

# Credit Scoring and Loan Scoring: Tools for Improved Management of Federal Credit Programs



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The PricewaterhouseCoopers Endowment for  
**The Business of Government**

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# Foreword

On behalf of The PricewaterhouseCoopers Endowment for the Business of Government, we are pleased to publish our second grant report. Thomas Stanton's report on credit scoring comes at an opportune time.

Credit scoring is an important application of technology to the business of government. It allows creditors, such as federal agencies which make loans, to evaluate millions of applicants consistently and impartially on many different characteristics. What once took weeks and a great deal of judgment is now completed in minutes, using data and objectivity. Similarly, more creditworthy individuals can be identified and expedited through this process.

The government is one of the largest originators of loans. Unfortunately, it often does not collect on these loans. The use of credit scoring would enable the government to better target and collect on these loans. In an era of tightening budgets, credit scoring is a tool that will enable government to increasingly choose wisely and also enable it to become a better financial manager.

As the availability of credit increases, the use of credit scoring is also likely to increase. Federal credit programs must not ignore the need to adapt credit-scoring technology as a means to conduct business in a more efficient and objective manner. As Mr. Stanton points out in this report, information-based technologies create both opportunities and risks for federal credit programs. The recommendations contained in this report will shed light on how federal credit agencies can use this technology to mitigate the risk associated with lending. We hope you will find this report informative and helpful.

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# Executive Summary

New information-based technologies are transforming the credit markets at a rapid pace. Lenders use credit scores and loan scores to generate loan-level information about a borrower's propensity to repay a particular loan. They measure the borrower's creditworthiness against a representative database, and use the resulting information to decide whether a loan should be made and, increasingly, on what terms.

Once the loan is made, lenders and servicers use scoring to help determine the most effective servicing and collection techniques to deal with a borrower who is delinquent or in default on a loan. Finally, credit scores and loan scores help lenders to assess risk and decide which loans and loan portfolios to securitize or otherwise sell, and help to price the sales transaction. When linked to data management systems, scoring-based systems allow lenders to originate and service high volumes of loans with unprecedented speed and accuracy.

Credit scoring and loan scoring create both opportunities and risks for federal credit programs. On the one hand, federal direct loan and loan guarantee programs can adopt some of the new technologies to improve their own credit administration. On the other hand, in today's environment the government will lag the private sector in resources and general capacity to adopt new information-based systems. This increases the prospect for adverse selection as private lenders use credit scoring and loan scoring to serve an increasing number of creditworthy borrowers who formerly would have been borrowers in a federal program.

This report presents four recommendations concerning ways that federal credit programs can use scoring to help manage credit risk:

1. Major federal credit programs that involve loans of a type for which scoring is suitable [especially including the single-family mortgage programs of the Federal Housing Administration (FHA) and the Department of Veterans Affairs (VA)] should create scoring-based systems to provide early warning of a deterioration in the credit quality of loans being originated under the program.
2. Major federal guarantee programs, including the single-family mortgage programs of FHA, VA, the Rural Housing Service, and Ginnie Mae, and the guaranteed loan programs of the Small Business Administration (SBA) and Department of Education, should adopt loan-level scoring systems to monitor the quality of performance of institutions that originate and service their guaranteed loans.
3. Federal direct loan programs, including federal direct student loans, the SBA disaster loan programs, and rural housing direct loans, should use scoring to help conduct controlled experiments in improved approaches to loan servicing.
4. Federal credit programs including the FHA single-family and SBA business loan programs should use credit scoring and loan scoring to experiment with improved targeting of creditworthy borrowers for whom traditional credit scores may be inappropriate.

Rapid deployment of scoring-based systems in the private sector means that some federal programs

may be at risk if they continue to do business in the old ways. The report presents three recommendations for dealing with this change in a strategic environment:

- Federal policymakers, especially at the Office of Management and Budget, should encourage appropriate federal credit agencies to make multiyear commitments of resources to adopt scoring-based systems in the context of well-designed strategic plans.
- Federal credit agencies should devote needed resources to assuring that they remain well informed about technological developments and the implications for the markets in which their programs operate.
- Federal policymakers in the Executive Branch and the Congress should consider structural changes to credit programs and organizations to increase their flexibility and capacity to respond to the many technology-driven changes that affect their ability to continue to serve their public purposes.

Credit scoring and loan scoring offer many possible benefits, but also raise public policy concerns that must be addressed. Federal credit agencies already have begun to partner with private lenders to apply scoring-based systems to the origination and underwriting of government-insured or guaranteed loans. The Federal Housing Administration, Department of Veterans Affairs, and Small Business Administration are incorporating scoring into the loan origination process. The VA also is conducting an experiment with the application of scoring-based systems to loan servicing. Other federal credit agencies are likely to follow soon.

Other important applications include the use of scoring-based systems to develop or enhance financial early warning systems, to monitor lender performance, to improve the targeting of federal credit to the most appropriate borrowers, and to experiment with lending to subgroups of underserved borrowers in an effort to increase their access to credit.

Not all loans benefit from credit scoring or loan scoring. If the probability of default varies largely based upon factors other than the borrower's individual credit, then credit scores do not add much value to credit administration. If loan data are not

standardized, or if sound historical data are unavailable, then loan scores will lack predictive value.

Thus, until someone develops a sound database and a model with predictive value based upon that database, loan scoring will not be useful in making or supervising federally guaranteed loans for FHA-financed multifamily rental properties, for example. By contrast, FHA single-family loans are scorable because information relating to defaults is standardized and available from many years of experience.

If they lack the requisite data, federal agencies may need to adopt and adapt off-the-shelf scores and scoring systems to their own program needs. Conversely, government agencies are at special risk of making misjudgments if they apply private-sector scorecards to subgroups of borrowers in their programs who act differently from the general population for which the scorecards may be appropriate.

Ultimately, the application of new technologies may require some federal credit agencies to develop more flexible organizational structures and programs if they are to continue to serve their public purposes. Leaders of some federal credit agencies, and especially those that benefit from significant external support, may need to begin a process of dialogue with stakeholders as a way to begin to enlist their participation in a consensus that might be built around the need to improve the design of some programs and organizations.

Policymakers may need to redesign the form of some government programs so that they can complement rather than be undercut by a dynamic private sector. Government organizations themselves may need to become much more nimble if they are to continue to serve their public purposes effectively in today's rapidly changing environment.

In the provision of credit, federal programs have neither the resources nor the policy freedom to operate at the leading edge of available technologies. On the other hand, the adoption of new practices in the private sector ultimately may make it untenable for some federal programs to continue doing business in the old ways.

# I. Introduction and Overview

New information-based technologies are transforming the credit markets at a rapid pace. Lenders use credit scores and loan scores to generate loan-level information about a borrower's propensity to repay a particular loan. They measure the borrower's creditworthiness against a representative database, and use the resulting information to decide whether a loan should be made and, increasingly, on what terms.

Once the loan is made, lenders and servicers use scoring to help determine the most effective servicing and collection techniques to deal with a borrower who is delinquent or in default on a loan. Finally, credit scores and loan scores help lenders to assess risk and decide which loans and loan portfolios to securitize or otherwise sell, and help to price the sales transaction. When linked to data management systems, scoring-based systems allow lenders to originate and service high volumes of loans with unprecedented speed and accuracy.

This report will examine the development and application of credit scoring and loan scoring by private lenders and the relevance of those developments to federal credit programs. The report concludes that information-based technologies create both opportunities and risks for federal credit programs. On the one hand, federal direct loan and loan guarantee programs can adopt some of the new technologies to improve their own credit administration. On the other hand, in today's environment the government will lag the private sector in resources and general capacity to adopt

new information-based systems. This increases the prospect for adverse selection as private lenders use credit scoring and loan scoring to serve an increasing number of creditworthy borrowers who formerly would have been borrowers in a federal program.

In other words, the waves of new information-based systems have created a sort of arms race. Federal credit programs cannot rest upon the status quo; they must adopt new technologies and approaches merely to protect their current positions. This report suggests a number of specific uses of credit scoring and loan scoring and related information-based systems that can help federal agencies administer their loan and guarantee programs.

Federal programs differ from private businesses in significant respects, and the process of adopting private-sector practices must be done selectively. Ultimately, the application of new technologies may require some federal credit agencies to develop more flexible organizational structures and programs if they are to continue to serve their public purposes.

Some large federal credit programs, such as FHA single-family mortgage insurance and federal small business loans, began in the aftermath of the Great Depression. These programs served as pioneers whose success in making new kinds of loans to creditworthy borrowers could demonstrate to private lenders that the market in such loans was viable and profitable. The new information technologies hold out the possibility that federal credit

programs once again can take on a pioneering role, by helping to serve those creditworthy but underserved borrowers who have been left behind in today's highly efficient credit markets.

This research report is organized as follows: Section I is the introduction. Section II discusses credit scoring and loan scoring as used by lenders and mortgage insurers in the private sector. This section provides an assessment of the usefulness of scoring-based systems for originating and servicing loans, monitoring lender performance, and other purposes. The benefits of scoring will vary according to the type of loan program and the nature of available data about borrowers, loans, and repayment experience.

Section III looks at larger strategic issues raised by the dramatic increase in the use of scoring-based systems. Borrowers, providers of financial services, and government credit programs all will be affected. For some federal credit programs, the new technologies are likely to place organizational structures under stress, as some of their existing functions become outmoded. Other programs may begin to experience deterioration in credit quality as new technologies accelerate the process of adverse selection by private lenders.

Section IV reviews policy issues relating to credit scoring and special considerations for federal credit agencies as they consider adopting scoring-based systems for purposes of loan administration. In particular, some federal credit agencies have been wary because of concerns that use of a scoring-based system might adversely affect minorities or other disadvantaged borrowers.

Section V surveys the current use of scoring by federal credit programs. The Federal Housing Administration, Department of Veterans Affairs, and the Small Business Administration have begun to incorporate scoring into the loan origination process. The VA also is conducting an experiment with the application of scoring-based systems to loan servicing. Other federal credit agencies are likely to follow soon.

Section VI suggests options for additional applications of scoring-based systems to federal credit programs. Perhaps most important, scoring can

permit federal credit agencies to develop new diagnostic and analytic capabilities. A federal credit agency could construct a financial early warning system to assure that adverse selection by private lenders was not creating unacceptable levels of financial risk in the new loans being originated for its programs. Another use would be to help federal agencies to monitor the performance of lenders with respect to the credit quality of loans that they originate or service for federal guarantee programs. For some programs, credit scoring can improve cost-effectiveness by helping to target underserved but creditworthy borrowers who are most likely to benefit from access to federal credit.

Section VII is the conclusion of this report: Credit scoring and loan scoring are here to stay. Each federal credit agency and its stakeholders must determine the extent that scoring-based systems are changing their strategic environment and how they should address the new risks and opportunities. The section also presents some recommendations for federal policymakers and program officials. Finally, a brief appendix offers some suggestions for federal managers who may want to explore the application of scoring to their own credit programs.

The author would like to thank the many people in government and the private sector whose insights contributed to this work. The author is especially grateful to reviewers of earlier drafts of this work, including Mark A. Abramson; David Brickman; Charles A. Capone, Jr.; Barry Dennis; Gary A. Miller; Nicolas P. Retsinas; Steve Robertson; and Robert S. Seiler, Jr. These reviewers provided many valuable comments. The author also wishes to express thanks to the PricewaterhouseCoopers Endowment for the Business of Government for funding this work. Sole responsibility for the contents of this report rests with the author.

# II. Credit Scoring and Loan Scoring in the Private Sector

## A. Credit Scores and Loan Scores

Scoring is a way to apply statistical modeling to a representative database and generate a numerical score for each borrower or loan. The score can be used to classify individual borrowers or loans into risk categories. A credit score is a number that is intended to predict a borrower's propensity to repay a loan; a loan score expands upon the credit score to include variables relating to loan characteristics — for example, the loan-to-value ratio for a home mortgage — to create a numerical indicator of the probability that a loan may default.<sup>1</sup>

Within the range of scores, lenders establish a cut-off point according to the amount of risk that they are willing to take with respect to borrowers or loans. In the mortgage market, for example, borrowers with low credit scores might be served by so-called subprime lenders rather than through the mortgage lenders who serve borrowers with higher scores in the conventional mortgage market.

As a technical matter, it is important to distinguish the actual factors that these scores measure. The

most common credit score, developed by Fair, Isaac and Company, is known as the FICO score. Fair, Isaac developed the FICO model to predict the likelihood of a consumer loan going into delinquency within two years of origination. By contrast, a mortgage score is designed to measure the likelihood that a 30-year mortgage, with a seven-to ten-year average life, will default and cause a loss.<sup>2</sup>

Credit scoring found its first applications in consumer lending. Starting in the 1960s, finance companies, followed by retailers and credit card companies, began to apply scoring-based systems to assess potential customers and evaluate credit applicants. Data management firms began to construct credit models based upon information extracted from credit bureau reports on borrowers who had taken out consumer loans. These firms constructed databases and mined the data for correlations between credit-related information about a borrower and that borrower's statistical likelihood of becoming delinquent on a consumer loan.

One of these firms, Fair, Isaac and Company, created a range of scores to capture these probabilities, from a low FICO score of 200 to a high score of 800. As lenders expand the use of the score-

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<sup>1</sup> See, e.g., Loretta J. Mester, "What's the Point of Credit Scoring?" Business Review, Federal Reserve Bank of Philadelphia, September/October 1997, pp. 3-16; and Robert B. Avery, Raphael W. Bostic, Paul S. Calem, and Glenn B. Canner, "Credit Risk, Credit Scoring, and the Performance of Home Mortgages," Federal Reserve Bulletin, July 1996, pp. 621-648.

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<sup>2</sup> See, e.g., Gordon H. Steinbach, "Making Risk-Based Pricing Work," Mortgage Banking, September 1998, pp. 11-21.

cards, Fair, Isaac and users respond to feedback and refine the scorecards to improve the correlation between score and actual credit performance.

Lenders applied such scorecards, and began to develop their own proprietary models and scores, for credit card loans, installment loans, and automobile loans. Today, lenders routinely use scoring to determine whether to extend such consumer credit and on what terms.

Private loan servicers also benefit from scoring-based systems. Credit scores can help in the process of devising cost-effective strategies for collection. Credit scores also can be combined with information about the loan and loan collateral to create a new servicing scorecard that relates directly to the risk of nonpayment by individual borrowers.<sup>3</sup> Creditworthy borrowers with high scores can be expected to cure their delinquencies, possibly without the lender intervening at all. Other borrowers may require prompt intervention. Database management permits servicers to target their interventions where they will be most effective.

Not all loans benefit from credit scoring or loan scoring. If the probability of default varies largely based upon factors other than the borrower's individual credit, then loan scores do not add much value to credit administration. If loan data are not standardized, or if sound historical data are unavailable, then loan scores will lack predictive value.

Effective loan scoring requires large amounts of high-quality data. Many different types of data are required, including information about loan origination and continuing loan performance, borrower characteristics, and the financial outcome, i.e., whether the loan prepays, becomes delinquent, defaults, or pays in full on time. The data must be available for a long period of time so that important background factors, notably the robust economy in recent years, can be taken into account in a predictive model.

Moreover, the data must be complete and clean. To gather and clean the data can involve substantial time and effort. Thus, to the extent that a federal agency cannot avail itself of a commercially available and appropriate set of credit or loan scores, scoring implementation can impose significant challenges and costs.

Until someone develops a sound database and a model with predictive value based upon that database, loan scoring will not be useful in making or supervising federally guaranteed loans for FHA-financed multifamily rental properties, for example. By contrast, FHA single-family loans are scorable because information relating to defaults is standardized and available from many years of experience.<sup>4</sup>

Finally, one other application of scoring deserves mention. This is the "institution" score that can help federal credit agencies to monitor the performance of lenders or other participants in their programs. The Department of Education, for example, needs to monitor the default rates of schools that offer federal direct or guaranteed loans to their students. Critical institution variables relate to the quality of origination and servicing of federal loans. Depending upon an agency's credit administration needs, it may be much easier to fashion an effective institution score than to create a new type of loan score.

By contrast to the loan score, which depends upon historical data, the institution score can be applied by measuring the performance of lenders and other institutions against their peers. Here, the key is to apply the score in such a way as to select an appropriate peer group for an institution's performance. Because of its focus upon credit scoring and loan scoring, this report discusses institution-level scoring systems only to the extent that they integrate loan-level scoring into their analysis.

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<sup>3</sup> Larry Cordell, "Scoring Tools to Battle Delinquencies," *Mortgage Banking*, February 1998, pp. 49-56.

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<sup>4</sup> For a cautionary note about scoring single-family loans, see Jim Kunkel, "The Risks of Mortgage Automation," *Mortgage Banking*, December 1995, pp. 15-57.

## B. Conducting Controlled Experiments

Once a lender has access to an effective data management system, managers can mine the data for useful information. Access to appropriate loan-level scores can permit a federal credit agency to conduct such experiments with greater cost-effectiveness than if scores are not available.

A number of promising practices in the private sector use information generated from selected subgroups that then are used to run controlled experiments. Officials of Fair, Isaac and Company apply the term “adaptive control systems” to describe the process of devising strategies for credit management, using control groups to test outcomes of alternative strategies, and modifying overall processes and strategies in response to the learnings.<sup>5</sup>

The essence of a controlled experiment is the way that it permits managers to test new approaches to credit management. Each current approach — to origination or servicing and collections of types of loans, for example — is deemed the “champion.” The manager then selects subportfolios that are used to test alternative approaches, deemed “challengers.” When a challenger yields a better outcome (here, in terms of reduced delinquencies or defaults) then it becomes the champion. The result is a continuous process of testing and refinement to move towards ever more valuable credit management techniques.

Controlled experiments can be valuable both in loan origination and in loan servicing and collections. In loan origination, for example, a lender may decide to extend credit to a specified group of nontraditional borrowers. Thus a mortgage lender might relax underwriting criteria that would rate borrowers as high risk if they had failed to make certain types of payments in the past. The lender then would track the delinquency and default rates of these borrowers for a few years. Based upon this experience, the lender might decide that payment records for such payments were not helpful in predicting the reliability of borrowers’ mortgage

payments and might omit such measures in the future, or perhaps weight them differently than in the past.

For loan servicing, the champion would be the current approach to doing business. A variety of challengers might be tested. For example, if data mining indicates that certain subgroups of borrowers have problems making their very first payment, then one challenger might involve a telephone call to selected borrowers at the time they receive their payment books to counsel them about the first payment. It could turn out that the challenger is cost-effective only for some types of borrowers; data mining allows targeting of first-payment calls to such borrowers rather than others. Another challenger might relate to meeting the special language needs of other types of borrowers and so forth.

## C. Automated Scoring-Based Systems

Although the consumer credit industry has used scoring systems for many years, new developments in electronic data interchange and processing mean that lenders now can originate and service high volumes of loans with unprecedented speed and accuracy. A lender can build a sophisticated information technology system, create a central database, and link it electronically to computers at the point of loan origination or servicing. This permits a loan officer to input a new loan application and transmit the data electronically to be matched against the central database and scored. The scoring-based decision is then transmitted back to the loan officer literally within minutes.

The mortgage market began to adopt scoring-based systems in the 1990s. In 1994 Freddie Mac, followed by Fannie Mae, announced the application of scoring to mortgage loans. Using the new data-processing technologies that now are available, the two lenders soon demonstrated how new scoring-based systems could offer substantial operational advantages over old ways of doing business.

Freddie Mac and Fannie Mae created automated underwriting systems that enable lenders to score loans and borrowers and accept large numbers of applications within only a few minutes. For the more creditworthy borrowers and higher-scoring

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<sup>5</sup> Mary A. Hopper and Edward M. Lewis, “Behavior Scoring and Adaptive Control Systems,” *Fair, Isaac and Company, Incorporated*, (San Francisco, CA: May 1992).

loans, the systems permit mortgage lenders to make immediate "accept" decisions, lock in a mortgage rate, and quickly close the loan. For less credit-worthy borrowers or lower-scoring loans, the systems refer the application back to the lender. Programs are now available to provide guidance to lenders about critical factors that the lender might adjust to make the loan acceptable.

Freddie Mac and Fannie Mae rolled out their automated underwriting systems in 1995; within two years these scoring-based systems accounted for about 40 percent of mortgage originations. In 1998, declining mortgage interest rates caused a record number of refinancings in the mortgage market; automated underwriting systems permitted lenders to keep up with demand and to close a record number of mortgage loans. Fannie Mae used automated underwriting to process nearly 2 million loans in that year alone.

New systems also permit companies to service huge numbers of loans. Mortgage servicers, such as Countrywide Home Loans, use their database systems to generate borrower and loan information when a borrower makes a telephone inquiry. For example, if a delinquent borrower calls, the system recognizes the caller's phone number and routes the borrower immediately to the collections department. Systems also can help to substitute for expensive staff time:

"The [Countrywide] system records recent information on an account and tries to guess why a call is being made, so a recording answers and tells the caller, for example, that his or her monthly payment was received three days earlier."<sup>6</sup>

Using such systems, major mortgage servicing companies today process payments and collections on immense volumes of loans. The top five mortgage servicers each serviced over \$200 billion of mortgages at year-end 1998; the top 10 companies serviced a total of almost \$1.6 trillion of mortgage volume.

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<sup>6</sup> Ted Cornwell, "Technology Will Help Lenders Cope: Defaults Rise While Economy Booms," *Mortgage Technology*, March/April 1998, pp. 31-36.

# III. Strategic Implications of the New Technologies

The new information-based technologies have profound implications for the credit markets. Consider the consequences for borrowers, competing financial services providers in the private sector and government, and the future role of some of the larger federal credit programs.

## A. Implications for Borrowers

For borrowers, a major consequence is increasing classification of loan applicants into distinct credit categories. These classes will be determined by two factors: (1) creditworthiness, and (2) transparency of information about their creditworthiness.<sup>7</sup> Because of the increased ability of lenders to stratify borrowers into classes, scoring systems heighten the importance of accuracy of the information in each borrower's credit report.

In the highest class are those borrowers who are creditworthy on the basis of easily accessible information. The new technologies will serve these borrowers through electronic loan transactions that approve and close loans almost instantaneously and at lower cost than ever before.

The next class consists of borrowers who are creditworthy but whose past credit activities may fall

outside of traditional statistical patterns. These are borrowers whose creditworthiness is translucent or opaque rather than transparent to the new scoring-based systems. These borrowers are likely to find that they receive very limited terms on credit card applications. Their mortgage applications are likely to fall within the category of applications that fail to receive an automatic "accept" decision from an automated mortgage underwriting system in the conventional market.

Instead of receiving automatic approval, their application will return to the lender for individualized, and more time-consuming and resource-intensive consideration. Such applicants may find that they qualify for special private sector or government loan programs.

Over time, the use of controlled experiments can help lenders to make the creditworthiness of some of these borrowers more transparent. Thus, analysis of payment records of renters might reveal that timely payment of rent and utility bills correlates well with reliable mortgage payments once these renters become first-time homebuyers. Once the scoring system incorporated this new information, more loan applicants would be scored in the "accept" range than before because their creditworthiness now would be clear to the scoring system.

The bottom class of credit applicants includes two kinds of borrowers who are not creditworthy: those (1) with and (2) without a transparent credit history

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<sup>7</sup> *The issue of transparency versus translucent or opaque information about credit quality is explored in, William R. Emmons and Stuart I. Greenbaum, "Twin Revolutions and the Future of Financial Intermediation," Olin Working Paper 96-48, November 1996. The author also is grateful to Neil Conklin, Chief Economist of the Farm Credit Council, for his application of this model to rural credit markets in a talk at Johns Hopkins University, March 1999.*

that reveals their lack of creditworthiness. In the past, the credit markets, and especially government programs, might have extended credit to the latter group of noncreditworthy borrowers simply out of an inability to screen them out.

Over time, the application of scoring-based systems will increase the transparency of information about such borrowers. Again, as lenders include new types of information in their databases, they may find transparent new reasons to exclude some borrowers from the "accept" category. To take the example above, lenders might find that a poor record of renters in making rent and utility payments was statistically relevant in helping to predict their unreliability in making mortgage payments if they decide to become homebuyers. As such information is validated, borrowers who lack creditworthiness increasingly will be denied credit, both by private lenders and by government programs that are concerned about default rates.

Given the heavy costs that default can impose upon a borrower, and the value of denying credit to those borrowers who in fact are unlikely to be able to handle their debt burdens, this is generally a good outcome. Some government programs in the past have done a grave disservice to some borrowers by extending credit that they could not handle.<sup>8</sup>

Thus, the widespread application of scoring-based systems will stratify borrowers as never before. The markets will serve the most preferred class of borrower through automated underwriting and low-cost transactions. Lenders will serve the less transparent class of creditworthy borrower with more costly and time-consuming processes.

The new scoring-based systems may permit the extension of some special and limited forms of credit, possibly at higher-than-average prices, to less creditworthy borrowers. The new systems also will increase the transparency of information about less creditworthy borrowers who in the past received more preferred forms of credit than would be merited by their actual circumstances.

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<sup>8</sup> Thomas H. Stanton, "Improving the Design and Administration of Federal Credit Programs," *The Financier: Analyses of Capital and Money Market Transactions*, May 1996, pp. 7-21.

## B. Implications for Financial Services Providers

Scoring-based systems also are exerting a profound influence upon lenders and other providers of financial services. The new technologies are driving down the costs of processing information relating to loan origination and servicing. The result has been to lower transaction costs and create excess capacity. Several strategic implications help to provide a context for the discussion here.

First, an increasing proportion of business is shifting from traditional lenders and loan-related service providers, who base many of their loans and services upon personal relationships with customers, to high-technology companies that substitute analysis of information databases for older ways of doing business.

Information databases have become important competitive assets. In the residential mortgage market, for example, information-based systems are helping to squeeze primary mortgage lenders and service providers between emerging Internet-based shopping and loan origination services, on the one hand,<sup>9</sup> and powerful secondary market databases on the other.<sup>10</sup> The result is to shift substantial value-added and related profits, from primary lenders and providers of loan-related settlement services to institutions that use scoring-based systems to manage risk and reduce transaction costs.

Second, the new technologies are taking apart old functions and reconstituting them in new ways. Thus, the new technologies have created economies of scale and have increased the capacity of companies to service loans effectively and inexpensively. The resulting increase in productivity has forced consolidation among mortgage servicing companies and the dramatic growth in servicing volumes, as noted above. Low costs permit centralized servicers to offer round-the-clock access to borrowers, instead of traditional face-to-face service at a lender's office only during business hours.

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<sup>9</sup> Kenneth A. Posner, "The Internet Mortgage Report: New Models, New Opportunities," *Morgan Stanley Dean Witter Investment Research*, February 4, 1999.

<sup>10</sup> Office of Federal Housing Enterprise Oversight, "Enterprises Introduce Automated Underwriting Systems," 1995 Annual Report to Congress, 1995, pp. 1-7.

Technological change places a premium upon organizational flexibility. Home computer terminals, traveling loan officers with laptop computers, and remote servicing facilities now can substitute for the expense of brick-and-mortar offices that once were the proud hallmark of lenders and other providers of financial services.

The pace of change makes organizational stability hard to sustain. As information-based technologies build upon one another, increasing numbers and kinds of organizations find that new systems and processes make many of their functions obsolete, in whole or in part. Outmoded organizational structures find themselves subjected to unprecedented stress as they suffer in the competition for resources to sustain themselves.

Third, continuing waves of improvement in scoring-based systems mean that nimble participants in the market are able to shift higher-risk loans to less sophisticated competitors. These market dynamics accelerate the process of adverse selection, both between more-adept and less-adept competitors and between the private sector and government. The initial enthusiasm about scorecards and scoring based systems has been followed by warnings about the need to constantly update databases and adjust to feedback so that scorecards do not become outdated.<sup>11</sup>

For credit market participants, one important factor is the *relative* quality of their scoring-based systems. One recent article presents credit scores as a tactical problem; lenders that use more sophisticated scorecards can sell higher-risk loans to unsuspecting buyers whose scorecards do not detect the actual level of risk involved and who do not price the transaction correctly. The article concludes:

“[A]s more and more institutions incorporate score analyses into their decision making, the companies that don’t will find themselves being adversely selected and, unknowingly,

accepting more credit risk than they planned.”<sup>12</sup>

The new technologies also affect government credit programs in many of these same ways.

### C. Implications for Federal Credit Programs

Several developments deserve discussion here. First, as the private market becomes more skilled at applying scoring-based systems to loan origination and servicing, the gap in transaction costs between private loans and government loans (either direct loans or loan guarantees) is likely to widen. The impact of this trend upon each particular federal program will vary according to the extent that scoring has high predictive value in determining the likelihood that a loan will become delinquent or default.

The reasons for this trend relate to the dynamics created by the rapid adoption of scoring-based systems in the private market. As the private market becomes more adept with such systems, it will use them to provide credit to worthy borrowers whose credit-related information is fairly transparent. Government direct loan and loan guarantee programs then will be left with a higher proportion of applicants and borrowers with less transparent creditworthiness. The benefits of information-based systems thus will accrue most directly to applicants and borrowers with transparency, and lower their origination and servicing costs the most, compared to the remaining kinds of borrowers.

Also, to the extent that the new scoring-based systems permit the private market to accelerate the process of adverse selection, the government is likely to serve an increasing proportion of applicants or borrowers of questionable creditworthiness. The average loan application then will require more careful processing than in the past and may require dedication of increased resources, such as financial counseling, to make many borrowers creditworthy.

To the extent that the average borrower becomes less creditworthy and the number of loan delinquencies or defaults rises in a federal program, loan-servicing costs also will rise. Current loans are easy to service, simply by collecting payments and accounting for them. By contrast, greater servicing

<sup>11</sup> See, e.g., Michael Todd, Robert Kennedy, and Colette Fried, “Ten Steps to Better Credit-Scoring,” *The Journal of Lending and Credit-Risk Management*, October 1998, pp. 54-59; Mark H. Adelson and Linda A. Stesney, “Dispelling Some Common MBS Myths,” *special report, Moody’s Investors Service*, December 12, 1997.

<sup>12</sup> Dan Feshbach and Pat Schwinn, “A Tactical Approach to Credit Scores,” *Mortgage Banking*, February 1999, pp. 46-52, at p. 52.

resources are required to deal with loans that are delinquent or in default. Thus the disparity in loan administration costs, between private loans and those loans made directly or guaranteed by government, is likely to grow.

Second, the new technologies are likely to apply significant stress to many government agencies, to an even greater extent than occurs with private firms. Governmental organizations tend to be more rigid than are those in the private sector. Strong constituent support may sustain many organizational units, such as an agency's offices in key states or congressional districts. Some organizational structures may be prescribed by law, and especially in appropriations acts. To the extent that technological change makes consolidation or reallocation of functions advisable, federal credit agencies may not be able to respond.

Government organizations also possess other rigidities. Budget constraints, civil service and classification laws, and pay differences between the government and the private sector may limit the numbers and affect the skills of people that staff an organization. Budget limitations, and especially the annual nature of the budget process for many federal credit agencies, may limit the amount of money that government can invest in new systems or processes. Time-consuming procurement procedures and pressures to accept a low bid rather than the most cost-effective proposal also limit government.

To the extent that technological change requires a change in business processes, many federal credit agencies may lack the ability to adjust either their staffing or their investments to keep up. Technological change thus may apply far greater amounts of stress to the structure and operation of some governmental organizations than to the functioning of more flexible and adaptable private organizations. In this environment, federal credit agencies may find that the need for organizational change becomes an integral part of the strategic planning process.

It is notable that those federal credit agencies that are authorized to operate as wholly owned government corporations show signs of being more flexible than the usual government department or agency. The three wholly owned federal government corporations that have a primary mission of

providing credit are the Government National Mortgage Association (Ginnie Mae), the Export-Import Bank of the United States, and the Overseas Private Investment Corporation.

Third, especially some of the larger government credit programs may find that advances in the private sector accelerate adverse selection to the point that serious responses are required to avoid taking unacceptable losses. Tracking earlier warnings, an actuarial report on the state of the FHA's Mutual Mortgage Insurance Fund suggests that new technologies can facilitate a process of adverse selection:

"[T]he improvement of the government-sponsored enterprises' (GSEs') ability to underwrite high quality, high LTV loans might cause an adverse selection effect. That is, without modifying its underwriting rules, FHA might end up with lower average quality loans... FHA is studying the development of its own mortgage scoring system. However, because of the relatively low volume and short performance history, little information can be drawn to quantify any of these effects. The ongoing developments in these areas should continue to be closely followed in the future."<sup>13</sup>

The conventional mortgage market has made steady incursions into the market share of federal mortgage programs, and especially the market traditionally served by FHA. In 1970, FHA provided mortgage insurance for 24.6 percent of the single-family mortgages originated that year; VA provided loan guarantees for 10.8 percent of single-family mortgages originated. By 1986, these numbers had dropped to 13 percent and 4.6 percent, respectively.

A steady decline in market share has meant that FHA and VA at the end of 1997 served only 8.6 percent and 3.3 percent of the market, respectively.<sup>14</sup> While

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<sup>13</sup> *Price Waterhouse, "Section I: Introduction," An Actuarial Review for Fiscal Year 1997 of the Federal Housing Administration's Mutual Mortgage Insurance Fund: Final Report, February 19, 1998, p. 7. See also, PricewaterhouseCoopers LLP, "Section I: Introduction," An Actuarial Review for Fiscal Year 1998 of the Federal Housing Administration's Mutual Mortgage Insurance Fund: Final Report, March 1, 1999, p. 7.*

<sup>14</sup> *Calculated from U.S. Department of Housing and Urban Development, "Mortgage Originations, 1-4 Family Units by Loan Type: 1970-1997," Table 16, U.S. Housing Market Conditions, May 1999, p. 64. In part, the decline in VA market share reflects a reduction in the number of veterans eligible to use the program.*

the conventional mortgage market grew by over 70 percent between 1986 and 1997, the number of originations of FHA and VA loans grew only slightly.

At the same time, the private mortgage market has been able to use new technologies to improve the credit quality of conventional mortgages compared to those insured by FHA. In 1986, FHA mortgages were 1.9 times more likely and VA loans 1.8 times more likely than conventional mortgages to become 90 days past due. By the end of 1998, these ratios had jumped to 4.7 times higher for FHA and 4.2 times higher for VA, compared to conventional mortgages.<sup>15</sup>

Adverse selection will affect different credit programs differently. Some programs such as the federal direct and guaranteed student loan programs may offer special terms that the private markets may not be able to match, except at the margins. Such programs are likely to be somewhat protected against large-scale adverse selection in the near future. Also, those types of loans for which scoring has not yet been developed, such as farm mortgages and multifamily mortgages, will not be subject to this form of adverse selection. By contrast, the FHA and VA single-family programs and possibly other federal programs such as the business loan programs of the Small Business Administration would seem to be more susceptible to such developments.

These changes in market dynamics ultimately may require that some government credit programs undergo substantial business process reengineering if they are to continue to serve their public purposes. New technologies are generating competitive pressures on market players, and organizational strength and flexibility will become increasingly relevant to programmatic success. Pressure also can arise from the increased perception that the private sector is doing a substantially better job of loan administration than a government agency.

For some federal agencies organizational redesign may be an essential part of gaining the capacity to gather and process loan information. An interesting example comes from the Rural Housing Service

(RHS) of the Department of Agriculture. This program was under pressure from capable private sector servicers who wanted the Congress to privatize RHS loan servicing. The RHS responded with a multiyear program to centralize servicing of rural housing direct loans in St. Louis, to add new technological capability to field offices to help with loan origination and servicing, and to relocate and downsize staff to accommodate the changes. The Rural Housing Service obtained a multiyear commitment from the Office of Management and Budget of the funds needed for the new technology and staff training.

All parties lived up to their commitments, and the new office is now operating on the basis of state-of-the-art servicing technologies. The result of centralized servicing has been to begin to create the capacity of the Rural Housing Service to gather high quality loan level data and to monitor loan performance in a timely manner. When a borrower begins to become delinquent, the RHS now is able to intervene early and allocate its scarce staff resources more effectively, trying to avert a default.

Program changes can involve more flexible and stronger organizational structures or changes in the form of government credit support. In the mid-1990s, FHA Commissioner Nicolas Retsinas sought to enhance the organizational capacity of the FHA. He proposed legislation to transform the FHA into a Federal Housing Corporation. A HUD report at the time suggested that the new wholly owned government corporation, to be known as the Federal Housing Corporation, would be a nimble organization that could gather and respond to information in a timely manner.

“[U]nlike the existing FHA, [the new corporation] would function through consolidated, flexible product line authority and new operational flexibilities so that it can easily adapt to market demands and customer needs.”<sup>16</sup>

Opposition from some constituencies meant that the Federal Housing Corporation idea failed to receive serious congressional consideration.

<sup>15</sup> Calculated from U.S. Department of Housing and Urban Development, “Mortgage Delinquencies and Foreclosures Started: 1986-Present,” Table 20, U.S. Housing Market Conditions, May 1999, p. 68.

<sup>16</sup> U.S. Department of Housing and Urban Development, HUD Reinvention: From Blueprint to Action, March 1995, p. 49. See also, “Federal Housing Corporation Charter Act (Draft),” pp. 60-72.

Especially if adverse selection pushes a federal credit program into a small niche, the government may want to consider transforming the form of credit support that it provides for underserved borrowers. One idea along these lines was contained some years ago in an OMB proposal to revise the FHA single-family mortgage insurance program. OMB proposed that FHA extend credit through a program of providing credit enhancements for pools of high loan-to-value and other high-risk mortgages securitized by Fannie Mae, Freddie Mac, or other securitizers.

The enhancement, in the form of a loss reserve, was to be designed to assure that the cash flow to investors would not be interrupted by defaults. As in the current program, FHA was supposed to continue to charge borrowers a fee to fully fund the loss reserves and cover its administrative costs.<sup>17</sup>

This proposal too met with substantial objections and was not refined to the point of addressing some of the significant policy issues that it raised. The point here is that the transformation into a program of credit enhancement may be one useful way that a federal credit agency such as FHA ultimately could address the problem of adverse selection that otherwise could cause intolerable losses to a federal credit program. The OMB proposal, for example, would have allowed FHA to budget for its credit risk each year in actual dollars provided for credit enhancement, rather than maintaining an open contingent liability.

It would be appropriate to consider a range of options for preserving a program such as the FHA homeownership program that serves such important public purposes. Increasingly, the value added from federal credit programs is likely to involve the provision of information to facilitate the flow of credit to underserved borrowers, rather than merely the provision of credit itself.

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<sup>17</sup> *The Office of Management and Budget, "FY 1996 Passback: Department of Housing and Urban Development," November 21, 1994, pp. 21-22.*

# IV. Public Policy Issues Relating to Adoption of Scoring by Federal Credit Agencies

Given the strategic significance of scoring-based systems for the delivery of federal credit, it is reasonable to argue that many federal credit agencies ought to incorporate appropriate systems into the administration of their credit programs. However, scoring-based systems cannot be applied blindly to federal programs.

Officials in a number of agencies express a variety of reservations about credit scoring and loan scoring. These may include concerns about the consequence of measuring the low creditworthiness of borrowers in some programs, and the possible disparate impact of credit scoring and loan scoring on minority borrowers. Other program managers may fear that disclosure of credit and loan scores may have negative effects upon the availability of federal credit in the future to the types of borrowers or loans that score least well.

The issue of possible disparate impact on subgroups of borrowers raises special concern. In one study conducted over twenty years ago, statistical analysis revealed that predictive factors relating to repayment of SBA small business loans differed significantly between white and African American borrowers. Applying one group's factors to the other group resulted in a significant increase in poor loan underwriting. Not only were some creditworthy borrowers

precluded from obtaining a loan, but loans were made to less creditworthy borrowers who had a significant probability of failure. As the author pointed out, both results were harmful; in the latter case, "[o]nce the black borrower has failed in business, he must meet his loan repayment obligations unless he pleads bankruptcy."<sup>18</sup>

A recent study of the residential mortgage market raises similar concerns. One issue relates to omitted variables in a credit-scoring model. Important omitted variables for home mortgage loans would include payment histories for rent and utilities, which typically are not included in credit-scoring models. The omission of such variables can make it difficult for creditworthy renters to score appropriately when they apply for mortgage loans.

Another critical issue relates to the application to non-random subsets of the population of credit histories that had been developed for a more general population:

"A particular concern in this respect is that minorities and lower-income individuals may be systematically underrepresented in the

<sup>18</sup> Timothy Bates, "An Econometric Analysis of Lending to Black Businessmen," *The Review of Economics and Statistics*, vol. LV, No. 3, August 1973, pp. 272-283, at p. 282.

baseline populations used to develop the scoring models. As a result, members of these groups, as they move into traditional credit markets, may be evaluated by models that may not accurately reflect their repayment propensities."<sup>19</sup>

The unfairness that can result from applying non-representative databases to subgroups of borrowers, and especially minorities, has not yet been fully resolved.<sup>20</sup> Acting Assistant Attorney General Bill Lann Lee, head of the Civil Rights Division of the U.S. Department of Justice, has addressed the question of disparate impact upon minority loan applicants and borrowers without fully answering it.

Mr. Lee spoke to the Mortgage Bankers Association about credit scoring and fair lending. He stated, "Well designed and fair credit-scoring systems hold great promise for objective decisions on any form of loan application."<sup>21</sup>

However, even though sound credit-scoring models themselves may not discriminate, Mr. Lee did see several prospects for discrimination in the lending decision itself. First, law enforcement agencies have found discrimination in lenders' failure to provide minority applicants with the same level of assistance that they provide to white applicants in securing their loans. The most common areas are the failure to help with explanations of negative credit histories and with documentation of applicant income.

Second, Mr. Lee pointed to lenders who override credit scores more often for white applicants than on behalf of minority applicants. Such overrides can include both approval of applicants despite a failing credit score and denial of applicants with a passing credit score. Finally, Mr. Lee expressed concern about price discrimination, in the form of lender requirements mandating that minorities pay higher points or interest rates than those required of white borrowers.

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<sup>19</sup> Robert B. Avery, Raphael W. Bostic, Paul S. Calem, and Glenn B. Canner, "Credit Scoring: Issues and Evidence from Credit Bureau Files," Board of Governors of the Federal Reserve System, February 23, 1998, p. 8.

<sup>20</sup> See Florence Lockafeer and David Rosen, Credit Scoring Small Business Loans: Capital Access or Bias? David Paul Rosen and Associates, July 1996.

<sup>21</sup> Bill Lann Lee, remarks before the Mortgage Bankers Association Fair Lending Conference, March 23, 1998, p. 3 (prepared text).

All of these issues are receiving attention from federal officials.<sup>22</sup> The Federal Reserve Board, in Regulation B under the Equal Credit Opportunity Act, precludes creditors from using credit-scoring systems unless they are "empirically derived, demonstrably and statistically sound."<sup>23</sup>

Recently, the Department of Housing and Urban Development (HUD), through the HUD Office of Fair Housing and Equal Opportunity, requested and obtained information from Fannie Mae and Freddie Mac about their automated underwriting systems, presumably to determine whether they meet Mr. Lee's standard of being well-designed and fair to all applicants and borrowers.<sup>24</sup> The Federal Housing Administration is developing its own FHA score-card, partly to try to assure that FHA scoring-based lending decisions would be fair to all applicants and borrowers.

In other words, the state of knowledge concerning equal credit opportunity would seem to suggest the following. First, credit-scoring systems can be constructed to be sound and fair to all applicants and borrowers. Second, the advent of credit scoring has not removed opportunities for lenders and creditors to discriminate access to loans and pricing. Third, as will be discussed below, there may be an important role for federal credit agencies in assisting with the development of databases that increase the access of disadvantaged borrowers to credit by increasing the transparency of information about their creditworthiness.

The important point for federal credit programs is to provide reassurance that, so long as federal scoring based systems are well-designed, with sensitivity both to statistical validity and to fairness issues, there seems to be little evidence that such systems would contribute to an increase in unfair credit practices. Scoring-based systems are tools to be used, as are any other tools of credit administration, with safeguards to prevent their misuse.

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<sup>22</sup> See, e.g., Office of the Comptroller of the Currency, OCC Bulletin 97-24, "Credit Scoring Models Description: Examination Guidance," May 20, 1997.

<sup>23</sup> 12 CFR Sec. 202.2(p)

<sup>24</sup> US Department of Housing and Urban Development, A Study of the GSEs' Single Family Underwriting Guidelines, Final Report, Office of Policy Development and Research, April 1999.

# V. Current Use of Scoring-Based Systems by Federal Credit Agencies

A review of federal credit agencies reveals that at least three have begun to permit some use of scoring-based systems. The Federal Housing Administration, Department of Veterans Affairs, and the Small Business Administration each permit lenders to use scoring-based systems in loan origination for some programs. The VA is experimenting with the application of scoring-based systems to loan servicing. No federal agency yet applies credit or loan scoring as a diagnostic tool to ascertain the performance of lenders or the credit quality of portfolios of direct loans or loan guarantees.

Both FHA and VA now permit mortgage lenders to use approved automated underwriting systems to originate their loans. Both agencies undertook assessment of Freddie Mac's Loan Prospector system and have approved its use. FHA and VA are now testing Fannie Mae's Desktop Underwriter system, including the PMI Mortgage Insurance Company's pmiAURA scoring system, in a similar pilot program.

After gaining experience in the Freddie Mac pilot program, FHA announced that it would develop its own scorecard. FHA contracted with Fair, Isaac and Company to develop a distinct FHA single-family scorecard. Preliminary indications are that the FHA automated system approves a much higher percentage of applicants than are approved by automated systems in the conventional market. Also, some lenders contend that automated under-

writing generates approval for a significant proportion of FHA loans that would not have been approved under traditional FHA guidelines.<sup>25</sup>

The Small Business Administration also contracted with Fair, Isaac and Company to obtain scorecards to help the SBA underwrite and quickly decide whether to approve loans under the SBA Low Documentation (LowDoc) Loan Program. SBA has made a commitment to attempt to respond to a LowDoc guaranty request within one-and-a-half business days.

The SBA applies scorecards based upon credit scores, rather than loan scores. The credit scores provide information about the propensity of the business proprietor to repay, on the theory that this is the single most important factor affecting the credit quality of a smaller-sized small business loan. The LowDoc program is limited to loans up to \$150,000. SBA directs lenders to submit larger loans and loans with more complicated financial issues to the standard SBA business loan program for underwriting according to usual procedures, rather than to LowDoc.

The Department of Veterans Affairs has a special concern about the welfare of VA borrowers and the need to avoid foreclosures whenever possible. VA

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<sup>25</sup> "What's the Score at FHA?" ABA Banking Journal, American Bankers Association, October 1998, p. 54.

is working with Fannie Mae and four servicers of VA mortgages to test the application of Fannie Mae's Risk Profiler system when servicing VA mortgages. This test is a controlled experiment that VA is conducting at no cost to the government.

Starting May 1, 1998, the four servicers began to apply Risk Profiler to their servicing portfolios of VA loans. About 500,000 loans will be included in the test, out of a total VA guaranteed loan volume of roughly 3 million loans outstanding. The four servicers range in size from one of the largest to a servicer of more modest size.

The servicers will perform a champion-challenger test on the 500,000 loans. Half of the loans will be serviced in the traditional manner. The other half will be scored and serviced with stratified techniques that involve special attention for early delinquency loans with weak scores. VA and the servicers will follow the performance of the loans for at least six months. Fannie Mae plans to use information from the test as feedback to revise and improve the VA loan segment of the Risk Profiler database.

The four servicers are willing to undertake the experiment because of the savings that they will achieve in managing delinquencies of high-score loans (i.e., those that tend to reinstate with no or little intervention) and in reducing defaults that otherwise would require costly attention. If the pilot program is successful, then VA could revise its servicing regulations to permit all VA loan servicers to benefit from more flexible requirements if they use Risk Profiler or, eventually, other acceptable systems.

The three pioneers in federal use of credit scoring for loan origination and servicing have been able to use systems that could be purchased, with or without adaptation, from private vendors or applied through private lenders. It should be pointed out that the adoption of a scoring-based system represents only the beginning of a process; to be successful, FHA and SBA will need to develop the capacity to obtain feedback from the application of their scorecards and to make adjustments from time to time. In the world of constantly evolving systems, any market participant that fails to learn from experience and adapt will find itself absorbing unanticipated losses.

# VI. Options for Additional Applications to Federal Credit Programs

Credit scoring and loan scoring offer the opportunity for some federal credit agencies to devise scoring-based database management systems for a broad range of purposes. Once they include such scores in their databases, federal managers can use the information to manage the credit risk of some large programs much more effectively than in the past. The opportunity to develop such approaches is growing; prices are dropping and new systems are constantly coming to market.

Several opportunities suggest themselves for government use of scoring: (1) in financial early warning systems, (2) to monitor performance of lenders that participate in government loan guarantee programs, (3) to improve the servicing of federal direct loans, and (4) to help improve targeting of federal credit programs. In other words, government credit agencies may find that, besides helping to enhance loan origination and servicing, other important and immediate benefits of scoring-based systems relate to the use of scores for diagnostic and analytic purposes.

## A. Scoring-Based Financial Early Warning Systems

Scoring-based systems can help federal credit agencies to measure the creditworthiness of their portfolios. For some credit programs, this will be useful, but not imperative. Other federal credit programs face strong private sector competition and growing evidence of adverse selection. To protect the finan-

cial health of some such programs, these agencies may find it essential that they construct and maintain financial early warning systems and continuously refine them.

In today's markets, information is the basis for financial performance. The FHA and VA now share their portfolio data with the private markets and permit private firms to construct scorecards from the information. This information will assist the conventional market to mine the government-guaranteed mortgage market for creditworthy borrowers. Issues of adverse selection, both among borrowers and among lenders, are real and must be addressed. Similarly, the growing use of scoring in small business lending and even rural lending may suggest the usefulness of financial early warning systems for agencies such as the SBA and some loan programs of the Department of Agriculture, for example.

The term "financial early warning system" can have a variety of meanings, depending upon the context. Here the term is meant to apply to a system that measures the credit quality of portfolios of direct loans or loan guarantees and that provides an early warning signal of deterioration in credit quality.

For such financial early warning systems, credit scores and loan scores can add considerable value. Using statistical sampling, a federal credit agency

can construct a database of current loans or loan guarantees, adjusted as new borrowers enter or leave the program. The federal agency then can score the direct loans or guaranteed loans for which a score can be obtained.

Initially, at least, programs that extend credit to individuals such as homebuyers are likely to find credit scores easier to obtain than loan scores. Interviews with mortgage lenders, for example, indicate that they now routinely obtain credit scores on all mortgages that they originate. They are unlikely to object if a federal credit agency such as FHA or VA required submission of such scores as a part of the documentation for each loan that the government insures or guarantees.

The function of the financial early warning system is to establish a baseline average score for the portfolio, or selected subsets of the portfolio, and to provide a prompt report of changes in that average score or in the distribution of scores. If the system sounds an early warning, the question becomes one of selecting an appropriate response. Federal credit agencies may want to review their legal authority and prepare a “what-if” handbook of measures that are available in response to a signal.

If an agency lacks sufficient authority to act, discussions with the relevant congressional committees might be useful. A repertoire of responses is desired, as a way of permitting an agency to deal with an early warning signal and avoid the Hobson’s choice between applying a draconian measure — say, to shut down some part of a program altogether — or waiting passively to see whether the signal might have been premature.

## **B. Adding Credit Scores or Loan Scores to Lender Monitoring Systems**

Lender performance is an essential part of an agency’s ability to maintain the financial soundness of a loan insurance or guarantee program, such as those of the FHA, VA, SBA, and Department of Education, for example. Credit scores or loan scores now can offer some of these agencies new capabilities for monitoring the quality of loans that lenders originate and service.

A private sector model is instructive. One private mortgage insurer monitors its risk position as follows:

1. Once insurance is in force, the company runs all loans through an automated underwriting system to obtain a mortgage score for each loan. The company also obtains FICO credit scores for each loan.
2. The company categorizes the mortgages according to credit quality.
3. The company then conducts an automated review of the quality of loans in groups and subgroups: companywide, insured through each of the company’s insuring offices, originated or serviced by each lender, and originated by each office of each lender.
4. The company pays special attention to early payment defaults as an indicator of lender performance.
5. For large lenders, this system can detect problem patterns within 90 days of origination or sooner. It takes longer for patterns to emerge with respect to lenders that originate smaller numbers of loans.

Once the information is included in the database, the company can stratify it according to particular variables. These could include geographical location, type of loan (e.g., fixed rate or variable rate), term, and loan-to-value ratio, for example.

The mortgage insurer uses its performance information to visit lenders whose performance is unacceptably low. The company reports that the FICO score seems to correlate especially well with early payment defaults. The FICO score is also useful to help explain performance problems to lenders. The company reports that most lenders respond positively when they are approached with evidence that average FICO scores on their originations have lagged those of their peer group.

The private mortgage insurer follows up with careful monitoring of average FICO scores for originations of mortgages by the lender (or by the office of the lender) that have been singled out for review. Alternatively, the insurer may specify that it will not accept originations of mortgages from that lender or office that fall below a specified FICO score.

A private mortgage insurer tends to have greater leverage over lenders than does a federal agency. Laws and regulations may require a significant process, for example, before a federal credit agency may apply sanctions or refuse to do business with a lender that originates loans with a high propensity to default.

Nonetheless, as has been demonstrated by one federal agency, Ginnie Mae, an effective and reliable lender monitoring system can yield many dividends. Ginnie Mae too would benefit from adding a credit-score or loan-score dimension to its successful lender monitoring systems, known as IPADS (Issuer Performance Analysis Database System) and CPADS (Correspondent Performance Analysis Database System).<sup>26</sup> Scoring systems based upon loan-level information can help to monitor the performance of lenders or other institutions in originating sound loans and also in servicing them.

### C. Scoring to Improve Servicing of Federal Direct Loans

Credit scores and loan scores help lenders to test current approaches, e.g., to loan servicing and collections, against experimental alternatives. The VA currently is running experiments to test application of scoring-based systems to servicing of VA home loans, and the practice is likely to spread to servicing of other federally guaranteed loans.

Federal credit agencies may find that scoring-based systems also can help with the servicing of federal direct loans, such as Rural Housing direct loans. Some officials at the Department of Education also have begun to explore application of scoring-based systems to the servicing of direct student loans. For such direct federal loans, champion-challenger tests can help to refine and target loss mitigation techniques. Combined with electronic data interchange, the government may be able to save money by targeting default prevention and loss mitigation approaches to the types of borrowers who will benefit most.

Credit scoring provides a valuable starting place for determining whether intervention might be needed and what form it might take. Again, this is a dynamic process that should evolve as it is applied. Credit managers can document correlations between credit scores and the forms of intervention that work most effectively in bringing a borrower into current status on repayments.

A credit manager may find, for example, that early counseling is most effective for borrowers in a certain range of credit scores, but that it is not needed for borrowers with high scores and is not helpful for borrowers with low scores. Such insight can help credit managers target such counseling to those cases where it is most likely to be cost-effective. Credit managers may also begin to experiment with new approaches to targeting borrowers for whom such counseling was not helpful; perhaps another form of intervention, or intervention earlier, may be more useful and cost-effective.

By mining the databases of the contractors that service federal direct loans, credit managers can begin to construct their own credit scores and then refine those scores as new correlations emerge from the data. Such scores would reflect factors that experience shows to be relevant to predicting a borrower's propensity to repay the particular type of federal loan.

Using experimentation and a process of comparing outcomes, credit managers can determine whether their own credit scores are superior to credit scores that can be purchased off-the-shelf from private vendors. It also may be possible eventually to combine credit scores with other information to create an empirically derived loss mitigation score that would have even greater predictive power.

The point of the exercise is to use scores as a tool to identify groups of borrowers for whom some interventions are more valuable than others. This helps to direct a federal credit agency's loan management activities so that they are the most useful in protecting borrowers from the unpleasant consequences of delinquency that could lead to default.

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<sup>26</sup> See Thomas H. Stanton, "Managing Federal Credit Programs in the Information Age: Opportunities and Risks," *The Financier: Analyses of Capital and Money Market Transactions*, Summer/Autumn 1998, pp. 24-39.

## D. Scoring to Improve Targeting of Federal Credit Programs

Ultimately, some programs may be able to apply scoring-based systems to help improve the targeting of federal credit. The most suitable borrowers might be defined as those who both (1) need the federal loans or guarantees because they lack access to nonfederal credit on reasonable terms, and (2) are creditworthy enough to be able to repay their federal loans without risking unacceptable levels of default. To the extent that improved targeting is acceptable to a program's stakeholders, some federal programs could complement the private credit markets with much more precision than ever before, and therefore with greater cost-effectiveness.

Especially in credit markets that are being transformed by widespread use of scoring-based systems, the availability of credit scores and loan scores can help federal agencies to devise more flexible underwriting criteria that enable the federal program to respond promptly to market developments. As lenders increasingly adopt automated underwriting systems, they will be able to adjust their own loan origination systems to follow such changes without difficulty. Again, it should be noted that credit scores or loan scores might be inappropriate for some federal credit programs, especially where the available information is inadequate.

For appropriate programs, scoring can be used to reduce access of borrowers who are unlikely to be creditworthy, while increasing access of creditworthy but nontraditional groups of borrowers. As with any new way of doing business, the effects of scoring must be evaluated in terms of the public purposes that a credit program is supposed to serve.

Some federal credit programs may be able to apply scoring to help to screen out borrowers who are unlikely to be able to handle their debt burdens. Candidates for this application of credit scores would seem to include some federal direct loan programs that serve borrowers who potentially might be at the lower end of creditworthiness. The SBA disaster loan programs, for example, might run quick credit scores on applicants for SBA loans after a disaster. Those people or businesses that were not creditworthy before the disaster are unlikely candidates to be able to repay their federal loans afterward.

Increased use of scoring-based systems also can provide an opportunity for some federal agencies to complement the behavior of private lenders and increase access to credit for new creditworthy borrowers. Consider again some of the limitations of scoring based systems: credit scores and loan scores are valuable only as applied to people and loans whose credit-related characteristics were captured in the sample of borrowers and loans that were used to develop the scoring database.

Some analysts complain that credit scores and loan scores may not properly reflect the creditworthiness of nontraditional borrowers. They point to factors that reduce a borrower's credit score, such as the number of credit inquiries, whether the borrower borrows from a finance company rather than a bank, or whether the borrower has a large number of small credit balances outstanding. While these factors may have predictive value for the average middle class borrower, there is a chance that some of them are not statistically relevant to the creditworthiness of some subgroups of borrowers.

Needed is an opportunity to conduct controlled experiments to determine whether some such factors might be relaxed, or replaced by other more predictive factors, when applying credit scores to some nontraditional borrowers. The federal government is ideally suited to support such experiments. A federal credit agency such as FHA might develop a risk-sharing program with private lenders to extend mortgage credit to nontraditional borrowers and monitor their propensity to repay the loans. The FHA already possesses statutory authority to enter into risk-sharing arrangements.

The resulting loan performance data could be shared with the private market as a way to facilitate the extension of credit to creditworthy borrowers who previously could not have been served on reasonable terms. In the terminology of Emmons and Greenbaum, the government would help to make transparent the previously opaque creditworthiness of these nontraditional borrowers.

Ultimately, in the words of one analyst, taken from a different context, FHA could become "the Bell Laboratories for housing finance."

"...FHA must test conventional perceptions of risk. It must challenge current orthodoxy. It must design new mortgage products, provide for new ways of support ... and continually push all participants ... to provide cheaper, more efficient and more responsive credit products to the marketplace."<sup>27</sup>

Whether Congress will allow federal credit agencies to take on this role is an open question. In any event, a major lesson of the information age is that federal credit agencies need to increase their value by creating information rather than merely managing the credit risk of large government direct or guaranteed loan portfolios.

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<sup>27</sup> *David Rosen, Target Markets and Key Products: Conclusion, Recommendations and Findings, FHA Multifamily Housing Business Strategic Plan, September 29, 1995, at p. 7.*

# VII. Conclusion: The New World of Scoring-Based Systems

Credit scoring and loan scoring are here to stay.

The conclusions of this research can be highlighted in terms of recommendations for federal program officials and policymakers about ways to address the opportunities and risks that the new technologies present. The opportunities that come from scoring-based systems relate to new operational improvements that can enhance the capacity of federal credit programs to serve their public purposes. The risks are more strategic in nature and relate to the ways that some agencies will need to respond if their programs are to keep pace in the new world of scoring-based systems.

These systems offer opportunities for many federal credit programs to increase their institutional capacity to manage credit risk:

- **Major federal credit programs that involve loans of a type for which scoring is suitable should create scoring-based systems to provide financial early warning of a deterioration in credit quality of loans being originated under the program.**

These programs include the single-family mortgage programs of FHA, VA, and the Rural Housing Service. Because loans from all of these programs are securitized by Ginnie Mae, it would be cost-effective to add loan-level scoring to a Ginnie Mae system that builds upon today's IPADS and CPADS lender monitoring systems to create a financial early warning database as well.

Credit scores would enable the combined system to have access to loan-level data that could be sorted by geographic region and loan type, as well as by the lender that originates or services the loan. Discussions with persons in the mortgage industry indicate that lenders are unlikely to object to reporting FICO scores with their loan origination information.

Other federal credit agencies also should explore the use of credit scores to create financial early warning systems. These include the SBA business loan programs and the guaranteed student loan program. Especially the SBA 7(a) business loan program may need to be concerned about adverse selection by lenders.

- **Major federal guarantee programs, including the single-family mortgage programs of FHA, VA, Rural Housing Service, and Ginnie Mae, and the guaranteed loan programs of the SBA and Department of Education, should adopt loan-level scoring systems to monitor the quality of performance of lenders who originate and service their guaranteed loans.**

The application of credit scoring, and eventually loan scoring, to lender monitoring promises considerable financial payoff because of the way it permits federal agencies to allocate their scarce resources, preventing unnecessary defaults that can occur from poor origination or servicing. Again, the Ginnie Mae IPADS/CPADS systems, which been pioneers in this regard, need to be enhanced through application of loan-level

scores to provide information about credit quality. The Department of Education also should apply scoring to the monitoring of participating educational institutions and perhaps to a review of the credit performance of student loan guarantee agencies.

- **Federal direct loan programs, including federal direct student loans, the SBA disaster loan programs, and rural housing direct loans, should use scoring to help conduct controlled experiments in improved approaches to loan servicing.** Good servicing is especially important in assuring the repayment performance of many federal student loans, for example. The development of champion-challenger experiments in servicing, even if rudimentary at first, could help the Department of Education to experiment with approaches to servicing that increase the loan repayment performance of different types of borrowers. Perennial questions, such as whether it is better to send monthly statements or a loan payment coupon book, then can be answered on the basis of empirical information.

Good servicing also is important in enhancing the performance of the many less creditworthy borrowers who may receive credit from an SBA disaster program or the RHS direct home loan program. In all of these applications, loan-level scores can provide an important diagnostic tool to help devise and learn from experiments.

- **Federal credit programs including the FHA single-family and SBA business loan programs should use credit scoring and loan scoring to experiment with improved targeting of creditworthy borrowers for whom traditional credit scores may be inappropriate.** Scoring can be used to expand access to federal credit. Federal credit agencies could add significant value by conducting out-of-sample experiments to determine whether modifications to commercially available scores might improve the access to credit of some creditworthy but nonstandard types of borrowers.

The federal agency first would experiment, either through a direct loan program or through risk sharing with lenders in a guaranteed loan program. Then the agency could use the information to adjust its own underwriting standards and guidelines. Once again, high quality information and systems are needed for such efforts to succeed.

The rapid deployment of scoring-based systems in the private sector means that some federal programs may be at risk if they continue to do business in the old ways:

- **Federal policymakers, especially at the Office of Management and Budget (OMB), should encourage appropriate federal credit agencies to make multiyear commitments of resources to adopt scoring-based systems in the context of well-designed strategic plans.**

The Office of Management and Budget has played a major role in facilitating cooperation among the federal housing credit agencies to begin the creation of a shared-data warehouse that can be used to test new approaches to credit management. OMB also has worked with particular federal credit agencies, for example the Rural Housing Service, to provide a commitment of multiyear funding to help develop technology-based improvements in loan management.

Working through the Federal Credit Policy Working Group, an interagency group chaired by OMB, the Office of Management and Budget can help agencies to share approaches to credit scoring and to develop cost-effective plans. The individual agencies then will need a commitment of multi-year funding to assure that the systems are adopted and integrated into day-to-day operations.

- **Federal credit agencies should devote needed resources to assuring that they remain well informed about technological developments and the implications for the markets in which their programs operate.**

By staying informed of technological developments, federal credit agencies can learn of opportunities to improve their management practices. The VA experiment with scoring-based servicing of VA home loans is an excellent example of the way that a federal agency can use its knowledge of industry practices to support its own improvements in program administration.

Federal credit agencies also need to remain alert to the possibility that new technologies can hasten the obsolescence of some of programs or practices. For example, a federal direct loan program could be affected adversely if the agency enters into long-term servicing agreements with companies whose practices and systems lag the industry standard.

- **Federal policymakers in the executive branch and Congress should consider structural changes to credit programs and organizations to increase their flexibility and capacity to respond to the many technology-driven changes that affect their ability to serve their public purposes.**

To achieve useful programmatic and organizational changes requires more than the application of sound principles of design. Also needed is the development of a consensus among a program's stakeholders. The FHA's attempt to create a Federal Housing Corporation benefited from good design but lacked the necessary consensus. Leaders of some federal credit agencies, and especially those that benefit from significant external support, may need to begin a process of dialogue with stakeholders as a way to enlist their participation in a consensus that might be built around the need to improve the design of some programs and organizations.

Credit scoring and loan scoring offer many possible benefits, but they also raise public policy concerns that must be addressed. Federal credit agencies already have begun to partner with private lenders to apply scoring-based systems to the origination and underwriting of government-insured or guaranteed loans. Other important applications include the use of scoring-based systems to develop or enhance financial early warning systems, to monitor lender performance, to improve the targeting of federal credit to the most appropriate borrowers, and to experiment with lending to subgroups of underserved borrowers in an effort to increase their access to credit.

Because they lack the requisite data, federal agencies may need to adopt and adapt off-the-shelf scores and scoring systems to their own program needs. Conversely, government agencies are at special risk of making misjudgments if they apply private-sector scorecards to subgroups of borrowers in their programs who act differently from the general population for which the scorecards may be appropriate.

As with many technology-based issues, the government would benefit from working through the policy and organizational decisions relating to new ways of doing business. Sound approaches need to

take advantage of available systems and technologies and private-sector practices that can effectively be absorbed into the organizational context of a federal program.

Policymakers may need to redesign the form of some government programs so that they can complement rather than be undercut by a dynamic private sector. Government organizations themselves may need to become much more nimble if they are to continue to serve their public purposes effectively in today's rapidly changing environment.

In the provision of credit, federal programs have neither the resources nor the policy freedom to operate at the leading edge of available technologies. On the other hand, the adoption of new practices in the private sector ultimately may make it untenable for some federal programs to continue doing business in the old ways.

# Appendix

## Scoring: Where to Begin

Credit scoring and loan scoring can be valuable tools for many federal credit programs, but not for all of them. New data management systems are increasingly available at a lower cost than ever before. Here are some suggestions for federal officials who may wish to explore the possibility of applying scoring to their own programs.

### Gather Information

Useful sources of information include knowledgeable officials at federal agencies that have begun to apply scoring to their programs, private sector firms that offer scoring systems, and private sector firms that have applied scoring to their own credit management practices. Substantial literature on scoring now exists in trade, finance, and academic publications.

### Develop a Modest Plan

Consider starting small. Start with scoring as a diagnostic device, such as an early warning system or to monitor lenders, rather than as an operational device, e.g., to screen loans and applicants.

Technology absorption is easier to implement if it can be done without disrupting the work processes of multiple organizational units. Also, as in the VA servicing experiment, start with scoring as a supplement to existing practices, rather than as a substitute.

A tentative business plan would include a dispassionate assessment of benefits and costs of the new scoring-based system and the time and resources that are required for development, testing, and implementation. Commercially available scores are likely to be much less expensive than specially tailored scores and may provide a good starting place for many program uses.

### Critique the Plan

Test the assumptions of the plan with officials inside the agency and with people at other agencies or private firms who have had experience with the proposed application. Scrutiny of cost and time estimates is especially important to assure that implementation won't be stopped if the allocated funds prove insufficient.

### Try an Experiment

A small experiment can test assumptions and produce valuable feedback. For example, credit scores may turn out to be useful predictors of credit quality for some types of federal loans, but not for others. This is best tested before an agency tries to apply scoring to a large part of its business. Other types of experiment can help an agency to determine cost-effective approaches to carrying out functions such as the servicing of direct loans.

Dissemination of the results of an experiment can prompt helpful comments from other federal agencies, the private sector, and perhaps economists or other academics. The development of a scoring system is an iterative process based upon continuing modifications that respond to the lessons and information gained from experience.

### Try to Obtain Commitment from the Top

Given the resource constraints at many federal agencies, it may be important to obtain support from senior agency officials before beginning to experiment with credit scoring. Career-level officials of the Department of Education, for example, were testing new approaches to avoiding loan defaults when funds suddenly were restricted so that the experiment (not involving credit scoring in this particular case) had to be terminated before the results were complete. Commitment from the top of an agency, and perhaps also from OMB, may be useful to assure that when experiments begin, they are permitted to run to completion.

# About the Author



Thomas H. Stanton is a Washington, DC, attorney. He is a fellow at the Center for the Study of American Government at the Johns Hopkins University, where he teaches graduate seminars on the law of public institutions; government and the American economy; and government and the credit markets.

Mr. Stanton's academic, legal, and policy experience relates to the capacity of public institutions to deliver services effectively, with specialties relating to federal credit and benefits programs, government corporations, and financial regulation. In recent years, he has provided legal and policy counsel regarding the design and operation of a variety of federal government programs.

Mr. Stanton is chair of the Standing Panel on Executive Organization and Management of the National Academy of Public Administration (NAPA) and has helped to teach NAPA's seminar on government enterprises. He is a former member of the Senior Executive Service.

His writings on government and the financial markets include a book on government-sponsored enterprises, *A State of Risk* (HarperCollins, 1991), and numerous articles. He is a member of the Advisory Board of a journal, *The Financier: Analyses of Capital and Money Market Transactions*.

Mr. Stanton earned a B.A. from the University of California at Davis, an M.A. from Yale University, and a J.D. from Harvard Law School. The National Association of Counties has awarded him its Distinguished Service Award for his advocacy on behalf of the intergovernmental partnership.

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