Directing scarce examiner resources to problem areas and problem institutions can only be done if adequate data are available to warn supervisors of impending problems. In the case of derivatives, the off-site information is inadequate to

determine the contribution of changes in derivatives positions to a bank's overall risk.

Given the dearth of useful data on risks posed by derivatives, any assessment by supervisors of the risks from derivatives activity must be based on on-site examinations rather than off-site monitoring. Examiners then can evaluate and discuss, and if necessary limit, derivatives activity as part of the exam, through informal agreements on derivatives activity in the form of board resolutions or a memorandum of understanding, or, in the case of severe violations, through formal regulatory actions.

Formal regulatory actions, written agreements or cease and desist orders, are the most severe regulatory action available short of closing the bank.[1] They are legally enforceable and publicly disclosed and, in the event of noncompliance, can result in civil penalties. These actions can be issued for any major shortcoming that can imperil the safety and soundness of an institution. While some are directed at specific practices of the bank, most commonly they are issued because of concerns about the safety and soundness of the bank. The actions will generally require changes in management information systems, reserving procedures, and capital adequacy. Formal actions are generally quite specific on actions to be taken in monitoring loans, but they usually contain no specific discussion of derivatives activity.

Among large U.S. banks with at least some derivatives activities (532 banks), over 16 percent came under a formal action during the first half of the decade. A slightly higher percentage of large banks with a notional value of derivatives exceeding 10 percent of their assets came under a formal action. Still, no significant incident of these banks taking second bets with derivatives appears to have occurred. Nonetheless, a bank in a precarious position that is active in derivatives has a strong incentive, given deposit insurance, to take risks that may not be easily monitored in the absence of direct oversight. Since formal actions are generally issued to banks with the lowest supervisory ratings and with the highest probability of failure, these institutions should have substantial supervisory attention given to their derivatives activity, given its potential for large and rapid changes in the overall risk exposure of a bank.

The one specific requirement found in nearly all formal actions is an increase in capital ratios. While formal actions often require banks to be in compliance with risk-based capital requirements, which could cause a bank to restrict its derivatives activity, most frequently they require the bank to meet a 6 percent leverage ratio (Peek and Rosengren 1995a), which gives no weight to off-balance-sheet activities and, thus, puts no particular pressure on the bank to restrict them.

The inability to monitor derivatives risks off-site and the lack of discussion in formal actions of controlling derivatives

risks raise the issue of whether current oversight of the derivatives activities at troubled institutions is sufficient. Formal actions can exceed 50 pages in length, detailing actions needed to reduce risks and improve management's ability to monitor and manage risks, yet they generally contain relatively little, if anything, concerning derivatives activity. While most of the problems at banks with formal actions stemmed from on-balance-sheet activities, derivatives still have great potential as instruments to be used to place second bets. The next section will investigate the extent to which active bank participants in derivatives markets have had financial difficulties, based on their capital ratios or on supervisory assessments, in order to examine whether additional attention to derivatives activity is warranted.

II. Derivatives Activity at Troubled Institutions

Table 1 lists the 25 most active banks in the United States, based on the notional value of their exchange rate derivatives activity in the first quarter of 1990. For each bank, the table indicates the size of its exchange rate derivatives positions, both in absolute terms and relative to assets. Seven of these 25 banks were subject to a formal action for at least part of the five-year period from the beginning of 1990 through the end of 1994. Five of the seven have publicly disclosed their formal actions: Bankers Trust, First National Bank of Boston, Bank of New England NA (two formal actions), Connecticut National Bank,

and Shawmut Bank NA. Only Bankers Trust had a formal action that targeted its derivatives activity. Some of these formal actions made no mention of derivatives activity. Others discussed liquidity risk or market risk concerns associated with the bank's derivatives activity. However, when these concerns were mentioned, they typically accounted for only a few sentences in the entire document. In these formal actions (other than the one for Bankers Trust), to the extent they discuss derivatives activities at all, the focus is more on the liquidity risks faced by banks as a consequence of customer concerns about the viability of the bank, rather than on the risks the bank might undertake in an effort to reverse its financial impairment. While this, in part, reflects greater attention on areas where banks had experienced documented losses, such as real estate, derivatives activity should still be a concern if it provided an opportunity to take second bets.

Table 2 provides similar information for the 25 banks with the largest notional values of interest rate derivatives in 1990:I. Again, 15 of the 25 banks have a volume of notional interest rate derivatives activity in excess of the volume of their assets, with one as high as 1,776 percent of assets. Five of the 25 institutions most active in interest rate derivatives had a formal action during the 1990:I to 1994:IV period. Each of the five was also among the 25 banks most active in exchange rate derivatives activity, listed in the previous table.

The large proportion of banks with sizable derivatives positions that received formal regulatory actions raises the question of whether banks engaged in derivatives activities are overrepresented among troubled banks. Table 3 presents characteristics related to a bank's financial health for large U.S. banks (assets greater than $300 million in 1988:IV), grouped according to the bank's average ratio of the notional value of total derivatives to total assets during the 1990:I to 1994:IV period.

Risk-based capital ratios provide one assessment of the extent to which banks are financially troubled. Banks with a risk-based capital ratio below 8 percent are classified as "undercapitalized" in the guidelines that were established as a result of the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA). Almost 21 percent of the banks without any derivatives activity fell below the 8 percent threshold at some time during the 1990:I to 1994:IV period. However, much higher shares of banks with some derivatives activities fell below the 8 percent threshold, with the share tending to rise with greater derivatives exposure relative to assets. Over 25 percent of banks with a ratio of notional derivatives to assets between 0 and 5 percent fell below the 8 percent threshold; the share rises to over 54 percent for those banks whose notional value of derivatives exceeded 100 percent of their assets. This evidence indicates that banks with relatively more derivatives activity were overrepresented among undercapitalized banks. In part, this

reflects size differences. Large, more diversified banks are generally less well capitalized than small banks. However, the greater diversification of assets at large banks should have aided in reducing the probability of becoming undercapitalized, although that appears not to have been the case during this period.

Similar patterns appear using risk-based capital thresholds of 9 and 10 percent. Under the FDICIA risk-based capital guidelines, banks with risk-based capital ratios between 8 and 10 percent are deemed to be only "adequately capitalized" and a ratio in excess of 10 percent is required for a bank to qualify as "well capitalized." Compared to large banks with no derivatives activity, banks whose notional values of derivatives activities exceeded 5 percent of their assets include roughly twice the share of banks with risk-based capital ratios below both the 9 and the 10 percent thresholds.

The volume of problem loans relative to total loans in a bank's portfolio provides another measure of a bank's financial health. The share of banks whose ratio of nonperforming loans (the sum of loans past due more than 90 days and nonaccruing loans) to total loans exceeded 5 percent at some time during the 1990 to 1994 window is another objective measure of credit problems. Nearly 38 percent of large banks with no derivatives activity had a nonperforming loans ratio exceeding 5 percent at some time during the window. While that share was not consistently below those for all the categories of banks with

some derivatives activities, it was well below the share for the group of banks with the highest derivatives exposure.

Examiners' assessments of troubled banks appears to be less closely related to the volume of a bank's derivatives activities. Nearly 24 percent of the banks with no derivatives activities fell into the two lowest examiner ratings categories for banks, CAMEL 4 indicating a possibility of failure and CAMEL 5 indicating that a bank is likely to fail.[2] This is roughly the same as the share of banks whose derivatives activity equaled less than 5 percent of assets. Yet only 21 percent of banks whose notional values of derivatives exceeded 100 percent of their assets and 22 percent of banks with values between 10 and 100 percent fell into these two lowest CAMEL ratings. Only the set of banks with derivatives activity equaling between 5 and 10 percent of assets had a higher share of banks rated CAMEL 4 or 5 than the banks with no derivatives activity.

Similarly, formal actions taken by examiners against troubled banks do not appear to have been related to the volume (relative to assets) of a bank's derivatives activities. The average share receiving formal actions is almost the same for banks with derivatives activities as for banks with no derivatives activity. However, because these troubled banks have the motive, the means, and the opportunity to use derivatives to take second bets, they should receive more intensive examiner oversight as they become troubled. The next section investigates whether examiners take derivatives activity into account when

setting CAMEL ratings and imposing formal actions, controlling for other problems at the bank.

III. Factors Affecting Formal Actions and CAMEL Ratings

A bank's financial health and the nature and degree of risks in both its on-balance-sheet and its off-balance-sheet obligations should be important factors in supervisory decisions to change a bank's rating or to impose a formal regulatory action. While much detailed information is available about on-balance-sheet activities, the same cannot be said of off-balance-sheet activities. In particular, the information reported in quarterly Call Reports is not sufficiently detailed to determine the extent to which banks are speculating or hedging with their derivatives activities. Because a bank can easily and quickly expose itself to a substantial amount of risk by taking speculative positions, derivatives activities should be an important consideration in supervisory oversight of banks.

The data used here are a pooled time series, cross-section panel of balance sheet and income statement data from the Call Reports, supplemented with information on CAMEL ratings and formal actions. Because formal actions are issued only as a result of an exam, and because most CAMEL rating changes occur as a result of an exam, we include only exam quarters in our regression samples.[3] The sample includes observations for the 1990:I to 1994:IV period on all large (more than $300 million in

assets as of 1988:IV) FDIC-insured domestic banks in the United States whose principal line of business was not credit cards.

We focus on large banks because smaller banks rarely are active in derivatives. We omit the first eight quarters of Call Report data of de novo banks, because their capital positions (as well as their loan portfolios and indicators of problem loans) do not yet reflect the characteristics of a fully operational bank, since they begin with virtually all capital and cash and adjust over time to their longer-run portfolio compositions.

We consider three alternative dependent variables, each associated with its own specific sample. The first dependent variable has a value of one if regulators downgraded the CAMEL rating of bank i to, or below, a rating of 4 in quarter t, and zero otherwise. The panel data set includes each observation of banks that have not yet been downgraded to the CAMEL 4 rating, as well as each observation of banks up to and including the quarter of the CAMEL 4 downgrade. Because we are estimating the probability of a CAMEL downgrade, once a bank has been downgraded to the new CAMEL rating, its subsequent observations are dropped from the sample.[4] Similarly, all observations of a bank that was downgraded prior to 1990:I are omitted.

The panel data sets are constructed in the same manner for the other two dependent variables related to downgrades to a CAMEL 5 rating and to the imposition of a formal action. In the first case, all of a bank's observations subsequent to the CAMEL 5 downgrade are omitted from the sample. In the second case, all

of a bank's observations subsequent to the imposition of a formal action are omitted from the sample. The three data samples used in the regressions each contain approximately 800 banks with an average of approximately 2900 observations.

To determine whether involvement in derivatives activity contributes to triggering a CAMEL downgrade or the imposition of a formal action, we will estimate the following logistic model:

$$(1) \quad I_{i,t} = b_0 + \beta_1 X1_{i,t} + \beta_2 X2_{i,t} + \nu_{i,t}$$

where the three alternative dependent variables take on the value of zero except in the quarter that a bank receives a CAMEL rating downgrade to 4 or 5, or receives a formal action, respectively, in which case its value is one. We include as explanatory variables a vector of bank-specific factors (X1) that have been used in earlier studies to identify problem and failing banks. (See, for example, Gilbert and Park 1994, Sinkey 1975, Sinkey 1978, Thomson 1991, and Whalen and Thomson 1988.) In order to test whether examiners consider the extent of derivatives activity among the determinants of CAMEL downgrades and the imposition of formal actions, we also include a vector (X2) of measures of a bank's derivatives activities. We use end-of-quarter data that reflect the results of the examination, that is, the data that would be relevant for supervisors making the decision to downgrade a bank's CAMEL rating or to impose a formal action.

The vector X2 contains two types of measures, (0,1) dummy variables to indicate whether the bank is a participant in the derivatives market (if so, the value equals 1) and a measure of the volume of a bank's derivatives activity, the ratio of the notional value of its derivatives to its assets. We consider two alternative specifications. First, we include, as separate arguments in the specification, measures of the two main components of derivatives activity, total exchange rate derivatives (swaps; spot, forward, and futures commitments; and options contracts, both written and purchased) and total interest rate derivatives (swaps; futures and forward contracts; and options contracts, both written and purchased). Second, we combine the exchange rate and interest rate components into two measures of total derivatives activity: a measure of the bank's total derivatives activity and a dummy variable with a value of one if the bank engages in either exchange rate or interest rate derivatives activity.

Because engaging in derivatives activity provides an additional means for a bank to speculate, should it choose to do so, involvement in the derivatives market increases the potential for risk-taking. Thus, we would expect the dummy variables to have positive coefficients. Then, given that a bank is active in derivatives, we hypothesize that the greater the derivatives activity, the greater the potential for the bank to take on risk. And, because of the increased difficulty of monitoring larger and more complicated derivatives positions, the greater is the

opportunity (the easier it becomes) for the bank to increase its risk exposure without being detected. Thus, one might expect positive coefficients on the measures of the magnitude of derivatives activity since, after controlling for other problems at troubled banks, examiners might be more likely to downgrade a bank's rating or to impose a formal action at a bank the more active is the bank in the derivatives market.

The vector of bank-specific factors (X1) contains seven sets of variables that measure a bank's capital position, the quality of its assets, credit risk, interest rate risk, earnings, liquidity, and bank size. The first set of variables captures a bank's capital position (the C in CAMEL). The risk-based capital ratio measures the capital position of the bank scaled by its risk-adjusted assets. Another variable measures the loan loss reserve, scaled by assets, capturing how well the bank has already reserved for potential losses. The second set of variables measures the quality of the asset portfolio (the A in CAMEL). It includes nonperforming loans (loans that are 90 days or more past due or are nonaccruing) scaled by assets, which provides a measure of problems in the loan portfolio, and other real estate owned (OREO), scaled by assets, another measure of problems in a bank's asset portfolio.

On-balance-sheet exposures to categories of relatively more risky assets provide an indication of a bank's credit-risk exposure. Thus, the third set of variables includes bank portfolio concentrations in commercial and industrial loans (C&I

loans), commercial real estate loans (Commercial RE loans), and construction loans, each scaled by assets.

The fourth set of variables captures the interest rate risk exposure of the bank. Following Simons (1995) and Kim and Koppenhaver (1993), we measure GAP variables as the absolute value of the difference between the volumes of assets and liabilities maturing or repricing within a given interval. The intervals used are: up to three months (GAP1), three months to one year (GAP2), one year to five years (GAP3), and over five years (GAP4). Because the GAP measures reflect only on-balance-sheet repricing frequencies or maturities of assets and liabilities, they do not include any effect on the overall interest rate risk exposure of the bank resulting from either speculative or hedging positions the bank undertakes through its derivatives activity.

Earnings (the E in CAMEL) provide a measure of the ability of a bank to weather one-time losses. We use the return on assets as our measure of earnings. A bank's liquidity (the L in CAMEL) is of particular importance when a bank becomes troubled. Deposit withdrawals and the reluctance of other institutions to subject themselves to counterparty risk through transactions with a troubled bank can lead to increased liquidity requirements. We include two measures of liquidity, each scaled by assets, brokered deposits and liquid assets. Liquid assets include the market value of securities less the book value of pledged securities, interest-bearing balances due from depository

institutions, average federal funds sold and securities purchased under agreements to resell, and assets held in trading accounts. Finally, we also include the log of total assets (Log(Assets)) to control for a bank's size.

Table 4 shows the results of estimating equation (1) for each of the dependent variables, a downgrade of the composite CAMEL rating to 4, a downgrade of the composite CAMEL rating to 5, and the imposition of a formal action. For each of these specifications, we estimate one equation that breaks out interest rate and exchange rate derivatives separately and one equation that combines these variables into measures of total derivatives activity.

In the six equations presented in the table, not even one of the estimated coefficients on the dummy variables that indicate derivatives activity or on the measures of the volume of a bank's derivatives activity is statistically significant. In fact, one-half of the estimated coefficients are negative, indicating a reduced probability of examiner actions associated with derivatives activity. These results would suggest that examiners do not use the fact that a bank engages in derivatives activity or the notional value of its derivatives activity relative to its assets in determining whether a troubled bank's CAMEL rating should be downgraded to a rating of 4 or 5 or a formal action should be issued.

On the other hand, these results may, instead, simply reflect the absence of good proxies for the riskiness of

derivatives positions based on the rather crude off-site Call Report data. It may be that examiners do fully evaluate, and take into consideration during detailed on-site examinations, the risk embedded in derivatives positions. However, considering the ease with which derivatives positions can be altered without detection during nonexam periods, and given the incentive troubled banks have to take speculative positions to try to recover from their depleted capital positions, the lack of adequate reported data for measuring the riskiness of derivatives positions, and thus overall bank risk, is unsettling.

In contrast to the derivatives variables, a number of the other possible determinants of CAMEL downgrades and the imposition of formal actions do have statistically significant estimated coefficients with the anticipated sign. The risk-based capital ratio has the predicted negative sign in each case and is significant at the 1 percent level in the CAMEL 4 and CAMEL 5 downgrade equations, indicating that the lower the capital ratio, the more likely is a rating downgrade. The lack of a significant coefficient in the formal actions equations may be related to the fact that formal actions frequently are imposed on banks when their capital ratios are still well above minimum requirements (Peek and Rosengren 1996).

Nonperforming loans have the anticipated positive effect, are significant at the 1 percent level in the CAMEL 4 equation, and just miss being significant at the 5 percent level in the formal actions equation. The OREO variable has the predicted

positive coefficient and is significant in each of the equations. The three variables measuring portfolio composition have the anticipated positive effect in almost every instance (the CAMEL 5 equations are the exceptions), although the estimated coefficient is significant only for C&I loans in the CAMEL 4 equation.

The estimated coefficients on the GAP variables are each positive (as predicted) and significant at the 1 percent level in the CAMEL 5 downgrade equations, indicating that the GAP variables may be particularly scrutinized at banks in imminent danger of being closed. However, the GAP effects are not significant in the other equations, with the exception of GAP2, which enters with a significant negative coefficient in the CAMEL 4 downgrade equations.

Liquid assets always has a positive estimated coefficient, but is significant only in the CAMEL 4 downgrade equations. The return on assets has the expected negative sign and is highly significant in each equation. Finally, bank size always has a negative effect, but is significant only for the first CAMEL 5 downgrade equation.

Measuring goodness of fit is problematic for logistic models. A standard but arbitrary measure is the percentage correctly predicted, based on a 50 percent threshold (predicted=1 if probability>50 percent; predicted=0 if probability<50 percent). However, if the percentage of observations equal to 1 is substantially less than 50 percent, as is the case here, that threshold can be particularly inappropriate. An alternative but

still somewhat arbitrary threshold is the actual proportion of observations equal to 1. Still another measure that provides an indication of the ability of the equation to identify the events (here, a CAMEL downgrade or the imposition of a formal action) is a comparison of the mean fitted probability of observations equal to 1 to that for the observations equal to 0.

Table 4 (bottom panels) contains such summary information for each equation. For the CAMEL 4 downgrade equations, the mean fitted probability for those observations with a value of one is more than 25 times that for observations with a value of zero. For the CAMEL 5 downgrade equations, it is more than 100 times that for observations with a value of zero. Thus, these equations do a very good job of distinguishing between downgrade quarters and non-downgrade quarters. While the ratio of the mean fitted probability for those observations with a value of one to that for observations with a value of zero is not nearly as high for the formal action equations, the ratio still has a relatively impressive value of over eight.

Based on a threshold value equal to the actual proportion of observations equal to one, the fit of the CAMEL downgrade equations is quite impressive. Approximately 95 percent of the observations of a downgrade to a CAMEL 4 rating and 99 percent of the observations of a downgrade to a CAMEL 5 rating are correctly predicted. At the same time, only about 7.5 percent and 4 percent of the non-downgrade observations are incorrectly predicted in the CAMEL 4 and CAMEL 5 equations, respectively.

For the formal actions equations, 79 percent of the observations of an imposition of a formal action are correctly predicted, with only about 13.5 percent of the non-imposition observations incorrectly predicted.

These equations appear to do a very good job of accounting for the factors that determine CAMEL rating downgrades to 4 or 5 and a reasonably good job of predicting formal actions, even without any significant contribution from variables reflecting the derivatives activity of banks. The evidence indicates that a simple (0,1) measure of whether a bank is engaged in derivatives activity and measures of the notional value of derivatives activity relative to a bank's assets do not appear to play a role in determining CAMEL rating downgrades or the imposition of formal actions. However, our ability to test more interesting hypotheses, such as whether the contribution of a bank's derivatives activity to its overall risk is a factor in supervisory evaluations, is limited by the currently available data. Even so, with so little left to explain in the CAMEL downgrade equations, unless the risk contribution associated with a bank's derivatives activity is highly correlated with other included explanatory variables, it is unlikely to have been an important contributor to supervisory decisions regarding CAMEL downgrades and formal actions.

IV. Conclusion

This paper documents that the set of large banks active in the derivatives market includes a relatively high percentage of troubled institutions. Furthermore, a significant fraction of banks heavily involved in derivatives activities were subject to formal regulatory actions during the first half of this decade. Because problem banks have an incentive to take speculative positions, the prevalence of problem banks among those actively engaged in derivatives markets should be of concern to policymakers.

Given that troubled banks have the motive to place second bets and that derivatives provide the means, it is important that such banks not be given the opportunity to do so. However, the lack of comprehensive information on the derivatives positions of banks makes it difficult to monitor the riskiness of derivatives positions, as well as the more important overall risk position of the bank. With only notional values of positions provided in call reports, off-site monitoring of risk is limited. Furthermore, on-site targeted examinations of derivatives activity are relatively infrequent and typically are scheduled well in advance, providing an opportunity for a bank to "window dress" its derivatives positions. Since derivatives positions can be altered quickly to reduce risk exposure in the event of an exam, only those institutions that take large bets and lose are likely to face the regulatory consequences of derivatives

speculation. Thus, the opportunity for troubled banks to take unmonitored second bets is very real.

Given the difficulty in monitoring the riskiness of derivatives activity, particularly with currently collected information, one might expect that derivatives activity would be prominently discussed in the formal actions entered into with bank regulators. However, most formal actions do not focus on off-balance-sheet risk, instead concentrating primarily on credit risk problems with loan portfolios. In addition, we find no evidence that derivatives activity is a significant factor in CAMEL downgrades or in regulatory decisions to impose a formal action.

While this finding is consistent with banks not using derivatives to take speculative positions, it could also reflect that banks with the motive, the means, and the opportunity to take speculative positions have yet to experience the type of losses that would attract attention. Given the magnitude of the losses that banks and savings and loans suffered with on-balance-sheet items over the past 15 years, the lack of more comprehensive data reporting requirements and more intensive regulatory monitoring of derivatives activities at troubled banks may be setting the stage for our next banking crisis. Derivatives activity is critical at many banks for the effective hedging of risks; however, it is important that bank regulators limit the moral hazard problem that arises from the incentive for troubled banks to use derivatives for speculation.

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Endnotes

1. Regulators also use informal agreements, such as the memorandum of understanding (MOU). MOUs are agreements between bank supervisors and a bank detailing actions to improve deficiencies in the bank's operations. The MOU offers suggestions likely to be discussed at the end of any full exam, but serves to emphasize that the findings during the exam were not satisfactory. The MOU generally is not made public and is not legally enforceable, so it emphasizes the need for changes by bank management without the potential penalties and attention generated by more serious actions. Because MOUs are not publicly available, we base our analysis of supervisory intervention on formal regulatory actions.

2. Bank supervisors rate the financial condition of a bank considering the capital adequacy, asset quality, management quality, earnings potential, and liquidity of the institution (CAMEL). Each component is evaluated on a scale from 1 to 5, with 1 being the highest rating and 5 the lowest. The composite CAMEL rating, which also ranges from 1 to 5, provides an assessment by examiners of the overall strength of a banking institution. Banks with a composite rating of 1 (sound in every respect, flawless performance) and 2 (fundamentally sound, only minor correctable weaknesses in performance) are resistant to external economic and financial disturbances and are not likely to be constrained by regulatory oversight. As a bank's composite rating falls to 3 (remote probability of failure, flawed performance), 4 (potential of failure, performance could impair viability), or 5 (high probability of failure, critically deficient performance), the supervisor's assessment of the likelihood of failure increases.

3. The standard practice of the Federal Deposit Insurance Corporation (FDIC) is to date examinations (which are reported in the formal actions) as of the beginning of the exam. The Office of the Comptroller of the Currency (OCC), on the other hand, typically reports "as of" dates that refer to the date of financial data used in the report, often the end-of-quarter call report date immediately preceding the start of the exam. Consequently, when the OCC exam date is the last day of a quarter, we denote the subsequent quarter in which the exam began as the exam quarter.

According to discussions with examiners, banks normally will know they are likely to receive a formal action at the beginning of the exam, although the actual formal action is often not signed for several months or even quarters after the completion of the exam. Furthermore, many of the provisions of the formal action that are time dependent are dated as of the commencement of the exam. Finally, Peek and Rosengren (1995b) have found that

bank behavioral responses, such as declines in lending, occur discretely in the quarter in which the exam resulting in the formal action is initiated, consistent with this dating practice.

4. Therefore, with multiple downgrades we use only the first observation. For example, if the quarterly CAMEL pattern was 3, 4, 3, 4, the last two observations would be dropped and the second quarter in the sequence would have a value of 1, representing the first quarter the bank had been downgraded to a CAMEL 4 rating. There were only two such instances for CAMEL 4 downgrades and only one bank with a multiple downgrade to a CAMEL 5 rating.

Table 1
Top 25 U.S. Banks Based on Notional Value of Exchange Rate Derivatives, 1990:I

	Bank	Notional Value of Exchange Rate Derivatives($000)	Total Assets ($000)	Exchange Rate Derivatives as a Percent of Assets
1	Citibank NA	767414000	166755000	460
2	Chemical Bank	452312000	48859000	926
3	Chase Manhattan Bank NA	435063799	84136740	517
4	Bankers TC	315641000	61861000	510
5	Morgan Guaranty TC of New York	300159214	70725390	424
6	First NB Chicago	240835639	37860975	636
7	Security Pacific NB	184038912	56892197	323
8	Bank of America NT&SA	181075000	88306000	205
9	Manufacturers Hanover TC	177557000	53743000	330
10	Bank of New York	48921139	45649665	107
11	Continental Bank NA	45452522	28806971	158
12	First NB of Boston	45196829	29766120	152
13	First Interstate Bank California	29932525	21109924	142
14	Mellon Bank NA	19509386	22471589	87
15	Bank of New England NA	16629663	15242326	109
16	Connecticut National Bank	10838903	11290688	96
17	State Street Bank & TC	5698578	10480109	54
18	First Union NB North Carolina	5065585	17867156	28
19	National Bank of Detroit	3471105	17017439	20
20	Shawmut Bank NA	2861037	8398461	34
21	NCNB NB of North Carolina	2659760	21513199	12
22	First Interstate Bank	2302671	855765	269
23	First Bank NA	2252677	12110899	19
24	Signet Bank Virgina	1710880	8866948	19
25	Maryland NB	1674139	10827063	15

Table 2
Top 25 U.S. Banks Based on Notional Value of Interest Rate Derivatives, 1990:I

	Bank	Notional Value of Interest Rate Derivatives($000)	Total Assets ($000)	Interest Rate Derivatives as a Percent of Assets
1	Citibank NA	432796000	166755000	260
2	Chemical Bank	387576000	48859000	793
3	Chase Manhattan Bank NA	335925904	84136740	399
4	Bankers TC	291124000	61861000	471
5	Morgan Guaranty TC of New York	290130372	70725390	410
6	Security Pacific NB	163536298	56892197	287
7	Manufacturers Hanover TC	143979000	53743000	268
8	First NB of Chicago	109990269	37860975	291
9	Bank of America NT&SA	90392000	88306000	102
10	Continental Bank NA	82050362	28806971	285
11	First NB of Boston	54357134	29766120	183
12	First Interstate Bank California	49935262	21109924	237
13	Bank of New York	35556245	45649665	78
14	First Interstate Bank	15196590	855765	1776
15	Wells Fargo Bank NA	13729500	47016293	29
16	Mellon Bank NA	12789002	22471589	57
17	Seattle-First NB	12501567	12264707	102
18	Bank of New England NA	8707773	15242326	57
19	First Bank NA	7819591	12110899	65
20	NCNB NB of North Carolina	7483750	21513199	35
21	Bank One Columbus NA	6190589	4188639	148
22	Maryland NB	5837089	10827063	54
23	Philadelphia NB	5718820	9770852	59
24	Signet Bank Virgina	4917466	8866948	55
25	Ameritrust Company NA	4472657	8347034	54

Table 3
Measures of Financial Health for Large Banks, Grouped According to Derivatives Exposure

		Share (Percent)[a]					
Average Ratio of Derivatives/Assets[b]	Number of Banks	RBC<8%	RBC<9%	RBC<10%	$\frac{\text{Nonperforming Loans}}{\text{Total Loans}}$ >5%	CAMEL 4 or 5	Formal Action
No Derivatives	365	20.82	28.22	39.18	37.53	23.83	17.26
0% <Derivatives<5%	306	25.49	38.89	59.15	30.72	23.52	16.34
5% <Derivatives<10%	63	34.92	57.14	76.19	44.44	28.57	14.29
10% <Derivatives<100%	139	30.22	53.24	73.38	35.97	22.30	17.27
>100%	24	54.17	79.17	91.67	50.00	20.83	16.67
All Banks	897	25.75	39.13	55.30	35.79	23.74	16.72

[a] Measured at any time during 1990:I to 1994:IV period.

[b] Derivatives/Assets measured as average of quarterly values during the 1990:I to 1994:II period.

Table 4
Factors Affecting CAMEL Downgrades and the Imposition of Formal Actions

	CAMEL 4 Downgrade		CAMEL 5 Downgrade		Formal Action	
Constant	0.572	-1.678	10.993*	8.310	-2.379	-2.290
	(0.18)	(0.60)	(2.00)	(1.67)	(0.95)	(0.99)
Exchange rate dummy	0.543		1.340		0.086	
	(1.21)		(1.69)		(0.23)	
Exchange rate derivatives Assets	-0.003		-0.028		0.003	
	(1.43)		(0.60)		(0.51)	
Interest rate dummy	-0.366		0.531		-0.502	
	(1.08)		(0.85)		(1.61)	
Interest rate derivatives Assets	0.002		0.009		-0.004	
	(1.22)		(1.18)		(0.55)	
Total derivatives dummy		-0.372		0.715		-0.246
		(1.08)		(1.16)		(0.82)
Total derivatives Assets		-0.001		-0.001		0.000
		(1.01)		(0.16)		(0.30)
Risk-Based Capital Ratio	-0.313**	-0.305**	-1.128**	-1.103**	-0.057	-0.054
	(4.52)	(4.38)	(6.42)	(6.40)	(1.40)	(1.33)
Loan Loss Reserves Assets	0.059	0.043	0.078	0.066	0.172	0.150
	(0.34)	(0.246)	(0.33)	(0.29)	(1.19)	(1.05)
Nonperforming Loans Assets	0.392**	0.391**	0.064	0.058	0.126	0.125
	(3.91)	(3.93)	(0.58)	(0.53)	(1.94)	(1.93)
OREO Assets	0.655**	0.656**	0.733**	0.729**	0.124*	0.131*
	(6.10)	(6.18)	(5.86)	(5.92)	(2.00)	(2.11)
C&I Loans Assets	0.039*	0.044*	-0.005	0.013	0.023	0.021
	(2.01)	(2.31)	(0.14)	(0.41)	(1.45)	(1.40)

Commercial RE Loans / Assets	0.037 (1.50)	0.036 (1.48)	0.030 (0.80)	0.020 (0.55)	0.008 (0.39)	0.011 (0.56)
Construction Loans / Assets	0.032 (1.22)	0.028 (1.08)	-0.064 (1.04)	-0.070 (1.16)	0.036 (1.44)	0.040 (1.59)
GAP1	-0.037 (1.43)	-0.038 (1.42)	0.140** (3.85)	0.138** (3.76)	-0.001 (0.05)	-0.001 (0.04)
GAP2	-0.073* (2.44)	-0.077* (2.52)	0.138** (3.22)	0.131** (3.10)	0.009 (0.39)	0.009 (0.39)
GAP3	-0.041 (1.38)	-0.043 (1.47)	0.146** (3.01)	0.137** (2.90)	-0.003 (0.15)	-0.002 (0.10)
GAP4	-0.051 (1.52)	-0.053 (1.57)	0.185** (3.76)	0.182** (3.72)	-0.021 (0.85)	-0.022 (0.88)

Table 4
CONTINUED

	CAMEL 4 Downgrade		CAMEL 5 Downgrade		Formal Action	
Brokered Deposits / Assets	-0.004 (0.09)	-0.004 (0.09)	0.071 (1.22)	0.074 (1.30)	0.052 (1.58)	0.046 (1.41)
Liquid Assets / Assets	0.049** (3.18)	0.048** (3.16)	0.039 (1.01)	0.039 (1.03)	0.011 (0.86)	0.012 (0.94)
Return on Assets	-1.556** (7.08)	-1.542** (7.03)	-0.741** (3.12)	-0.683** (3.00)	-0.855** (5.11)	-0.863** (5.15)
Log (Assets)	-0.254 (1.28)	-0.085 (0.50)	-0.753* (2.13)	-0.551 (1.74)	-0.100 (0.60)	-0.115 (0.76)
Log Likelihood	-210.45	211.66	-75.07	76.71	-324.33	-325.80
Observations	2691	2691	3091	3091	2831	2831
Observations=1	138	138	69	69	105	105

Proportion of Observations=1	.051282	.051282	.022323	.022323	.037089	.037089
Mean fitted probability of observations=1	.577	.576	.706	.701	.241	.238
Mean fitted probability of observations=0	.023	.023	.007	.007	.029	.029
	Percent					
[1]predicted=1, actual=1	94.9	95.7	98.6	98.6	79.0	79.0
[1]predicted=0, actual=1	5.1	4.3	1.4	1.4	21.0	21.0
[2]predicted=0, actual=0	92.6	92.5	96.2	95.9	86.4	86.5
[2]predicted=1, actual=0	7.4	7.5	3.8	4.1	13.6	13.5

[1] Percent refers to the proportion of observations equal to 1 based on a threshold probability equal to the actual share of observations equal to 1.

[2] Percent refers to the proportion of observations equal to 0 based on a threshold probability equal to the actual share of observations equal to 1.

Absolute values of t-statistics in parentheses.
* significant at the 5 percent level.
**significant at the 1 percent level.