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Retail Credit Risk Modeling: A Help or Hindrance to Effective Bank Management?

by Christopher Henderson, Retail Risk Officer

"...financial innovation is good for the economy, but, as demonstrated in the current crisis, the benefits of innovation are usually understood well before the risks come to light." [1]

This quote addresses the complex financial products that played a central role in today's financial crisis, which resulted, in part, from advances in financial engineering. It also clearly echoes the challenge that senior bank managers face in leveraging the information that comes out of analytical models used in banking—models are supposed to illuminate risks before the benefits of key bank practices can be realized. If credit risk models, in particular, are to be useful in practice, the inherent drawbacks from using these models must also be well understood. As the latest credit crisis and recession continues to unfold, the importance of credit risk modeling in financial markets has become increasing clear; it is no longer a "backwater" topic among banking professionals.

In today's global recession, a few banking institutions are experiencing defaults on some assets that are unprecedented and could be categorized as "tail events." Industry practice has led to the adoption of a solvency standard used by rating agencies for historically observed default rates for AA-rated companies. To have the risk profile of an AA-rated bank, a bank must hold an amount of capital that is sufficient to weather all but the three worst of 10,000 possible loss scenarios for a one-year period and remain solvent. Or equivalently, the bank must remain solvent in 9997 out of 10,000 possible loss scenarios. In other words, this equates to a solvency standard of 99.97 percent.

It is understood that most banking models could not predict credit losses at or beyond the 99.97 percent threshold or tail of the loss distribution with

[1] Collins, Michael E., "Restoring Confidence in the Banking System," *SRC Insights*, Second Quarter 2009, Vol. 13, Issue 4, available online at: <www.philadelphiafed.org/bank-resources/publications/src-insights/2009/second-quarter/q2si2_09.cfm>.

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Supervision Spotlight on Stress Testing: A Complementary Risk Management Tool

by Michael E. Collins, Executive Vice President

Today's financial crisis has led bankers and regulators to reconsider how risks are best detected, mitigated, and managed. The lessons learned are being applied to enhance practices in a number of risk management areas, including risk concentrations, off-balance sheet exposures, valuation, and liquidity risk. Renewed emphasis is also being placed on viewing risk from an enterprisewide perspective and using routine stress testing to consider a wide array of potential impacts under various scenarios.

For many years, stress testing has been considered a key component of an effective internal risk management framework. The forward-looking analysis sheds light on inherent risk exposures and offers alternative insight into the potential severity of negative outcomes. The metrics generated help management evaluate capital and liquidity needs under adverse scenarios, inform the setting of risk tolerances, and facilitate the formation of appropriate contingency plans.

The use of stress testing in the banking industry drew considerable attention this year when the Supervisory Capital Assessment Program (SCAP) was conducted. The Federal Reserve described the SCAP as "a forward-looking exercise designed to estimate losses, revenues, and reserve needs for bank holding companies in 2009 and 2010 under two macroeconomic scenarios, including one that is more adverse than expected."[1] Assessments were conducted at the top 19 banks with assets above $100 billion. The interagency exercise was considered part of traditional supervisory activity and normal dialogue with banks.[2] Although it does not represent a new capital standard, the exercise will

[1] The *Supervisory Capital Assessment Program: Design and Implementation*, April 2009, is available online at: <www.federalreserve.gov/newsevents/press/bcreg/bcreg20090424a1.pdf>.

[2] The federal bank regulatory agencies that participated in the SCAP are the Board of Governors of the Federal Reserve System, the Federal Reserve Banks, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency.

likely have an influence on upcoming reviews of capital adequacy.

While there are no current plans to put other banking institutions through the SCAP, it seems that certain fundamental concepts and practical techniques of the exercise could help inform a variety of other decision-making processes. For example, any bank holding company (BHC) that requests to redeem U.S. Treasury capital requires initial approval from its primary federal supervisor. Part of the evaluation process involves confirming that the institution has a comprehensive internal capital assessment process. A bank that engages in a SCAP-type exercise with its primary regulator could help substantiate how well the levels and quality of its capital would withstand severe loss rates and adverse economic conditions.

The use of stress testing is particularly relevant after prolonged periods of benign financial conditions when there may be a greater tendency to become complacent and discount risk. Stress testing is equally important during expansive times when new, innovative products grow rapidly but performance is unproven. In the past, stress tests were often focused exclusively on narrow business lines and failed to capture an organization's broader perspectives. Considering other business functions, as well as senior management's strategic views, makes the overall process more robust and the output more useful.

Effective stress testing does not always require the use of sophisticated models. Basic techniques that couple historical analysis with sound judgment and provide a range of outcomes can prove to be as effective as many expensive computer systems. However, the sophistication of stress test practices should be commensurate with the size, complexity, and risk characteristics of the institution and its portfolio.

Liquidity and commercial real estate (CRE) are two areas where stress testing is extremely relevant today. The heightened emphasis on liquidity stems from sluggish credit market conditions, and CRE concerns are being fueled by rising delinquencies and portfolio concentrations evident at institutions of all sizes. Stress testing offers management important insight into an individual institution's capacity to weather challenging market conditions and better equips management to make educated decisions about strategic direction and risk appetite.

Tests should be designed to assess how well a financial institution's condition holds up during severe, but plausible events. To properly assess a bank's resilience, the institution's condition should be subjected to meaningful shocks of varying severity and duration, including some tail events that fall outside conventional wisdom and, in some cases, may not have occurred previously. The effects of concurrent pressures and the interactions among risks also deserve consideration, since stresses are often correlated. Risks posed by broader market instability and reputational risk must also be factored into the mix.

The overall stress test process should be formally integrated into the bank's risk culture, but remain nimble enough to consider new and emerging challenges. Scenarios should be updated frequently to reflect modified forecasts, relevant emerging issues, and recently introduced product types. The approach and methodology should be documented clearly, and the data should be granular enough to accommodate the needs of decisionmakers. Limitations should be acknowledged and conveyed clearly.

Ideally, the end results of stress testing should be actionable and lead to prompt and effective response. Occasionally, conclusions may be produced, but there may be a failure with properly communicating information throughout the management chain. Having an efficient management information

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Michael E. Collins, Executive Vice President

From The
Examiner's Desk

Fair Value Measurement: Challenging, yet Attainable

by William Lenney, Regulatory Applications Specialist, and Paul Matteo, Intern

In today's market, some financial institutions have reported significant amounts of unrealized losses on their available-for-sale and held-to-maturity securities portfolios. Financial institutions and external auditors have been challenged in determining when a decline in the fair value of a security is an other-than-temporary impairment (OTTI), and, therefore, would need to be reported as a loss on the income statement.

Since FAS 157 was released in 2006, there have been challenges with fair value measurement when markets are inactive or transactions cease to be orderly.[1] The Financial Accounting Standards Board (FASB) issued guidance on April 9, 2009, to clarify fair value measurements and to change the accounting treatment for other-than-temporary impairment for debt securities.

FASB Staff Position (FSP) FAS 157-4, *Determining Fair Value When the Volume and Level of Activity for the Asset or Liability Have Significantly Decreased and Identifying Transactions That Are Not Orderly*, provides guidance for fair value measurements when markets are not active. FSP FAS 115-2 and FSP FAS 124-2, *Recognition and Presentation of Other-Than-Temporary Impairments*, change the method for determining OTTI for debt securities and recording the impairment in the financial statements.

Although some transactions may not have appeared orderly during the past year, FASB asserts that measurement has only become more difficult, not that order has ceased to exist. Fair value can still be measured, but entities might have to search diligently for accurate values in markets that are not as active. To improve fair value measurements, FASB created a list of market and transaction conditions that may indicate the presence of Level 3 inputs.[2]

FSP FAS 157-4 provides specific factors to consider when determining whether a market has become inactive:

a. Few recent transactions.
b. Price quotations not based on current information.
c. Substantial variation in price quotations over time or among market makers.
d. Indexes that previously were highly correlated with the fair values of the asset or liability are demonstrably uncorrelated with recent indications of fair value for that asset or liability.
e. Significant increase in implied liquidity risk premiums, yields, or performance indicators for observed transactions or quoted prices when compared with the reporting entity's estimate of expected cash flows, considering all available market data about credit and other nonperformance risk for the asset or liability.
f. Wide bid-ask spread.

[1] An orderly transaction is a transaction that assumes exposure to the market for a period prior to the measurement date to allow for marketing activities that are usual and customary for transactions involving such assets or liabilities; it is not a forced transaction (e.g., a forced liquidation or distress sale).

[2] Definitions of Level 1, 2, and 3 inputs are included in Statement of Financial Accounting Standards No. 157, *Fair Value Measurements*, September 2006, available at: <www.FASB.org>.

g. Significant decline or absence of a market for new issuances for the asset or liability or similar assets or liabilities.
h. Limited public information available.

After considering these factors, a decision should be made regarding whether market activity has decreased significantly, and whether the market quotations represent fair value. Adjustments may then be necessary to achieve fair value through the use of valuation techniques, e.g., market approach, income approach, or cost approach. FASB, however, does not indicate that any individual technique is superior to another. The technique that would make use of the best available inputs should be used.

Emphasis for determining fair value measurements should be on making use of the best inputs available, not on using the best technique. If the market is not active, then the inputs used will most likely be Level 3 (Fig. 1). When a market is less active and several transactions may not be orderly, Level 2 or 3 inputs will most likely be found.

FASB has also created indicators that, when observed in a transaction, could demonstrate a potential lack of orderliness in that transaction. These factors are:

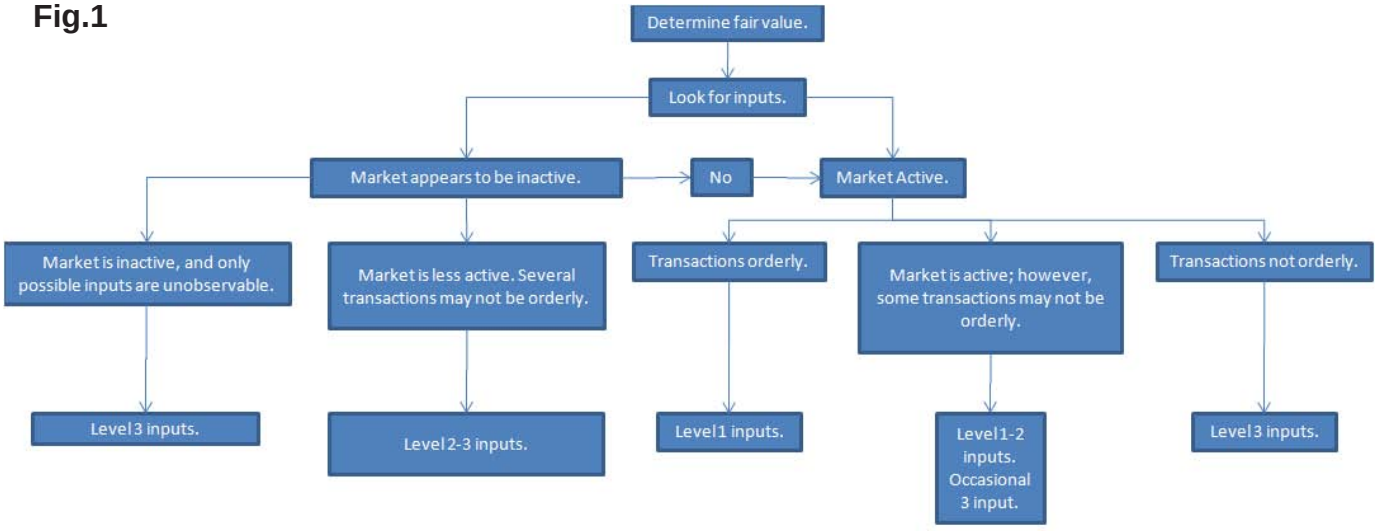
a. Inadequate exposure to the market for a period before the measurement date to allow for marketing activities that are usual and customary for transactions involving such assets or liabilities under current market conditions.
b. A usual and customary marketing period exists, but the seller marketed the asset or liability to a single market participant.
c. The seller is in or near bankruptcy or receivership (i.e., distressed), or the seller was required to sell to meet regulatory or legal requirements (i.e., forced).
d. Transaction price is an outlier when compared with other recent transactions for the same or similar asset or liability.

If the transaction is no longer deemed orderly, then the transaction price is not considered indicative of fair value. However, if the situation is more complex, and the circumstantial evidence deems the transaction orderly despite the presence of those factors listed above, then weight can be put on the price as demonstrative of fair value.

If little information is available to indicate that the transaction is either orderly or not orderly, then this transaction price is not considered to adequately represent fair value. Given limited options of other inputs, though, this information can be used to make a determination of fair value, but good judgment should be used in making that determination.

If the market is active and orderly, then the inputs used will typically be Level 1 (Fig. 1). If the market is active and some transactions are not orderly, Level

Fig.1



2 inputs will most likely be used. Occasionally, if the market is active, but not orderly, then Level 3 inputs should be used.

FAS 157-4 requires disclosure of the inputs and valuation techniques used to measure fair value during interim and annual periods. Securities should be segmented into major categories, such as equity securities, debt securities issued by foreign governments, corporate debt securities, etc., and this information should be disclosed in the financial statements.

FSP FAS 115-2 and FSP FAS 124-2 provide guidance on establishing improved consistency to the timing of impairment recognition and achieving better clarity about the credit and noncredit components of debt securities that are not expected to be sold.

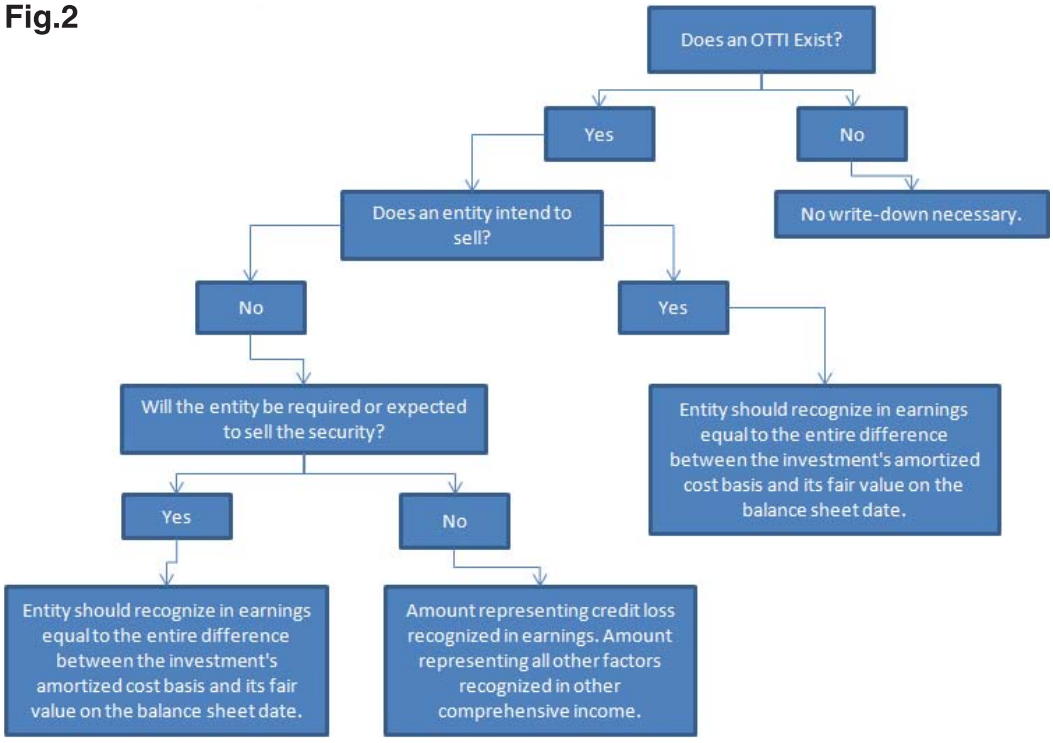
Previously, unless management could definitely assert its intent and ability to hold a security until a forecasted recovery date, an OTTI write-down was necessary. FSP FAS 115-2 provides clearer guidance on how and when to write down a debt security. An assessment should be made regarding whether 1) there is intent to sell the debt security, or 2) it is more likely than not that a sale of the debt security will be required prior to its anticipated recovery. If either of these conditions is met, an OTTI must be recognized.

If a security is impaired and there is intent to sell, then an OTTI write-down is necessary (Fig. 2). An amount equal to the entire difference between the investment's amortized cost basis and its fair value on the balance sheet date should be reported on the income statement. However, even if there is no intent to sell, and a sale is not required, an OTTI should still be recognized. The OTTI in this case will be separated into either the amount representing credit loss or the amount related to all other factors.

Impairment related to credit loss should be recognized in earnings, while impairment related to other factors should be recognized in other comprehensive income, net of applicable taxes. The OTTI related to the security's credit loss should be measured as the difference between the present value of the expected cash flows and the amortized cost basis.

The amendments to FASB statements 115 and 157 should make it easier to apply fair value measurement standards. However, sound judgment and good reasoning are still vital to the application of both statements. FASB aims to establish that fair value is still attainable, even during today's difficult economic situation. Nevertheless, financial institutions and individuals will need to be vigilant as they work harder to attain a reasonable measure of fair value. □

Fig.2



Amendments to Annual Audit and Reporting Requirements

by Natalie Howell, Intern, and Samuel Leland, Intern

Section 36 of the Federal Deposit Insurance Act (FDI Act) and the FDIC's implementing regulation Part 363—*Annual Audit and Reporting Requirements*, (part 363) sets forth requirements for all state member banks and other insured depository institutions with $500 million or more in total assets regarding annual audits and the filing of related reports with the appropriate federal banking agencies. As of June 23, 2009, the FDIC has amended part 363—to strategically incorporate sound audit and reporting practices from the Sarbanes-Oxley Act of 2002 and to address changes in the banking industry.[1] Section 36 is generally intended to facilitate early recognition of problems in financial management at insured depository institutions; state member banks must file required reports with the FDIC and their District's Federal Reserve Bank. This article will cover some of the major amendments and detail the specific reporting requirements.

The final rule includes amendments to annual reporting requirements, clarifications to the independence standards applicable to accountants, amendments to filing and notice requirements, and additional audit committee duties. The following sections highlight key changes.

[1] More information regarding these amendments can be found on the FDIC's website at: <www.fdic.gov/news/news/financial/2009/fil09033.html>.

Compliance with Designated Laws and Regulations

The amendments to part 363 require that management's stated conclusion regarding compliance be included with management's assessment of compliance with laws and regulations pertaining to insider loans and dividend restrictions. Any noncompliance with such laws and regulations should also be included in this conclusion. The disclosure of any noncompliance will not require those responsible to be identified personally; however, the disclosure must include accurate qualitative and quantitative information relevant to the noncompliance, dividends, and insider loans involved. Any corrective actions taken by management should be included as well.

The amendments to part 363 require that management's stated conclusion regarding compliance be included with management's assessment of compliance with laws and regulations pertaining to insider loans and dividend restrictions.

Better Explain and Increase Enforceability of Independence Standards for Independent Public Accountants

Required audit and attestation services must be performed by an independent public accountant. To qualify as an independent public accountant, one must meet the independence standards that apply to audits of both nonpublic and public companies. The revisions to part 363 explain that independent public accountants should be in compliance with the independence standards of the SEC and the AICPA, as well as the PCAOB when auditing public companies that have been approved by the SEC. If there is a situation in which more than one standard is relevant, the most restrictive of applicable standards should be adhered to. If an accountant does not meet the required standards, the FDIC (or other appropriate

federal banking agency) has the power to dismiss, suspend, or prohibit an accountant from performing the necessary audit and attestation services.

Boards of Directors to Develop Written Criteria When Determining the Independence of Audit Committee Members

The amendment requires that the board of directors develop and uphold written criteria for establishing that a prospective or current audit committee member is an outside director and independent of management. The criteria include:

1. The committee member cannot be an officer or employee of the institution or any affiliate of the institution.
2. If the committee member owns 10 percent or more of any class of voting securities of the institution, the board of directors must decide and document whether this interferes with the committee member's "independent" judgment in carrying out his or her committee responsibilities.

These criteria must be applied annually (at a minimum) and recorded in the board's minutes.

Requirements Concerning Consolidated Assets of Bank Holding Companies

Previously, an insured depository institution that is a subsidiary of a bank holding company could use consolidated holding company financial statements to satisfy the auditied financial statements requirement of part 363 regardless of whether the assets of that insured depository institution subsidiary or subsidiaries of the holding company represented substantially all or only a minor portion of the holding company's consolidated total assets. The amendments now require that the insured depository institution assets comprise at least 75 percent of a holding company's total consolidated assets in order to file on a consolidated level.

The amendments now require that the insured depository institution assets comprise at least 75 percent of a holding company's total consolidated assets in order to file on a consolidated level.

In summary, the rationale for the change is that, in the past, when the assets of insured depository institution subsidiaries did not comprise a substantial portion of a holding company's consolidated total assets, the consolidated financial statements, including the accompanying notes to the financial statements, did not always provide sufficient information regarding the financial position and results of operations of these institutions. In addition, the extent of audit coverage provided to these institutions in the audit of the consolidated holding company was sometimes limited.

This specific revision will not be enforced until fiscal years ending on or after June 15, 2010, in order to give affected insured depository institutions time to comply.

Effective Dates

The amendments to part 363 will be effective 30 days after being published in the Federal Register. For most institutions, this will be year-end 2009. The exceptions to this rule are as follows:

- December 31, 2009, will be the deadline for boards of directors to develop written criteria for determining the independence of an audit committee member.
- The effective date for insured depository institutions to meet the 75 percent threshold for complying with Part 363 at the holding company level has been delayed until fiscal years ending on or after June 15, 2010. □

Following are reporting requirement details for covered institutions.

Reports to be Filed for Institutions with $500 Million or More but Less than $1 Billion in Total Assets:

1. Audited comparative annual financial statements
2. The independent public accountant's report on the audited financial statements
3. A management report that contains:
   a. A statement of management's responsibilities for:
      i. Preparing the annual financial statements
      ii. Establishing and maintaining an adequate internal control structure over financial reporting
      iii. Complying with the designated safety and soundness laws and regulations pertaining to insider loans and dividend restrictions
   b. An assessment by management of the institution's compliance with the designated laws and regulations pertaining to insider loans and dividend restrictions during the year, which must state management's conclusion regarding compliance and disclose any noncompliance with these laws and regulations

In general, an institution that is required to file, or whose parent holding company is required to file, management's assessment of the effectiveness of internal control over financial reporting with the Securities and Exchange Commission (SEC) or the appropriate federal banking agency in accordance with Section 404 of the Sarbanes-Oxley Act of 2002 must submit a copy of such assessment with its part 363 annual report as additional information. However, this assessment will not be considered part of the institution's part 363 annual report.

Reports to be Filed for Institutions with $1 Billion or More in Total Assets:

1. Audited comparative annual financial statements.
2. The independent public accountant's report on the audited financial statements.
3. A management report that contains:
   a. A statement of management's responsibilities for:
      i. Preparing the annual financial statements
      ii. Establishing and maintaining an adequate internal control structure over financial reporting
      iii. Complying with the designated safety and soundness laws and regulations pertaining to insider loans and dividend restrictions
   b. An assessment by management on the effectiveness of the institution's internal control structure over financial reporting as of the end of the fiscal year that must:
      i. Identify the internal control framework used by management to evaluate the effectiveness of internal control over financial reporting
      ii. State that the assessment included controls over the preparation of regulatory financial statements in accordance with regulatory reporting instructions and identify the regulatory reporting instructions
      iii. State management's conclusion as to whether internal control over financial reporting is effective as of the institution's fiscal year-end
      iv. Disclose all material weaknesses in internal control over financial reporting, if any, that management has identified that have not been remediated prior to the institution's fiscal year-end

c. An assessment by management of the institution's compliance with the designated laws and regulations pertaining to insider loans and dividend restrictions during the year, which must state management's conclusion regarding compliance and disclose any noncompliance with these laws and regulations

4. The independent public accountant's attestation report concerning the effectiveness of the institution's internal control structure over financial reporting. The accountant's report must not be dated prior to the date of the management report and management's assessment of the effectiveness of internal control over financial reporting and must:
   a. Identify the internal control framework used by the independent public accountant, which must be the same as the internal control framework used by management, to evaluate the effectiveness of the institution's internal control over financial reporting
   b. State that the independent public accountant's evaluation included controls over the preparation of regulatory financial statements in accordance with regulatory reporting instructions and identify the regulatory reporting instructions
   c. State the independent public accountant's conclusion as to whether internal control over financial reporting is effective as of the institution's fiscal year-end
   d. Disclose all material weaknesses in internal control over financial reporting, if any, that the independent public accountant has identified as not having been remediated prior the institution's fiscal year-end

Agencies Issue Frequently Asked Questions on Identity Theft Rules

On June 11, 2009, an FAQ document regarding identity theft red flags and change of address discrepancies was released jointly by the Board of Governors, the Federal Deposit Insurance Corporation, the National Credit Union Administration, the Office of the Comptroller of the Currency, the Office of Thrift Supervision, and the Federal Trade Commission. The purpose of the FAQ document is to help financial institutions, creditors, consumer report users, and card issuers better understand and follow Sections 114 and 315 of the Fair and Accurate Credit Transactions Act of 2003. The document covers topics including:[1]

- The scope of the red flag rules and guidelines
- Clarification of terms relevant to identity theft
- Various aspects of the Identity Theft Prevention Program
- Duties of card issuers and users

The FAQ document is available on the Board of Governors' public website at <www.federalreserve.gov/newsevents/press/bcreg/20090611a.htm>.

Other formal enforcement actions are available on the Board of Governors' website at <www.federalreserve.gov/boarddocs/enforcement/search.cfm>. □

[1] From Sections 114 and 315 of the Fair and Accurate Credit Transactions Act of 2003. More information is available at: <www.ftc.gov/os/fedreg/2007/november/071109redflags.pdf>.

Supervisory 411 Responding to a Security Breach: Be Prepared

In 2005, interagency guidance was issued to address response programs for unauthorized access to customer information maintained by financial institutions and their service providers.[1,2] Today, the guidance is just as important, if not more, for institutions weathering today's economy. The guidance states that every financial institution should develop and implement a response program while providing for flexibility in designing a risk-based response program that is tailored to the size, complexity, and nature of the institution's operations.

The quality of an institution's response to incidents involving a breach of customer information and containment of the breach are a function of the institution's culture, established processes, and training. Preparation is essential to determining the success of the response to a security breach incident. Assigning responsibilities to staff members and offering adequate training help ensure that the response to an incident will be organized and efficient.

Institutions that have adequate resources should create a formal incident response team. Whether a formal response team is in place or not, quick action by the staff is very important for helping to contain a breach and minimizing the damage, including loss to the institution. Regular testing of response processes and procedures will provide good feedback on the adequacy of the preparations. And ongoing customer education is also important to help reduce the number of incidents and the breadth of the incident if one does occur.

An institution's response program should contain procedures for the following:

1. Assessing the nature and scope of an incident and identifying what customer information systems and types of customer information have been accessed or misused
2. Notifying the institution's primary federal regulator as soon as possible once the institution becomes aware of an incident involving unauthorized access to or use of sensitive customer information
3. Complying with applicable suspicious activity reporting regulations and guidance to ensure that appropriate law enforcement authorities are notified in a timely manner
4. Taking appropriate steps to contain and control the incident to prevent further unauthorized access to or use of customer information, for example, by monitoring, freezing, or closing affected accounts
5. Notifying customers as soon as possible when it is determined that misuse of sensitive customer information has occurred or is reasonably possible

Institutions should notify their primary federal regulator when there is a security breach involving *sensitive customer information*, including the nature of the breach and whether law enforcement has been notified or a suspicious activity report has been or will be filed.[3] Information should also include the response action taken, the number of customers affected, whether customers have been or will be notified, and whether a service provider is involved. For more information, please reference the guidance and the FFIEC IT Handbook at <www.ffiec.gov/ffiecinfobase/index.html>. □

[1] *Interagency Guidance on Response Programs for Unauthorized Access to Customer Information and Customer Notice* was a joint effort of the Office of the Comptroller of the Currency, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of Thrift Supervision. For the Federal Reserve, reference SR Letter 05-23, *Interagency Guidance on Response Programs for Unauthorized Access to Customer Information and Customer Notice*, available at: <www.federalreserve.gov/boarddocs/srletters/2005/SR0523.htm>.

[2] The guidance interprets the *Interagency Guidelines Establishing Information Security Standards*, 12 CFR, part 208, app. D-2 and 12 CFR, part 225, app. F.

[3] Please refer to the *Interagency Guidelines Establishing Information Security Standards* for the formal definition of sensitive customer information.

Retail Credit Risk Modeling: A Help or Hindrance to Effective Bank Management?

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such benign historical data. Most banks' loan portfolios, however, are not experiencing losses in the tails during this recession, and what remains important is that modeling credit losses is the starting point for a conversation that will consider all significant factors that affect the collectability of a portfolio at any given point in time.

This article will provide insight into the various types of modeling techniques commonly used in risk management practices, with a special focus on retail credit, and will assess the state of those models within the context of the current recession.

Why Do Banks Use Credit Risk Models?

Banking has long evolved from a relationship-centered business model to more of a market-based aggregator of assets that can distribute credit risks and returns to a global investor base. The key to this evolution has been the advancement in risk measurement tools that are more accurate and better validated. As the business of banking has become more complex, so have both the environment in which banks operate and the level of rigor embedded in credit risk models.

One of the most critical risk modeling functions for banks is estimating credit losses that serve as inputs to the allowance for loan and lease losses (ALLL). The ALLL covers estimated credit losses on individually impaired loans and loans evaluated at a segment level with similar risk characteristics, and it reflects adjustments for relevant qualitative and environmental factors (i.e., economic). In other words, a loan loss model for the ALLL must be conditional on the state of the economy, as it is used to determine estimated losses as of the evaluation date. Credit loss models for the ALLL are not usually statistic-based models like those used for making retail credit decisions (e.g., scoring models). Credit scoring models are generally built as tools to rank order the performance characteristics of the population, rather than to accurately forecast the incidence or the dollar amount of loss. Credit scoring has transformed the retail business by contributing to the dramatic loan growth through automated decision mechanisms. Scoring models are also important in evaluating credit acquisition and account management strategies once an account is booked.

To calculate how much capital is needed to cover unexpected losses, it is helpful to estimate what losses would be in several possible states of the economy.

Another critical risk modeling function for banks is capital estimation. Lenders price for their expected losses by incorporating a credit risk component into their pricing models, along with important components, such as yield, cost of funds, fixed costs, etc. In any given year, however, the credit environment may be such that actual losses exceed expectations. These unexpected losses generally arise as a result of changes in economic conditions or policy (e.g., a change in bankruptcy laws). To calculate how much capital is needed to cover unexpected losses, it is helpful to estimate what losses would be in several possible states of the economy. The various loss outcomes in these different states provide a loss distribution that associates various loss levels with probabilities that each loss level will occur. Economic capital is calculated as the difference between the expected loss and a much higher loss amount, i.e., at the solvency threshold noted above, that has only a 0.03 percent chance of occurring.

Although these modeling activities provide critical results, bank managers must still conduct more forward-looking analyses to better understand loss estimates, revenue, and reserve needs under specific and more adverse macroeconomic conditions. This type of analysis is called stress testing, and what bank managers have learned in the current crisis and recession is that stress test results can help avert potential financial distress if testing is done in enough time to implement risk mitigation strategies (such as raising more capital).

Common Credit Risk Modeling Frameworks

Unlike in wholesale credit modeling, retail loan portfolios are made up of individual small loans, and limited resources are devoted to analyzing the idiosyncratic risk of an individual borrower. To fully utilize economies of scale associated with risk assessment, statistical tools (credit scoring), and account management, retail loans are generally grouped into segments that have homogenous risk characteristics. Every institution will have a slightly different view of its risk segmentation, but credit risk models are commonly applied at the segment level if the data permit, while modeling estimated losses for the ALLL and unexpected losses for allocated economic capital is commonly performed at the portfolio level.[2] The following points briefly describe fundamental modeling frameworks for retail portfolios.

Scorecard Models

- Scorecard model development is primarily used for rank-ordering purposes. Scorecards can include prediction of delinquency, default, bankruptcy, attrition, profitability, and account acquisition, as the data reflect portfolio risk characteristics.
- Scorecard development requires statistical techniques that include logistic/probit regression, decision tree methods, neural networks, and linear regression.
- Macroeconomic information is rarely considered in scorecard modeling, but with some adjustments, scorecards could be augmented with economic variables to address causal relationships.

Roll Rate/Markov Chain Models

- Roll rate models measure the percentage of accounts or dollars that "roll" from one stage of delinquency to the next until the accounts meet contractual default criteria.
- Individual accounts are not tracked in the model. The stages of delinquency reflect a pool of accounts at the segment or portfolio level.
- Markov chain models are similar to roll rate models in that they track the transition of a pool of accounts into other stages of delinquency; however, these models can account for all types of transitions. For example, Markov models will not only reflect the average probability that a delinquent account will become further delinquent, but also the probability that a delinquent account will become current in the next period. This allows for bank managers to account for different assumptions around collection trends and attrition.
- Like scorecard models, Markov and roll rate models are based on portfolio risk characteristics and ignore economic factors. With considerable augmentation of the reference data, roll rate and Markov models could be adjusted to ensure that loss estimates are conditional on different economic conditions.

Vintage Models

- Vintage models normally segment the portfolio by either year-on-book (YOB) or month-on-book (MOB) that an account is booked on a bank's balance sheet. Once the vintage criterion is determined, the loss performance is tracked over time.
- Vintage models can be further segmented to reflect more granular levels of risk, such as delinquent/nondelinquent and bankrupt/nonbankrupt populations.
- Annual loss rates by vintage usually provide fewer

[2] For large complex banking institutions that are mandatory Basel II institutions, the advanced approach requires minimum required regulatory capital to be estimated at the segment level. The "use test" also suggests that the advanced approach should mimic the bank's standard risk management practices; therefore, risk segmentation should be a fundamental component of risk management.

data points, so nonparametric smoothing methods (such as weighted averages) are useful for estimation purposes.
- Assumptions regarding account management strategies and economic conditions can be incorporated into the smoothing algorithms.

Credit Risk Model Performance in the Financial Crisis

Credit risk models were severely hampered by the speed at which financial, economic, and borrower behaviors were changing over the course of the crisis and into the current recession. Retail credit conditions worsened rapidly in 2007, as credit performance trends in credit card, prime mortgages, and home equity lines of credit (HELOCs) became more adverse. At that time, many market participants believed that the observed market turbulence would stay contained within the subprime and near-prime mortgage business. By 2008, a series of escalating events triggered by the failures and near failures of some of the world's largest financial institutions severely eroded confidence in the U.S. financial system, shut down capital markets, and ultimately affected the real economy. The official announcement of the onset of a recession and the freezing of credit markets set the stage for an unprecedented policy response by the U.S. government and the Federal Reserve. As a result, it is difficult to assess credit risk models under these stress conditions.

It is important to note that much of the risk that was mounting in the mortgage market was known by financial institutions, as it was clearly outlined in regulatory guidance and accessible in mainstream publications and research reports. One could argue that if the emerging risks were known, model frameworks and assumptions could have been changed to reflect the heightened risks. Federal regulators issued interagency guidance on subprime lending in March 1999, while expanded supervisory guidance was issued in January 2001. Under this guidance, the regulatory agencies asserted their belief that responsible subprime lending can expand credit access for consumers and offer attractive returns, provided that institutions recognize and manage the unique risks associated with this activity.

The Federal Reserve Bank of Atlanta published a financial update for the third quarter of 2005, noting the inherent risk in a growing subprime mortgage market to holders of securities backed by subprime mortgages. Robert A. Eisenbeis, director of Research at the Atlanta Fed at that time, warned that observers, regulators, and markets did not yet fully understand the risks (of subprime lending and securities backed by subprime mortgages) because the phenomenon was relatively new. The article also noted that at the time, at least 60 percent of the rates on subprime mortgages would reset, beginning in 2006 and continuing through 2014. These early warnings signs went largely unnoticed, as we now fast-forward nearly four years and find ourselves in one of the most severe recessions since the Great Depression.

The chart on the next page best captures how a large, sophisticated banking institution with significant modeling data history and deep risk management expertise demonstrated an inability to accurately estimate near-term losses on its credit card portfolios. In particular, as the unemployment rate began its sharp ascent, the bank formulated loss rate projections that were less adverse due, in part, to assumptions around the correlation between card losses and unemployment. As higher actual unemployment trends were realized, the bank subsequently needed to increase loss projections to reflect deteriorating economic conditions.[3] As a result of the bank's inability to accurately capture losses, inadequate reserving has led to greater pressure on earnings and may have exacerbated the downward pressure on equity prices in the midst of the financial crisis.

Conclusion

After nearly 20 months into the current recession, the importance of credit risk models to help inform risk

[3] This might also suggest that bank models may have been enhanced with better economic forecasts of key macroeconomic variables.

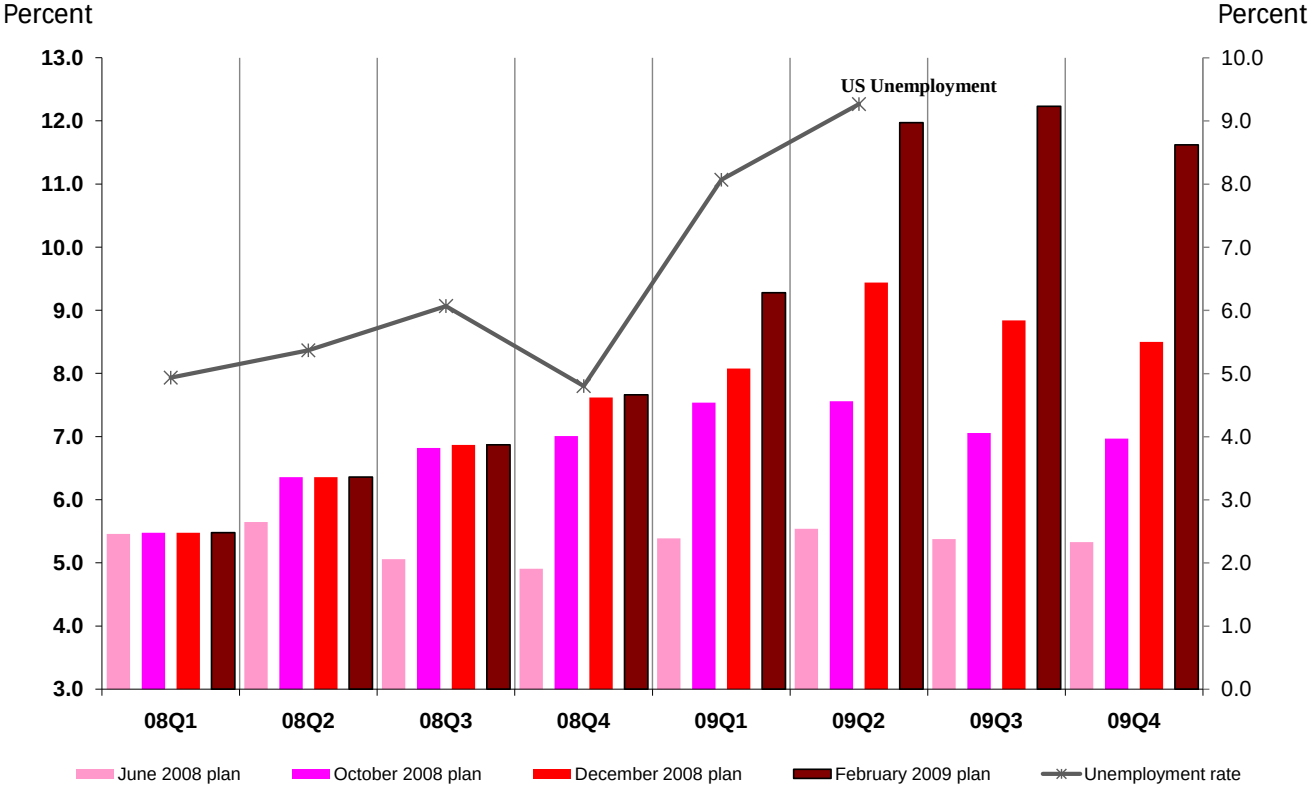
management decisions is absolutely clear. In particular, banking firms need to better incorporate economic variables into credit risk models in order to provide bank management greater insight on the direction and accuracy of loss estimates. It's not clear, however, that, had many of the credit risk models discussed above been conditional on the state of economy, it would have had an important impact on estimating the severity of losses experienced by institutions in this recession and helped to mute the severity of the crisis.

It is clear that there is room for enhancement of credit risk models at even the most sophisticated and largest institutions. Enhancement might come in the form of more rigorous statistical models, but not at the cost of predictive accuracy. Benchmarking existing modeling frameworks with alternative or new models would significantly strengthen banks' modeling efforts. Additionally, more work on stress testing and model validation should become standard practice for banks.

Bank examination staff should continue to strive to enhance stress testing and model validation, using actual bank data, in order to support more robust supervisory discussions that might help inform a bank's capital decisions in the future. □

Net Charge-off Forecast – Credit Card

Large US Banking Firm (over $1 Tril.)



Source: Bank MIS, BLS

Bank Mergers and Acquisitions Continue at a Slow Pace

by William Lenney, Regulatory Applications Specialist Analyst, and Paul Matteo, Intern

This is the third installment in a recurring series on Third District and national trends in bank mergers and acquisitions. "Factors Affecting Bank Acquisition Valuations," published in the first quarter 2008 issue of *SRC Insights*, discussed key factors affecting the bank acquisition valuation trend during the five-year period of January 1, 2002, to December 31, 2006. Specifically, it noted that acquiring banks were paying a significant price-to-book premium for target banks, and that by the end of 2006, valuations were at record levels. "Bank Mergers and Acquisitions Slow with Economy," which was published in the first quarter 2009 issue of *SRC Insights*, extended the original study to June 30, 2008. It noted that economic and financial conditions deteriorated significantly during 2007 and the first half of 2008, and the challenges of the weak housing market, subprime mortgage crisis, a slowing economy, reduced liquidity, and capital issues led to a decline in the number of bank acquisitions and lower price-to-book premiums paid for target banks.

For this article, data from 771 U.S. commercial banks acquired from January 2002 to June 30, 2009, were reviewed to update the 2002–June 30, 2008, analysis. In general, the analysis found that bank mergers and acquisitions continued at a slow pace, and price-to-book ratios continued to slide (Fig. 1). In addition to a sharp decline in price-to-book valuations, the overall number of nationwide acquisitions also declined sharply. During the first six months of 2009, there were only 13 acquisitions, compared to the 67 acquisitions during the first six months of 2006, a strong period for bank acquisitions and mergers.

Summary of Recent Analysis

The factors from the 2002–June 30, 2008, analysis were reevaluated to include the bank mergers and acquisitions completed from July 1, 2008, to June 30, 2009. Some of the prior conclusions were not consistent with the current analysis; specifically, in the prior two studies, a higher price-to-book premium was paid for banks outside the acquirer's state. From January 2002 to June 30, 2008, interstate bank targets received a 2.53 average price-to-book value, while intrastate targets only received 2.31. In contrast, in the period July 1, 2008–June 30, 2009, interstate banks only received a 1.17 average price-to-book premium, while intrastate banks received a 1.39 average price-to-book value.

Also in the prior studies, the total asset size of target financial institutions had an impact on the acquisition price, as the price-to-book ratio appeared to increase with the total asset size of the acquired institution. However, from July 1, 2008, to June 30, 2009, large target institutions received a lower price-to-book premium than the smaller target institutions. Banks with assets

Fig. 1: Price-to-Book by Year

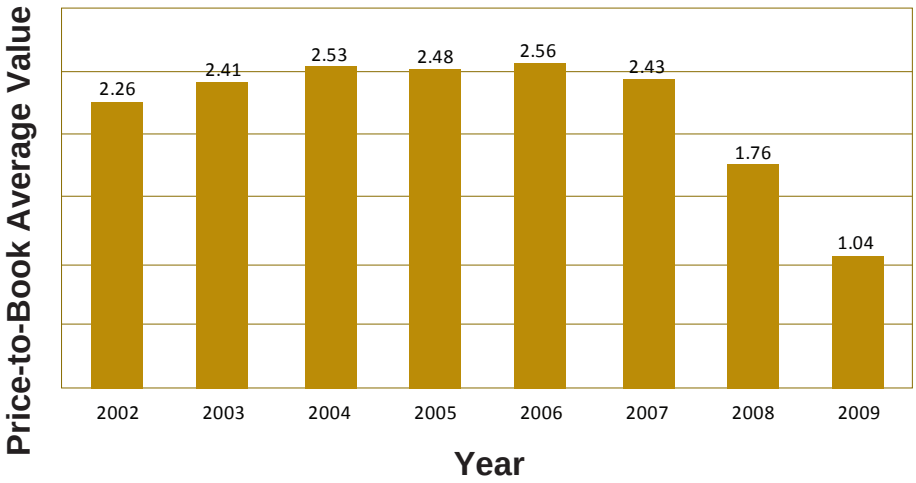
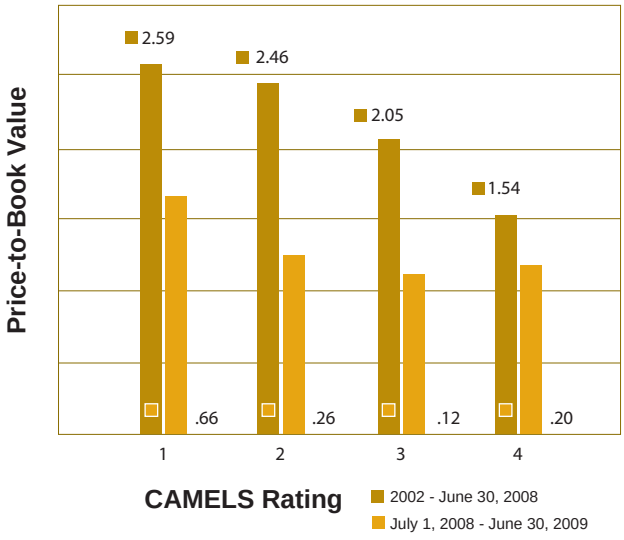


Fig. 2: Price-to-Book Vs. CAMELS Rating



exceeding $1 billion received a 0.88 average price-to-book ratio, while banks with less than $1 billion in assets received an average of 1.02 price-to-book premium.

Despite these changes, strong composite CAMELS and RFI/C ratings and core deposits continue to demonstrate a solid relationship to higher price-to-book values. Geography also still plays an obvious role in price-to-book as well, but the ratios in each region have changed noticeably.

In theory, financial institutions that have solid overall performance should expect to receive a higher price-to-book premium. As solid overall performance commonly results in composite CAMELS or RFI/C ratings of strong or satisfactory, it is not surprising that examination and inspection ratings correlate and correspond to price-to-book premiums paid. This fact was evident in the 2002–June 30, 2008, analysis and again proved to be the case with the recent data.

Recurring Themes

The average price-to-book premiums paid during the January 1, 2002–June 30, 2008, time period for 1- and 2-rated banks were 2.59 and 2.46, respectively, while 3- and 4-rated banks received 2.05 and 1.54, respectively (Fig. 2). During the last 12 months, 1-rated banks received 1.66, while 2-rated banks received 1.26. The average price-to-book premium for a 3-rated target was 1.12, and there was only one 4-rated target, which received 1.20 times book value. Although the premiums paid were consistently lower during the past 12 months, we found that higher rated banks continued to consistently receive a higher price-to-book premium than lower rated banks.

In the prior studies, target banks with a high percentage of core deposits received a higher price-to-book premium. This continues to be the case, as banks with core deposits over 20 percent received a 2.33 price-to-book premium, while banks with lower core deposits of five percent or less only received a 0.78 average price-to-book value.

During the last 12 months, target institutions across the nation received lower price-to-book prices (Fig. 3). For example, target institutions in the New York and Richmond Districts received 2.29 and 2.23, respectively, from 2002–June 30, 2009. However, from July 1, 2008–June 30, 2009, they only received 0.82 and 0.78, respectively. The targets in the Dallas, San Francisco, and Atlanta Districts continued to receive high price-to-book ratios—2.64, 2.15, and 1.75, respectively—from July 1, 2008–June 30, 2009. The few institutions acquired in these Districts during this time period had strong composite CAMELS and RFI/C ratings and relatively high core deposits ratios, which is consistent with the prior two studies, in that acquirers were willing to pay a premium for quality institutions.

The highest price-to-book premium paid in the nation from July 1, 2008, to June 30, 2009, was Hillister Enterprises II Inc.'s purchase of Crosby Bancshares in the Atlanta District for 3.37 times book value, whereas the lowest price-to-book premium over the last 12 months was Wells Fargo & Co.'s purchase of Wachovia for 0.23 times book value. It is interesting to note that the Wachovia Corp. deal was also the highest amount, at $15 billion.

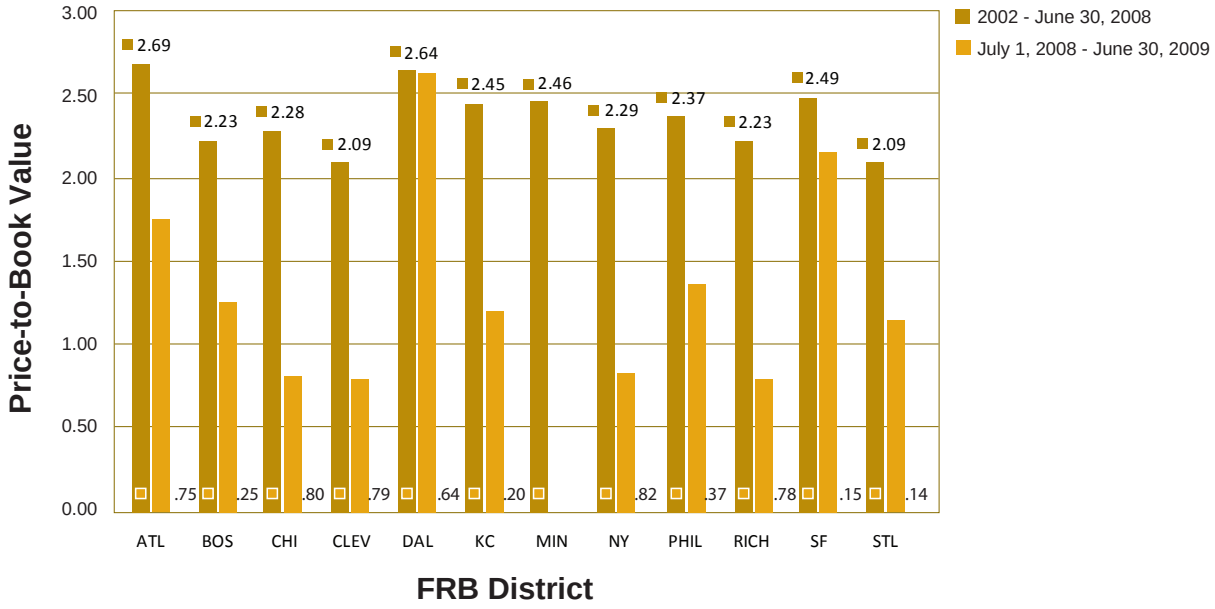
Institutions acquired in the Third District received a 1.37 average price-to-book premium from July 1, 2008–June 30, 2009, which was a significant drop from the 1.73 average during July 1, 2007–June 30, 2008. The highest price-to-book premium paid in the Third District during July 1, 2008–June 30, 2009, was Penseco Financial Service's $58 million acquisition of Old Forge Bank, which was priced at 1.72 times book value.

Conclusion

Deterioration in economic and financial conditions has led to a decline in the number of bank acquisitions and lower price-to-book premiums paid for target banks. Multiple factors influence the price-to-book premium paid for financial institution acquisitions. Acquiring institutions are not willing to pay a higher price-to-book premium for large out-of-state targets, as they did in the past, but institutions that have strong overall performances and ratings are still considered more valuable. Similarly, banks with high core deposits receive a higher average price-to-book premium.

Known for departing bits of wisdom in his quotes, Ben Franklin once said, "Nothing is certain but death and taxes." And, in the bank acquisition business, it seems that nothing provides certainty but strong ratings and high core deposit ratios. ☐

Fig. 3: Price-to-Book Values Relative to FRB Districts



Supervision Spotlight on Stress Testing: A Complementary Risk Management Tool *...continued from page 3*

system in place to generate periodic reports will help facilitate this process. It is also essential that the internal business culture be receptive to stress testing and recognize the potential value added.

The use of stress testing as a complementary risk management tool will continue to serve an important role in strengthening corporate governance and increasing the resilience of individual banks and the financial system. ☐

Who To Call

Your institution may need to contact an officer, manager, or staff member in the Supervision, Regulation, and Credit Department, but you may not know whom to contact. The following list should help you find the correct contact person to call. Financial institutions that have an appointed central point of contact should generally contact that individual directly. **Contact names appearing in bold are the primary contacts for their areas.**

Community, Regional, and Global Supervision	
William W. Lang, SVP	574-7225
Elisabeth V. Levins, AVP	574-3438
Stephen J. Harter, Manager	**574-4385**
Jacqueline Fenton, Manager	**574-7267**
Eric A. Sonnheim, AVP	574-4116
Lorraine Lopez, Manager	**574-6596**
Adina A. Himes, Manager	**574-6443**
H. Robert Tillman, Special Advisor	574-4155
Capital Markets	
William W. Lang, SVP	574-7225
Elisabeth V. Levins, AVP	574-3438
Consumer Compliance & CRA Examinations	
William W. Lang, SVP	574-7225
Constance H. Wallgren, AVP	574-6217
Robin P. Myers, Manager	**574-4182**
David A. Center, Manager	**574-3457**
Consumer Complaints	
Federal Reserve Consumer Help Center	888-851-1920
Regulations Assistance	
Regulations Assistance Line	**574-6568**
Enforcement	
A. Reed Raymond, VP	574-6483
Cynthia L. Course, AVP	**574-3760**
Joe Willcox, Manager	**574-4327**
Regulatory Applications	
A. Reed Raymond, VP	574-6483
William L. Gaunt, AVP	574-6167
James D. DePowell, Manager	**574-4153**
Retail Risk Analysis	
Christopher C. Henderson, Retail Risk Officer	**574-4139**
Discount Window and Reserve Analysis	
Vish P. Viswanathan, VP	574-6403
Gail L. Todd, Credit Officer	**574-3886**

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