



SYSTEMIC RISK:  
FANNIE MAE, FREDDIE MAC  
AND  
THE ROLE OF OFHEO

**February 2003**



OFFICE OF FEDERAL HOUSING ENTERPRISE OVERSIGHT  
1700 G STREET NW WASHINGTON DC 20552 (202) 414-3800

---

February 4, 2003

The Honorable Richard Shelby  
Chairman  
Committee on Banking, Housing, & Urban Affairs  
United States Senate  
Washington, D.C. 20510

The Honorable Michael G. Oxley  
Chairman  
Committee on Financial Services  
United States House of Representatives  
Washington, D.C. 20515

Dear Chairmen:

Pursuant to 12 U.S.C. 4513, Sec. 1313 (e), I am pleased to transmit to the Congress a report by the Office of Federal Housing Enterprise Oversight entitled: "Systemic Risk: Fannie Mae, Freddie Mac and the Role of OFHEO."

Over the past two years, economists and researchers at OFHEO have examined the issue of systemic risk in the nation's housing and financial markets. We used our internal resources, as well as research conducted outside the agency. The goal of the study is to understand the impact of the GSEs on those markets, the nation's economy and the role of OFHEO in reducing systemic risk.

I believe that the public and the nation's housing markets will benefit from the enactment of the legislative recommendations contained in this Report. Therefore I urge Congress to give high priority to the passage of the legislative proposals summarized herein.

The views expressed in the report are my views and do not necessarily represent the views of the Secretary of Housing and Urban Development or the President.

Sincerely,

  
Armando Falcon  
Director

cc The Honorable Paul S. Sarbanes, Ranking Member, Senate Committee on Banking, Housing & Urban Affairs  
The Honorable Barney Frank, Ranking Member, House Committee on Financial Services

# **Systemic Risk: Fannie Mae, Freddie Mac and the Role of OFHEO**

## **Table of Contents**

<b>Executive Summary</b>	<b>1</b>
<b>Introduction</b>	<b>5</b>
<b>Chapter One: Defining Systemic Risk</b>	<b>7</b>
Section One: Describing and Defining Systemic Risk and Systemic Events	<b>7</b>
Section Two: Stages of a Systemic Event	<b>12</b>
Section Three: The Effect of Consolidation and Use of Over-the-Counter Financial Derivatives on Systemic Risk	<b>30</b>
Section Four: Difficulties in Assessing Indirect Interdependencies	<b>36</b>
<b>Chapter Two: Environment in Which the Enterprises Operate</b>	<b>37</b>
Section One: The Statutory and Regulatory Framework in Which the Enterprises Operate	<b>37</b>
Section Two: The Operations of the Enterprises	<b>45</b>
Section Three: Interdependencies between the Enterprises and Firms and Borrowers in the Primary Market	<b>72</b>
Section Four: Interdependencies Between the Enterprises and Firms in Securities and Derivatives Markets	<b>75</b>
<b>Chapter Three: Economic Effects of the Activities of the Enterprises</b>	<b>79</b>
<b>Chapter Four: Assessing Systemic Risk</b>	<b>87</b>
Section One: Measuring Systemic Risk	<b>87</b>
Section Two: The current condition of the Enterprises	<b>89</b>
Section Three: The Scenarios	<b>93</b>
Section Four: Conclusions Implied by the Scenarios	<b>105</b>
<b>Chapter Five: Mitigating Systemic Risk</b>	<b>107</b>
<b>Chapter Six: Actions and Recommendations</b>	<b>113</b>

## **I. EXECUTIVE SUMMARY**

Fannie Mae and Freddie Mac – the two government-sponsored enterprises (GSEs) chartered by the federal government to support the secondary market for residential mortgages – provide considerable benefits to the housing sector of the U.S. economy. The Enterprises support housing activity by supplying ample, low-cost liquidity to the primary mortgage market. Fannie Mae and Freddie Mac are in strong financial condition today, and the possibility of either Enterprise failing or contributing to a financial crisis is remote. The risk of either company causing a systemic disruption is highly unlikely under the comprehensive safety and soundness regulation of the Office of Federal Housing Enterprise Oversight (OFHEO). OFHEO employs examinations, a stringent risk-based capital stress test, and other tools to meet its responsibility and reduce systemic risk.

Nevertheless, it is useful to consider, hypothetically, what systemic impact an Enterprise could have on the housing market and financial system in two very different situations. In the first case, the Enterprises are strong and other parts of the financial system are destabilized. In the second, either Enterprise is itself experiencing financial difficulties.

If the Enterprises are financially strong during a stressful economic period in which many other financial institutions experience solvency and liquidity problems, the Enterprises are a source of stability. Their activities can protect mortgage lending and the housing sector. In addition, in those circumstances, the liquidity of Fannie Mae and Freddie Mac debt and mortgage-backed securities (MBS) can enhance the liquidity of institutions that hold those obligations and overall liquidity in financial markets. In both ways, the Enterprises mitigate systemic risk.

If Fannie Mae or Freddie Mac experienced financial difficulties the systemic implications might vary depending upon the circumstances. Any systemic disruption would likely be minimal as OFHEO took prompt corrective action and other market participants filled the short-term market void. Alternatively, in the unlikely circumstance that an enterprise experienced severe financial difficulties, they could cause disruptions to the housing market and financial system.

This report consists of six chapters:

Chapter One presents the concepts used in the report and surveys the literature on financial crises and systemic risk.

Chapter Two summarizes the relationship of the government to the Enterprises, and examines their operations and activities. The Enterprises support the housing sector and assist refinance activity by ensuring that residential mortgage lenders in all regions of the country have continual access to funds on comparable terms. Fannie Mae and Freddie Mac do so by purchasing single- and multifamily mortgages underwritten according to their standards and by guaranteeing MBS collateralized by such loans.

Chapter Three discusses the fact that the activities of Fannie Mae and Freddie Mac have had several economic effects: local and regional markets for single-family mortgages that carry

no federal guarantee or insurance are fully integrated into the capital markets; interest rates on conventional fixed-rate loans the Enterprises are eligible to purchase are lower than they otherwise would be; and the supply of credit to the housing sector is more stable than the supply of credit to most other sectors of the economy.

Chapter Four analyzes hypothetical scenarios in which, under adverse financial conditions, the activities and financial health of Fannie Mae and Freddie Mac affect the rest of the financial sector. The scenarios illustrate how under some circumstances the Enterprises can be a source of strength for the U.S. housing finance system and the financial sector as a whole, and present other circumstances where Fannie Mae and Freddie Mac might or might not increase the risk of financial disruptions that could lead to large losses in aggregate economic activity.

Chapter Five discusses how the safety and soundness regulation of Fannie Mae and Freddie Mac by OFHEO limits the systemic risk posed by the Enterprises by ensuring their safe and sound operation.

Chapter Six describes the regulatory actions that OFHEO will undertake to enhance its supervision and offers two legislative recommendations, as follows:

## **Regulatory Actions**

### **A. Continue the Planned Enhancements to OFHEO's Supervisory Tools**

OFHEO is engaged in an ongoing process to enhance its ability to perform its safety and soundness mission by, among other things, significantly expanding its examination program, enhancing its data and analytical capabilities and its early warning systems, fully utilizing the risk-based capital stress test as an analytical tool, and completing its regulatory infrastructure project.

### **B. Conduct Additional Research**

Research may help secure a better understanding of the economic effects of Enterprise activities at both a regional and national level and, building upon that, the implications of the operations of the Enterprises for systemic risk. Furthermore, more research needs to be done on the complex networks of interdependencies between Fannie Mae and Freddie Mac, mortgage borrowers, and lenders and other firms in the primary mortgage market, and between the Enterprises and other participants in securities and derivatives markets. Further research and analysis of the benefits and costs of alternative approaches to mitigating systemic risk would also be desirable.

### **C. Enhance Enterprise Transparency to Improve Market Discipline**

The relationship of Fannie Mae and Freddie Mac to financial markets is critical to their viability, and they must have access to capital markets to accomplish their mission. The Enterprises access domestic and global financing sources and offer a variety of issuances

demanded by these markets. They are significant participants in the MBS and agency debt markets, and in related hedging activities, and as issuers and guarantors of securities.

Enterprise access to the markets and the price of that access are directly affected by investor perceptions of the transparency of the Enterprises and the safety and soundness of their operations. All financial regulators recognize transparency as a fundamental component of safety and soundness. Disclosure strengthens market understanding, market discipline and market stability. OFHEO will continue to review ways to increase financial disclosures by Fannie Mae and Freddie Mac.

#### D. Clarify Conservatorship Process Through Regulation

OFHEO will issue a regulation to implement the agency's conservatorship authority. A regulation would support OFHEO's ability to use that authority to manage the affairs of an Enterprise that experienced severe solvency problems.

### **Legislative Recommendations**

#### A. Permanently Fund OFHEO to Insure That It Has Adequate Resources and Budget Flexibility

OFHEO recommends that the agency be permanently funded and exempt from the appropriations process. Currently, OFHEO's assessments of Fannie Mae and Freddie Mac are subject to the annual Congressional appropriations process, whereas other regulators' assessments are exempt. Permanent funding would permit OFHEO to adapt more easily to changes in the Enterprises' activities and to conform should serious problems develop or a financial crisis become much more likely. OFHEO's funding mechanism should be identical to that of all other federal safety and soundness regulators.

#### B. Receivership Authority for OFHEO

OFHEO recommends that the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 be amended to allow the agency to close and appoint a receiver to manage the affairs of an insolvent Enterprise. If the condition of an Enterprise is such that it is not viable, then OFHEO should have authority to place it in receivership and wind down the business of the company. Financial markets, the housing sector and creditors all would benefit from the final resolution of a non-viable Enterprise.

The role of a receiver is to take possession of the assets of a federally regulated financial institution that has been closed, to liquidate or otherwise dispose of those assets, and use the proceeds to pay the institution's creditors. Receivership serves the function for such institutions that bankruptcy proceedings serve for other failed private corporations. The Office of the Comptroller of the Currency, the Office of Thrift Supervision, and the Farm Credit Administration have the authority to close and place in receivership national banks, federally insured thrifts, and Farm Credit System institutions, respectively. Receivership authority would provide greater fairness to all market participants, and would facilitate the liquidation or merger

of a failed Enterprise by clearly authorizing actions relating to outstanding claims that are essential to such remedies.

## II. INTRODUCTION

Over the past quarter-century, financial markets in many countries have experienced serious disturbances associated with financial institutions' difficulties and failures. The period has been one of profound and rapid changes in the financial sector. Those events have heightened awareness of systemic risk – the possibility that a systemic event a financial crisis that leads to a substantial reduction in aggregate economic activity – will occur. That awareness, in turn, has fostered considerable research and discussion among financial regulators, policy makers, and economists about the nature of systemic risk and how the private and public sectors can mitigate that risk. It has also led to numerous reforms in financial regulation intended to achieve that objective.

Recent analyses of systemic risk have concluded that some non-bank financial institutions are now so large and integral to the financial sector as a whole that their failure could lead to a systemic event.<sup>1</sup> Fannie Mae and Freddie Mac—the two government-sponsored enterprises (GSEs) chartered by the federal government to support the secondary market for residential mortgages<sup>2</sup>—are among the largest non-bank financial institutions in the world. Thoughtful observers have expressed concern that, if either of those Enterprises experienced severe financial difficulties, turmoil in the market for GSE debt could become severe and spread to other financial markets, substantially increasing systemic risk.<sup>3</sup> Factors cited as justifying that concern include the huge size of the outstanding debt and mortgage-backed securities<sup>4</sup> (MBS) of Fannie Mae and Freddie Mac, and the fact that, although investors perceive an implicit federal guarantee of those obligations, the government has provided no explicit legal backing for them.<sup>5</sup>

The large and rapidly growing literature on financial crises, systemic risk, and the role of governments in mitigating that risk includes no detailed analyses of how Fannie Mae and Freddie Mac can affect systemic risk. This report addresses that gap by analyzing how the Enterprises operate in the housing finance system and the financial sector, how their activities affect economic activity, and how they can affect systemic risk in different circumstances. It also

---

<sup>1</sup> See, for example, Group of Ten, *Consolidation in the Financial Sector* (January 2001), 144: “[I]t must be acknowledged that the evolution of non-bank financial institutions in the United States ... has reached the point where the scale and level of participation in financial markets of a number of these institutions is sufficient to make their financial impairment a potentially systemic event.” That report is available online at <http://www.bis.org/publ/gten05.htm>.

<sup>2</sup> This report follows the charter acts of Fannie Mae and Freddie Mac in using the term “residential mortgage” to refer to single- and multifamily mortgage loans.

<sup>3</sup> See, for example, W. Poole, “Financial Stability,” *Economic Review*, Federal Reserve Bank of St. Louis, Vol. 84, No. 5 (Sept./Oct. 2002), 1-7 at 5-6. The author is the president and chief executive officer of the Federal Reserve Bank of St. Louis.

<sup>4</sup> This report uses the term “mortgage-backed security” (MBS) to refer to single- and multiclass securities whose cash flows are derived from groups of residential mortgages or MBS. A single-class MBS is a financial asset, issued by a trust, that represents an undivided beneficial interest in a group of mortgages underlying the trust. The trust pays each investor in the MBS a pro rata share of any principal and interest payments from the individual mortgages collected in each period. A multi-class MBS represents a beneficial interest in a trust that has issued multiple classes of securities. The securities of each class entitle investors to cash flows structured differently from the payments on the mortgages underlying the trust. Most multi-class MBS are Real Estate Mortgage Investment Conduits (REMICs).

<sup>5</sup> Poole, *op. cit.*, 5.

discusses how safety and soundness regulation of Fannie Mae and Freddie Mac by OFHEO limits the systemic risk associated with the Enterprises by ensuring their safe and sound operation.

This report is not intended to address and answer all questions related to systemic risk, but to promote the examination of the issue and the public policy discussion.

## CHAPTER ONE: DEFINING SYSTEMIC RISK

### Section One: Describing and Defining Systemic Risk and Systemic Events

In a financial crisis, the transmission of information about investments and firms, the allocation of credit and the transfer of risks may be disrupted; the pricing of financial assets may be distorted; the clearing and settling of payments may be impaired; and business and households may be unable to obtain financing for routine purchases or withdraw funds from deposits at banks. A financial crisis in the context of this report is a severe disruption in the functioning of housing finance markets or the financial sector in which lenders and investors that extend credit to households and businesses are no longer willing or able, on a widespread basis, to finance investments that would normally be considered creditworthy.<sup>6</sup>

A financial crisis may lead to a systemic event. A systemic event is defined as a financial crisis that causes a substantial reduction in aggregate economic activity, such variables as housing starts, home sales, consumption, output and employment. Systemic risk is the possibility that a systemic event may occur. Mitigating systemic risk and responding to systemic events are major concerns of central banks and financial regulators,<sup>7</sup> yet there is no consensus among government officials or economists about the definitions of those terms.<sup>8</sup>

Systemic events occur not only in the economy but also in other systems.<sup>9</sup> In many groups of interrelated and interdependent living things, a breakdown in the functioning of one or a few entities can spread to many others, causing sufficient damage to harm the well being of the group or system as a whole. The nature of the event, its timing and incidence, and its likely effects are studied in an effort to identify means of reducing potential losses.

In the economy, the financial sector is only one of many sectors where an unexpected event can lead to disruptions in the functioning of important markets that are severe enough to lower aggregate economic activity. The sudden failure of a very large nonfinancial firm or a large group of small firms may lead to systemic problems. That possibility was of concern when Enron was near bankruptcy in 2001. Government officials and the private sector assessed the potential for Enron's failure to disrupt the markets for wholesale electricity and credit derivatives

---

<sup>6</sup> For a very similar definition, see Nelson, W., and W. Passmore, "Pragmatic Monitoring of Financial Stability," in *BIS Papers 1: Marrying the Micro- and Macro-Prudential Dimensions of Financial Stability* (Basel, Switzerland: Bank for International Settlements, March 2001), 367-384, available online at <http://www.bis.org/publ/bispap01.htm>.

<sup>7</sup> See, for example, Brimmer, A.F., "Central Banking and Systemic Risks in Capital Markets," *Journal of Economic Perspectives*, Vol. 3, No. 2 (Spring 1989), 3-16; and Ludwig, E.A., "Rethinking Systemic Risk," in *Research in Financial Services: Banking, Financial Markets, and Systemic Risk* (Vol. 7), ed. G.G. Kaufman (Greenwich, CT: JAI Press, 1995), 349-356 at 349-350.

<sup>8</sup> Bartholomew, P.F., and G.W. Whalen, "Fundamentals of Systemic Risk," in *Research in Financial Services: Banking, Financial Markets, and Systemic Risk*, *op. cit.*, 3-17 at 3; Greenspan, A., "Luncheon Address: Remarks on Risk Measurement and Systemic Risk," in *Risk Measurement and Systemic Risk: Proceedings of a Joint Central Bank Research Conference* (Washington, DC: Board of Governors of the Federal Reserve System, 1995), 11-16 at 15; and Schwartz, A.J., "Systemic Risk and the Macroeconomy," in *Research in Financial Services: Banking, Financial Markets, and Systemic Risk*, *op. cit.*, 19-30 at 19.

<sup>9</sup> De Bandt, O., and P. Hartmann, *Systemic Risk: A Survey* (Working Paper #35, European Central Bank, November 2000), 10, available online at <http://www.ecb.int/pub/wp/ecbwp035.pdf>.

and, via such disruption, damage the economy as a whole.<sup>10</sup> There is also evidence that an unexpected price shock that results from trade interruptions—for example, the large increases in petroleum prices that followed the oil embargo in 1973—can inflict losses on non-financial sectors that are large enough to cause a reduction in aggregate economic activity.<sup>11</sup>

Policy makers, financial regulators, and economists have long been especially concerned about the systemic risk posed by the financial sector. Financial contracts, institutions, and markets play a critical role in financing economic growth. They do so by mobilizing savings; acquiring information about investments and allocating funds; facilitating the trading, hedging, diversification, and pooling of risks; monitoring managers and exerting control over corporations; and facilitating the exchange of goods and services.<sup>12</sup> It is widely believed that the financial sector poses more systemic risk to the economy than other sectors, in part because severe breakdowns in that sector’s functioning have occurred in many nations and contributed to large declines in aggregate economic activity.<sup>13</sup> Indeed, it was largely in response to various financial crises in the 19<sup>th</sup> and 20<sup>th</sup> centuries that modern governmental institutions and practices related to the financial sector—the lender of last resort function of central banks, deposit insurance, prudential supervision of and regulatory standards for banks and government-sponsored enterprises (GSEs), and multinational financial corporations such as the International Monetary Fund (IMF)—were established and have evolved.<sup>14</sup>

Concern about the systemic risk posed by the financial sector has increased in the last two decades.<sup>15</sup> During that period many nations experienced costly disruptions in the

---

<sup>10</sup> “Fed Assures on Enron’s Fall,” The Telegraph (UK), December 7, 2001, available online at <http://www.portal.telegraph.co.uk/money/main.jhtml?xml=/money/2001/12/07/cnenro07.xml&sSheet=/money/2001/12/07/ixcityfront.html>; and Rowe, D., “Enron and Systemic Risk,” *Risk* (January 2002), xx, available online at <http://www.risk.sungard.com/news/pdf/rowe200201.pdf>.

<sup>11</sup> There is large literature on the mechanisms and the degree to which oil price shocks can affect the aggregate economy. See, for example, Bernanke, B.S., M. Gertler, and M. Watson, “Systematic Monetary Policy and the Effects of Oil Price Shocks,” *Brookings Papers on Economic Activity 1: 1997* (Washington, DC: Brookings Institution), 91-142; and Hooker, M., *Oil and the Macroeconomy Revisited*, (Washington, DC: Board of Governors of the Federal Reserve, Finance and Economics Discussion Paper 1999-43), available online at <http://www.federalreserve.gov/pubs/feds/1999/199943/199943pap.pdf>.

<sup>12</sup> Levine, R., “Financial Development and Economic Growth: Views and Agenda,” *Journal of Economic Literature*, Vol. XXXV (June 1997), 688-726.

<sup>13</sup> Two reasons are often given for that view. First, the structure of banks, the interdependencies of financial institutions through direct exposures and payment and settlement systems, and the dependence of the value of financial contracts on expectations about the future make the financial sector more fragile than other sectors of the economy. See, for example, De Bandt and Hartmann, *op. cit.*, 13-14. For the view that banks do not contribute more to systemic risk than other industries, see Benston, G.J., and Kaufman, G.G., “Is the Banking and Payments System Fragile?” *Journal of Financial Services Research*, Vol. 9, No. 2. (June 1995), 209-240. Second, severe breakdowns in the financial sector’s functioning have occurred in many nations and contributed to large declines in aggregate economic activity. On recent financial crises and their costs, see, for example, International Monetary Fund, “Financial Crises: Characteristics and Indicators of Vulnerability,” in *World Economic Outlook* (Washington, DC: International Monetary Fund, May 1998), 74-97, available online at <http://www.imf.org/external/pubs/ft/weo/weo0598/>.

<sup>14</sup> See, for example, International Monetary Fund, *op. cit.*, 74.

<sup>15</sup> During that period academics, private groups, financial regulators in the U.S. and other nations, central banks, and multinational financial organizations have sponsored conferences and published numerous studies on financial crises, systemic risk, and role of governments in preventing and limiting the costs of financial crises and mitigating systemic risk. Numerous academic papers have examined the financial crises of the last two decades and the

functioning of the financial sectors of their economies. Between 1980 and 1995, over 130 of the member nations of the IMF—including the U.S.—experienced significant problems in their banking sectors that took the form of widespread failures, suspensions of the convertability of bank liabilities, or large-scale government financial assistance to banks.<sup>16</sup> Currency crises—speculative attacks on the value of and devaluations of currencies, followed by efforts to defend

---

systemic risk posed by the financial sector. For reviews and analyses of that literature, see Davis, P.E., *Debt, Financial Fragility, and Systemic Risk* (Oxford: Oxford University Press, 1995), 117-146; and De Bandt and Hartman, *op. cit.* The National Bureau of Economic Research sponsored two conferences and volumes on economic and financial crises that addressed related topics. See Feldstein, M., ed., *The Risk of Economic Crisis* (Chicago: University of Chicago Press, 1991); and Hubbard, R.G., ed., *Financial Markets and Financial Crises* (Chicago: The University of Chicago Press, 1991).

Several papers have examined the potential effects on systemic risk of the explosive growth of over-the-counter (OTC) markets for financial derivatives. See Darby, M.R., “Over-the-Counter Derivatives and the Systemic Risk to the Global Financial System,” (National Bureau of Economic Research, Working Paper #4801, July 1994); Edwards, F., *The New Finance: Regulation and Financial Stability* (AEI Press: Washington, DC, 1997); Gorton, G., and R. Rosen, *Banks and Derivatives* (Cambridge, MA: National Bureau of Economic Research Working Paper No. 5100, April 1995); Hentschel, L. and C.W. Smith, Jr., “Derivatives Regulation: Implications for Central Banks,” *Journal of Monetary Economics*, Vol. 40 (2), 1997, 305-346; Hunter, W.C., and D. Marshall, in *Restructuring Regulation and Financial Institutions*, ed. Barth, J., D. Brumbaugh, and G. Yago (Milken Institute: Santa Monica, CA, 2000); and Mackey, R.J., “Derivatives and Systemic Risk: Issues, Views, and Analysis,” in *Banking, Financial Markets, and Systemic Risk*, *op. cit.*, 111-169.

The Group of Thirty has published studies of derivatives and systemic risk. See Global Derivatives Study Group, “Working Paper of the Systemic Issues Subcommittee,” in *Derivatives: Practices and Principles, Appendix I: Working Papers* (Washington, DC: Group of Thirty, 1993), and Group of Thirty, *Global Institutions, National Supervision and Systemic Risk* (Washington, DC: Group of Thirty, 1997).

Among U.S. government agencies, the Office of the Comptroller of the Currency sponsored a conference on banking, financial markets, and systemic risk. For the conference volume, see *Research in Financial Services Private and Public Policy: Banking, Financial Markets, and Systemic Risk*, *op. cit.* The Department of the Treasury sponsored a report on the future of the financial system that addressed systemic risk. See Litan, R.E., and Rauch, J., *American Finance for the 21<sup>st</sup> Century* (Washington, DC: U.S. Department of the Treasury, 1997), 97-127.

Among central banks, the Board of Governors of the Federal Reserve System, the Federal Reserve Bank of New York, the Bank for International Settlements, the Bank of England, and the Bank of Japan have organized three conferences since 1995. For proceedings, see Board of Governors of the Federal Reserve System, *Risk Measurement and Systemic Risk*, *op.cit.*; Bank of Japan, *Risk Measurement and Systemic Risk: Proceedings of a Joint Central Bank Research Conference*, (Tokyo: Bank of Japan, November 1998); and *Risk Measurement and Systemic Risk: Proceedings of The Third Joint Central Bank Research Conference* (Basel, Switzerland: Bank for International Settlements, October 2002), available online at <http://www.bis.org/cgfs/conf/mar02.htm>. The Bank of England hosted a conference on “Banks and Systemic Risk” in May 2001. The conference papers, which were published in the May 2002 issue of the *Journal of Banking and Finance*, are available at <http://www.bankofengland.co.uk/Links/setframe.html>. In recent years the annual conferences on bank structure and competition sponsored by the Federal Reserve Bank of Chicago have featured panels on issues related to systemic risk. See Federal Reserve Bank of Chicago, *Payments Systems In the Global Economy: Risks and Opportunities* (Chicago, IL: Federal Reserve Bank of Chicago, 1998), and Federal Reserve Bank of Chicago, *Global Financial Crises: Implications for Banking and Regulation* (Chicago, IL: Federal Reserve Bank of Chicago, 1999); Federal Reserve Bank of Chicago, *The Changing Financial Industry Structure and Regulation: Bridging States, Countries and Industries* (Chicago, IL: Federal Reserve Bank of Chicago, 2000); and Federal Reserve Bank of Chicago, *The Financial Safety Net: Costs, Benefits, and Implications for Regulation* (Chicago, IL: Federal Reserve Bank of Chicago, 2001).

<sup>16</sup> Lindgren, C., G. Garcia, and M. Saal, *Bank Soundness and Macroeconomic Policy* (Washington, DC: International Monetary Fund, 1996), 20-35.

that value by expending foreign reserves or raising interest rates—occurred in Europe in 1991-93, Latin America in 1994-95, and East Asia in 1997-98.<sup>17</sup>

Most of those financial episodes were costly both in lost economic output and in government outlays to shore up fragile financial sectors. IMF economists estimate that cumulative losses attributed to banking problems in 54 member nations from 1980 to 1995 averaged 11.6 percent of the Gross Domestic Product (GDP) of the affected countries over an average recovery period of three years.<sup>18</sup> Another study of 24 major banking and currency crises in the last two decades estimated that cumulative losses—the direct costs of resolving insolvent institutions and the cost of lost economic output—averaged roughly 15-20 percent of annual GDP.<sup>19</sup>

Analyses of financial crises and systemic events typically consider neither how those episodes affected or could affect economic activity in specific sectors of the economy such as housing, manufacturing, or agriculture, nor the potential for specific financial institutions to lead or contribute to such episodes. The housing sector is a large part of the U.S. economy—accounting for over 11 percent of GDP<sup>20</sup>—and Fannie Mae and Freddie Mac are the dominant firms in U.S. housing finance markets.<sup>21</sup> A major reduction in or cessation of an Enterprise’s mortgage purchases could disrupt the functioning of those markets and increase mortgage rates sufficiently to reduce U.S. housing activity—such as housing starts and home sales—relative to the level that would have occurred absent the disruption.<sup>22</sup> A substantial reduction in housing activity could substantially lower aggregate economic activity—such as consumption, output, and employment. Therefore, this report focuses on one type of systemic event – an episode in which severe financial difficulties at Fannie Mae or Freddie Mac contribute to a financial crisis that sufficiently disrupts the functioning of housing finance markets to reduce substantially aggregate economic activity in the U.S. relative to the level that would have occurred absent the crisis.

Whether an episode constitutes a systemic event is a judgment call that requires assessing whether a financial crisis occurred and, if so, whether the resulting economic losses are sufficiently large. The widespread failures of banks and other financial intermediaries in the U.S.

---

<sup>17</sup> Kaminsky, G.L., and C.M. Reinhart, “The Twin Crises: The Causes of Banking and Balance-of-Payments Problems,” *American Economic Review*, Vol. 89, No. 3 (June 1999), 473-500.

<sup>18</sup> International Monetary Fund, “Financial Crises: Characteristics and Indicators of Vulnerability,” *op. cit.*, 79.

<sup>19</sup> Hoggarth, G., R. Reis, and V. Saporta, “Costs of Banking System Instability: Some Empirical Evidence,” *Journal of Banking and Finance*, Vol. 26, No. 5 (May 2002), 825-855.

<sup>20</sup> That percentage reflects the gross output originating from the construction, real estate services, and real estate finance and insurance sectors. For statistics for 1988-1997, see Hu, D., and A. Pennington-Cross, *The Evolution of Real Estate and The Economy*, (Washington, DC: Research Institute for Housing America, June 2000), 4, available online at <http://www.housingamerica.org/docs/RIHA00-02.pdf>.

<sup>21</sup> In 2001, for example, the Enterprises purchased 40 percent of the single-family mortgages not insured or guaranteed by the government—so-called conventional loans—that were originated in that year. Office of Federal Housing Enterprise Oversight, *Mortgage Markets and the Enterprises in 2001* (Washington, DC: August 2002), 13.

<sup>22</sup> For discussions of the importance of the secondary market in the housing finance system and the effect of changes in mortgage rates on housing activity, respectively, see Hendershott, P.H. and K.E. Villani, “Secondary Residential Mortgage Markets and the Cost of Mortgage Funds,” *AREUEA Journal*, Vol. 8 (Spring 1980), 50-76; and Chinloy, P., “Real Estate Cycles: Theory and Empirical Evidence,” *Journal of Housing Research*, Vol. 7, No. 2 (1996), 173-190.

the 1980s and early 1990s illustrate this point. During that period some 1,400 thrifts became insolvent and were merged or resolved by the federal government.<sup>23</sup> The resulting economic losses included the costs of resolving those institutions and the reduction in U.S. GDP resulting from the unwise investments that they made and from higher interest rates.<sup>24</sup> The costs of resolving insolvent thrifts alone totaled about \$200 billion in 1990 dollars—over 3 percent of U.S. GDP in that year.<sup>25</sup> One study estimates the reduction in GDP from unwise investments by the thrift industry in the 1980s at \$200 billion in 1990 dollars and approaching \$300 billion in the 1990s.<sup>26</sup> The thrift industry’s troubles led to a short-term reduction in the supply of funds to finance residential mortgages, which caused interest rates on fixed-rate single-family mortgages not insured or guaranteed by the government—so-called conventional loans—to rise by about 0.5 percentage points relative to the level that would have existed if other sources of funds had been immediately available, which in turn reduced the level of housing activity.<sup>27</sup> More importantly, the thrifts financed investments—notably residential and commercial real estate in states such as Texas and California—that effectively “crowded out” more productive investments in the 1980s and 1990s, lowering the overall capital stock and aggregate economic activity.<sup>28</sup>

Despite the magnitude of the failures and losses associated with banks and thrifts in the 1980s and early 1990s, a case can be made that the episode does not qualify as a systemic event because the losses in neither the financial sector as a whole nor the housing finance system significantly reduced the aggregate U.S. economic activity.<sup>29</sup>

---

<sup>23</sup> Caprio, G., and D. Klingebiel, *Scope and Fiscal Costs of Banking Crises: Compilation of Information on Systemic and Non-Systemic Banking Crises from 1970s Onward* (Washington, DC: The World Bank, October 1999), available online at <http://www1.worldbank.org/finance/html/fp-banks.html>.

<sup>24</sup> See, for example, U.S. Congressional Budget Office, *The Economic Effects of the Savings & Loan Crisis* (Washington, DC: Government Printing Office, January 1992).

<sup>25</sup> *Ibid.*, 1, 32.

<sup>26</sup> *Ibid.*, xi.

<sup>27</sup> Hendershott, P. and Van Order, R., “Integration of Mortgage and Capital Markets and the Accumulation of Residential Capital,” *Regional Science and Urban Economics*, May 1989, 188-210.

<sup>28</sup> U.S. Congressional Budget Office, *op.cit.*, 10-11, 17-19.

<sup>29</sup> Caprio and Klingebiel, *op.cit.*, 5, do not classify the widespread failures of thrifts and banks in the U.S. in the 1984-91 period as a systemic event.

## Section Two: Stages of a Systemic Event

In a systemic event, an adverse economic shock or a series of shocks, subsequent developments in the financial sector, and private and public responses to those developments are followed by a financial crisis that reduces aggregate economic activity substantially. In thinking about systemic events, a useful device is to divide them into five stages that occur in rough chronological sequence.

1. Conditions before the systemic event, including those that make the economy vulnerable to adverse economic shocks;
2. The adverse economic shock that imposes losses, increases risk, and leads to higher interest rates;
3. The spread of liquidity<sup>30</sup> problems in the financial sector;
4. The private and public sectors' responses to the decline in liquidity and subsequent developments in the financial sector; and
5. The ensuing financial crisis that adversely affects aggregate economic activity.

Those stages generally occur in the suggested sequence—for example, adverse economic shocks generally precede a financial crisis. The stages may also overlap considerably—for example, developments following an initial shock may include failures of large financial institutions, which may themselves also be shocks. Moreover, some systemic events—one resulting from a sudden, catastrophic operational failure in the financial sector after a terrorist attack, for example—might not follow the stages. The stages are illustrative and will not describe the path of every systemic event. Nonetheless, they describe most episodes where the functioning of the financial sector is disrupted sufficiently to precipitate a financial crisis that reduces economic activity substantially. Understanding the five stages of a systemic event and their usual sequence will assist in analyzing how Fannie Mae and Freddie Mac can affect systemic risk.<sup>31</sup>

---

<sup>30</sup> A distinction may be made between funding and market liquidity. Funding liquidity is the ability of an entity to fund its positions and meet, when due, the cash and collateral demands of counterparties, credit providers, and investors. Market liquidity is the ability to transact business in necessary volumes without unduly moving market prices. A reduction in liquidity increases the funding costs of affected financial institutions and imposes losses on investors that sell assets or liquidate positions in affected markets. See, for example, Downes, J., and J.E. Goodman, *Dictionary of Finance and Investment Terms* (Woodbury, NY: Barrons Educational Series, Inc., 1985), 213; and Schinasi, G.J., Craig, R.S., Drees, B., and C. Kramer, *Modern Banking and OTC Derivative Markets* (Washington, D.C.: International Monetary Fund, Occasional Paper No. 203, 2000), 66.

<sup>31</sup> For other efforts to analyze stages of financial crises and systemic events, from which the discussion in the text has benefited, see Davis, *op. cit.*, 117-146, 190-202; De Bandt and Hartmann, *op. cit.*; International Monetary Fund, "Financial Crises: Characteristics and Indicators of Vulnerability," *op. cit.*, 74-97; Kaufman, G. G., "Banking and Currency Crises and Systemic Risk: A Taxonomy and Review," *Financial Markets, Institutions & Instruments*, vol. 9, no. 2. (2000), 69-131; Kindleberger, C., *Manias, Panics, and Crashes: A History of Financial Crises, Fourth Edition* (New York: John Wiley & Sons, Inc., 2000), 13-22; and Mishkin, F.S., "Asymmetric Information and Financial Crises: A Historical Perspective," in *Financial Markets and Financial Crises*, *op. cit.*, 69-108.

## Stage One – The conditions before the systemic event, including those that make the economy vulnerable to adverse shocks

Any conditions in the financial sector or in real sectors of the economy that influence the probability of the occurrence of a financial crisis, the potential duration and severity of a crisis, and its potential economic impacts affect systemic risk. The literature on systemic risk and financial crises suggests several conditions or market characteristics that increase systemic risk. Of those factors, the ones most relevant to analyzing the impact of Fannie Mae and Freddie Mac on systemic risk are:

- A. high levels of interdependencies among financial institutions;
- B. high leverage of such institutions;
- C. the presence of bubbles in the prices of real and financial assets;
- D. under pricing of the financial safety net;<sup>32</sup>
- E. weak market discipline of institutions covered by the safety net;
- F. lax safety and soundness regulation and poor public disclosure; and
- G. the presence of macroeconomic problems.

Dealing with each factor individually is valuable.

### A. High Levels of Interdependencies Among Financial Institutions

The higher the level of interdependencies among financial institutions, relative to their capital and individual risk exposures, the greater the likelihood that a shock will lead to widespread solvency and liquidity problems.<sup>33</sup> Financial institutions are interdependent if losses at one institution cause or are related to losses at another. Interdependencies among financial institutions may be direct or indirect.

Direct interdependencies exist through interfirm on- and off-balance sheet exposures. A financial institution's direct interdependencies exist through explicit contractual arrangements with other parties—loans, financial derivatives, or credit insurance, for example—that expose the institution to counterparty risk. When Institution A's exposure to Institution B is large relative to Institution A's capital, the failure of Institution B may severely impair Institution A's capital or render Institution A insolvent.

---

<sup>32</sup> The financial safety net in the U.S. consists of deposit insurance; access by banks to discount lending from the Federal Reserve; the low-cost access of banks and GSEs to "Fedwire," the Federal Reserve's system for clearing and settling large-value transfers of funds and securities; and the Fed's guarantee of the finality of those transactions. In addition, the federal government is widely perceived to have provided an implicit guarantee of GSE obligations. By transferring to the government some of the losses from the activities of covered financial institutions, the financial safety net lowers the expected costs of those activities, thereby creating incentives for those institutions to increase their risk. Capital requirements and other elements of safety and soundness regulation seek to limit the portion of the losses from the activities of covered institutions borne by the government and, thereby, those institutions' incentives to increase risk. See, for example, Walter, J.R., and J.A. Weinberg, "How Large is the Federal Financial Safety Net?" *Cato Journal*, Vol. 21, No. 3 (Winter 2002), 369-393.

<sup>33</sup> For discussions of interdependencies among financial institutions, see Michael, I., "Financial Interlinkages and Systemic Risk," *Financial Stability Review* (Issue 4, Spring 1998), 26-33; and Group of Ten, *op.cit.*.

Indirect interdependencies exist when financial institutions have similar indirect exposures to non-financial sectors or financial markets. Firms A through Z have similar indirect exposures if changes in the common sector or market lead each firm's probability of suffering losses to change proportionally in the same direction. Indirect interdependencies have two potential sources.<sup>34</sup> First, financial institutions may have similar contractual relationships with firms or households that have correlated exposures to non-financial sectors or financial markets. Examples of this phenomenon are the exposures in the 1970s and 1980s of banks in Texas and other states in the southwestern U.S. that lent heavily to the oil industry,<sup>35</sup> and the exposures today of Fannie Mae and Freddie Mac and the private mortgage insurance industry to mortgage borrowers. The oil industry was exposed to risk of loss from declining oil prices. Mortgage borrowers are exposed to risk of loss from a nationwide drop, or widespread regional declines, in home prices.<sup>36</sup> Second, financial institutions may themselves have correlated exposures to some non-financial sectors or financial markets. An example is the similar exposures in the late 1970s and early 1980s of thrift institutions and Fannie Mae to rising interest rates. Those institutions did not necessarily have common counterparties, but were directly exposed to the same adverse shock.

A high level of interdependencies among financial institutions, relative to their capital and individual risk exposures, creates the possibility of contemporaneous losses or failures of those institutions. The higher the direct interdependencies between institutions, the greater the risk of simultaneous losses or multiple failures. Concern about failures of correspondent banks that held uninsured deposits at the insolvent Continental Illinois National Bank (Continental) in 1984 was a major reason why the government provided financial assistance to that institution.<sup>37</sup> There is disagreement, however, about whether the failure of Continental would have imposed direct losses sufficient to erode the capital of many correspondent banks.<sup>38</sup>

Loss sharing arrangements between institutions, such as credit insurance or credit derivatives, may improve risk diversification by individual financial institutions.

---

<sup>34</sup> The analysis in the text was suggested by Group of Ten, *op. cit.*, 135-136.

<sup>35</sup> Federal Deposit Insurance Corporation, *History of the Eighties: Lessons for the Future*, Volume 1, An Examination of the Banking Crises of the 1980s and Early 1990s (Washington, DC: 1997), 291-336.

<sup>36</sup> When the price of a home declines, the owner suffers an economic loss that will be recognized if he or she sells the home. The possibility of such losses is one of the risks of homeownership.

<sup>37</sup> See Federal Deposit Insurance Corporation, *op. cit.*, 251. The assistance to Continental, which occurred after it was insolvent, took the form of a \$2 billion capital infusion from the Federal Deposit Insurance Corporation (FDIC) and discount window lending by the Federal Reserve System. *Ibid.*, 244.

<sup>38</sup> The actual loss rate on Continental's uninsured deposits was about 5 percent. A Congressional staff analysis found that, if the loss rate had been 10 percent, no correspondent bank would have suffered a loss greater than its capital and only two banks would have suffered losses in excess of one-half of their capital. U.S. House Committee on Banking, Finance, and Urban Affairs, Subcommittee on Financial Institutions Supervision, Regulation and Insurance, *Continental Illinois National Bank: Report of an Inquiry into Its Federal Supervision and Assistance, Staff Report* (99<sup>th</sup> Congress, 1st Sess., 1985), 15-19. According to one economist, that finding indicates "[b]anks had protected themselves against apparently limiting their exposures relative to their capital and monitoring them." Kaufman, "Banking and Currency Crises and Systemic Risk: A Taxonomy and Review," *op. cit.*, 104. The FDIC's Chairman argued that some small banks would have failed as a result of their credit losses. He also noted that the liquidation of Continental would have been a protracted process that would have imposed losses on the bank's counterparties. Federal Deposit Insurance Corporation, *op. cit.*, 251.

However, for the financial sector as a whole, those benefits may be largely offset by increased interdependencies. If a significant number of interdependent institutions incur losses or fail simultaneously, uncertainty about the prospects of the remaining firms, even the solvent ones, and about the likely responses of other investors in those firms, will also increase. This may make it difficult for the remaining solvent institutions to issue debt. Concern about the potential for liquidity problems at banks with uninsured deposits at Continental was an additional reason for the government's decision to rescue that bank.

## B. Highly Leveraged Financial Institutions

Leverage—the magnification of the rate of return of an investment or position beyond the rate obtained by investing one's own funds—can be an important engine of economic growth, as when firms borrow money to finance valuable investments. At the same time, there is considerable evidence that financial crises are preceded by the emergence of a degree of leverage in the economy that in retrospect is viewed as excessive.<sup>39</sup> Economists have developed various theories of how non-financial firms, households, and financial institutions develop levels of indebtedness that are viewed in retrospect as excessive.

One theory posits that, during the expansionary phase of the business cycle, non-financial firms, households, and lenders become euphoric and engage in irrational excesses of borrowing and lending.<sup>40</sup> According to this view, as the demand for credit rises during boom times, interest rates also rise and the debt service costs of non-financial firms and households increase. Inflation also accelerates, which reduces the real value of outstanding debt, offsetting the increase in nominal debt, and encouraging further borrowing. Heightened competition reduces profit margins and net worth, which tends to lead firms and households in search of higher returns to shift toward more volatile, less liquid assets. Those trends make non-financial firms and households more likely to default on their obligations, which in turn increases the financial fragility of banks and other financial institutions. That makes the financial sector as a whole more vulnerable to disturbances in the real economy. Banks may also become more fragile by increasing both their indebtedness and leverage and reducing liquidity.

Another theory assumes that banks and other lenders behave rationally but suffer from disaster myopia.<sup>41</sup> Unfavorable outcomes on individual investment projects occur frequently enough for their risk to be measured. Competition causes lender to assign subjective probabilities to such outcomes to reflect available information. An adverse

---

<sup>39</sup> See, for example, International Monetary Fund, "Financial Crises: Characteristics and Indicators of Vulnerability," *op. cit.*, 80-81: "In many cases, overly expansionary monetary and fiscal policies have spurred lending booms, excessive debt accumulation, and overinvestment in real assets, which have driven up equity and real estate prices to unsustainable levels."

<sup>40</sup> Feldstein, M., "Introduction," in *The Risk of Economic Crisis, op.cit.*, 1-18; Minsky, H.P., "The Financial Instability Hypothesis: A Clarification," in *The Risk of Economic Crisis, op. cit.*, 158-166; Minsky, H.P., "Financial Factors in the Economics of Capitalism," *Journal of Financial Services Research*, Vol. 9, 1995, 197-208; and Kindleberger, *op. cit.*

<sup>41</sup> Guttentag, J., and R.J. Herring, "Credit Rationing and Financial Disorder," *Journal of Finance*, Vo. 39, No. 5 (December 1984), 1359-1382.

shock may occur that has less-than-catastrophic direct consequences on real sectors, but which, because it was not anticipated by lenders, may cause a financial disturbance that substantially exacerbates its impact on aggregate economic activity. The probability lenders assign to such an infrequent disastrous event is subject to much greater error. This is because it is much harder to estimate than the probabilities of unfavorable outcomes on individual projects. Such shocks occur infrequently and lenders are likely to discount their likelihood.

Moreover, as a disastrous shock recedes into the past, it is more difficult to call it to mind and estimates of its probability eventually decline toward zero. This theory predicts a tendency for estimated probabilities of disaster to become unrealistically low during periods, such as an economic expansion, in which no major shocks occur. Banks and lenders may extend credit on terms that are more favorable than, and lower their capital positions below, levels that accurate disaster probabilities would require. That process of relaxation of credit standards and decline of capital positions makes financial institutions more vulnerable to default, which increases the magnitude of losses when shocks occur.

A third explanation is that, in the presence of imperfect information, lenders and investors engage in herding behavior.<sup>42</sup> In that view, lenders and investors who are not confident about their ability to quantify the risk of future outcomes apply their own subjective probabilities to them, adding a premium to cover unspecified adverse events. In such cases, people tend to watch others and not deviate from the norm in terms of factors taken into account and weights given to them. Such behavior is rational and optimal at the level of the individual investor because information is costly and watching supposedly better-informed investors appears to be an inexpensive way to become informed. At the same time, herding may create indirect interdependencies among banks and other financial institutions and lead to concentrations, levels of risk, and degrees of leverage that heighten the financial sector's vulnerability to a shock.

It has been suggested that herding was evident in the investment, trading, and risk management strategies of hedge funds and many large banks and securities firms in the U.S. prior to the turbulence in financial markets in the fall of 1998.<sup>43</sup> Long-Term Capital Management (LTCM), other hedge funds, and banks and securities firms took similar large positions, frequently through trading of exotic derivatives, in markets for high-risk, relatively illiquid securities such as junk bonds and emerging market debt.<sup>44</sup> The

---

<sup>42</sup> See, for example, De Bandt and Hartmann, *op. cit.*, 25, and the literature cited therein; and Davis, *op. cit.*, 135, who quotes an observation of John Maynard Keynes: "a 'sound' banker, alas, is not one who foresees danger and avoids it, but one who, when he is ruined, is ruined in a conventional and orthodox way, along with his fellows, so no one can really blame him."

<sup>43</sup> Edwards, F., "Hedge Funds and the Collapse of Long-Term Capital Management," *Journal Of Economic Perspectives*, Vol. 13 (2), Spring 1999, 189-210 at 200, 206. On the behavior of those institutions see International Monetary Fund, "Turbulence in Mature Financial Markets," in *World Economic Outlook and International Capital Markets Interim Assessment* (Washington, DC: International Monetary Fund, December 1998), 35-65 at 53-57, available online at <http://www.imf.org/external/pubs/ft/weo/weo1298/pdf/file3.pdf>.

<sup>44</sup> For descriptions of those exposures, see Edwards, "Hedge Funds and the Collapse of Long-Term Capital Management," *op.cit.*, 197-200; and International Monetary Fund, "Turbulence in Mature Financial Markets," *op. cit.*, 52-57. Of course, there were significant differences among those institutions. LTCM focused solely on

institutions also used risk management models that did not accurately measure the risk of those strategies.<sup>45</sup> Following the Russian default in August 1998, heightened uncertainty led investors to sell such securities and buy low-risk, relatively liquid ones.<sup>46</sup> The sharp widening of yield spreads caused by that stampede for liquidity imposed large losses on LTCM and other institutions that had been betting against just that event. Those losses put LTCM and the other institutions under pressure to meet margin calls and provide more collateral to creditors and swap counterparties. There was uncertainty about whether LTCM and other hedge funds might be forced to sell their holdings of less liquid securities at any price. Distress selling could have caused the value of those obligations to drop precipitously, which would have imposed large losses on banks and other securities firms with similar positions. That episode illustrates how, in today's global financial markets, vulnerability to a financial crisis can increase when many large financial institutions incur similar exposures in the same markets whether through herding behavior or otherwise.

### C. Asset Price Bubbles

Market bubbles—the unsustainable rise of prices away from fundamental values—may also make an economy more vulnerable to a shock. Economists have developed a number of theories to account for the emergence of asset price bubbles. One theory posits rational speculation by optimists as the cause of bubbles.<sup>47</sup> In that view, the current market prices of assets depend in part on expectations about the future rate of change of those prices. If investors generally expect asset prices to rise, that expectation may become self-fulfilling, regardless of market fundamentals. The factors emphasized by the theories of excessive leverage summarized above—euphoria, disaster myopia, and herding—may also help to explain the emergence of a bubble.

If firms and households borrow to finance purchases of assets in a market experiencing a bubble, the effects of a shock that causes the bubble to burst are magnified. If the market is important to the economy as a whole, the burst may result in a level of borrower defaults that threatens solvency and leads to liquidity problems at banks and other financial institutions. The experience of the Japanese economy in the last two decades provides a classic example of that process. During the second half of the 1980s and the early 1990s, Japan experienced a rapid rise in the prices of commercial real estate and other assets, an overheating of economic activity, and a sizable increase in

---

convergence trades and was very highly leveraged even for a hedge fund, whereas banks engaged in many lines of business, such trading was a relatively small part of their operations, and they were much less leveraged.

<sup>45</sup> Jorion, P., "Risk Management Lessons from Long-Term Capital Management," *European Financial Management*, Vol. 6 (September 2000), 277-300.

<sup>46</sup> For summaries of the episode, see Edwards, *op. cit.*, 199-200; and Statement by William J. McDonough, President, Federal Reserve Bank of New York (Testimony before the Committee on Banking and Financial Services, U.S. House of Representatives, October 1, 1998), available online at: <http://www.newyorkfed.org/pihome/news/speeches/MCD981001.html>.

<sup>47</sup> Flood, R.P., and P.M. Garber, "Bubbles, Runs, and Gold Monetization," in *Crises in the Economic and Financial Structure*, *op. cit.*, 275-293.

the money supply and credit.<sup>48</sup> The bursting of the bubble led to a financial crisis in which a large number of banks and other financial institutions became insolvent and continue to experience a high level of nonperforming loans.<sup>49</sup>

#### D. Under Pricing of the Financial Safety Net

The financial safety net protects investors in certain assets from loss and incorporates mechanisms for maintaining the availability of credit during periods of financial difficulties. Those functions contribute to the stability of the financial sector and the economy.<sup>50</sup> For example, the Federal Reserve's guarantee of timely and ultimate payment of transactions executed over Fedwire is a critical source of stability for the U.S. banking system. In addition, whereas widespread runs on banks were common in the U.S. in the 19<sup>th</sup> century, they have not occurred in the U.S. since the institution of federal deposit insurance.<sup>51</sup> However, if safety net services are under priced,<sup>52</sup> they may stimulate moral hazard behavior – the tendency of economic agents, in situations where they do not bear the full costs of their behavior, to take actions that maximize their own welfare but are detrimental to others – that results in excessive leverage, interdependencies, and asset prices.<sup>53</sup>

Banks and other financial institutions whose liabilities are covered (or perceived to be covered) by government guarantees have taken risks that they would not have absent the financial safety net.<sup>54</sup> Uninsured depositors or investors in the debt of these institutions may believe they will be compensated in whole or in part if the institutions in which they

---

<sup>48</sup> See, for example, Okina, K., M. Shirakawa, and S. Shiratsuka, "The Asset Price Bubble and Monetary Policy: Japan's Experience in the Late 1980s and the Lessons," *Monetary and Economic Studies*, Vol. 19, No. S-1 (February 2001), 395-450 at 399-418.

<sup>49</sup> See, for example, Nakaso, H., *The Financial Crisis in Japan During the 1990s: How the Bank of Japan Responded and the Lessons Learnt* (Basel, Switzerland: Bank for International Settlements, October 2001), 4-16, available online at <http://www.bis.org/publ/bispap06.pdf>.

<sup>50</sup> See, for example, Benston, G.J., Eisenbeis, P.M. Horvitz, E.J. Kane, and G.G. Kaufman, *Perspectives on Safe and Sound Banking* (Cambridge, MA: MIT Press, 1986), xiii-xiv.

<sup>51</sup> See, for example, U.S. Congressional Budget Office, *Reforming Federal Deposit Insurance* (Washington, DC: U.S. Government Printing Office, September 1990), 10.

<sup>52</sup> The financial safety net is under priced if covered financial institutions can receive the benefits of actions that increase their risk without paying all of the expected costs of those actions. See Furlong, F.T., and M.C. Keeley, "Capital Regulation and Bank Risk-Taking: A Note," *Journal of Banking and Finance*, Volume 13, Number 6, 1989, 883-91.

<sup>53</sup> Economic agents have an incentive to engage in such behavior where asymmetric information prevents parties that could be adversely affected from monitoring their actions. For example, a bank that lends to a firm cannot monitor all of the firm's actions. As a result, the bank is exposed to the risk that the firm's owners will invest in high-risk projects in which the firm does well if the project succeeds and the bank bears most of the losses if the project fails. See, for example, Kotowitz, Y., "Moral Hazard," in Eatwell, J. M. Milgate and P. Newman, eds., *The New Palgrave: Allocation, Information and Markets* (New York: W.W. Norton, 1989), 207-213.

<sup>54</sup> Davis, *op. cit.*, 135; Hunter and Marshall, *op. cit.*, at "319-320; Kaufman, "Banking and Currency Crises and Systemic Risk: A Taxonomy and Review," *op. cit.*, 85 and 116; and Marshall, D., "Understanding the Asian Crisis: Systemic Risk as Coordination Failure," *Economic Perspectives* (Chicago: Federal Reserve Bank of Chicago, Third Quarter 1998), 17, available online at [http://www.chicagofed.org/publications/economicperspectives/1998/ep3Q98\\_2.pdf](http://www.chicagofed.org/publications/economicperspectives/1998/ep3Q98_2.pdf).

have invested default on those obligations.<sup>55</sup> In that event, creditors demand less disclosure by the institutions and monitor them less diligently than they would if they did not anticipate a bailout,<sup>56</sup> and the institutions' borrowing costs are less sensitive to changes in their risk than they would be absent that expectation.<sup>57</sup> As a result, the institutions are likely to choose to make higher-risk loans and take higher-risk positions in financial markets. The thrift industry, Fannie Mae, and the Farm Credit System would probably not have funded long-term mortgages with short-term debt in the 1970s and 1980s<sup>58</sup> to the degree that they did in the absence of federal deposit insurance and the market's perception of an implicit federal guarantee of GSE obligations.

Real estate, especially commercial real estate, is one sector of the economy in which the effects of moral hazard behavior stimulated by government guarantees may be pronounced. In the last two decades bubbles developed in the prices of U.S. farmland, Swedish and Japanese commercial real estate, and Thai residential and commercial real estate.<sup>59</sup> Recent studies explain the emergence of those bubbles in terms of the unique characteristics of land and moral hazard behavior by banks.<sup>60</sup> Those studies observe that land is different from some financial assets (such as stock) in that it is in fixed supply, and that it is generally not possible to sell short individual tracts of land. The studies suggest that those conditions imply that optimists will set the price of land, since only people who already own land or who are interested in buying land will influence land's market value. If a group of agents controlling sufficient wealth becomes sufficiently overoptimistic about land values, a bubble may emerge. Whether a bubble in land prices emerges depends largely on the behavior of lenders, who can refuse to lend to optimists. Moreover, as rising land prices increase the value of the collateral backing loans, the value of lender assets and capital also increase, which encourages additional lending, in a self-reinforcing process. In that manner, subsidized lenders may subsidize and amplify the over-investment behavior of excessively optimistic borrowers who invest in land.

Where banks or other lenders covered by explicit or perceived implicit government guarantees finance a bubble in asset prices and their exposure is high relative to their

---

<sup>55</sup> "Analysts and GSE officials explain that creditors expect a GSE would likely receive federal assistance should one become seriously troubled ...." U.S. General Accounting Office, *Government-Sponsored Enterprises: The Government's Exposure to Risks* (Washington, DC: Government Printing Office, 1990), 85.

<sup>56</sup> The perception of an implicit federal guarantee of MBS guaranteed by Fannie Mae and Freddie Mac is an important reason why the Enterprises do not disclose as much information about the collateral backing those securities as do private-label issuers.

<sup>57</sup> "... creditors do not react to deterioration in the financial condition of a GSE the same way they react to a similar change in a private firm ...." U.S. General Accounting Office, *op. cit.*, 85-86, at 86.

<sup>58</sup> Those funding strategies are described in Kane, E.J., *The S&L Insurance Mess: How Did it Happen?* (Washington, DC: The Urban Institute Press, 1989), 72-75; U.S. Department of Housing and Urban Development, *1986 Report to Congress on the Federal National Mortgage Association* (Washington, DC: September 1987), 100-102; and U.S. Congressional Budget Office, *Controlling the Risks of Government-Sponsored Enterprises* (Washington, DC: U.S. Government Printing Office, 1991), 77-78.

<sup>59</sup> Herring, R.J. and S.M. Wachter, *Real Estate Booms and Banking Busts: An International Perspective* (Washington, DC: Group of Thirty, 1999), 23-38, 45-54.

<sup>60</sup> Carey, M.S., *Feeding the Fad: The Federal Land Banks, Land Market Efficiency, and the Farm Credit Crisis* (Ph.D. Dissertation, Department of Economics, University of California at Berkeley, 1990); and Herring and Wachter, *op. cit.*

capital, the bursting of the bubble may cause widespread insolvencies that may require a government to consider a bailout. That outcome has occurred in commercial and agricultural real estate and, occasionally, in local or regional residential real estate in the U.S. and other countries. For example, the perception of the implicit federal guarantee of the debt of the Farm Credit System played an important role in the boom and bust cycle in agricultural land prices in the 1970s and 1980s, as did subsidies to investment in land conveyed by federal deposit insurance.<sup>61</sup> Deposit insurance also played a role in stimulating the southwestern oil and real estate boom of the 1970s and 1980s<sup>62</sup> and the commercial real estate boom and bust of the 1980s.<sup>63</sup> Credit subsidies have also fueled recent commercial real estate booms and busts and related banking crises in Japan and Sweden, and a similar pattern emerged in commercial real estate markets and the banking sector in Thailand.<sup>64</sup>

Many economists believe that moral hazard behavior stimulated by government guarantees was a major cause of the financial crises that occurred in East Asia in 1997.<sup>65</sup> One study argues that such behavior probably contributed to the turmoil in financial markets in developed countries and the collapse of LTCM in the fall of 1998.<sup>66</sup> Before Russia's default, international creditors and investors had observed IMF and U.S. assistance to Mexico, Korea, Indonesia, and other nations. This may have led investors to believe that the major developed countries and the IMF would not permit a major country to default. It is also possible that under pricing of the financial safety net in the U.S. contributed to the behavior of large banks that pursued trading strategies similar to LTCM's and used similar risk management models. That behavior raises questions, according to the study, about the adequacy of the risk management practices at large banks and challenges the ability of financial regulators to monitor the risk of the institutions they supervise.

The view that vulnerabilities result from moral hazard behavior implies that, in designing financial safety nets, policy makers and financial regulators should seek to minimize incentives to engage in such behavior. One way to achieve that objective is to limit the proportion of the financial institutions' liabilities that are covered by explicit

---

<sup>61</sup> Calomiris, C., R.G. Hubbard, and J. Stock, "The Farm Debt Crisis and Public Policy," *Brookings Papers on Economic Activity* 2 (Washington, DC: Brookings Institution, 1986), 441-485; and Carey, *op. cit.* A Federal Deposit Insurance Corporation staff study of bank lending to agriculture in the 1970s and 1980s notes that "the availability of almost unlimited amounts of credit played an important role in expanding the farmland market in the 1970s" and says that expansion is "reminiscent of a speculative bubble" but does not explain lenders' willingness to fund the bubble in terms of moral hazard behavior fostered by deposit insurance. Federal Deposit Insurance Corporation, *op. cit.*, 260-262.

<sup>62</sup> Horvitz, P., "The Causes of Texas Bank and Thrift Failures," in P.L. Brock, ed., *If Texas Were Chile: A Primer on Banking Reform* (San Francisco: ICS Press, 1992), 131-193.

<sup>63</sup> Herring and Wachter, *op. cit.*, 39-44, analyze the case of commercial real estate lending in Boston in the late 1970s and the early 1980s.

<sup>64</sup> Herring and Wachter, *op. cit.*, 27-32, 33-38, 45-54.

<sup>65</sup> See, for example, Krugman, P., "What Happened to Asia?" (unpublished paper, January 1998), available online at <http://web.mit.edu/krugman/www/DISINTER.html> and Marshall, *op. cit.*

<sup>66</sup> Edwards, "Hedge Funds and the Collapse of Long-Term Capital Management," *op. cit.*, 203.

government guarantees or the perception of implicit guarantees. That strategy has the potential to increase market discipline by the creditors of those institutions.<sup>67</sup>

#### E. Weak Market Discipline

Market discipline refers to the ability of investors and creditors to track and comprehend the changing financial condition and risk of firms and securities, to price securities accordingly, and, through pricing, to influence the actions of management.<sup>68</sup> For market discipline to exist, a number of conditions must be met.<sup>69</sup> First, firms must make high-quality public disclosures that allow investors to monitor their financial condition, foresee likely future developments, and make informed decisions. There is considerable evidence that given quality disclosures, markets can effectively identify changes in a financial institution's financial condition on a reasonably contemporaneous basis.<sup>70</sup> Second, financial markets must be competitive. Third, investors must believe they are at risk for loss. Fourth, investors must be able to respond to changes in a firm's risk by influencing the actions of management. Although stockholders and bondholders can undoubtedly influence managers *in extremis*, there is less evidence that they can influence management in non-extreme situations.<sup>71</sup>

In general, market discipline will be weak or nonexistent if disclosures are inaccurate or incomplete,<sup>72</sup> markets are not competitive, government guarantees are so complete as to lead investors to believe they are protected from all losses, investors cannot foresee future changes in a firm's fortunes that are not already manifest in financial statements, or owners of equity or debt cannot effectively influence a firm's actions. Failures in market discipline of banks contributed to many of the banking crises that occurred around the world in the 1980s and 90s.<sup>73</sup>

#### F. Lax Safety and Soundness Regulation and Poor Public Disclosure

The purpose of safety and soundness regulation of institutions protected or perceived to be protected by the safety net is to give them incentives to limit their risks and to countervail the incentives created by an underpriced financial safety net. Safety and

---

<sup>67</sup> See, for example, the survey of options to increase market discipline of banks in Benston, *et. al.*, *op. cit.*, 186-200. Kaufman, "Banking and Currency Crises and Systemic Risk," *op. cit.*, 115-120, emphasizes the potential for increased market discipline of banks to reduce systemic risk in banking.

<sup>68</sup> Bliss, R.R., and M.J. Flannery, "Market Discipline in the Governance of U.S. Bank Holding Companies: Monitoring vs. Influencing," in *Prudential Supervision: What Works and What Doesn't*, ed. F.S. Mishkin (Chicago: The University of Chicago Press, 2001), 107-143.

<sup>69</sup> Bliss and Flannery, *op. cit.*; Lane, T.D., "Market Discipline," *IMF Staff Papers*, Vol. 40, No. 1 (March 1993), 53-88.

<sup>70</sup> Flannery, M.J., "Using Market Information in Prudential Bank Supervision: A Review of the U.S. Empirical Evidence," *Journal of Money, Credit, and Banking* (August 1998), 273-305.

<sup>71</sup> Bliss and Flannery, *op. cit.*, 109.

<sup>72</sup> For example, Enron's failure to disclose the details of its related-party transactions when they occurred and, subsequently, the extent of its losses and debt for which it was liable, limited market discipline by its stockholders. See, for example, "Enron and Accounting Issues," Statement of Shadow Financial Regulatory Committee No. 176 (February 25, 2002), available online at <http://www.aei.org/shdw/shdw176.htm>.

<sup>73</sup> Lindgren, Garcia, and Saal, *op. cit.*, 117-122.

soundness regulation encompasses capital standards and limitations on the assets, activities, and risk exposures of such institutions.<sup>74</sup>

Lax safety and soundness regulation may fail to limit the risk-taking of individual financial institutions and, thereby, contribute to making the economy more vulnerable to adverse economic shocks. Supervisory capital requirements that are too low or unrelated to actual risk, failure to monitor institutions' risk exposures and risk-management practices, and slow or ineffective intervention when risks increase or capital erodes raise the likelihood that firms will take excessive risk and, when adverse economic shocks occur, experience more numerous and severe solvency and liquidity problems.<sup>75</sup> For example, in the 1970s the federal banking agencies permitted U.S. money-center banks to lend to less-developed countries (LDCs) in amounts that were quite large relative to those banks' capital, even after the rise in interest rates that began in late 1979 accelerated the growth of those exposures and increased their default risk.<sup>76</sup> As *The Wall Street Journal* noted in 1981, "... to some analysts the situation looks starkly ominous, threatening a chain reaction of country defaults, bank failures and a general depression matching that of the 1930s."<sup>77</sup> After higher interest rates and a global recession led to widespread LDC defaults beginning in 1982, the market values of the money-center banks' LDC portfolios plummeted.

Government efforts to enhance financial disclosures are intended to overcome perceived inadequacies of the provision of information to investors<sup>78</sup> and may also affect the incentives of institutions covered by the financial safety net. Regulations requiring the disclosure of information regarding publicly traded financial instruments, products, or services can seek to ensure that disclosures by corporations—including financial institutions—are sufficient to enable significant market discipline of their activities.<sup>79</sup>

Recent studies by financial regulators in the U.S. and other nations suggest that recent changes in the banking system and the financial sector are making safety and soundness regulation increasingly difficult.<sup>80</sup> The studies argue that regulators should enhance disclosures about the financial condition and risk of banking institutions to enhance market discipline and reduce moral hazard.<sup>81</sup>

---

<sup>74</sup> White, L. J., "The Theory of Financial Regulation in the New Environment of Liberalization," in A. Saunders (Ed.), *Recent Developments in Finance* (Homewood, IL: Business One Irwin, 1992), 177-194 at 179, 182-183.

<sup>75</sup> For a discussion of those types of weaknesses of safety and soundness regulation, see Benston, *et. al.*, *op. cit.*, *passim*.

<sup>76</sup> For a discussion of the LDC debt crisis, see Federal Deposit Insurance Corporation, *op. cit.*, 191-210.

<sup>77</sup> *Ibid.*, at 200.

<sup>78</sup> White, *op. cit.*, 83-184.

<sup>79</sup> For an early discussion of the potential for disclosure to increase market discipline of banks, see Benston, *et. al.*, *op. cit.*, 195-200.

<sup>80</sup> See, for example, Study Group on Subordinated Notes and Debentures, *Using Subordinated Debt as an Instrument of Market Discipline* (Washington, DC: Board of Governors of the Federal Reserve System, December 1999), 1.

<sup>81</sup> See, for example, Study Group on Disclosure, *Improving Public Disclosure in Banking* (Washington, DC: Federal Reserve System, March 2000, Staff Study 173), available online at <http://www.federalreserve.gov/pubs/staffstudies/2000-present/ss173.pdf>.

## G. Macroeconomic Problems

Over-expansionary monetary and fiscal policies tend to spur lending booms, excessive accumulation of debt by firms and households, and over-investment in real assets, which in combination may drive up equity and real estate prices to unsustainable levels.<sup>82</sup> The eventual tightening of policies to contain inflation and adjust a country's foreign debt position, and the resulting corrections of asset prices, may lead to a slowdown in economic growth. It may also lead to difficulties servicing domestic and foreign debt, declining collateral values and net worth, and rising levels of non-performing loans that threaten the solvency of banks and other financial institutions.

### Stage Two – The Adverse Economic Shock Imposes Losses, Increases Risk and Leads to Higher Interest Rates

An adverse economic shock is an unexpected event that causes losses and increases risk in the financial sector and leads to higher interest rates for at least some financial institutions or in some financial markets. Shocks may be categorized theoretically in terms of the entities they affect. At one extreme, an *idiosyncratic* shock initially affects only the financial condition and risk of a single firm or the price of a single asset. At the other extreme, a *systematic* shock affects all markets and firms at the same time. Most shocks fall between those theoretical extremes.<sup>83</sup> Adverse shocks may take many forms—for example, an unexpected default by a sovereign borrower or systemically important financial institution or non-financial firm; large, unexpected losses at many institutions in a financial market; a disaster or other extreme event that causes an operational failure in financial markets or payment and settlement systems; an unexpected and large change in the price of a systemically important commodity or other real or financial asset such as oil or real estate; a change in the financial environment such as a shift from fixed to floating exchange rates or a major shift in the monetary regime,<sup>84</sup> or destabilizing changes in macroeconomic policies.

An adverse economic shock imposes direct losses on, and may create solvency problems for, nonfinancial firms, financial institutions, and financial market investors. For example, the large increase in market interest rates that occurred between November 1979 and January 1985 rendered the thrift industry and Fannie Mae insolvent on a mark-to-market basis (the market value of their long-term mortgage assets dropped much more than the market value of their mostly short-term liabilities).<sup>85</sup> If, as a result of a shock, a nonfinancial firm or a financial institution defaults, that event will impose credit losses on financial institutions that are owed money by the failed firm.<sup>86</sup> Those indirect consequences of a shock are often termed “spillover effects.” If one institution's exposure to a defaulting firm was very large relative to its capital,

---

<sup>82</sup> International Monetary Fund, “Financial Crises: Characteristics and Indicators of Vulnerability,” *op. cit.*, 80-81.

<sup>83</sup> De Bandt and Hartmann, *op. cit.*, 12.

<sup>84</sup> For examples of such policy changes (termed “shifts in regime”) from the 1970s and 1980s, see Davis, *op. cit.*, 178-179.

<sup>85</sup> See, for example, Kane, E.J., *The S&L Insurance Mess: How Did it Happen?* (Washington, DC: The Urban Institute Press, 1989), 72-75; and U.S. Department of Housing and Urban Development, *op. cit.*, 100-102.

<sup>86</sup> For example, in September 1998 it was estimated that, if Long-Term Capital Management had defaulted, the hedge fund's counterparties would have experienced losses of more than several billion dollars. Statement by William J. McDonough, *op. cit.*

spillover effects may cause the affected firm to fail. In some cases concern about the possibility that the failure of a large ailing bank will cause many other banks to fail has motivated financial regulators to provide financial assistance to the ailing bank.<sup>87</sup> The bursting of an asset bubble may also lead financial institutions to incur large credit losses or fail.<sup>88</sup>

Financial institutions' losses resulting from an adverse shock negatively impact capital, and increase their risk of failure.<sup>89</sup> The default risk of the loans and other fixed-income assets that financial institutions hold, and potential claims on new borrowers, may also increase.<sup>90</sup> Lenders and investors will respond to those increased risks by raising the interest rates that affected financial institutions, nonfinancial firms, and households must pay.<sup>91</sup> For example, when the thrift industry and Fannie Mae became mark-to-market insolvent in 1979, investors demanded higher yields on uninsured thrift deposits and the Enterprise's debt to compensate for those institutions' increased risk of failure.<sup>92</sup> Affected institutions may respond to the combination of lower capital and higher marginal funding costs by raising the interest rates they charge or by reducing their lending, both of which tend to amplify the negative effects on aggregate economic activity of an adverse shock. The interest rates charged by thrifts and other financial institutions in 1981-1983 rose more than the general level of interest rates, and that differential contributed to the decline in housing activity and the severity of the recession during that period.<sup>93</sup> Capital shortages of many U.S. banks following the bursting of farm and commercial real estate market bubbles that had developed in the 1980s contributed to a reduction in bank lending in the early 1990s and to the severity of the recession that occurred in that period.<sup>94</sup>

An adverse shock may also provide information that reveals or implies an increased risk of crashes or illiquidity in specific financial markets, or increased risk of default by non-financial

---

<sup>87</sup> For example, when Continental Illinois National Bank and Trust Company experienced severe financial difficulties in May 1984, federal regulators were concerned that closing the bank and paying its depositors no more than \$100,000 for each insured account would lead to the failure of a number of correspondent banks whose uninsured deposits at Continental exceeded their equity capital. If Continental had defaulted and those correspondent banks had lost all or nearly all of their uninsured funds, some of them would have failed. Federal Deposit Insurance Corporation, *op. cit.*, 251. However, as noted above, there is disagreement about whether a significant number of failures would have occurred.

<sup>88</sup> Bubbles developed in U.S. farmland prices, Swedish property prices, and Thai real estate in the 1980s, and in commercial real estate prices in Japan in the 1970s and 1980s. The bursting of those bubbles contributed to widespread bank failures and, in some cases, banking crises. See Herring and Wachter, *op.cit.*

<sup>89</sup> See, for example, Benston, G. J., *An Analysis of the Causes of Savings and Loan Association Failure* (New York, NY: New York University Salomon Brothers Center for the Study of Financial Institutions, 1985), 9-13.

<sup>90</sup> *Ibid.*, 69.

<sup>91</sup> *Ibid.*, 136-152.

<sup>92</sup> For evidence on deposit rates at banks and thrifts in Texas in 1988, see Short, G.D., and J.W. Gunther, "The Texas Thrift Situation: Implications for the Texas Financial Industry," (Dallas, TX: Federal Reserve Bank of Dallas, September 1988). For evidence on the yields on short-term Fannie Mae debt, see U.S. General Accounting Office, *op.cit.*, 86-89.

<sup>93</sup> See, for example, Barth, J.R., *The Great Savings and Loan Debacle* (Washington, DC: American Enterprise Institute for Public Policy Research, 1991), 37-48; and National Commission on Financial Institution Reform, Recovery and Enforcement, *Origins and Causes of the S&L Debacle: A Blueprint for Reform* (Washington, DC: U.S. Government Printing Office, July 1993), 4-10.

<sup>94</sup> See, for example, the symposium on "The Role of the Credit Slowdown in the Recent Recession," *Quarterly Review* (New York, NY: Federal Reserve Bank of New York, Spring 1993), 3-49.

firms and financial institutions that did not incur losses as a direct result of the shock. Lenders and investors may respond to the new information by curbing new lending and liquidating their exposures to such firms and liquidating their positions in such markets. Those actions will lead to higher interest rates and further amplify the adverse effect of the shock on economic activity. Those responses may be termed information-based contagion because they involve the emergence of liquidity problems at specific firms or in specific markets in response to new information about risks.<sup>95</sup>

Theories of financial crises argue that credit rationing by lenders and investors will increase after an adverse shock.<sup>96</sup> A basic feature of the financial sector is that borrowers have more information about the projects they want to finance than do potential sources of funds. That asymmetric information<sup>97</sup> makes it difficult for lenders and investors to distinguish between low- and high-risk projects and leads them to set the interest rates at which they will lend, and the prices at which they will trade other financial claims, on the basis of the expected average quality of all projects.<sup>98</sup> The rise in interest rates following a shock will increase adverse selection<sup>99</sup> by borrowers seeking funds—the risk of the average project seeking financing will increase as lower-risk borrowers drop out of the market rather than pay higher rates. By increasing information asymmetries, a shock may also make it more difficult to distinguish between low- and high-risk borrowers.<sup>100</sup> If lenders and investors perceive the adverse selection problem and information asymmetries to be severe, they will cease supplying new funds to some potential borrowers. The alternative would be to raise interest rates or other charges even more, but that would be likely to worsen the risk pool. The decline in the supply of funds will tend to increase interest rates further, which tends to exacerbate the adverse selection problem and lead to a further decline in liquidity.

---

<sup>95</sup> See, for example, De Bandt and Hartmann, *op. cit.*, 14-15; and Kaufman, “Banking and Currency Crises and Systemic Risk: A Taxonomy and Review,” *op. cit.*, 95. For a bibliography of studies of financial contagion, see <http://www1.worldbank.org/contagion/index.html>.

<sup>96</sup> See Mishkin, *op. cit.*, “Asymmetric Information and Financial Crises: A Historical Perspective,” 71 and *passim*. The classic paper on credit rationing is Stiglitz, J., and A. Weiss, “Credit Rationing in Markets with Imperfect Information,” *American Economic Review*, Vol. 71 (1981), 393-410.

<sup>97</sup> Asymmetric information refers to the fact that one party to a transaction often does not know enough about the other party to make well-informed decisions. Although the uninformed party may be able to obtain and process additional information, doing so is costly and the potential benefits of having the information are difficult to assess. In the financial sector, the unequal distribution of information makes it difficult for investors to assess the asset quality, risk exposure, and solvency of many types of financial institutions. See, for example, Postlewaite, A., “Asymmetric Information,” in Eatwell, *et. al.*, *op. cit.*, 35-38.

<sup>98</sup> See, for example, Duca, J. and S. Rosenthal, “Do Mortgage Rates Vary Based on Household Default Characteristics? Evidence on Rate Sorting and Credit Rationing,” *Journal of Real Estate Finance and Economics*, Vol. 8, pp. 99-113, 1994. For a literature review, see Rosenthal, S., “Eliminating Credit Barriers to Increase Homeownership: How Far Can We Go?,” *Research Institute for Housing America*, Working Paper 01-01, March 2001, available online at <http://www.housingamerica.org/docs/RIHAWp01-01.pdf>.

<sup>99</sup> In the financial sector, adverse selection refers to the fact that potential bad risks are the ones that most actively seek out a loan or equity investment. When information asymmetries exist, the parties who are the most likely to produce an adverse outcome are most likely to be selected. See, for example, Katz, M., and H.S. Rosen, *Microeconomics* (New York, NY: Richard D Irwin, Inc., 1991), 606-616.

<sup>100</sup> Mishkin, “Asymmetric Information and Financial Crises: A Historical Perspective,” *op. cit.*, 71.

Information asymmetries among financial institutions that participate in payment and settlement systems<sup>101</sup> can also lead to a large, rapid decline in liquidity following an adverse shock that may cause some participants to fail to settle further spreading the impact of the financial shock.<sup>102</sup> Payment and settlement systems are potentially key channels by which the financial sector can amplify the effects of an adverse shock on aggregate economic activity. That risk arises in two ways. First, the value of transactions to be settled each day is extremely large and there is generally imperfect synchronization between payments to creditors and receipts of funds by debtors. Participating institutions can have exposures to credit and liquidity risk that are very large in relation to their capital and, if their counterparties fail before claims are settled, can incur substantial losses. Herstatt risk<sup>103</sup> arises from the fact that there is incomplete overlap between the operating hours of the Fedwire and the large-value interbank funds transfer systems of Germany and Japan. As a result, if a party to a cross-border foreign exchange transaction defaults before its counterparties in other countries receive payment in their currencies, those creditors may incur losses and become less liquid.

Second, the pace of financial activity, notably securities trading, prevents system participants from knowing the indirect exposures they face through the settlement positions of their counterparties vis-à-vis others. When a shock occurs that leads some institutions to fail to settle, participants may not be able to distinguish between short-term liquidity problems and underlying insolvencies. As a result, they may curtail the availability of funds and withdraw from transactions with solvent firms. That response may force distress sales of financial assets that result in general price declines undermining the solvency of institutions. In a worst case scenario, that process would become self-reinforcing, as failures compel new defaults on settlement obligations, which lead to further curtailment of liquidity, declines in asset prices, and defaults. Thus, the failure of one or more institutions to settle (or the fear that they might not be able to do so) has the potential to trigger and spread a financial crisis.<sup>104</sup>

---

<sup>101</sup> The two key systems in the U.S. are Fedwire, an electronic transfer system developed by the Federal Reserve that enables financial institutions to transfer funds and book-entry securities, and the Clearing House Interbank Payment Company (CHIPS), a privately owned system used to settle nearly all large-value international payments made or received by U.S. firms. Federal Reserve data indicate that Fedwire funds transfers originated in 2001 totaled \$423.9 trillion, and the average daily value of transfers was \$1.68 trillion. CHIPS data indicate that the total dollar amount of transfers on that system in that year was \$311.7 trillion, and the average daily dollar amount of transfers was \$1.24 trillion. The combined annual value of transfers through those two systems was more than 70 times the U.S. GDP, and the average daily value of transfers processed was about 29 percent of annual GDP, in 2001. In effect, the payment system "turns over" the entire GDP in about three days. See Board of Governors of the Federal Reserve, "Fedwire and Net Settlement Statistics: Annual Volume and Value," available online at <http://www.federalreserve.gov/paymentsystems/fedwire/annual.pdf>; Bureau of Economic Analysis, "National Income and Product Accounts Tables," Table 1.1, Gross Domestic Product, available online at <http://www.bea.doc.gov/bea/dn/nipaweb/TableViewFixed.asp - Mid>; Clearing House Interbank Payment System, "CHIPS Annual Statistic from 1970 to 2002," available online at <http://www.chips.org/stats.htm>; and Federal Reserve Bank of New York, "The U.S. Payment System: Putting It All Together," available online at [http://www.ny.frb.org/bankinfo/payments/gi\\_part6.html](http://www.ny.frb.org/bankinfo/payments/gi_part6.html)

<sup>102</sup> For a review of theories and evidence regarding systemic risk in payment and settlement systems, see De Bandt and Hartmann, *op. cit.*, 32-36, 54-55.

<sup>103</sup> Named after Bankhaus Herstatt, a German bank that failed in 1974, imposing significant losses on its foreign exchange counterparties.

<sup>104</sup> For further discussion, see Borio, C., "Payment and Settlement Systems: Trends and Risk Management," in *Research in Financial Services Private and Public Policy: Banking, Financial Markets, and Systemic Risk*, *op. cit.*,

### Stage Three – The Contagious Spread of Liquidity Problems in the Financial Sector

A significant decline in liquidity in the financial sector is typically a temporary phenomenon. Actions by the Federal Reserve or other central banks that supply liquidity to the banking system frequently support a return to more liquid conditions. As confidence in the economy increases, the profit motive leads lenders and investors to resume extending credit and making investments they expect to be profitable.

However, if the liquidity of enough financial institutions and markets declines sufficiently, many lenders and investors may expect illiquidity in the financial sector to spread. In turn, that expectation may lead them to curb new lending or reduce their existing exposures in an effort to avoid incurring greater losses, further liquidity declines, and even more defaults. Such actions may bring about the very conditions market participants sought to avoid, as many financial institutions and markets become illiquid or insolvencies are more wide-spread. The term “pure contagion”<sup>105</sup> may be used to refer to such a self-fulfilling reduction in liquidity. That type of financial contagion results from behavior that, although rational for individual economic agents, is not socially optimal in the sense that defaults are higher, and asset values and economic activity are lower, than they would be if the financial sector remained liquid. Pure contagion can occur because financial market participants have imperfect information about how others with similar exposures are likely to behave, and they cannot coordinate their actions to sustain liquid conditions despite the mutual gain from doing so.<sup>106</sup>

Economists use pure contagion and equivalent concepts to explain a number of phenomena that occur during financial crises—including banking panics, runs on the short-term debt of other financial institutions and non-financial firms, collapses of securities markets, and runs on a nation’s currency.<sup>107</sup> Empirical research to test those theories has produced mixed results to date. A recent, comprehensive review of the literature on systemic risk found that empirical tests have been unable to distinguish information-based and pure contagion in banking, securities, or currency markets.<sup>108</sup>

This report regards the emergence of pure contagion in the financial sector as the critical point in the development of a systemic event. Information-based contagion – lenders and investors limiting the supply of funds to specific firms or markets when the information available

---

87-110; and Eisenbeis, R.A., “Private Sector Solutions to Payment System Fragility,” *Journal of Financial Services Research*, Vol. 9 (1995), 327-349.

<sup>105</sup> See, for example, De Bandt and Hartmann, *op. cit.*, 14-15.

<sup>106</sup> See, for example, Marshall, *op.cit.*, and P. Masson, “Contagion: Macroeconomic Models with Multiple Equilibria,” *Journal of International Money and Finance*, Vol. 18 (1999), 587-602.

<sup>107</sup> Although those theories do not always use the term pure contagion, they emphasize the prevalence of asymmetric and imperfect information, how the expectations of market participants about the behavior of others can shift markedly, and the inability of market participants to coordinate their actions. On banking panics, see Calomiris, C.W., and G. Gorton, “The Origins of Banking Panics: Models, Facts, and Bank Regulation,” in *Financial Markets and Financial Crises*, *op.cit.*, 109-173; and De Bandt and Hartmann, *op. cit.*, 18-23. On other types of financial institutions, non-financial firms, and securities markets, see Calomiris, C.W., “Is the Discount Window Necessary? A Penn Central Perspective”, *Review* (Federal Reserve Bank of St. Louis, May/June 1994), 31-56 at 36; Davis, *op cit.*, 121, 143-146; and De Bandt and Hartmann, *op. cit.*, 18-31. On the currency, banking, and financial crises in Asia in the 1990s, see Marshall, *op. cit.*

<sup>108</sup> De Bandt and Hartmann, *op. cit.*, 44.

after a shock indicates those firms or markets pose greater risk than previously believed – may lead to a decline in lending and investment, a credit crunch, that reduces economic activity. That adverse effect reflects the change in conditions in the real economy brought about by the shock, rather than a deterioration in the functioning of the financial sector. Pure contagion, in contrast, involves a general decline in market confidence and a widespread “run” on the financial claims issued by many nonfinancial firms and financial institutions. Those developments can produce a level of defaults and declines in asset values and investment that are significantly greater than justified by any change in economic fundamentals that constituted an adverse shock.<sup>109</sup> For that reason, the emergence of pure contagion substantially raises the risk of a financial crisis that, if not addressed successfully by the public and private sectors, can lead to a systemic event.

#### Stage Four – The Public and Private Sectors’ Responses to the Decline in Liquidity and the Subsequent Developments in the Financial Sector

If illiquidity begins to spread contagiously in the financial sector, governments and private firms will take steps to support a return to more stable conditions. Those responses in turn will influence how events unfold.

Important actors in the public sector are the Federal Reserve System, other nations’ central banks, the U.S. Congress, other national legislatures, the U.S. Treasury Department, financial regulators and other nations’ finance ministries. Central banks can supply liquidity to the banking system through open-market operations and discount lending. For example, at the time of the stock market crash in October 1987, the tendency for money center banks to limit lending to securities firms threatened to force some of the latter to default, which would have exacerbated the losses resulting from the crash. The Federal Reserve responded by making discount loans to banks that in turn lent to securities firms.<sup>110</sup> To cite another example, the terrorist attacks of September 11, 2001 markedly disrupted funds transfers, greatly increasing the liquidity needs of many financial institutions and non-financial firms that were due payments.<sup>111</sup> Those needs were met by record discount lending and an extraordinary infusion of funds through the Federal Reserve’s open-market operations.<sup>112</sup> Legislatures and finance ministries can supply funds to cover the costs of re-capitalizing systemically important financial institutions or large groups of smaller institutions. For example, many countries expended substantial public funds to recapitalize their banking systems in the 1980s and 1990s.<sup>113</sup>

---

<sup>109</sup> For models of market equilibria in which crisis assessments of the value of financial assets diverge widely from pre-crisis values, see Marshall, *op. cit.*, and Masson, *op. cit.*

<sup>110</sup> For a discussion of that episode, see Brimmer, *op. cit.*, 11-15.

<sup>111</sup> McAndrews, J.J., and S.M. Potter, “Liquidity Effects of the Events of September 11, 2001,” *FRBNY Economic Policy Review* (November 2002), 59-79, available online at [http://www.newyorkfed.org/rmaghome/econ\\_pol/2002/1102mcan.pdf](http://www.newyorkfed.org/rmaghome/econ_pol/2002/1102mcan.pdf).

<sup>112</sup> On September 12, 2001, the Federal Reserve System provided a record \$45 billion in loans to member financial institutions, including one to a financial institution that was unable to provide adequate collateral. In the prior week, the System’s lending averaged less than one-half of one percent of that amount. See Greenspan, A., “The Condition of Financial Markets,” (Testimony before the Committee on Banking, Housing and Urban Affairs, U.S. Senate, September 20, 2001), available online at <http://www.federalreserve.gov/boarddocs/testimony/2001/20010920/default.htm>; and McAndrews and Potter, *op. cit.*, 69-73.

<sup>113</sup> Caprio and Klingebiel, *op. cit.*; and Hoggarth, Reis, and Saporta, *op. cit.*

Important actors in the private sector are the largest banks, securities firms, and other financial institutions which can play important roles in extending credit and taking positions despite widespread illiquidity and heightened risk. For example, the Federal Reserve's actions after September 11<sup>th</sup> enabled U.S. banks to lend to credit-worthy securities firms that needed funds to finance their inventories but were cash-constrained.<sup>114</sup> Banks and credit card companies facilitated a return to more normal conditions by easing their payment deadlines on consumer and mortgage loans.<sup>115</sup>

#### Stage Five – The Ensuing Financial Crisis That Adversely Affects Aggregate Economic Activity

The actions of the private and public sectors may fail to contain the contagious spread of liquidity problems. For example, in the early 1930s the Federal Reserve System did not provide adequate liquidity to the banking system to stem a massive banking panic and prevent the failure of one-third of U.S. banks.<sup>116</sup> A significant failure to assure adequate liquidity in the financial sector may lead to a financial crisis that results in a significant drop in investment, consumption, GDP, or activity in specific sectors of the economy (such as housing), below the level expected before the onset of the crisis. The drop can be analyzed in terms of geographic areas, economic sectors, and the period before activity returns to the pre-event trend or expected level.

---

<sup>114</sup> Ip, G., and P. Beckett, "Fed Acts to Bolster Banks at Home and in Europe," *The Wall Street Journal* (September 14, 2001), A2; and Ip, G., and J. VandeHei, "Economic Front: How Policymakers Regrouped to Defend the Financial System," *The Wall Street Journal* (September 18, 2002), A1.

<sup>115</sup> Garver, R., and L. Kuykendall, "Gov't, Industry Measures Take Shape: D.C. Acts to Open Markets, Ship Checks; Secret Meetings," *American Banker* (September 14, 2001), 1.

<sup>116</sup> Friedman, M., and A.J. Schwartz, *A Monetary History of the United States, 1867-1960* (Princeton, NJ: Princeton University Press, 1963), 349-358.

### Section Three: The Effect of Consolidation and Use of Over-the-Counter Financial Derivatives on Systemic Risk

Traditionally, concerns about systemic risk focused primarily on the possibility that bank failures could lead to contagious runs in which retail depositors fled to currency, triggering a decline in the money supply, a breakdown in payment and settlement systems, and an interruption of bank lending.<sup>117</sup> There is much less concern about those possibilities today because of the existence of deposit insurance, the track record of central banks in providing liquidity to the banking system in times of potential crisis, and the improvements in banking supervision since the Great Depression.

Economists, financial regulators, and policymakers now focus more on the systemic risk associated with the wholesale activities of financial institutions and markets. Those activities include overnight loans among banks, the clearing and settling of large-value transfers of funds and securities, and trading in markets for government and corporate debt and other fixed-income securities, foreign exchange, and financial derivatives. Recent studies have addressed the question of how two trends—consolidation among banks and the rapidly growing use of over-the-counter (OTC) derivatives—have affected the systemic risk posed by wholesale activities.

#### Consolidation Among Banks

In the 1990s, rapid consolidation in the financial sector reduced the number of banks in the U.S. by about one-third.<sup>118</sup> During that period, the largest institutions grew substantially in terms of total assets, share of banking industry assets, and assets relative to GDP. For example, the share of industry assets of the 50 largest banks increased from 49 percent at the end of 1990 to nearly 63 percent at year-end 1998.<sup>119</sup> A recent study by the Group of Ten addressed the question of how those trends affected risk in the financial sector.<sup>120</sup> That study concluded that diversification gains seem likely to accrue from consolidation across regions of a given nation and from consolidation across national borders, as well as from consolidation across financial products and services. However, consolidation may also increase operating risks and managerial complexities. Moreover, the larger firms that result, in part, from consolidation have a tendency either to participate in or otherwise rely more heavily on “market” instruments, which exposes them more to rapid declines in market prices and increases the potential speed at which they may experience financial declines.<sup>121</sup> Overall, the study found that the net impact of consolidation on

---

<sup>117</sup> Group of Ten, *op. cit.*, 14-15, 132. For discussions of the changing nature of systemic risk, see International Monetary Fund, “Managing Global Finance: Private and Public Challenges Raised by Last Fall’s Mature Market Turbulence,” in *International Capital Markets: Developments, Prospects, and Key Policy Issues* (September 1999), 118-168; and Schinasi, *et. al.*, *op. cit.*

<sup>118</sup> Rhoades, S.A, *Bank Mergers and Banking Structure in the United States: 1990-1998* (Washington, DC: Board of Governors of the Federal Reserve System, August 2000), 23-25, available online at [www.federalreserve.gov/pubs/staffstudies/2000-present/ss174.pdf](http://www.federalreserve.gov/pubs/staffstudies/2000-present/ss174.pdf) and Bassett, W.F., and E. Zakrajsek, “Profit and Balance Sheet Developments at U.S. Commercial Banks in 1999,” *Federal Reserve Bulletin* (June 2000), 367-395 at 368, available online at <http://www.federalreserve.gov/pubs/bulletin/2000/0600lead.pdf>. For an analysis of bank consolidation, see Shull, B., and G. Hanweck, *Bank Mergers in a Deregulated Environment: Promise and Peril* (Westport, CT: Quorum Books, 2001).

<sup>119</sup> Rhoades, *op. cit.*, 24.

<sup>120</sup> Group of Ten, *op. cit.*

<sup>121</sup> *Ibid.*, 14-15, 128-132.

the risk of individual institutions is unclear and must be assessed on a case-by-case basis. The study also found that the impact of consolidation on the systemic risk posed by the financial sector is uncertain.<sup>122</sup>

The Group of Ten study also argued that increasing size and the growing complexity of the activities of large financial institutions has probably increased the challenges of identifying solvency problems and resolving failed institutions in a timely fashion. The study concluded that:

It seems likely that if a large and complex banking organization became impaired, then consolidation and any attendant increase in complexity may have, other things being equal, increased the probability that the work-out or wind-down of such an organization would be difficult and could be disorderly. Because such firms are the ones most likely to be associated with systemic risk, this aspect of consolidation has most likely increased the probability that a wind-down could have broad implications.

Important reasons for this effect include disparate supervisory and bankruptcy policies and procedures both within and across national borders, complex corporate structures and risk management practices that cut across different legal entities within the same organization, and the increased importance of market-sensitive activities such as OTC derivatives and foreign exchange transactions. In addition, the larger firms that result, in part, from consolidation have a tendency either to participate in or to otherwise rely more heavily on “market” instruments. Because market prices can sometimes change quite rapidly, the potential speed of such a firm’s financial decline has risen. This increased speed, combined with the greater complexity of firms caused in substantial degree by consolidation, could make timely detection of the nature of a financial problem more difficult, and could complicate distinguishing a liquidity problem from a solvency problem at individual institutions.

The importance of this concern is illustrated by the fact that probably the most complex large banking organization wound down in the United States was the Bank of New England Corp. Its \$23.0 billion in total assets (\$27.6 billion in 1999 dollars) in January 1991 when it was taken over by the government pale in comparison to the total assets of the largest contemporary U.S. firms, which can be on the order of \$700 billion.<sup>123</sup>

The Group of Ten study also measured the interdependencies among large, complex banking organizations (LCBOs) in the U.S. The study found that direct interdependencies of the average LCBO in the U.S., as measured by the ratios of short-term interbank loans to capital and of the positive market value of derivatives contracts to capital, increased substantially in the

---

<sup>122</sup> *Ibid.*, 14-15, 131.

<sup>123</sup> *Ibid.* See also the analysis at 132-135.

1988-1999 period.<sup>124</sup> The same study found that the total (direct and indirect) interdependencies of the average LCBO, as measured by the correlations of the stock returns of sampled banks, also increased significantly during that period.<sup>125</sup> As noted above, an upward trend in direct interdependencies, relative to capital, among large financial institutions implies that when an adverse shock leads to the failure of one institution, there is greater likelihood of spillover effects on other institutions. Likewise, a higher level of indirect interdependencies among institutions means a greater likelihood that an adverse shock will result in correlated losses at those institutions. It is not clear, however, what level of consolidation, or level or type of interdependencies increases the risk of spillover effects and correlated losses enough to make the financial sector unacceptably vulnerable to a shock.

A recent paper attempted to quantify the risk of large spillover effects resulting from direct interdependencies among banks in the U.S. by simulating the potential effect of the failure of a large bank on other institutions that have bilateral credit exposures to the failed bank arising from overnight Federal funds transactions.<sup>126</sup> The simulations assumed that counterparties of the failed bank suffered two rates of loss on their exposures: 40 percent and five percent. Under the first assumption of a 40 percent loss rate, the study found that the failure of the largest bank in the Fed funds market would cause the failure of two to six other primarily smaller banks holding less than 1 percent of total bank assets.<sup>127</sup> If the two largest debtor banks failed, fewer than 10 other banks would fail. Under the second assumption of a five percent loss rate, which is consistent with the loss rate of uninsured depositors at Continental Illinois National Bank, the initial failure(s) would cause no other banks to fail.<sup>128</sup>

Those results arguably should be interpreted as lower bound estimates, as the simulations did not consider interbank exposures through other channels.<sup>129</sup> Aggregate interbank exposures may be much higher than federal funds exposures alone, however, and the risk of large losses from cascading bank failures may be significant. Importantly, the simulations also illustrate that the magnitude of credit exposures among interdependent financial institutions and the expected losses given default are both important determinants of the degree of spillover effects and the potential for contagion.<sup>130</sup>

### Growing Use of Financial Derivatives

The term derivative refers to a variety of bilateral contracts whose value derives from an underlying asset, reference rate, or index. The most common derivatives embody forward contracts, options, or some combination of those building blocks. Those instruments either have

---

<sup>124</sup> *Ibid.*, 137-140. The study's sample of institutions considered LCBOs included the largest banking organizations in the U.S. For a list of which of the largest 50 banking institutions were considered LCBOs at year-end 1998, see Study Group on Subordinated Notes and Debentures, *op. cit.*, 29.

<sup>125</sup> Group of Ten, *op. cit.*; and De Nicolo, G., and M.L. Kwast, "Systemic Risk and Financial Consolidation: Are They Related?" *Journal of Banking and Finance*, Vol. 26, No. 5 (May 2002), 861-880.

<sup>126</sup> Furfine, C.H., *Interbank Exposures: Quantifying the Risk of Contagion* (Basel: Bank for International Settlements Working Paper No. 70, June 1999), available online at <http://www.bis.org/publ/work70.pdf>.

<sup>127</sup> *Ibid.*, 7.

<sup>128</sup> *Ibid.*, 8.

<sup>129</sup> *Ibid.*, 12.

<sup>130</sup> *Ibid.*, 8-11.

standardized terms and are traded on organized exchanges, or have unique features and are negotiated privately “over-the-counter” or OTC.

Derivatives give financial institutions and non-financial firms greater capacity to unbundled, repackage, and transform financial risks. That increases firms’ ability to diversify and hedge risk, price the different types of risks embodied in financial instruments, and select those they do not want.<sup>131</sup> Overall, derivatives contribute to more complete markets for trading and managing risk and facilitate a more efficient allocation of risk.

Banks, securities firms, and other participants in the market for OTC derivatives play one or more of three roles. Brokers match buyers and sellers, but avoid market and counterparty risk exposures. Dealers make markets, serve as counterparties on at least one side of virtually all contracts, and actively manage the risks of the resulting net portfolio position. End-users—non-financial firms, institutional investors, other financial institutions, and governments—use OTC derivatives to manage risk, reduce transactions costs, lower financing costs, and increase portfolio yields. End-users could accomplish much the same results by using exchange-traded futures, options, and derivative securities, but only at the much higher cost of establishing a sophisticated in-house unit capable of continually managing exchange-traded positions.

Unlike the exchange-traded derivatives markets which are subject to Federal regulation by the Commodity Futures Trading Commission, OTC derivatives are unregulated individual contractual agreements between the parties involved in the transaction. Increasingly, trade practices have resulted in uniform language and standard templates, but for the most part, there is no comprehensive system of regulation for these instruments.

The existence of standardized, government-approved commodities futures and well-regulated and -capitalized clearing agencies in the exchange-traded derivatives markets, serve to reduce, to some extent, the likelihood of a systemic event arising out of the operation of those markets. Such comfort does not exist in the case of unregulated OTC derivatives, where economic and market forces may, during a period of stress or crisis, be exacerbated by problems that arise out of the structure and operation of the unregulated marketplace.

The market for OTC derivatives is quite large, both in absolute terms and relative to the global economy and global financial markets. The Bank for International Settlements (BIS) estimates that the notional principal amount of outstanding OTC derivatives totaled \$111.1 trillion at the end of 2001, up from \$80.3 trillion at year-end 1998. Because OTC derivatives contracts do not specify the exchange of notional principal, gross market value—an estimate of the cost of replacing a defaulted contract, typically about 2 to 5 percent of notional principal—is a better indicator of current credit exposure than notional principal. BIS estimates that the global gross market value of outstanding contracts in OTC derivatives markets was \$3.8 trillion at the end of 2001, up from \$3.2 trillion at year-end 1998. Netting arrangements—written contracts to combine offsetting obligations between two or more parties reducing them to a single net

---

<sup>131</sup> See, for example, Schinasi, *et. al.*, *op. cit.*, 41, and Greenspan, A., New York, New York, April 22, 2002, available online at <http://www.federalreserve.gov/boarddocs/speeches/2002/20020422/default.htm>.

payment or receipt for each party—make the net market value of outstanding OTC derivatives less than one-third the gross market value.<sup>132</sup>

Dealing in OTC derivatives, which is dominated by the major internationally active banks and securities firms, is highly concentrated. According to data compiled by the Office of the Comptroller of the Currency, at the end of 2001 seven U.S. banks held nearly 96 percent of the notional OTC derivatives of the U.S. banking system. Twenty-five banks held over 99 percent of the notional OTC derivatives outstanding of all U.S. banks.<sup>133</sup>

OTC derivatives involve credit exposures for the contracting parties. For example, a financial institution that finances a long-term, fixed-rate loan with short-term debt can limit its exposure to interest rate risk by entering into a pay-fixed, receive-floating swap—an agreement to pay interest at a fixed rate at specific intervals for a certain period in exchange for receiving interest at a floating rate over that same period. Each party's payments are calculated by multiplying the appropriate interest rate by the notional principal amount, which is not exchanged. The contract effectively converts the institution's long-term loan into a short-term asset. If the contract's reference floating rate is perfectly correlated with the rate on the institution's short-term debt, interest rate risk associated with financing the loan is eliminated. Each party is both a debtor and a creditor whose net position varies over time with changes in the contract's reference floating rate. The contract exposes each party to credit risk—the possibility that the other party will default on its obligation to pay if the reference floating rate changes and it becomes the net debtor in the arrangement.

A key feature of OTC derivatives is that the credit risk of a contract is correlated with the underlying market risk exposure being hedged, which may be quite volatile. Day-to-day shifts in the prices of financial assets can have a considerable effect on the OTC derivatives-related credit exposures of individual financial institutions, as well as the distribution and concentration of those exposures across the financial sector.<sup>134</sup>

In 1994 the U.S. General Accounting Office (GAO) expressed concern that failure by a large end-user of derivatives could lead to the following sequence of events: one or more dealers who were counterparties could default, causing a chain reaction of counterparty defaults; the opaqueness of derivatives and increased uncertainty could result in a general lack of liquidity or “freeze-up” of OTC derivatives markets, forcing dealers and others to use the more liquid exchange-traded futures and options markets, and leading to “price breaks” in those markets; those price breaks could spread to markets for other assets and create widespread uncertainty about asset values, which in turn could generate widespread panic selling, plunging asset values throughout the world, resulting in real economic losses.<sup>135</sup>

---

<sup>132</sup> Bank for International Settlement (BIS), *Quarterly Review: International Banking and Financial Market Developments* (Basel, March 2002), A99, Table 19; and BIS Press Release “Rapid Expansion of OTC Derivatives Market in the Second Half of 2001,” May 15, 2002.

<sup>133</sup> U.S. Office of the Comptroller of the Currency, *OCC Bank Derivatives Report, Fourth Quarter 2001* (Washington, DC, March 2002), 9.

<sup>134</sup> Schinasi, *et al.*, *op. cit.*, 3.

<sup>135</sup> U.S. General Accounting Office, *Financial Derivatives: Actions Needed to Protect the Financial System* (Washington, DC: Government Printing Office, May 1994).

A number of studies counter that GAO overstates the risk exposure of OTC derivatives dealers by ignoring three important facts: 1) dealers maintain balanced portfolios, 2) the greater diversification provided by the size of dealer portfolios significantly lowers their counterparty credit risk exposure, and 3) netting agreements and posted collateral substantially limit the credit exposures of dealers and other derivatives counterparties.<sup>136</sup> Those studies argue that derivatives activity has reduced systemic risk by allowing risks to be actively traded and efficiently allocated. They also argue that a lack of liquidity among derivatives dealers and other market makers can be handled by the Federal Reserve System and other nations' central banks. At the same time, there is acknowledgement that OTC derivatives give banks and other institutions powerful tools to increase their risk in ways that are relatively opaque, and that those instruments complicate regulatory efforts to monitor the risk of, and set capital requirements for, financial institutions that use them.<sup>137</sup>

---

<sup>136</sup> Darby, *op.cit.*; Edwards, *The New Finance*, *op. cit.*; Hentschel and Smith, *op. cit.*; Hunter and Marshall, *op. cit.*; and Mackey, *op. cit.*

<sup>137</sup> For example, during a period of volatile interest rates, a financial institution can increase its exposure to rising interest rates by entering into a pay-floating, receive-fixed swap. That transaction synthetically converts a portion of the institution's fixed-rate assets into floating-rate assets. If the notional amount of the contract is large enough relative to the institution's assets, the transactions can raise the institution's overall interest rate risk exposure quite substantially. See also, for example, Schinasi, *et al.*, *op. cit.*, 48: "OTC derivatives activities are relatively opaque. In traditional banking, when a bank issues a loan the risks are transparent even if they are not easily quantified and managed. With OTC derivatives transactions, it can be difficult to adequately gauge, assess and understand the distribution and balance of counterparty and other risks, including who owns which risks." However, with respect to the Enterprises, OFHEO's risk-based capital stress test takes in account all of the financial derivatives of Fannie Mae and Freddie Mac on an instrument-level basis, so that each Enterprise's risk-based capital requirement reflects the risk posed by those instruments.

## Section Four: Difficulties in Assessing Indirect Interdependencies

Financial regulators generally assess risk at the level of individual institutions, yet such assessments cannot be aggregated to yield assessments of the systemic risk posed by the financial sector as a whole.<sup>138</sup> Assessing systemic risk requires estimation of the interdependencies among, at least, the largest and most important institutions and markets. One economist suggests that, at a minimum, it would be desirable for regulators to have sufficient information on the terms of financial contracts to assess the net position of the financial sector vis-à-vis the rest of the economy—non-financial firms and households.<sup>139</sup> At present such assessments are not possible, in part because financial institutions are not required to report information needed to analyze such interdependencies in detail, in part because different regulators are responsible for different types of financial institutions, and in part because financial regulators have not committed the necessary resources required to collect and analyze such information.

Investors' and financial regulators' lack of data to estimate all indirect interdependencies limits the effectiveness of market discipline and regulatory efforts to counter the incentives created by an underpriced financial safety net to overextend credit, build up excessive leverage, or finance asset price bubbles. The weak market discipline of LTCM—despite the fact that LTCM required a minimum investment of \$10 million and allowed no withdrawals for three years, which should have attracted only relatively sophisticated investors—and the large indirect interdependencies that developed between LTCM and the banking system and among bank counterparties of LTCM illustrate this point.

---

<sup>138</sup> Crockett, A., "Marrying the Micro- and Macro-Prudential Dimensions of Financial Stability," remarks before the Eleventh International Conference of Banking Supervisors (September 21, 2000), available online at <http://www.bis.org/speeches/sp000921.htm>.

<sup>139</sup> Hellwig, M., "Systemic Aspects of Risk Management in Banking and Finance," *Swiss Journal of Economics and Statistics*, Vol. 131 (4/2), 1995, 723-737 at 731.

## CHAPTER TWO: ENVIRONMENT IN WHICH THE ENTERPRISES OPERATE

### Section One: The Statutory and Regulatory Framework in Which the Enterprises Operate

Moving from defining systemic risk, identifying the stages of a systemic event and indicating conditions that make the economy vulnerable to such an event, it is necessary to understand the unique nature and operations of Fannie Mae and Freddie Mac and the interdependencies between the Enterprises and participants in housing, mortgage and broader financial markets.

Congress established Fannie Mae and Freddie Mac to overcome historical limitations in the nation's financial system that led to credit crunches in local and regional mortgage markets.<sup>140</sup> Until the 1980s, limitations of the nation's decentralized banking system—including deposit rate ceilings and geographic limitations on bank activities posed by the McFadden Act, by many states, and by the Douglas Amendment to the Bank Holding Company Act—forced banks and thrifts to depend on local markets for funds.<sup>141</sup> As a result, localities and regions experiencing population declines or slow economic growth often had a surplus of mortgage funds, while areas experiencing more rapid growth often had a shortage of funds.<sup>142</sup> Further, when economic downturns occurred and households and non-financial firms liquidated deposits at banks and thrifts, those lenders often had to curb new mortgage lending.<sup>143</sup> The resulting “credit crunches” in mortgage markets often exacerbated downturns in housing activity and increased the volatility of local and regional economies.<sup>144</sup>

Today, legal restrictions on access to nationwide funding no longer exist and non-GSEs perform some of the functions previously performed by the Enterprises.<sup>145</sup> Nonetheless,

---

<sup>140</sup> See Federal National Mortgage Association, “Federal National Mortgage Association: Background and History” (Washington, DC: 1975), 1-6; and Senate Report, Banking and Currency Committee, No. 91-761 (April 7, 1970), to accompany S. 3685, the Emergency Home Finance Act of 1970, 3490 (enacted as P.L. 91-351, that legislation created Freddie Mac). On the broader history of Fannie Mae and Freddie Mac and their role in the U.S. housing finance system, see Bartke, R. W., “Fannie Mae and the Secondary Mortgage Market,” *Northwestern University Law Review*, 66(1) (March-April, 1970), 1-78; Bartke, R. W., “Home Loan Financing At the Crossroads – A Study of the Federal Home Loan Mortgage Corporation,” *Indiana Law Journal*, 48(1) (Fall 1972), 1-42; and Weicher, J. C., “The New Structure of the Housing Finance System,” *Federal Reserve Bank of St. Louis Review* (July-August, 1994), 47-66 at 54.

<sup>141</sup> See, for example, National Commission on Financial Institution Reform, Recovery and Enforcement, *op. cit.*, at 22.

<sup>142</sup> Regions experiencing rapid economic and population changes suffered a chronic shortage of lendable mortgage funds, whereas slower growing regions often had an excess of available funds. Interest rates were often higher in regions where funds were tight relative to rates in markets where funds were “easy”. See *Background and History of the Federal National Mortgage Association*, Department of Housing and Urban Development, Federal National Mortgage Association (Washington, DC, January, 1966), 1-14 at 14.

<sup>143</sup> See, for example, Colton, K.W., “Housing Finance in the 1980s: Economic Factors Indicate Future Direction,” in *Federal Housing Programs: Past and Present* (New Brunswick, NJ, Center for Urban Policy Research – Rutgers University, 1985), at 152.

<sup>144</sup> See Colton, *op. cit.*, 158. See also Hendershott, P., and K. Villani, *Regulation and Reform of the Housing Finance System*, (Washington, DC: American Enterprise Institute, 1977), 74-84, for an extended discussion of mortgage capital shortages and their impact on housing cycles.

<sup>145</sup> Non-GSEs now promote home lending by integrating local mortgage markets into the capital markets through securitization and demonstrate the viability of innovative mortgage products and financing techniques. For a discussion of the Enterprises historical role in performing those functions, see Weicher, J., “The Development of the

increasing investment in housing by lowering the interest rates of single-family mortgages Fannie Mae and Freddie Mac are eligible to purchase,<sup>146</sup> making funds available during exceptionally difficult market environments,<sup>147</sup> and supporting affordable mortgage lending continue to be public policy rationales for continued government sponsorship of the Enterprises.<sup>148</sup>

Congress chartered the Enterprises, authorized them to perform specific activities, and established a regulatory scheme to ensure they have adequate capital, operate safely, and attain certain housing goals. The charters of Fannie Mae and Freddie Mac and other provisions of federal law convey legal benefits to the Enterprises. Those benefits and the Enterprises' ability to borrow at interest rates close to those paid by the U.S. Treasury have enabled them to become the most important institutions in U.S. housing finance markets and very important participants in the broader financial sector.

The principal federal laws pertaining to Fannie Mae and Freddie Mac are the Enterprises' statutory charters ("the charter acts") and the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 ("the 1992 Act").<sup>149</sup> The charter acts give the Enterprises several broad public policy purposes. Specifically, the charters state that it is the purpose of Fannie Mae and Freddie Mac to:<sup>150</sup>

- Provide stability in the secondary market for residential mortgages;
- Respond appropriately to private capital markets;
- Provide ongoing assistance to the secondary market for residential mortgages (including activities relating to mortgages on housing for low- and moderate-income families involving a reasonable economic return that may be less than the return earned on other activities) by increasing the liquidity of mortgage investments and improving the distribution of investment capital available for residential mortgage financing; and

---

Housing GSEs," in P. Wallison, ed., *Public Purposes and Private Interests, Fannie Mae and Freddie Mac, Volume I: Government Subsidy and Conflicting Missions* (Washington, DC: AEI Press, 2000), 15-25. For a discussion of securitization by non-GSEs, see Bruskin, E., A.B. Sanders, and D. Sykes, "The Nonagency Mortgage Market: Background and Overview," in F. Fabozzi, C. Ramsey, and M. Marz, *The Handbook of Nonagency Mortgage-Backed Securities*, 2<sup>nd</sup> Edition (New Hope, PA: Frank Fabozzi Associates, 2000), 5-38.

<sup>146</sup> See, for example, Marzol, A., "Contributions to Homeownership," in P. Wallison, *Public Purposes and Private Interests, op. cit.*, 45-50.

<sup>147</sup> In the fourth quarter of 1998, crises in the Asian and Russian debt markets and hedge fund losses provoked a "flight to quality" that caused borrowing costs to rise in many markets. A *Wall Street Journal* article noted at the time that the presence of Fannie Mae and Freddie Mac helped keep the residential mortgage market liquid and limit the increase in mortgage rates. Tejada, C., "Jumbo Mortgage Rates Haven't Fallen Very Far," *Wall Street Journal* (October 29, 1998), C1.

<sup>148</sup> See, for example, Gardner, J.L., and S. Wachter, "Guest Editors' Introduction: Fannie Mae and Freddie Mac in the Housing Finance System: I," *Cityscape*, Vol. 5 (3), 1-8 at 2; available online at <http://www.huduser.org/periodicals/cityscape/vol5num3/guest.html>.

<sup>149</sup> See Federal National Mortgage Association Charter Act ("Charter Act") (12 U.S.C. 1716-1723); Federal Home Loan Mortgage Corporation Act ("Corporation Act") (12 U.S.C. 1451-1459); and Federal Housing Enterprises Financial Safety and Soundness Act of 1992 ("1992 Act") (Title XIII of P.L.-550, 12 U.S.C. 4501 *et seq.*).

<sup>150</sup> Charter Act (12 U.S.C. 1716); Corporation Act (12 U.S.C. note to 1451).

- Promote access to mortgage credit nationwide by increasing mortgage investment liquidity and improving the distribution of capital available for residential mortgage financing.

The charter acts also specify the corporate form and statutory powers of Fannie Mae and Freddie Mac. Each Enterprise is privately owned, issues stock traded on the New York Stock Exchange, and operates as a unitary firm on a nationwide basis. Fannie Mae and Freddie Mac's activities are restricted to supporting the residential mortgage market.

The 1992 Act gives the Secretary of Housing and Urban Development (HUD) general regulatory authority over the Enterprises, including the power to issue regulations necessary to ensure they carry out their public mission.<sup>151</sup> The Secretary also sets, monitors, and enforces affordable housing goals that require each Enterprise to devote a proportion of its mortgage purchases to loans that finance housing in geographically underserved areas and housing that is affordable to very low-, low-, and moderate-income households.<sup>152</sup> In addition, the Secretary has specific fair lending responsibilities with respect to the Enterprises.<sup>153</sup>

The 1992 Act also established the Office of Federal Housing Enterprise Oversight (OFHEO) as an independent office within HUD. OFHEO's mission is to examine and regulate the Enterprises for capital adequacy and safety and soundness. A Director appointed by the President and confirmed by the Senate for a five-year term heads OFHEO, which has regulatory authority similar to that of other federal financial regulators. OFHEO's supervisory responsibilities include, but are not limited to:

- Conducting examinations of the Enterprises;
- Establishing and maintaining a risk-based capital standard, using a stress test that simulates each Enterprises' financial condition during stressful interest rate and credit risk scenarios;
- Monitoring capital adequacy based on a minimum capital standard and the risk-based capital standard;
- Prohibiting excessive executive compensation;
- Ensuring compliance by Fannie Mae and Freddie Mac with applicable statutory and regulatory requirements;
- Taking enforcement actions, as appropriate; and
- Conducting research to enhance OFHEO's oversight of Fannie Mae and Freddie Mac and its contributions to Federal regulation of financial institutions and markets.

The charter acts of Fannie Mae and Freddie Mac grant them special benefits under federal law. Those benefits include exemptions from state and local corporate income taxes<sup>154</sup> and from requirements to register securities with the Securities and Exchange Commission

---

<sup>151</sup> 1992 Act (12 U.S.C. 4541).

<sup>152</sup> 1992 Act (12 U.S.C. 4561-4589).

<sup>153</sup> 1992 Act (12 U.S.C. 4545).

<sup>154</sup> Charter Act (12 U.S.C. 1723a(c)(2)) Corporation Act (12 U.S.C. 1452(e)).

(SEC).<sup>155</sup> The Secretary of the Treasury has discretionary authority to purchase up to \$2.25 billion in obligations issued by an Enterprise.<sup>156</sup> In addition, the securities of Fannie Mae and Freddie Mac are eligible for Federal Reserve open-market purchases,<sup>157</sup> as collateral for most state and local deposits,<sup>158</sup> and as collateral for loans from Federal Reserve<sup>159</sup> and Federal Home Loan Banks.<sup>160</sup> Further, federally chartered depository institutions may invest in the Enterprises' securities in unlimited amounts.<sup>161</sup>

Another important legal benefit is the access of Fannie Mae and Freddie Mac to the Federal Reserve's Fedwire Funds Transfer and Fedwire Securities Transfer Systems,<sup>162</sup> which are electronic transfer systems operated by the Federal Reserve System that enable financial institutions to transfer funds and use book-entry securities.<sup>163</sup> The size of the Enterprises' business activities makes them large users of Fedwire. While the number of daily Fedwire transactions by Fannie Mae and Freddie Mac is relatively small, each Enterprise's daily dollar volume is substantial. Use of the Fedwire by Fannie Mae and Freddie Mac lowers their costs, although the value of that benefit is difficult to quantify.<sup>164</sup>

---

<sup>155</sup> Charter Act (12 U.S.C. 1723c; Corporation Act (12 U.S.C. 1455(g)). In July 2002 Fannie Mae and Freddie Mac each agreed to voluntarily register its common stock with the SEC in 2003, which will require each Enterprise to file periodic financial disclosures under the Securities Exchange Act of 1934. See "Fannie Mae to Voluntarily Register its Common Stock with Securities and Exchange Commission as Company's Seventh Voluntary Commitment Fosters Transparency," Fannie Mae News Release, July 12, 2002, available online at <http://www.fanniemae.com/newsreleases/2002/2032.jhtml>; and "Freddie Mac Announces Agreement With SEC, OFHEO for SEC Review of Financial Disclosures," Freddie Mac News Release, July 12, 2002, available online at [http://www.freddiemac.com/news/archives2002/agreement\\_071202.htm](http://www.freddiemac.com/news/archives2002/agreement_071202.htm).

<sup>156</sup> Charter Act (12 U.S.C. 1719(c)) Corporation Act (12 U.S.C. 1455(c)(2).

<sup>157</sup> 12 U.S.C. 355(2)

<sup>158</sup> Charter Act (12 U.S.C.1723c; Corporation Act (12 U.S.C. 1455(g)).

<sup>159</sup> 12 U.S.C. 347.

<sup>160</sup> 12 U.S.C. 1430(a)(3)(b).

<sup>161</sup> (12 U.S.C. 1757(7)(e); (12 U.S.C. 1464(c)(1)(D)-(F).

<sup>162</sup> Charter Act (12 U.S.C. 1723a(g); Corporation Act (12 U.S.C. 1452(d)).

<sup>163</sup> Book-entry securities are marketable securities issued in electronic form by the U.S. Government, any agency or instrumentality thereof, certain international organizations, or others that the Federal Reserve Banks determine are eligible to be held in a Fedwire securities account and eligible for transfer.

<sup>164</sup> The Fedwire links more than 9,000 institutions with the Federal Reserve Banks, allowing the movement of balances among correspondent banks and enabling those banks to transfer funds on behalf of their customers. In 2001, the Fedwire made some 112.4 million fund transfers, with a total value of approximately \$424 trillion and an average value per transfer of \$3.77 million. Transfers on behalf of bank customers include funds used to make deposits and other large-scale, time-sensitive payments. All funds transfers are immediate, final, and irrevocable when processed. The Federal Reserve's extension of credit to make such payments is generally perceived to be part of the federal financial safety net.

The Fedwire Securities System allows depositors of securities to transfer ownership against payment. More than 8,600 depository institutions maintain a securities account with a Federal Reserve Bank to hold and transfer U.S. Treasury securities and other securities, including mortgage-backed securities, issued or guaranteed by federal agencies and government-sponsored enterprises (GSEs). Fedwire book-entry securities transfers totaled 15 million in 2001 (excluding reversals) with a total value of \$212 trillion and an average value per transfer of \$15.6 million. Transfers settle immediately after entry into the system. The transfer of securities' ownership and related funds occur simultaneously and are final at the time of transfer—a significant benefit to users of the National Book Entry System.

On the benefits to the Enterprises and banks of Fedwire use, see Carnell, R.S., "Federal Deposit Insurance and Federal Sponsorship of Fannie Mae and Freddie Mac: The Structure of Subsidy," in P. J. Wallison, ed., *Serving Two Masters, Yet Out of Control* (Washington, DC: AEI Press, 2001), 56-83 at 80; Jones, K., and B. Kolach, "The

The Federal Reserve has policies to reduce the risks to the Federal Reserve Banks, the banking system, and others posed by the Fedwire and other payment systems. The Federal Reserve imposes limits on the size of Fedwire transactions and limits (known as “net debit caps”) on negative positions in an institution’s Fedwire account at any time during a business day (“daylight overdrafts”).

Fannie Mae and Freddie Mac each maintain more than one account at the Federal Reserve. A “General” account is used for funds transfer and certain other Fedwire activities. A “Principal and Interest” account is used to process the regularly scheduled payment of principal and interest on securities and the original issue of Enterprise securities. Each Enterprise is subject to a net debit cap for transactions on its General Account, but is not subject to such fees on its Principal and Interest (P&I) account.

The Federal Reserve Board (Board) noted in 1994 that most Enterprise daylight overdrafts were related to the regular payment of P&I on securities issued by the Enterprises through the Federal Reserve.<sup>165</sup> Reducing those overdrafts could delay until later in the day Enterprise P&I payments, which could have the effect of increasing the size and duration of daylight overdrafts of depository institutions that receive corresponding credits. To avoid that outcome, the Board instituted a policy, which remains in effect, that exempts Enterprise P&I accounts from daylight overdraft restrictions.<sup>166</sup>

Even in the instance of a sizable daylight overdraft, the Federal Reserve has a security interest in assets owned by an Enterprise that are held on the Federal Reserve’s Fedwire System. If either Enterprise were unable to cover an overdraft, the Federal Reserve’s security interest would enable it to take possession of unencumbered Enterprise-owned assets. Fannie Mae and Freddie Mac reimburse the Federal Reserve for Fedwire services, which include authorizing and effecting the withdrawal of book-entry securities, activity related to book-entry principal and interest payments, and other custodial services.

The legal benefits conveyed by the federal government save Fannie Mae and Freddie Mac billions of dollars each year.<sup>167</sup> For example, exemption from SEC registration fees saved

---

Federal Safety Net, Banking Subsidies, and Implications for Financial Modernization, “*FDIC Banking Review*, Vol. 12, No. 1, Spring, 1999, 1-30 at 5; available online at [http://www.fdic.gov/bank/analytical/banking/1999may/1\\_v12n1.pdf](http://www.fdic.gov/bank/analytical/banking/1999may/1_v12n1.pdf). The Federal Reserve’s extension of credit to make such payments is generally perceived to be part of the federal financial safety net. See Kaufman, G., and P.J. Wallison, “The New Safety Net,” *Regulation*, Summer 2001, 28-35, at 30; available online at <http://www.cato.org/pubs/regulation/regv24n2/kaufman.pdf>. For a review of theories and evidence regarding systemic risk in payment and settlement systems, see De Bandt and Hartmann, op. cit., 32-36, 54-55.

<sup>165</sup> Board of Governors of the Federal Reserve System, “Interpretation of the Payments System Risk Reduction Policy: Daylight Overdrafts of Government Sponsored Enterprises,” 59 Fed. Reg. 25060-25062, May 13, 1994.

<sup>166</sup> *Ibid.*

<sup>167</sup> The Treasury Department estimated the value of those legal benefits in 1995 at \$4.6 billion to \$6.9 billion. See U.S. Department of the Treasury, *Government Sponsorship of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation* (Washington, DC: 1996), 29-35. For more recent estimates, see U.S. Congressional Budget Office, *Federal Subsidies and the Housing GSEs* (Washington, DC: U.S. Government Printing Office, May 2001), available online at <http://www.cbo.gov/showdoc.cfm?index=2841&sequence=0>; Fannie Mae, *Setting the Record Straight: An Analysis of CBO’s 2001 Report on Fannie Mae and Freddie Mac* (May 23, 2001), available online at <http://www.fanniemae.com/global/pdf/ir/issues/fm cbo.pdf>; and Pearce, J.E., and J.C.

the Enterprises over \$200 million in 1999, when their combined issuance volumes were very high.<sup>168</sup> The most important source of savings, however, is the market's perception that the government implicitly guarantees the Enterprises' obligations.<sup>169</sup> As a standard reference volume on the short-term debt market observed: GSEs "are regarded by most people who lend them money as the government in disguise."<sup>170</sup> That perception arises from the legal benefits Fannie Mae and Freddie Mac enjoy, their ability to borrow in the federal agency credit market, the volume of their outstanding obligations, and strong Congressional support for their public purposes.<sup>171</sup> The perception lowers the yields that investors require on debt issued and mortgage-backed securities (MBS) guaranteed by the Enterprises and leads investors and other counterparties to set less stringent limits on their credit exposures to each Enterprise.<sup>172</sup> As a result, Fannie Mae and Freddie Mac can issue much larger volumes of securities (without obtaining private credit ratings on an issue-by-issue basis<sup>173</sup>), sell a much larger proportion of callable debt than private firms with comparable capital, and avoid the need to post collateral on derivatives transactions. Further, because of the perception, materially higher risk is unlikely to raise the borrowing costs of either Fannie Mae or Freddie Mac to the same extent as it would in the absence of that perception.<sup>174</sup> Another economic benefit of government sponsorship is that the Enterprises are the only GSEs specifically chartered to support the secondary mortgage

---

Miller III, *Freddie Mac and Fannie Mae: Their Funding Advantage and Benefits to Consumers* (McLean, VA: Freddie Mac, January 2001), available online at <http://www.freddiemac.com/corporate/reports/>.

<sup>168</sup> U.S. Congressional Budget Office, *Federal Subsidies and the Housing GSEs*, *op. cit.*, Table 4, available online at <http://www.cbo.gov/showdoc.cfm?index=2841&sequence=0>.

<sup>169</sup> Fannie Mae estimated, for example, that the funding advantage afforded by government sponsorship saved the Enterprises between \$3 billion and \$4.2 billion, and the exemption from state and local income taxation saved them \$0.6 billion, in 2001. Fannie Mae, *Setting the Record Straight: An Analysis of CBO's 2001 Report on Fannie Mae and Freddie Mac*, *op. cit.* As required by statute, the prospectuses of Fannie Mae and Freddie Mac debt and MBS state clearly and prominently that those securities are not U.S. government obligations and are neither issued nor guaranteed by the U.S. government.

<sup>170</sup> Marcia Stigum, *The Money Market*, 3<sup>rd</sup> Edition (Homewood, IL: Dow Jones-Irwin, 1990), 358.

<sup>171</sup> U.S. Congressional Budget Office, *Controlling the Risks of Government-Sponsored Enterprises*, *op. cit.*, 7-9. The federal agency credit market is the market in which debt of federal agencies such as the Postal Service and the Tennessee Valley Authority and GSEs such as Fannie Mae and Freddie Mac, and MBS issued or guaranteed by GSEs and the Government National Mortgage Association (Ginnie Mae—a federal agency), are issued and traded.

<sup>172</sup> "As a result of the belief that Congress would use taxpayer funds to prevent the failure of a GSE, ... some GSEs are in a position to increase financial leverage virtually unconstrained by the market ...." U.S. Department of the Treasury, *Report of the Secretary of the Treasury on Government-Sponsored Enterprises* (Washington, DC: April 1991), 1. This statement was made prior to the imposition of federal risk-based capital standards on Fannie Mae and Freddie Mac and other GSEs, which limit their ability to increase their leverage.

<sup>173</sup> "Fannie Mae standard domestic obligations, like Treasuries, typically receive no rating on an issue-by-issue basis, because investors and the rating agencies view the implied government backing of Fannie Mae as a sufficient indication of the investment quality of Fannie Mae obligations." Anthony F. Marra, senior vice president and deputy general counsel, Fannie Mae, submission to the Office of the Comptroller of the Currency, Docket 97-22, *Risk-Based Capital Standards: Recourse and Direct Credit Substitutes* (February 3, 1998), 4.

<sup>174</sup> After reviewing the cost of funds of Fannie Mae when that GSE was mark-to-market insolvent in the late 1970s and early 1980s and of the Farm Credit System when it had serious solvency problems during the 1980s, the General Accounting Office (GAO) concluded that "... creditors do not react to deterioration in the financial condition of a GSE the same way they react to the deterioration of a private firm. Creditors have demanded a higher return when they learn of deterioration of a GSE's financial condition, but the GSEs have retained their AAA ratings, and creditors have continued to purchase debt securities even when the GSEs were in serious financial difficulties." According to GAO, "[a]nalysts and GSE officials explain that creditors expect a GSE would likely receive federal assistance should one become seriously troubled." See U.S. General Accounting Office, *Government-Sponsored Enterprises: The Government's Exposure to Risks* *op. cit.*, 85-89 at 86, 85.

market.<sup>175</sup> The presence of only two such GSEs and the lower operating and funding costs of Fannie Mae and Freddie Mac limit the competition faced by each Enterprise in that market.

Economists have sought to quantify the funding cost savings that Fannie Mae and Freddie Mac enjoy by virtue of government sponsorship. Several recent studies compared the yields on general obligation, non-callable Enterprise debt issued in the late 1990s to those on similar instruments issued by non-GSE financial institutions with credit ratings of single-A and double-A.<sup>176</sup> The studies found that the spreads between those yields ranged from about 20 basis points for short-term (1- to 3-year) debt to about 50 basis points for long-term (10- to 30-year) debt.<sup>177</sup> Those savings are attributable to the perception of an implicit federal guarantee of the Enterprises' obligations,<sup>178</sup> their liquidity,<sup>179</sup> and the lower amount of capital that banks are required to maintain against the obligations.<sup>180</sup>

Historically, the principal rationale for government sponsorship of Fannie Mae and Freddie Mac was to overcome the limitations of U.S. housing finance markets by linking local and regional markets for residential mortgage credit to the national and international capital markets.<sup>181</sup> Today, legal restrictions on access to nationwide funding no longer exist and non-GSEs perform some of the functions previously performed by the Enterprises.<sup>182</sup> Nonetheless, increasing investment in housing by lowering the interest rates of single-family mortgages

---

<sup>175</sup> A third GSE, the Federal Home Loan Bank System, was chartered to make loans (called advances) to depository institutions and other lenders that make residential mortgage and, recently, certain other types of loans. The System does not purchase residential mortgages in the secondary market. For overviews of the System, see U.S. Congressional Budget Office, *The Federal Home Loan Banks in the Housing Finance System* (Washington, DC: U.S. Government Printing Office, July 1993); and U.S. Federal Housing Finance Board, *Report on the Structure and Role of the Federal Home Loan Bank System* (Washington, DC: April 1993).

<sup>176</sup> Ambrose, B.W., and A. Warga, "Measuring Potential GSE Funding Advantages" *Journal of Real Estate Finance and Economics* Vol. 25, No. 2 (2002), 129-150; Nothaft, F.E., J.E. Pearce, and S. Stevanovic, "Debt Spreads Between GSEs and Other Corporations," *Journal of Real Estate Finance and Economics* Vol. 25, No. 2 (2002), 151-172; and Sanders, A.B., "Government Sponsored Agencies: Do the Benefits Outweigh the Costs?," *Journal of Real Estate Finance and Economics* Vol. 25, No. 2 (2002), 121-127.

<sup>177</sup> Sanders, A.B., *op.cit.*, at 123-124.

<sup>178</sup> See, for example, U.S. Department of the Treasury, *Government Sponsorship of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation*, *op. cit.*, 3.

<sup>179</sup> *Ibid.*, 31; and Pearce and Miller, *op. cit.*, 6-9.

<sup>180</sup> The risk-based capital regulations adopted by the federal banking regulatory agencies assign lower credit risk weights to MBS guaranteed and debt issued by GSEs than to other comparable assets. Specifically, Enterprise-debt and guaranteed MBS are assigned a 20 percent risk weight, whereas whole mortgages and private-label MBS are assigned a 50 percent risk weight and corporate debt securities are assigned a 100 percent risk weight. Spong, K., *Banking Regulation: Its Purposes, Implementation, and Effects*, 4<sup>th</sup> Ed. (Kansas City, MO: Federal Reserve Bank of Kansas City, 1994), 74-76. The lower risk weights for Enterprise obligations increase investor demand for them, which contributes to their lower yields.

<sup>181</sup> See the references cited in De Bandt and Hartmann, *op.cit.*

<sup>182</sup> Non-GSEs now promote home lending by integrating local mortgage markets into the capital markets through securitization and demonstrate the viability of innovative mortgage products and financing techniques. For a discussion of the Enterprises historical role in performing those functions, see Weicher, J., "The Development of the Housing GSEs," in P. Wallison, ed., *Public Purposes and Private Interests, Fannie Mae and Freddie Mac, Volume I: Government Subsidy and Conflicting Missions* (Washington, DC: AEI Press, 2000), 15-25. For a discussion of securitization by non-GSEs, see Bruskin, E., A.B. Sanders, and D. Sykes, "The Nonagency Mortgage Market: Background and Overview," in F. Fabozzi, C. Ramsey, and M. Marz, *The Handbook of Nonagency Mortgage-Backed Securities*, 2<sup>nd</sup> Edition (New Hope, PA: Frank Fabozzi Associates, 2000), 5-38.

Fannie Mae and Freddie Mac are eligible to purchase,<sup>183</sup> making funds available during exceptionally difficult market environments,<sup>184</sup> and supporting affordable mortgage lending continue to be public policy rationales for continued government sponsorship of the Enterprises.<sup>185</sup>

---

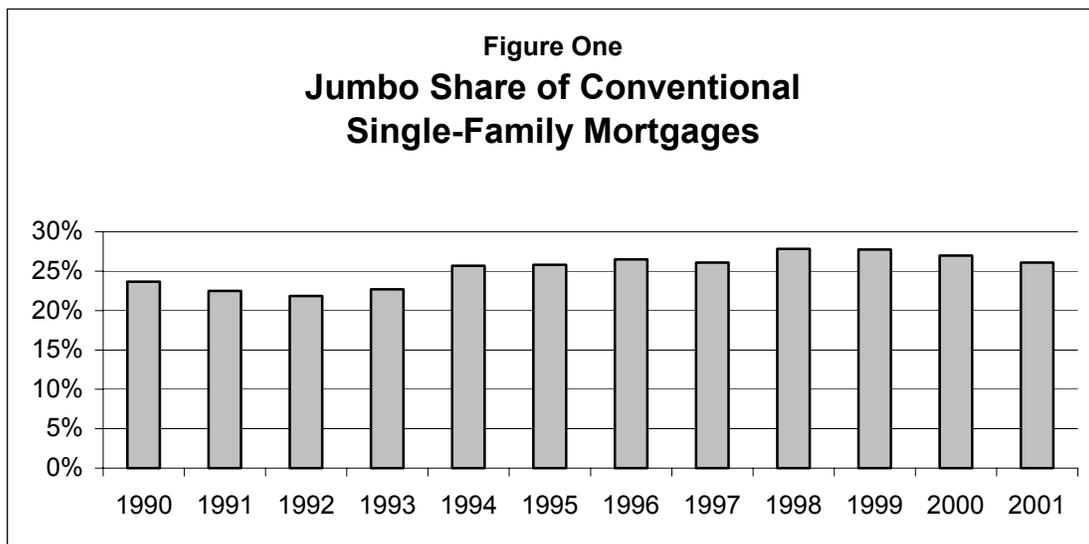
<sup>183</sup> See, for example, Marzol, A., “Contributions to Homeownership,” in P. Wallison, *Public Purposes and Private Interests*, *op. cit.*, 45-50.

<sup>184</sup> For example, in the fourth quarter of 1998, crises in the Asian and Russian debt markets and hedge fund losses provoked a “flight to quality” that caused borrowing costs to rise in many markets. A *Wall Street Journal* article noted at the time that the presence of Fannie Mae and Freddie Mac helped keep the residential mortgage market liquid and limit the increase in mortgage rates. Tejada, C., “Jumbo Mortgage Rates Haven’t Fallen Very Far,” *Wall Street Journal* (October 29, 1998), C1.

<sup>185</sup> See, for example, Gardner, J.L., and S. Wachter, “Guest Editors’ Introduction: Fannie Mae and Freddie Mac in the Housing Finance System: I,” *Cityscape*, Vol. 5 (3), 1-8 at 2; available online at <http://www.huduser.org/periodicals/cityscape/vol5num3/guest.html>.

## Section Two: The Operations of the Enterprises

As noted above, a mission of Fannie Mae and Freddie Mac is to provide stability in the secondary market for residential mortgages. To do so, the Enterprises buy mortgages from lenders, financing those purchases through the issuance of debt securities or the creation and sale of guaranteed securities backed by pools of loans, or by guaranteeing MBS issued by lenders. Typically, Fannie Mae or Freddie Mac securitize a number of loans from a lender which retains a portion of the monthly mortgage interest payments as compensation for servicing the loans in the pool. The Enterprise retains a guarantee fee and passes the balance of the monthly payments to the holders of the MBS for that loan pool. Fannie Mae and Freddie Mac each holds in its retained mortgage portfolio those mortgages and MBS it finances with debt. Securitization and debt financing of a mortgage portfolio are alternative means of channeling funds from capital market investors to mortgage lenders. To profit from those activities, Fannie Mae and Freddie Mac must actively and continually manage interest rate, credit, operations, and political risks.



Source: Inside Mortgage Finance Publications Inc.

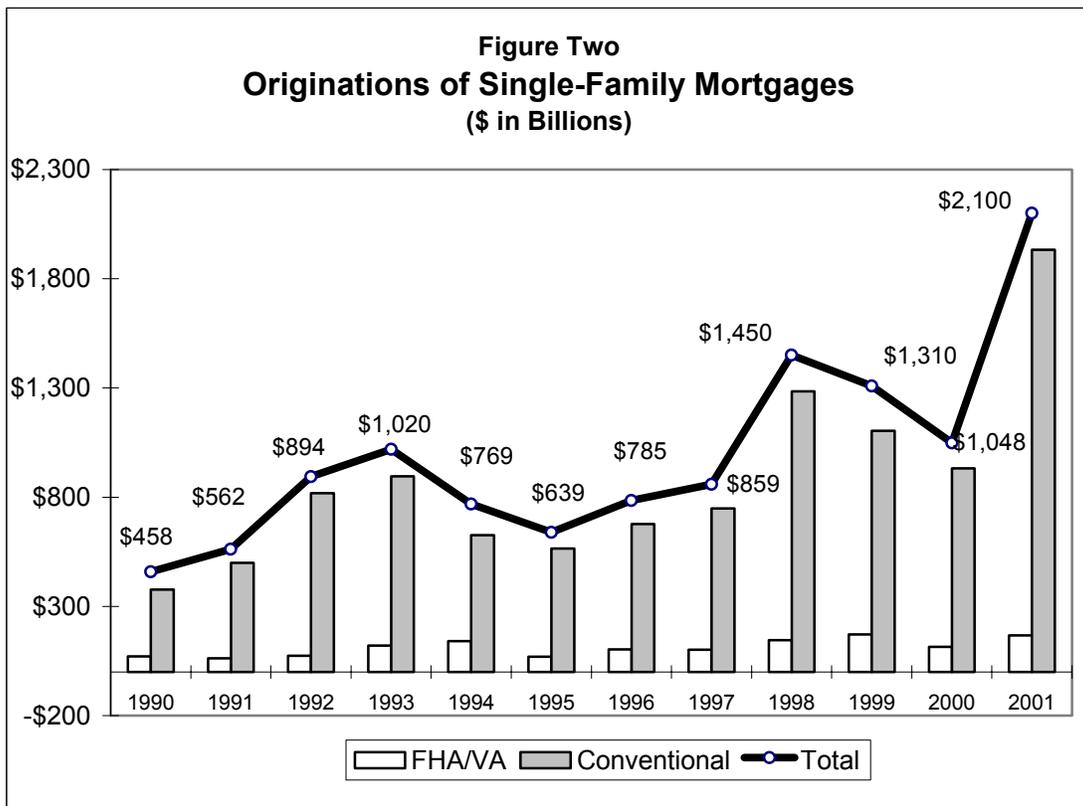
### Purchasing Mortgages

#### Single-Family Loans

Fannie Mae and Freddie Mac are the largest purchasers of conventional single-family mortgages in the secondary market. Single-family first mortgages are generally categorized into loans that are insured or guaranteed by the federal government and mortgages that carry no such federal backing—so-called conventional loans.<sup>186</sup> Conventional single-family loans are frequently characterized as either conforming or non-conforming. Conforming mortgages have

<sup>186</sup> The Federal Housing Administration (FHA) insures residential mortgages, whereas the Department of Veterans Affairs (VA) and the Rural Housing Service (RHS) guarantee such loans.

balances less than the conforming loan limit (\$322,700 in 2003) and are underwritten according to the standards of Freddie Mac and Fannie Mae. Non-conforming loans have balances above the conforming loan limit (non-conforming jumbo mortgages, see Figure One), are not underwritten according to the Enterprises' standards, or both. Conventional mortgages make up the bulk of the dollar volume of single-family originations (see Figure Two). In recent years government-insured or -guaranteed loans comprised 10 percent to 13 percent of single-family volume.<sup>187</sup>



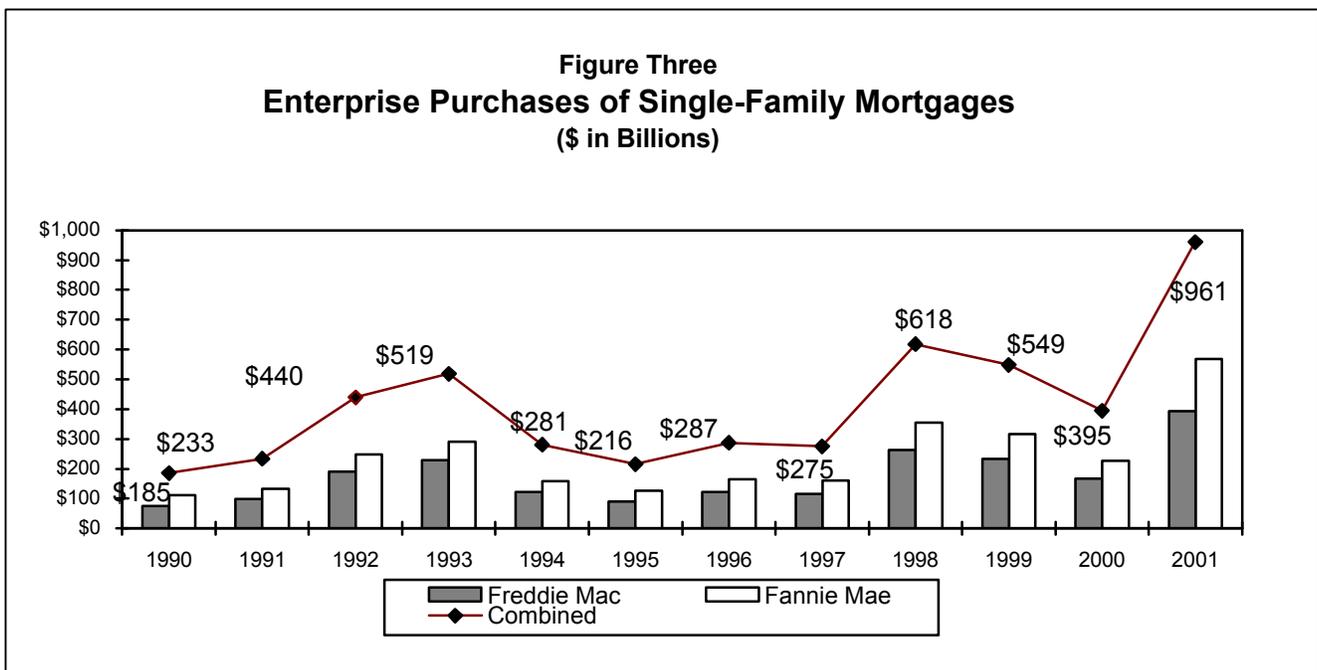
Sources: U.S. Department of Housing and Urban Development, U.S. Department of Veterans Affairs, Inside Mortgage Finance Publications, Inc.

The Enterprises together purchased \$960 billion of conventional single-family loans in 2001, an amount that represented roughly 50 percent of the nearly \$1.9 trillion of such mortgages

<sup>187</sup> Inside Mortgage Finance Publications, Inc., *2002 Mortgage Market Statistical Annual*, (Bethesda, MD: 2002), Volume I, 3-4.

originated in that year (see Figure Three).<sup>188</sup> From 1994 to 2000, the Enterprises' purchases of conventional single-family loans represented 44 percent of originations of those mortgages.<sup>189</sup>

In the last decade there has been significant consolidation in the origination segment of conventional single-family mortgage lending. The market share of the top 10 conventional originators rose from 17 percent in 1990 to over 50 percent in 2001, and the market share of the top 25 firms rose from 28 percent to over 69 percent in the same period.<sup>190</sup> The largest single-family mortgage lenders tend to sell a high proportion of their conventional originations to Fannie Mae and Freddie Mac. In 2001, sales of conventional single-family mortgages to the Enterprises by lenders that were among the top 10 originators of such loans represented nearly one-half of their conventional originations.<sup>191</sup>



Sources: Fannie Mae and Freddie Mac.

In addition, many of the largest lenders have arrangements to sell a large proportion of their conventional single-family originations exclusively to one of the Enterprises. For example, sales to Fannie Mae in 2001 by six of that Enterprise's top 10 sellers represented more than 50 percent of each of those firm's originations, and sales to Freddie Mac by five of its top 10

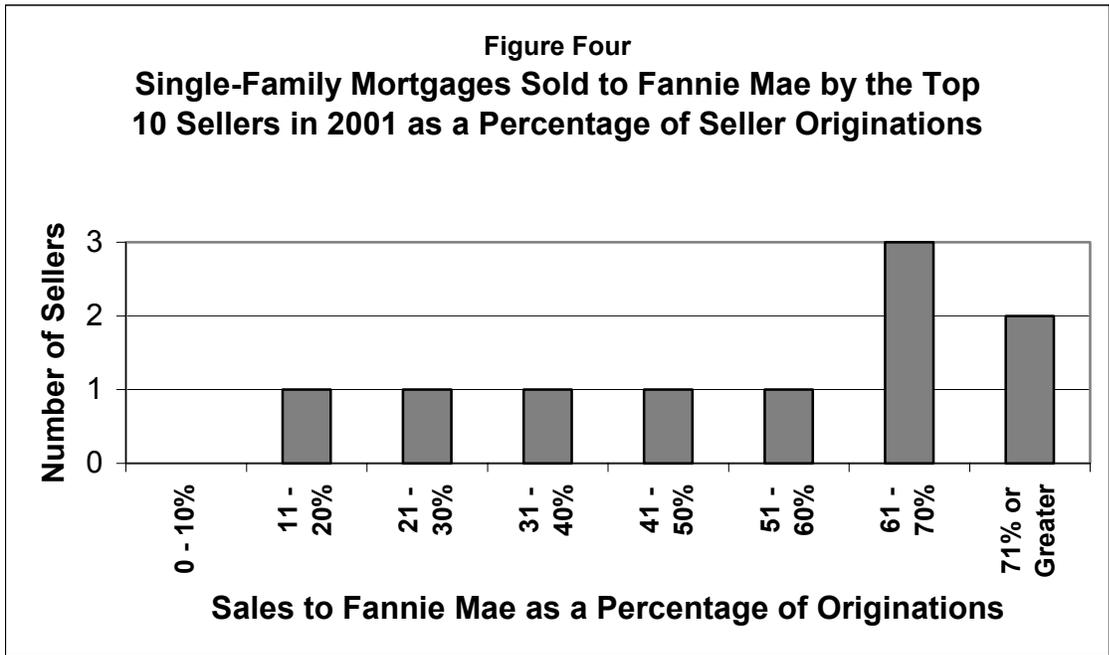
<sup>188</sup> Unless otherwise noted, statistics on the activities of Fannie Mae and Freddie Mac are taken from the historical data tables in Office of Federal Housing Enterprise Oversight, *op. cit.*, 37-83.

<sup>189</sup> Van Order, R., "The Structure and Evolution of American Secondary Mortgage Markets, with Some Implications for Developing Markets," *Housing Finance International*, Vol. XVI, No. 1 (September 2001), 16-31 at 18.

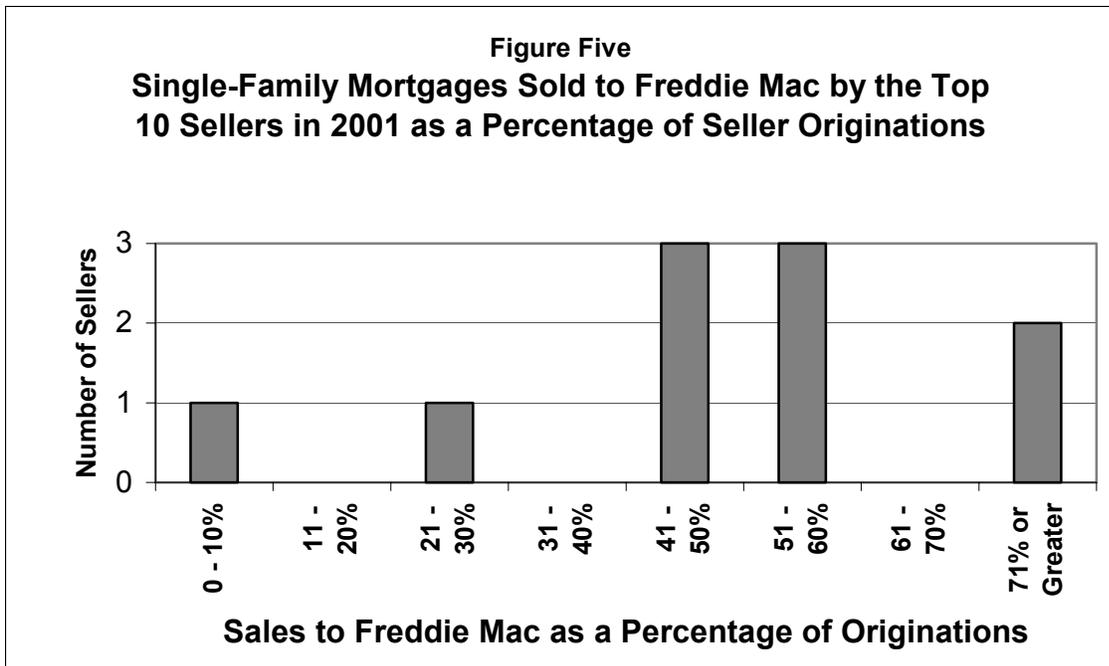
<sup>190</sup> Inside Mortgage Finance Publications, Inc., *op. cit.*, Vol. I, at 37.

<sup>191</sup> OFHEO calculation based on Enterprise data and Inside Mortgage Finance Publications, Inc., *op. cit.*, Vol. I, 37.

mortgage sellers represented more than 50 percent of each of their originations (see Figures Four and Five).<sup>192</sup>



Source: Based on review of Home Mortgage Disclosure Act and Office of Federal Housing Enterprise Oversight data.



Source: Based on review of Home Mortgage Disclosure Act and Office of Federal Housing Enterprise Oversight data.

<sup>192</sup> *Ibid.*

To limit the credit risk - the possibility of failing to recover amounts due from borrowers – posed by the single-family mortgages they purchase and securitize, Fannie Mae and Freddie Mac have standards for all loan products they will purchase<sup>193</sup> that address the creditworthiness of the borrower, the capacity of the borrower to make the required payments, and the collateral value of the property. All three factors determine the credit risk of lending a specific amount to a specific borrower to buy a specific property.

Traditional underwriting looks to a prospective borrower’s income, assets and liabilities, debt ratios (monthly housing expense or total monthly expense to gross monthly income), and credit history.<sup>194</sup> Underwriters assess all that information in reaching judgments about the borrower’s ability and willingness to repay a mortgage. The appraised market value of the property and the LTV ratio—the amount of the loan divided by the value of the property—are among the other data used in making a decision about the application.

In 1995 Fannie Mae and Freddie Mac began to use automated underwriting systems (AUS) to evaluate the credit risk of single-family mortgages before purchase. Those systems, which provide an alternative to the use of “rules of thumb” in underwriting, use statistical models to assess objectively and consistently the ability and willingness of prospective borrowers to repay their loans.<sup>195</sup> The Enterprises’ AUS also incorporate automated valuation models (AVM). Those models, which provide another tool for evaluating the value of the collateral backing a mortgage, use property-level databases and statistical models to estimate market values for properties.<sup>196</sup> Fannie Mae and Freddie Mac have deployed related systems for purposes of internal management of credit risk and loss-mitigation by servicers.

Fannie Mae and Freddie Mac have purchase standards for single-family mortgages that specify the terms and conditions of loans they will purchase. The Enterprises will buy loans that pose higher credit risk only with credit enhancement or higher fees or yields.<sup>197</sup> Each Enterprise’s charter prohibits purchases of single-family mortgages with loan-to-value (LTV) ratios greater than 80 percent without an eligible form of credit enhancement, which in practice generally takes the form of private mortgage insurance. Other forms of credit enhancement include recourse arrangements between the lender and the Enterprise, letters of credit, and over-collateralization.

---

<sup>193</sup> For Enterprise eligibility criteria for first lien one- to four-family mortgages, see Fannie Mae, *Selling Guide*, Part VII: Mortgage Eligibility, 701; and Freddie Mac, *Seller/Servicer Guide*, Chapter 22: General Mortgage Eligibility.

<sup>194</sup> For a review of traditional underwriting standards for conventional and government-insured or -guaranteed mortgages, see Pafenberg, F., *Financing the Home Purchase: The Real Estate Professional’s Guide* (Washington, DC: National Association of Realtors, 1993).

<sup>195</sup> For discussions of AUS and how they differ from traditional mortgage underwriting, see Straka, J.W., “A Shift in the Mortgage Landscape: The 1990s Move to Automated Credit Evaluations”, *Journal of Housing Research*, Vol., 11, Issue 2 (2000), 207-232; and Gates, S., Perry, V., and Zorn, P., “Automated Underwriting in Mortgage Lending: Good News for the Underserved?” (unpublished paper, November 2001).

<sup>196</sup> For a recent discussion, see Maselli, P.F., “What’s the Future for AVMs?”, *Mortgage Industry Trends* (Freddie Mac, September 2002) available online [http://www.freddiemac.com/news/trends/trends\\_september02.htm](http://www.freddiemac.com/news/trends/trends_september02.htm).

<sup>197</sup> See, for example, Fannie Mae, *Selling Guide*, Part X. Chapter 2: Desktop Underwriter, Section 202.05 B, for instructions to lenders indicating that guaranty fees for Flexible 97 or Flexible 100 mortgages will be higher than those for other, less risky loans.

Fannie Mae and Freddie Mac influence the amount of leverage households assume when taking out conventional single-family mortgages. Changes in the Enterprises' underwriting standards and AUS over time could increase the proportion of single-family loans they purchase with high LTV ratios.<sup>198</sup> All else being equal, a higher LTV ratio increases the credit risk of a single-family mortgage.<sup>199</sup> An increase in leverage used to purchase homes makes households more vulnerable to economic shocks. Greater borrower leverage would increase the exposures of Fannie Mae and Freddie Mac, mortgage insurers, and other firms that bore the credit risk on the mortgages.

The average LTV ratio of newly originated conventional, single-family mortgages declined in the second half of the 1990s, but is higher than it was a decade ago. The Monthly Interest Rate Survey (MIRS) conducted by the Federal Housing Finance Board tracks interest rates on purchase originations and provides information on the characteristics, including LTV ratios, of newly originated loans.<sup>200</sup> According to MIRS, the average LTV ratio of newly originated purchase mortgages rose significantly from 1986 through 1995, peaking at 79.9 percent, and declined steadily from 1996 through 2001, but still remains higher than a decade ago. Similarly, the percentage of loans originated with LTV ratios above 90 percent rose sharply from 1986 through 1995, peaking at 27 percent, and has declined through 2001. The generally upward trend in LTV ratios in the last decade reflects both the desire of households for lower down payments on purchases mortgage and the increased availability and popularity of cash-out refinance loans.<sup>201</sup>

OFHEO has found little evidence that conventional single-family mortgage borrowers are over-leveraged. The average LTV ratio of conventional purchase loans has been declining since 1995<sup>202</sup>, the year in which automated underwriting began to play an important role in the origination of single-family mortgages. The AUS of Fannie Mae and Freddie Mac require that the increased credit risk associated with high LTV ratios be offset by compensating factors, generally a very strong borrower credit history.<sup>203</sup>

---

<sup>198</sup> To increase substantially the proportion of conventional single-family mortgages they purchase that have high-LTV ratios, Fannie Mae and Freddie Mac would probably have to change their underwriting guidelines and AUS. Nearly all high-LTV ratio mortgages are purchase loans. Purchase mortgages acquired by the Enterprises that are affordable to low- and moderate-income borrowers—so-called low-mod-loans—tend to have somewhat higher LTV ratios than non-low-mod purchase loans. Nonetheless, the difference is not very large. See *Profiles of GSE Mortgage Purchase in 1999 and 2000*, (Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research, April, 2000), Tables 10a-2000 and 10b-2000.

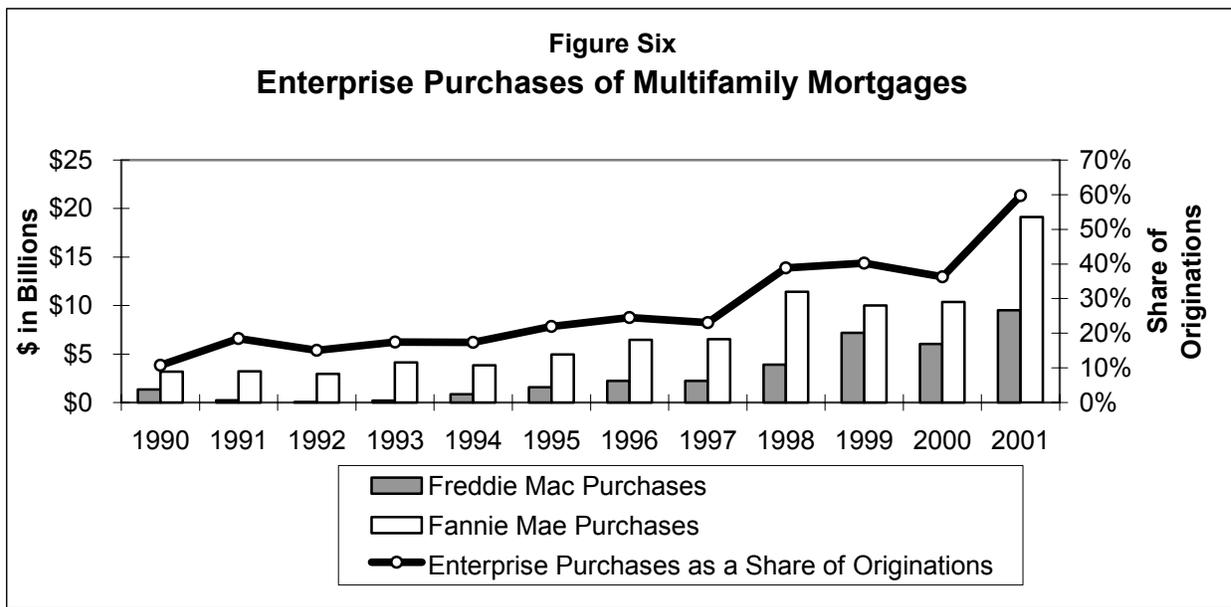
<sup>199</sup> The higher the LTV ratio—the lower amount of equity the buyer has in the property—the more likely the mortgage is to default, everything else being equal.

<sup>200</sup> U.S. Federal Housing Finance Board, *Monthly Interest Rate Survey*, available online at [http://fhfb.gov/MIRS/mirs\\_nav.htm](http://fhfb.gov/MIRS/mirs_nav.htm).

<sup>201</sup> Freddie Mac conducts a quarterly survey of refinance activity that documents that trend. The survey is available online at [http://www.freddiemac.com/news/finance/refi\\_archives.htm](http://www.freddiemac.com/news/finance/refi_archives.htm).

<sup>202</sup> U.S. Federal Housing Finance Board, *Monthly Interest Rate Survey*, *op. cit.*

<sup>203</sup> For discussions of how the Enterprises' AUS evaluate risk factors, see Fannie Mae *Selling Guide*, Part X, Chapter 2, Desktop Underwriter, 1019; and Freddie Mac *Single-Family Seller/Service Guide*, Vol. 1, Chapter 37.1: Underwriting a Mortgage for Sale to Freddie Mac.



Source: Fannie Mae and Freddie Mac.

Another source of credit risk to Fannie Mae and Freddie Mac is the possibility that their counterparties—mortgage insurers, mortgage sellers and servicers, and other providers of credit enhancements—may be unable to meet their contractual obligations. Before entering into transactions with one of those counterparties, each Enterprise conducts a comprehensive analysis that generally includes a review of the counterparty’s business plan, scope of work, ability to perform, and policies; the legal agreements between the counterparty and the Enterprise; and the Enterprise’s own rating of the counterparty’s ability to meet its obligations.<sup>204</sup> Fannie Mae and Freddie Mac monitor approved counterparties through monthly reporting and analysis.

### Multifamily Loans

In addition to purchasing single-family mortgages, the Enterprises also purchase mortgages on multifamily properties.<sup>205</sup> The market for multifamily mortgages is particularly important to Fannie Mae and Freddie Mac because these loans comprise a large proportion of the Enterprises’ purchases that count toward the low- and moderate-income and special affordable housing goals established by the Secretary of HUD.<sup>206</sup> Fannie Mae and Freddie Mac acquire

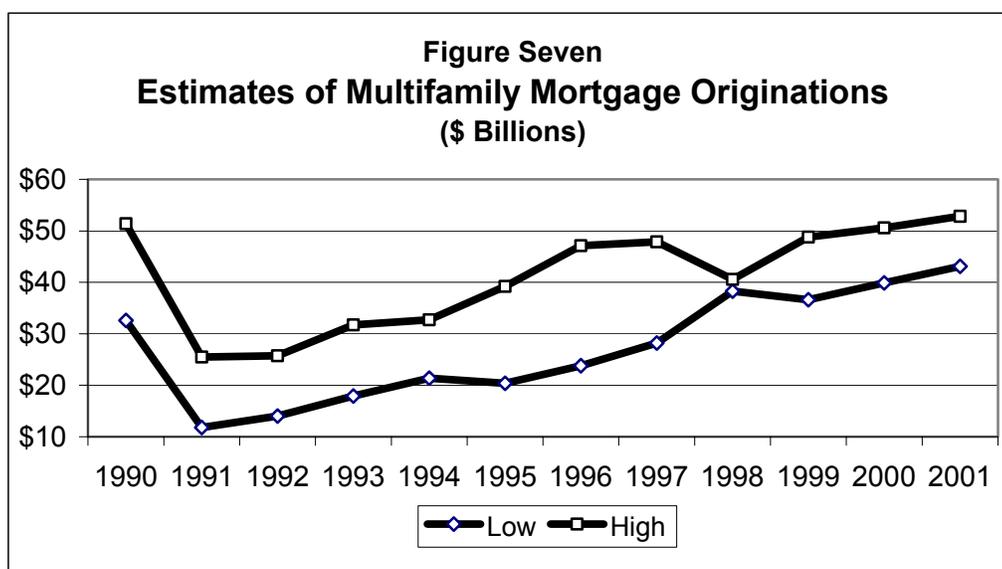
<sup>204</sup> For seller/servicer eligibility requirements, see Fannie Mae *Single Family Servicing Guide* Part I: Lender Relationships; and Freddie Mac *Single-Family Seller/Servicer Guide*, Vol. 1, Chapter 4.2: Eligibility Criteria. For an example of private mortgage insurers’ eligibility requirements, see Freddie Mac, *Private Mortgage Insurers Eligibility Guidelines*, available upon request from Freddie Mac.

<sup>205</sup> The Department of Veterans Affairs and Housing and Urban Development and Independent Agencies Appropriations Act for Fiscal Year 1999 repealed the limit on the size of multifamily mortgages eligible to be financed by Fannie Mae and Freddie Mac

<sup>206</sup> U.S. Department of Housing and Urban Development, *Study of Multifamily Underwriting and the GSEs’ Role in the Multifamily Market* (Washington, DC: Office of Policy Development and Research, August 2001), xiii, available online at <http://www.huduser.org/publications/pdf/gsemultifamily.pdf>.

multifamily loans through multiple cash purchase programs, negotiated transactions, or the exchange of conventional multifamily mortgages for MBS. Fannie Mae and Freddie Mac have less influence over the pricing and terms of mortgages in the multifamily market because the multi-family market is less homogeneous than the single-family market.<sup>207</sup>

Fannie Mae and Freddie Mac each increased their purchases of multifamily mortgages substantially in recent years, with the Enterprises' combined multifamily acquisitions rising from under \$9 billion in 1996 and 1997 to over \$28 billion in 2001 (see Figure Six). The efforts of Fannie Mae and Freddie Mac to achieve the housing goals set by the HUD Secretary contributed substantially to that growth.<sup>208</sup> As a proportion of multifamily originations (see Figure Seven), the purchases of Fannie Mae and Freddie Mac rose from 11 percent in 1990 to approximately 60 percent in 2001.<sup>209</sup>



Sources: Office of Federal Housing Enterprise Oversight based on data from the Board of Governors of the Federal Reserve, U.S. Department of Housing and Urban Development, U.S. Bureau of the Census.

As with the single-family mortgages they purchase or securitize, Fannie Mae and Freddie Mac actively manage credit risk associated with the multifamily mortgages they purchase or securitize. The credit risk associated with multifamily mortgages arises from two sources. The first is that the cash flows of a property may be insufficient to service the mortgage and the second is that proceeds from the sale or refinancing of a property may be insufficient to repay the loan. When assessing whether multifamily mortgages should be purchased, Fannie Mae and Freddie Mac look to the collateral for ultimate payment, since multifamily loans generally do not allow recourse to the borrower. Thus, the cash flow and the underlying market value of the property are most critical when evaluating the credit risk of multifamily transactions. The two

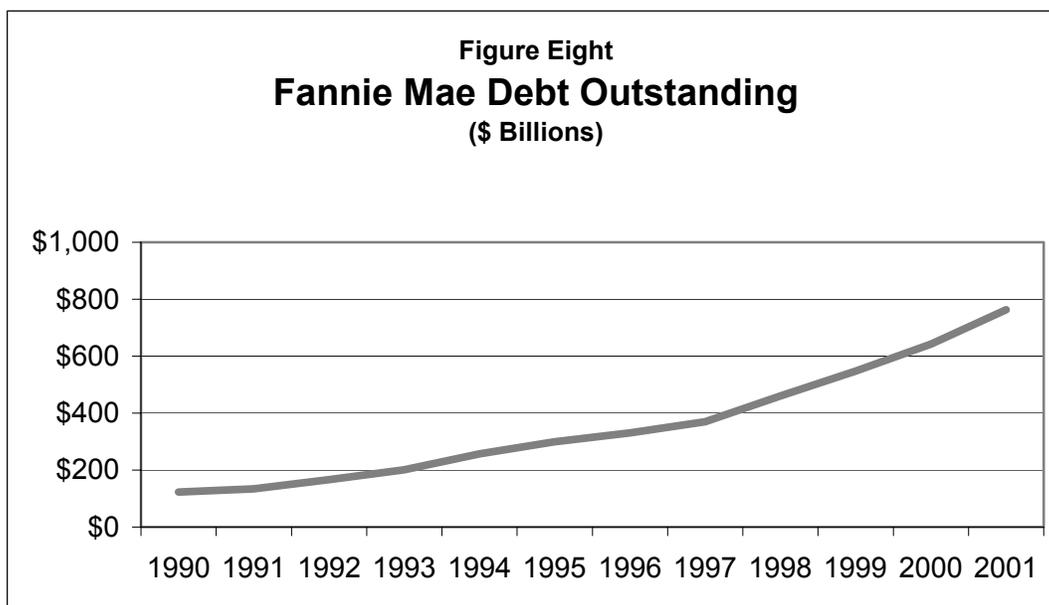
<sup>207</sup> *Ibid.*, 102.

<sup>208</sup> *Ibid.*, 5-9.

<sup>209</sup> OFHEO estimated those percentages by dividing the combined multifamily purchases of Fannie Mae and Freddie Mac in each year by the average of the high and low estimates of multifamily originations shown in Figure Seven.

most important indicators of credit risk that the Enterprises consider are the debt-service coverage ratio (DSCR) and the LTV ratio.<sup>210</sup> Since a loan’s DSCR is based on the current debt service and current net operating income, it is the primary indicator of credit quality. As the DSCR rises, credit risk declines. The LTV ratio reflects borrower equity in a property; all else being equal, borrower equity is inversely related to credit risk.<sup>211</sup>

The Enterprises’ multifamily underwriting standards require that multifamily mortgages be of high investment quality.<sup>212</sup> A loan must be originated in a market with low vacancy rates, low rental concessions, stable or increasing tenant demand, diversified sources of employment, and other strengths. The property must be in excellent condition and be managed by a firm with a documented record of professionalism. The Enterprises will purchase mortgages with a fixed interest rate for the entire term to maturity or with rates that are reset by contract. In their negotiated transactions programs, Fannie Mae and Freddie Mac generally accept multifamily transactions with fixed-rate mortgages that are fully amortizing or have balloon features.



Source: Fannie Mae.

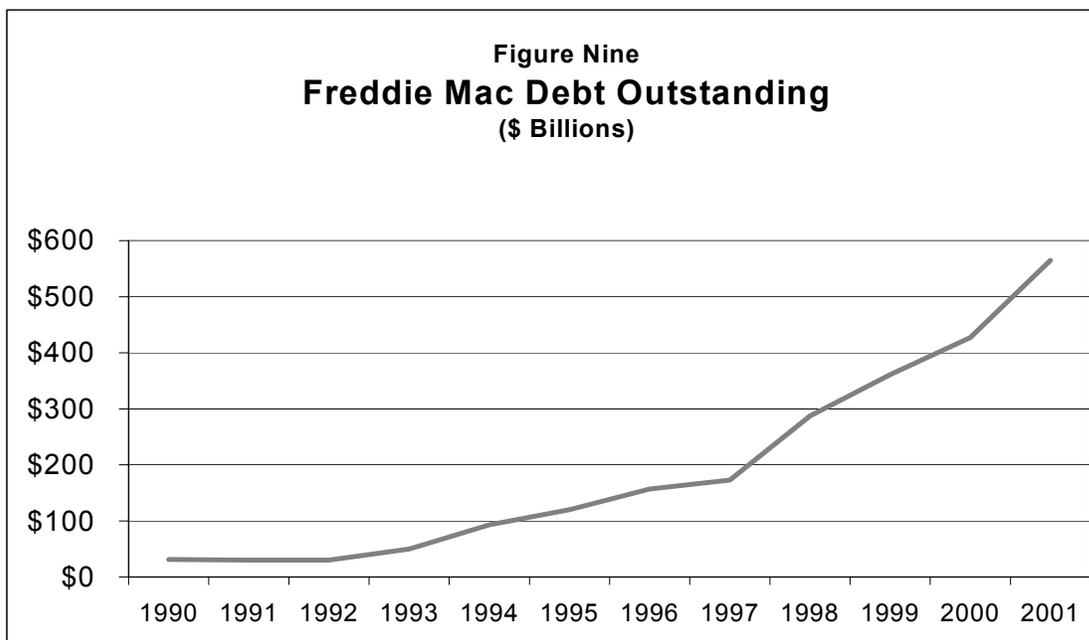
<sup>210</sup> *Ibid.*, 32.

<sup>211</sup> For a discussion of DSCR and LTV, see, Goldberg, L., and C. A. Capone, Jr., “Multifamily Mortgage Credit Risk: Lessons From Recent History,” *Cityscape*, Vol. 4, No. 1 (1998), 93-113 at 97.

<sup>212</sup> U.S. Department of Housing and Urban Development, *Study of Multifamily Underwriting and the GSEs’ Role in the Multifamily Market*, *op. cit.*, 27-40.

## Issuing Debt and Creating/Selling Guaranteed Securities

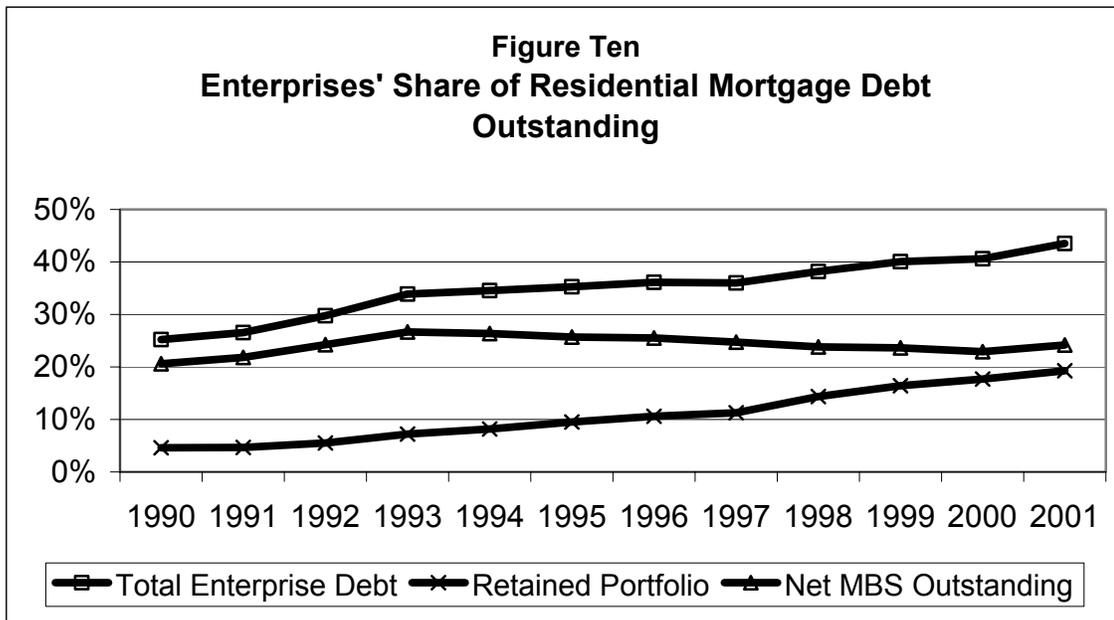
Fannie Mae and Freddie Mac grew at a rapid pace in the 1980s and 1990s, as the reduced role of thrift institutions in housing finance, the waves of mortgage refinancings in that period, and the economic benefits of government sponsorship allowed the Enterprises to increase substantially the volume of residential mortgages they have securitized or financed with debt<sup>213</sup> (see Figures Eight and Nine). At the end of 1990, Fannie Mae and Freddie Mac had securitized \$604 billion in outstanding mortgage loans and held an additional \$136 billion of mortgages in their asset portfolios.<sup>214</sup> The Enterprises' combined total book of business—mortgages securitized and held on the balance sheet—represented 25 percent of outstanding residential mortgage debt (see Figure Ten). At the end of 2001, the combined mortgage asset portfolios of Fannie Mae and Freddie Mac had risen to over \$1.2 trillion, an increase of more than seven-fold, whereas their combined outstanding MBS held by other investors had more than doubled to over \$1.5 trillion. Because of that growth, the combined book of business Fannie Mae and Freddie Mac exceeded 43 percent of outstanding residential mortgage debt at the end of 2001. The share of all residential mortgages in the Enterprises' retained portfolios rose from less than 5 percent to over 19 percent in that period (Figure Ten).



Source: Freddie Mac.

<sup>213</sup> For discussions of the Enterprises' growth in the 1980s and 1990s and the competitive advantage provided by the economic benefits of government sponsorship, see, for example, Hendershott, P.H., "The Market for Home Mortgage Credit: Recent Changes and Future Prospects," in R.A. Gilbert, ed., *The Changing Market in Financial Services* (Boston: Kluwer Academic Publishers, 1992) 99-123; and Weicher, J., "The New Structure of the Housing Finance System," *op. cit.*

<sup>214</sup> For historical data on the Enterprises' activities, see the appendix tables in Office of Federal Housing Enterprise Oversight, *op. cit.*



Sources: Fannie Mae, Freddie Mac, and Board of Governors of the Federal Reserve System.

Fannie Mae was initially a portfolio investor in residential mortgages and only began to securitize mortgages in the early 1980s.<sup>215</sup> Freddie Mac originally emphasized securitization and only began to build a significant retained mortgage portfolio in the 1990s.<sup>216</sup> Today, slightly less than half of each Enterprise's total mortgage portfolio is held on the balance sheet. Unsecuritized mortgage loans have become a smaller part of each Enterprise's assets—roughly 21 percent of Fannie Mae's and 10 percent of Freddie Mac's at year-end 2001.

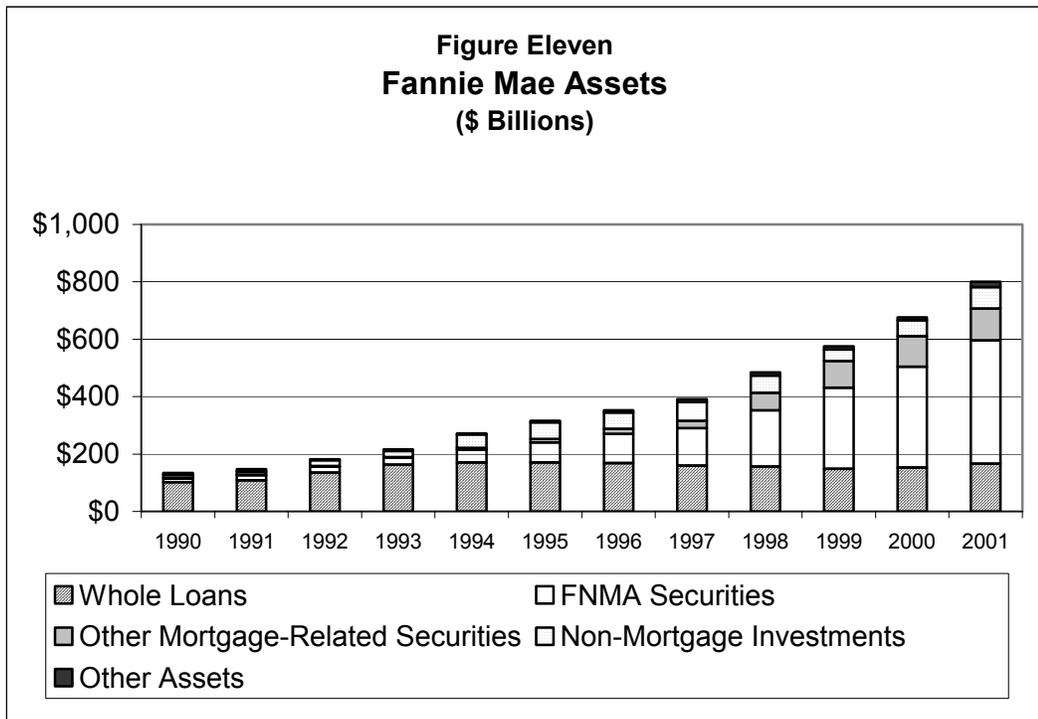
The Enterprises' on-balance sheet assets grew rapidly from 1992 to 2001, rising at an annual rate of 18 percent at Fannie Mae and 32 percent at Freddie Mac (see Figures Eleven and Twelve). At year-end 2001, Fannie Mae's assets totaled \$800 billion, whereas Freddie Mac's totaled \$617 billion. As the asset portfolios of Fannie Mae and Freddie Mac have grown in the last decade, so has their outstanding debt (see Figures Eight and Nine). The combined debt outstanding of the Enterprises rose from \$154 billion at the end of 1990 to \$1.33 trillion at year-end 2001, more than a seven-fold increase. The Enterprises issue debt of all maturities, from discount notes with maturities as short as overnight to bonds with maturities as long as 30 years. To manage the interest rate risk and other market risks posed by their rapidly growing retained mortgage portfolios, they also frequently issue intermediate and long-term debt securities with embedded call features. Fannie Mae and Freddie Mac issued increasing amounts of callable debt in the 1990s.<sup>217</sup>

<sup>215</sup> The Housing and Urban Development Act of 1968, which converted Fannie Mae into a GSE, authorized the Enterprise to issue and guarantee MBS, but Fannie Mae did not do so until 1982. For historical data on the Enterprise's mortgage portfolio and MBS, see the appendix tables in Office of Federal Housing Enterprise Oversight, *op. cit.*, 38-41, 44-48.

<sup>216</sup> For historical data, see *Ibid.*, 54-57, 60-64.

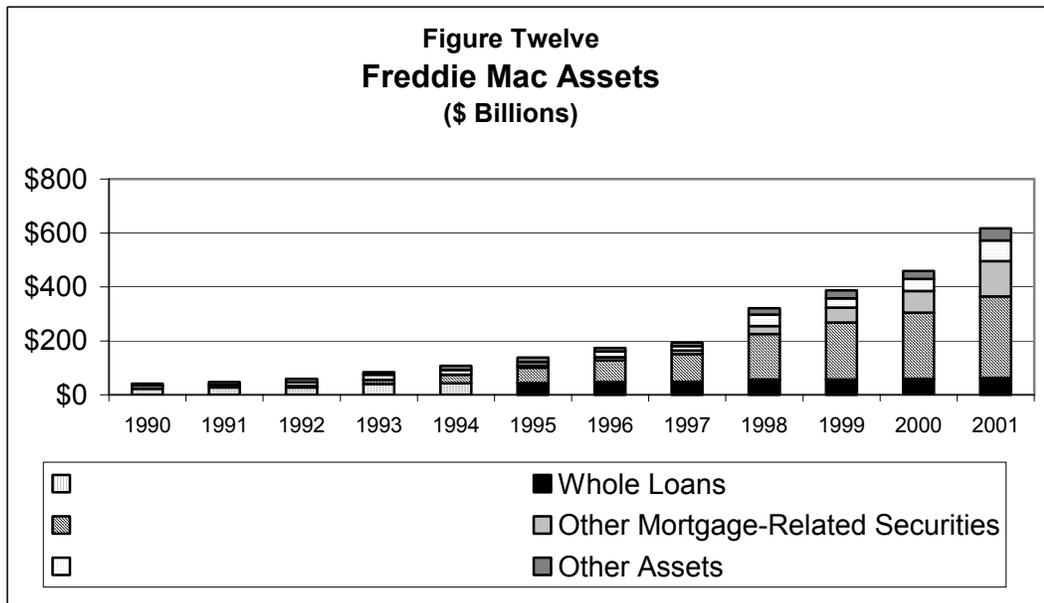
<sup>217</sup> Fannie Mae first issued callable debt in 1989. The Enterprise's callable debt outstanding rose from over \$22 billion at the end of 1991 to \$140 billion at year-end 2001. Fannie Mae, *1991 Annual Report*, 36; and *2001 Annual Report*, 57. Freddie Mac began issuing callable debt in 1990. The Enterprise's callable debt increased from nearly

**Figure Eleven  
Fannie Mae Assets  
(\$ Billions)**



Source: Fannie Mae.

**Figure Twelve  
Freddie Mac Assets  
(\$ Billions)**



Source: Freddie Mac.

\$5 billion to over \$96 billion between 1991 and year-end 2001. Freddie Mac, *1991 Annual Report*, 43; and *2001 Annual Report*, 73.

As the volume of U.S. Treasury debt declined in 1998, market participants looked for other issuers that could provide a large liquid market of debt that posed low credit risk.<sup>218</sup> In response, Fannie Mae and Freddie Mac introduced debt issuance programs that mirror those of the Treasury.<sup>219</sup> Today, under those programs, the Enterprises auction short-term discount notes (Fannie Mae's Benchmark Bills and Freddie Mac's Reference Bills) and sell medium and long-term non-callable securities (Fannie Mae's Benchmark and Freddie Mac's Reference Notes and Bonds) in large volume and on a regular calendar.<sup>220</sup>

With the decline of Treasury security issuance, debt issued by Fannie Mae and Freddie Mac has been discussed as one of several possible new benchmarks for pricing other securities, along with corporate debt, the interest rate swap market, and, at the short end of the yield curve, the repo market. Whereas Enterprise securities are perceived as having lower credit risk than corporate debt securities, and are increasingly used in routine capital market transactions, trading volumes in their futures contracts are still low relative to those of Treasury futures, reflecting that Enterprise futures have not gained wide acceptance as benchmarks.<sup>221</sup>

Trading in debt issued by Fannie Mae and Freddie Mac increased rapidly after the introduction of their Treasury-like issuance programs, which increased the liquidity of their securities. Specifically, trading in GSE debt—predominantly Enterprise securities—increased significantly in 2000, rising to an average daily volume of more than \$70 billion from less than \$50 billion in 1999. Even more significantly, inter-dealer trading, which is key to the provision of liquidity, more than doubled in 2000.<sup>222</sup> Securities dealers appear to have allocated some of the risk capital withdrawn from the U.S. Treasury market to trading in the Enterprises' securities.

Benchmark and Reference Notes have rapidly become popular collateral for repurchase agreements—a form of short-term financing—at rates comparable to those that use Treasury collateral. The market share of agency collateral—primarily Fannie Mae and Freddie Mac securities—in repurchase agreements cleared through the Government Securities Clearing Corporation, which clears most such transactions, grew from nearly nothing in 1998 to 12.3

---

<sup>218</sup> See, for example, Fleming, M.J., "Financial Market Implications of the Federal Debt Paydown," *Brookings Papers on Economic Activity*, No. 2 (Washington, DC: Brookings Institution, 2000), 221-251, at 221-222; available online at <http://brookings.nap.edu/books/0815712642/html/221/html>.

<sup>219</sup> *Ibid.*, 241-243; "Fannie Mae Benchmark Notes," in Fannie Mae, *Funding Notes* (January 1998), available online at [http://www.fanniemae.com/markets/debt/pdf/fundingnotes\\_1s\\_98.pdf](http://www.fanniemae.com/markets/debt/pdf/fundingnotes_1s_98.pdf); and "Freddie Mac Announces Reference Notes Program," Freddie Mac News Release, March 16, 1998, available online at <http://www.freddiemac.com/news/archives1998/refnotes.htm>.

<sup>220</sup> Fannie Mae's 2003 Noncallable Benchmark Bills, Notes and Bonds Calendar is available online at [http://fanniemae.com/markets/debt/pdf/debt\\_calendar\\_2003.pdf?p=Debt+Securities](http://fanniemae.com/markets/debt/pdf/debt_calendar_2003.pdf?p=Debt+Securities). The 2003 Issuance Schedule for Freddie Mac Reference Bills is available online at <http://freddiemac.com/debt/html/refbillmain.html>.

<sup>221</sup> Philip D. Wooldridge, "The Emergence of New Benchmark Yield Curves," *BIS Quarterly Review* (Basel, Switzerland: Bank for International Settlements, December 2001), 48-57 at 53, available online at [http://www.bis.org/publ/r\\_qt0112.pdf](http://www.bis.org/publ/r_qt0112.pdf).

<sup>222</sup> Daily volumes are reported in Study Group on Fixed Income Markets, "The Changing Shape of Fixed Income Markets," in *BIS Papers No. 5. The Changing Shape of Fixed Income Markets: A Collection of Studies by Central Bank Economists* (Basel, Switzerland: Bank for International Settlements, September 2001), 1-43 at 30-31; available online at <http://www.bis.org/publ/bispap05.htm>. For a recent empirical study of the effect of the Enterprises' Treasury-like issuance programs on the liquidity of Enterprise debt, see Ambrose, B., and T.D. King, "GSE Debt and the Decline in the Treasury Debt Market," *Journal of Money, Credit, and Banking*, Vol. 34, No. 3., Part 2 (August 2002), 812-839.

percent in 2001.<sup>223</sup> The availability of Enterprise notes through repurchase agreements has aided the use of those securities for hedging purposes.<sup>224</sup>

Further increasing the importance of Enterprise securities, in 1999 the Federal Reserve System, which holds most of its portfolio in U.S. Treasury securities, expanded the pool of securities eligible for use as collateral on its repurchase agreements that already included direct Enterprise obligations, to encompass their MBS.<sup>225</sup> In 2001 federal agency debt obligations comprised 25 percent of the collateral for the Fed's long-term repurchase agreements. Mortgage-backed securities—to a large extent Enterprise MBS—were collateral for 27 percent of those agreements.<sup>226</sup>

Between 1996 and 2001, foreign holdings of what the Federal Reserve refers to as “U.S. agency securities” (a category that includes the debt and MBS of Fannie Mae and Freddie Mac, Federal Home Loan Bank System debt, MBS guaranteed by Ginnie Mae, and securities of smaller GSEs and federal agencies), have grown about as fast as the Enterprises' debt, and almost twice as fast as their combined debt and mortgage-backed securities.<sup>227</sup> It was not unusual in 2000 for foreign investors to buy 50 percent or more of a new issue of two- or three-year Enterprise notes or more than 20 percent of a new issue of long-term notes.<sup>228</sup> Through June 30, 2002, Freddie Mac reported that 31 percent of its Reference Notes (excluding those sold through auctions) have been placed outside North America.<sup>229</sup> Importantly, the Enterprises' debt securities make up an increasing share of the portfolios of foreign central banks. Specifically, the share of foreign central bank portfolios invested in GSE obligations grew from 2 percent in 1995 to 5 percent in 2000, whereas the share of U.S. Treasury securities in those portfolios fell from 63 percent to 59 percent.<sup>230</sup> At year-end 2000 and 2001, foreign and international monetary authorities held \$102.3 billion and \$133.1 billion in federal agency securities, respectively.<sup>231</sup>

---

<sup>223</sup> Fannie Mae, *Fundingnotes*, Vol. 7, Issue 3 (March 2002), 2, available online at [http://www.efanniemae.com/markets/debt/pdf/fundingnotes\\_3\\_02.pdf](http://www.efanniemae.com/markets/debt/pdf/fundingnotes_3_02.pdf).

<sup>224</sup> *Ibid.*

<sup>225</sup> Federal Reserve Bank of New York, *Domestic Open Market Operations During 1999*, February 2000, 3, available online at <http://www.ny.frb.org/pihome/Omo/omo99.pdf>. A recent study by Federal Reserve staff examined the possibility of the Federal Reserve using Enterprise and other GSE obligations for open market and discount window operations. See Federal Reserve System Study Group on Alternative Instruments for System Operations, *Alternative Instruments for Open Market and Discount Window Operations* (Board of Governors of the Federal Reserve System (December 2002), 2-12-14; available online at [http://www.federalreserve.gov/boarddocs/surveys/soma/alt\\_instrmnts.pdf](http://www.federalreserve.gov/boarddocs/surveys/soma/alt_instrmnts.pdf). The study observed (14): “The [Federal Reserve] System's outright purchase of GSE obligations (or even its continued use of these obligations in repurchase agreements) could enhance liquidity of GSE obligations and thereby inappropriately foster the ability of the GSEs to expand their operations; this expansion could further affect credit allocation and increase systemic risk.”

<sup>226</sup> *Ibid.*, 18.

<sup>227</sup> OFHEO calculations based on Enterprise data and statistics in Board of Governors of the Federal Reserve System, *Flow of Funds Accounts of the United States: Annual Flows and Outstandings* (September 16, 2002), 80, available online at <http://www.federalreserve.gov/Releases/Z1/Current/annuals/a1995-2001.pdf>.

<sup>228</sup> Crandall, L., “Growth of Foreign Holdings of Agency Debt,” in *Reference Point*, Vol. 3, No. 3 (Freddie Mac, September 2000), available online at <http://www.freddie.com/debt/html/refpointmain.html>.

<sup>229</sup> Freddie Mac, *Reference Point*, Vol. 3, No. 3 (July 2002), available online at <http://www.freddie.com/debt/html/refpointmain.html>.

<sup>230</sup> Bank for International Settlements, *The Changing Shape of Fixed Income Market*, *op. cit.*, 40.

<sup>231</sup> See Board of Governors of the Federal Reserve, Statistical Release Z.1, *Flow of Funds Accounts of the United States* (March 7, 2002), Table L210 “Agency Securities”, available online at

According to economists at the Federal Reserve Bank of New York, GSE debt securities account for nearly all of those obligations. Those amounts represented more than 5.4 percent of GSE debt obligations outstanding at year-end 2000 and 6.3 percent at year-end 2001.<sup>232</sup>

Another indication of the growing importance of Fannie Mae and Freddie Mac securities is the emergence of futures contracts on the Enterprises' debt. In March 2000 the Chicago Board of Trade introduced futures contracts on the Enterprises' medium- and long-term notes.<sup>233</sup> Although their use has been limited so far, those contracts can assist in hedging against changes in the interest rates on Treasury securities, Enterprise debt, or interest rate swaps, or in the spreads between those rates.<sup>234</sup>

### Use of Financial Derivatives

Fannie Mae and Freddie Mac are each among the largest end-users of financial derivatives. To date virtually all of the derivatives contracts of Fannie Mae, and most of those of Freddie Mac, have been over-the-counter (OTC) contracts, primarily interest rate swaps and swaptions—options to enter into interest rate swaps. The Enterprises use interest rate swaps and swaptions, in combination with actual debt instruments, to create long-term debt synthetically and to obtain options to extend or shorten the maturity of their debt. Fannie Mae and Freddie Mac also purchase interest rate floors and caps to enhance their ability to withstand the effects of significant interest-rate swings. The Enterprises enter into foreign currency swaps to fully hedge the exchange-rate risk associated with issuing foreign currency-denominated debt. Fannie Mae and Freddie Mac also enter into derivatives contracts—including futures, options on futures, and short sales—to hedge future purchases of mortgages and the issuance of securities against risk of loss due to adverse interest-rate movements.

Most residential mortgages have stated maturities of 30 years, but few loans remain outstanding that long, as most borrowers prepay their loans before their stated maturity. To control their exposures to interest rate risk, Fannie Mae and Freddie Mac need debt securities whose principal repayments match the expected repayments of their mortgage asset portfolios, as well as the ability to accelerate or decelerate their debt principal repayments as mortgage prepayment expectations change. To achieve those objectives, the Enterprises use interest rate swaps and swaptions, which comprise the largest portion of the notional amounts of their outstanding derivatives contracts.

---

<http://www.federalreserve.gov/releases/Z1/Current/z1r-4.pdf>; and Statistical Release H.4.1, Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks (January 3, 2002 and January 4, 2001), available online at <http://www.federalreserve.gov/releases/H41/20020103/>.

<sup>232</sup> OFHEO calculations based on Enterprise data and statistics available in the sources cited in footnote 226.

<sup>233</sup> Fannie Mae, "Agency Futures on Benchmark Notes Allow Spread Hedging and Trading," *Funding Notes*, Vol. 5, Issue 4 (April 2000), available online at [http://www.fanniemae.com/markets/debt/pdf/fundingnotes\\_4\\_00.pdf](http://www.fanniemae.com/markets/debt/pdf/fundingnotes_4_00.pdf); and Crandall, L., "Agency Futures Contract Debuts," *Reference Point* (Freddie Mac, June 2000), available online at <http://www.freddiemac.com/debt/html/refpointmain.html>. The Chicago Board of Trade also introduced futures and options on Enterprise and Ginnie Mae MBS in March 2001, but lack of investor interest led the exchange to delist those instruments in January 2002.

<sup>234</sup> Sturm, F.W., *10-Year Agency Note Futures and Options: Hedging Swap Risk* (Chicago: Board of Trade of the City of Chicago, January 2001), available online at <http://www.cbtc.com/cbot/docs/6628.pdf>.

Fannie Mae and Freddie Mac use interest rate swaps largely to create “synthetic” long-term debt. In a pay fixed/receive floating swap, an Enterprise receives a floating rate, roughly consistent with the rates paid on its discount notes, and pays a fixed rate consistent with the maturity of the swap. Basis swaps may be used to hedge inconsistencies between the floating swap rate, usually based on LIBOR (the London Interbank Offered Rate), and the rates the Enterprises pay investors in their discount notes. Fannie Mae and Freddie Mac use discount notes and interest rate swaps to create synthetic long-term debt when the overall cost of doing so is less than that of issuing debt with the same maturity as the swap.

Embedding a call provision in a debt security allows the issuer to retire the security early when interest rates fall. Fannie Mae and Freddie Mac use callable debt to shorten the maturities of their liabilities when interest rates fall and borrower prepayments accelerate. Embedding cancellation features in pay fixed/receive floating swaps accomplishes the same purpose, and that alternative is used when it is cheaper than issuing callable debt. Alternatively, an Enterprise might buy a swaption—in this case a “call” swaption, an option to enter into a pay floating/receive fixed swap after a specified date. If that option were exercised, the pay floating/receive fixed swap would effectively “call” long-term debt, converting it to short-term debt.

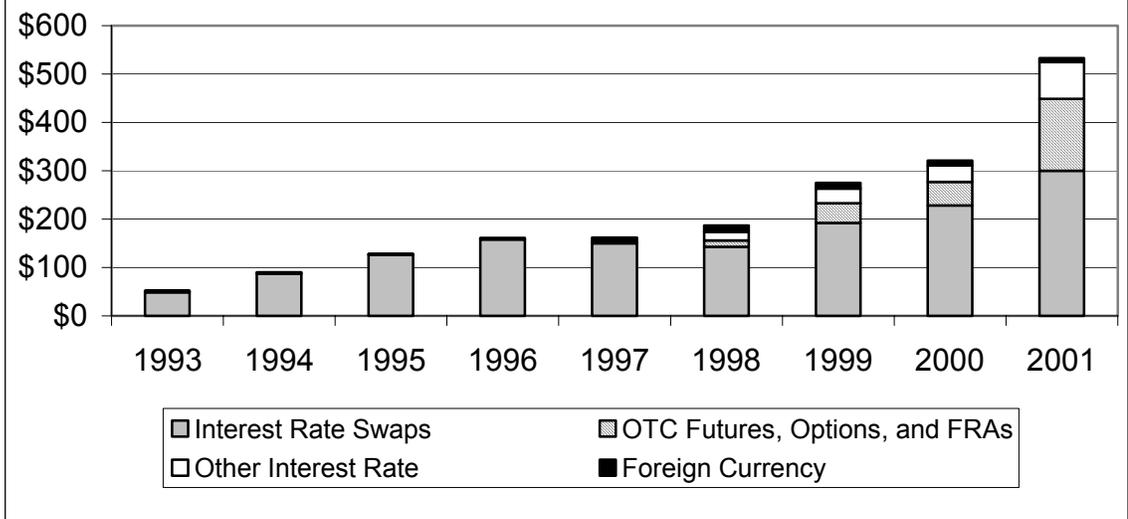
Fannie Mae and Freddie Mac buy “put” swaptions—options to enter into pay fixed/receive floating swaps—in order to have the ability to lengthen their liabilities in the event interest rates rise and mortgage prepayments slow. A pay fixed/receive floating swap converts existing short-term debt to long-term debt. The exercise of a “put” swaption allows an Enterprise to lock in fixed-rate funding at the market levels in effect when it purchased the swaption.

Fannie Mae and Freddie Mac are increasingly prominent in the market for financial derivatives, especially interest rate derivatives. The development of deep and liquid markets for interest rate swaps and other OTC derivative instruments made it possible for the Enterprises to grow their mortgage asset portfolios, hedge their growing interest rate risk, and minimize their funding costs. Fannie Mae and Freddie Mac have rapidly expanded the notional amounts of their financial derivatives in recent years (see Figures Thirteen and Fourteen). The notional amount of the combined financial derivatives outstanding of Fannie Mae and Freddie Mac increased from \$72 billion at the end of 1993, the first year for which comparable data were reported, to \$1.6 trillion at year-end 2001. That growth was particularly dramatic in 2001, largely due to each Enterprise’s hedging activities associated with portfolio rebalancing undertaken in response to falling interest rates, which changed expectations about mortgage prepayments.<sup>235</sup>

---

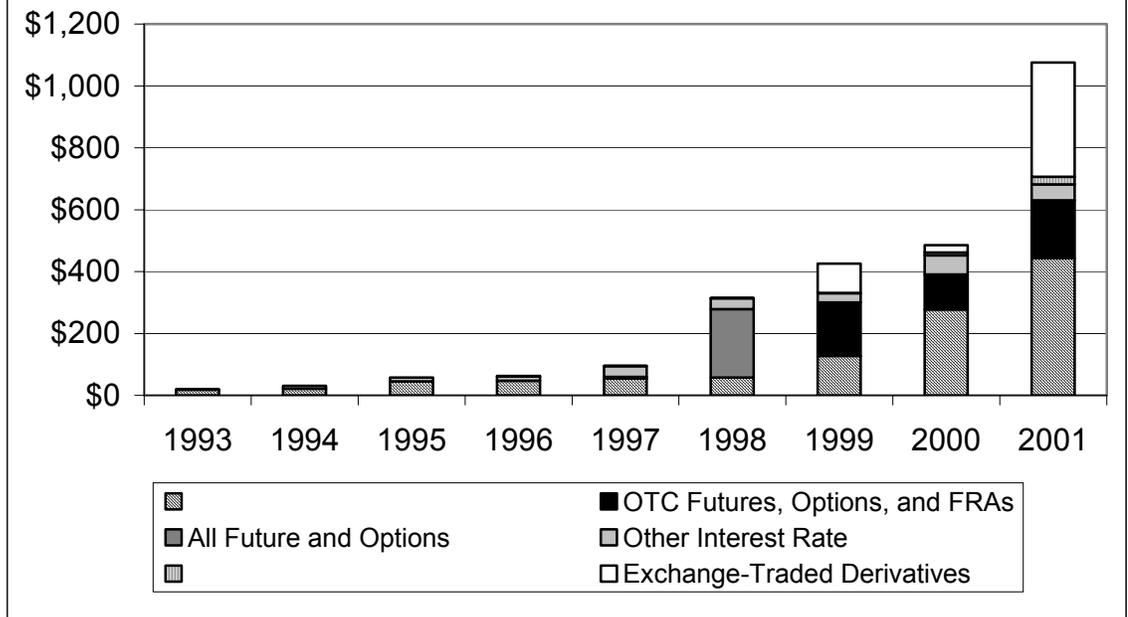
<sup>235</sup> Freddie Mac, *Information Statement* (March 29, 2002), A-18.

**Figure Thirteen**  
**Notional Amount Outstanding of Fannie Mae**  
**Financial Derivatives, 1993 - 2001**  
**(\$ Billions)**



Source: Fannie Mae.

**Figure Fourteen**  
**Notional Amount Outstanding of Freddie Mac**  
**Financial Derivatives, 1993 - 2001**  
**(\$ Billions)**



Source: Freddie Mac.

As shown in Table One, at June 30, 2001, the date of the most recent international survey of derivatives activity, the combined notional amount of the Enterprises' interest rate derivatives comprised more than 7.5 percent of OTC single-currency, dollar-denominated interest rate derivatives of all end-users. As a share of the notional amounts of end-user financial institutions—a relevant universe of comparable entities—the combined contracts of Fannie Mae and Freddie Mac constituted 10.5 percent of the market. Moreover, the Enterprises' positions comprise even larger percentages of the markets for certain types of interest rate derivatives such as swaptions. As also shown in Table One, the presence of Fannie Mae and Freddie Mac in the markets for foreign exchange derivatives is far more limited.

<b>Table One</b>				
<b>The Enterprises in the Over-the Counter (OTC)</b>				
<b>Derivatives Market, Mid-Year 2001</b>				
<b>(Notional Amounts Outstanding, \$ in Billions)</b>				
	<b>The Enterprises</b>	<b>End-User Financial Institutions (Enterprise Percent)</b>	<b>All End Users (Enterprise Percent)</b>	<b>All Counterparties (Enterprise Percent)</b>
<b>ALL INTEREST RATE DERIVATIVES</b>	<b>\$996</b>	<b>\$31,961 (3.12%)</b>	<b>\$39,493 (2.52%)</b>	<b>\$75,813 (1.31%)</b>
<b>Dollar Denominated Interest Rate Derivatives</b>	<b>\$996</b>	<b>\$9,486 (10.50%)</b>	<b>\$13,152 (7.57%)</b>	<b>\$25,666 (3.88%)</b>
<b>All Foreign Exchange Derivatives</b>	<b>\$28</b>	<b>\$7,759 (0.36%)</b>	<b>\$12,216 (0.23%)</b>	<b>\$20,435 (0.14%)</b>
<b>Foreign Currency Swaps involving US Dollars</b>	<b>\$28</b>	<b>\$1,498 (1.85%)</b>	<b>\$2,419 (1.15%)</b>	<b>\$3,487 (0.80%)</b>

Source: Office of Federal Housing Enterprise Oversight based on data from the Bank for International Settlements, Fannie Mae, and Freddie Mac.

In interpreting the notional amounts of either Enterprise's derivatives contracts, it must be recognized that those numbers do not bear any direct relationship to the credit exposures of that Enterprise or its counterparties. The credit exposures reflect the replacement costs of derivatives contracts. Importantly, credit exposures fluctuate with market conditions, so that although a larger number and higher notional amount of similar contracts may magnify an Enterprise's position with respect to a counterparty, the market value of that position may be sometimes positive, sometimes negative.<sup>236</sup> The replacement value of a derivative may be zero, positive, or negative, depending on market conditions—interest rate levels in the case of interest rate contracts, and currency prices in the case of foreign exchange contracts. Further, to reverse the effects of one derivative contract, Fannie Mae or Freddie Mac may later enter into a mirror-image contract that effectively cancels the risk of the first contract but doubles the amount reflected in the total notional amount of its outstanding contracts.

Fannie Mae and Freddie Mac have credit exposures to their interest-rate and foreign-currency OTC derivatives counterparties. Were a counterparty to default, the potential loss would be the replacement value of the contract at that time. That value depends on market conditions. For example, an interest rate swap entered into today—under which one counterparty pays today's fixed rate and receives the short term rate—has no value since the rates on each side of the swap are at current market levels. A swap gains or loses value when, as time passes, its terms become more or less favorable than those currently available in the marketplace—an earlier swap may have a fixed-pay rate below today's swap rate, for example. When interest rates or interest rate spreads move substantially, counterparty credit exposures may as well.<sup>237</sup>

To reduce the risk of loss due to default by OTC derivatives counterparties, Fannie Mae and Freddie Mac do business with highly rated counterparties only, monitor their levels of exposure to individual institutions, and require counterparties not rated triple-A to post collateral to substantially cover exposures that have a positive market value.<sup>238</sup> Consistent with industry practice, each Enterprise requires counterparties to post collateral when the Enterprise's exposure exceeds exposure maximums, and require proportionally more collateral from lower rated counterparties to cover a given amount of exposure. Derivatives counterparties generally enter into netting agreements that cover all contracts between the two parties, and Fannie Mae and Freddie Mac monitor counterparty exposures based on the net exposure of all contracts with a given institution. Positions are marked to market and counterparties post collateral daily.

When a derivatives counterparty of Fannie Mae or Freddie Mac has a positive gross credit exposure to the Enterprise – that is, when the Enterprise's exposure is negative – the Enterprise does not post collateral to cover that exposure, regardless of its size. That practice reflects the fact that private credit ratings agencies have granted the Enterprises triple-A credit ratings, in large part because of investors' perception of an implicit federal guarantee of

---

<sup>236</sup> See, for example, Schinasi, *et al.*, *op. cit.*, 49.

<sup>237</sup> See, for example, Schinasi, *et al.*, *op. cit.*, 49.

<sup>238</sup> On the Enterprises' management of counterparty credit risk, see Fannie Mae, *2001 Annual Report*, 41-43; Freddie Mac, *2001 Annual Report*, 39-40.

Enterprise obligations.<sup>239</sup> With the growth of the Enterprises' mortgage asset portfolios and corresponding use of OTC derivatives, the consolidation of the financial services industry, and the decline in the number of major derivatives dealers, the gross credit exposures of Fannie Mae and Freddie Mac to individual counterparties can be substantial. The Enterprises require counterparties to post collateral, making each Enterprise's net uncollateralized credit exposures to individual counterparties a small fraction of its gross exposures.

The market for OTC derivatives is highly concentrated among a small number of dealers, primarily brokerage firms and commercial banks that are counterparties for at least one side of virtually all contracts.<sup>240</sup> The largest dealers include JPMorgan Chase, Citigroup (including the large derivatives operation of its broker/dealer subsidiary, Salomon Smith Barney), Deutsche Bank, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley Dean Witter.<sup>241</sup>

<b>Table Two</b>				
<b>Notional Amounts of Enterprise Over-the-Counter (OTC) Derivatives</b>				
<b>and Average Counterparty Credit Ratings, Year-End 2001</b>				
<b>(\$ in Millions)</b>				
	<b>Fannie Mae</b>		<b>Freddie Mac</b>	
	<b>Average Counterparty Credit Rating</b>	<b>Notional Amount</b>	<b>Average Counterparty Credit Rating</b>	<b>Notional Amount</b>
<b>Counterparties with five largest notional amounts</b>	<b>AA-</b>	<b>\$319,324</b>	<b>AA-</b>	<b>\$387,503</b>
<b>Counterparties with 6th-10th largest notional amounts</b>	<b>AA</b>	<b>\$145,196</b>	<b>AA-</b>	<b>\$198,645</b>
<b>Other Counterparties</b>	<b>AA-</b>	<b>\$68,618</b>	<b>AA-</b>	<b>\$75,632</b>
<b>Total</b>		<b>\$533,139</b>		<b>\$661,781</b>

Source: Office of Federal Housing Enterprise Oversight based on Fannie Mae and Freddie Mac data.

<sup>239</sup> On the use of collateral to limit credit risk exposures to derivatives counterparties, see, for example, Global Derivatives Study Group, *op. cit.*, 36-37. Standard & Poors has assigned Fannie Mae and Freddie Mac risk-to-the-government ratings of AA-. See, for example, Standard & Poors, "Re: Fannie Mae Risk to the Government Rating AA-," (February 27, 2002), available online at <http://www.fanniemae.com/global/pdf/initiatives/sixvoluntary/riskgovtrating.pdf>. Moody's Investors Service has assigned each Enterprise a Bank Financial Strength Rating of A-. See, for example, "Moody's Assigns Bank Financial Strength Rating of A- to Fannie Mae: Affirms Debt and Preferred Stock Ratings (Long-Term Senior Debt at Aaa)," (February 27, 2002), available online at <http://www.fanniemae.com/global/pdf/initiatives/sixvoluntary/022702.pdf>. Generally, a firm with such ratings would have to post collateral against a positive gross credit exposure of derivatives counterparty in excess of a specific threshold.

<sup>240</sup> See, for example, Schinasi, *et al.*, *op. cit.*, 10-12.

<sup>241</sup> See *Ibid.*, 4, for the top 20 dealers in 1999 and 2000.

That market structure is reflected in the concentration of the derivatives contracts of Fannie Mae and Freddie Mac. At year-end 2001, five counterparties accounted for almost 60 percent of the total notional amount of Fannie Mae's OTC derivatives, and 58 percent of Freddie Mac's (see Table Two). To minimize counterparty credit risk, the Enterprises have set policies to do business only with highly rated counterparties (virtually all are rated single-A or better), make use of master netting agreements, and, to the extent possible given market concentration, limit their exposures to individual counterparties.<sup>242</sup> The average credit rating of each Enterprise's OTC derivatives counterparties at year-end 2001 was in the double-A range.<sup>243</sup>

An Enterprise has current credit exposure only on derivative contracts that are "in-the-money"—that have positive market values. Those are the contracts that, given current market conditions, would cost money to replace. For example, a pay-floating/receive-fixed swap has a positive market value if the fixed rate exceeds the current market interest rate. In addition, an Enterprise's contracts with a single counterparty are generally netted together, resulting in a single net exposure.<sup>244</sup> Further, collateral protects most of those net exposures.<sup>245</sup> Thus, an Enterprise's credit exposures equal the sum of the net positive market value of its exposure to each counterparty in excess of posted collateral.

The net market value of Fannie Mae's derivatives portfolio – was about \$0.8 billion at year end 2001, whereas Freddie Mac's was about \$1.7 billion. The Enterprises' net uncollateralized exposures, which represent the amount of net market value not offset by the value of pledged collateral, were even smaller—\$110 million for Fannie Mae and \$69 million for Freddie Mac.<sup>246</sup>

As of year-end 2001, the credit exposure of Fannie Mae's counterparties was about \$7 billion, whereas the exposure of Freddie Mac's counterparties was about \$2.6 billion. Those figures represent the sum of each Enterprise's exposure to counterparties where the netted values of the contracts favors the counterparty.

To fully reflect the risk associated with the financial derivatives of Fannie Mae and Freddie Mac, OFHEO's risk-based capital stress test takes into account the terms of those instruments in calculating each Enterprise's risk-based capital requirement. The stress test also takes into account the credit ratings of derivatives counterparties.

It is necessary then, when considering systemic risk, to note that a problem at an Enterprise may not only directly contribute to the possibility of a financial crisis and a systemic event but may also create problems at counterparties that could translate into their contributing to

---

<sup>242</sup> Freddie Mac, *Information Statement* (March 29, 2002), A-13; Fannie Mae, *Information Statement* (April 1, 2002), 42-43.

<sup>243</sup> Table Two shows the weighted average credit rating for three groups of each Enterprise's counterparties. The lower of the Moody's and S&P's rating reported by an Enterprise was used, and if necessary translated into S&P's nomenclature. OFHEO calculated the weighted average rating by assigning numerical values to each rating, 1 for AAA, 2 for AA+, 3 for AA, etc.; multiplying by the notional amount for the counterparty; dividing by the notional amount for all counterparties in the category; and rounding.

<sup>244</sup> Fannie Mae, *2001 Annual Report*, 41-43; and Freddie Mac, *2001 Annual Report*, 39-40.

<sup>245</sup> *Ibid.*

<sup>246</sup> *Ibid.*, 42 (Fannie Mae) and 40 (Freddie Mac).

such events. Such reinforcement of trends has appeared in other interdependent markets, such as the commodities and securities markets in the market correction of 1987. Furthermore, each of the counterparties with which the Enterprises deal are of such size, and the concentration of total derivatives activity with them is of such importance, that problems at the counterparties alone may be enough to result in a financial crisis transmuting into a systemic event and the Enterprises could find themselves unwilling participants in a problem only partially of their own doing.

Although the OTC derivatives counterparties of Fannie Mae and Freddie Mac had substantially greater exposures to the Enterprises on their derivatives contracts than vice versa and the net uncollateralized exposure of Fannie Mae and Freddie Mac to derivatives counterparties was quite small at year-end 2001, questions of derivatives valuation and collateral adequacy cannot be dismissed. In volatile markets such as those associated with the Asian currency crisis of 1997 and the Russian default of 1998—the latter associated with the collapse of Long Term Capital Management—the market values of some derivatives contracts may fluctuate significantly and even be difficult to determine, especially where markets cease to function normally and model-based valuations, which assume liquidity, become invalid.<sup>247</sup> Such circumstances can make it impossible to determine in an accurate and timely manner the levels of collateral needed to offset derivatives-related credit exposures. Thus, in the times of greatest financial stress, collateral may not provide the level of protection it would under normal market conditions. However, most Enterprise derivatives are simple instruments, the market for which is likely to remain liquid in all but the most extreme circumstances.

Of the two Enterprises, only Freddie Mac makes significant use of exchange-traded derivatives—largely futures and options on futures—primarily in its hedging of debt issuances.<sup>248</sup> Unlike OTC derivatives, which are arrangements between counterparties that are themselves responsible for managing the resulting credit exposures, with exchange-traded derivatives a financial clearinghouse serves as an intermediary, and changes in the value of open contracts are settled daily. As a result, most observers believe exchange-traded derivatives entail minimal counterparty risk.<sup>249</sup>

Fannie Mae and Freddie Mac are exposed to an erosion of their liquidity in derivatives markets. The Enterprises rely on the derivatives markets to provide funding flexibility—such as the ability to create long-term callable debt synthetically, potentially at a lower cost than issuing such debt directly—and to purchase options to hedge the interest rate risk of their mortgage portfolios. The OTC interest rate derivatives of Fannie Mae and Freddie Mac now make up a significant share of the global market for such contracts. Specifically, at mid-2001 the notional amount outstanding of the Enterprises' combined OTC interest rate derivatives comprised about 7.6 percent of the end-user market for dollar-denominated interest rate derivatives, and 10.5 percent of that market when non-financial institution end-users are excluded (see Table One).

---

<sup>247</sup> See, for example, *Ibid.*, 25 (Fannie Mae) and 52 (Freddie Mac).

<sup>248</sup> *Ibid.*, A-17 and -20; Fannie Mae, *Information Statement, op. cit.*, 43; and Office of Federal Housing Enterprise Oversight, *op. cit.*, 49 and 66.

<sup>249</sup> See, for example, Pitts, M., and F.J. Fabozzi, "Introduction to Interest-Rate Futures and Options Contracts," in Fabozzi, F.J., ed., *The Handbook of Fixed-Income Securities*, 6<sup>th</sup> Ed. (New York: NY, Mc-Graw-Hill, 2001), 1175-1196 at 1185.

The growth in the retained asset portfolios and use of OTC derivatives of Fannie Mae and Freddie Mac, and the decline in the number of major derivatives dealers, raises the question as to whether the OTC derivatives markets will continue to be deep enough to accommodate the Enterprises' needs for reasonably priced hedges for interest rate risk. Continued growth of the assets of Fannie Mae and Freddie Mac may eventually cause dealers to consider seriously whether they should set limits on their exposure to each Enterprise. In addition, as one Enterprise has noted, there is uncertainty about whether the market will continue to meet the Enterprises' growing demand for derivatives products,<sup>250</sup> particularly those with thinner markets, such as swaptions. While such products might remain available, the demand for them by Fannie Mae and Freddie Mac could be so large as to make terms less favorable, increasing the Enterprises' cost of hedging their exposures to interest rate risk and potentially depressing their net interest margins.<sup>251</sup> For example, although pricing has since improved, in September 2000 *Credit* magazine suggested that Freddie Mac's all-in borrowing costs would be increased due to the impact of its \$5 billion euro offering in Fall 1999 on the quite thin euro/dollar currency swap market.<sup>252</sup> In volatile markets, the Enterprises may find hedging vehicles extremely expensive or even unavailable.

Fannie Mae and Freddie Mac take two broad approaches to hedging their interest rate risk. One approach, often termed "options hedging" involves obtaining options to change expected liability maturities that match the optionality of assets.<sup>253</sup> By that means, when falling interest rates shorten the maturities of mortgage assets, for example, options can be exercised to shorten liability maturities as well. Such hedging can take the form of issuing callable debt or purchasing swaptions. The second approach, often termed "dynamic rebalancing" involves adjusting the expected maturities of assets and liabilities as interest rates change.<sup>254</sup> Rebalancing is accomplished by altering the composition of liabilities or entering into swaps that otherwise adjust effective liability maturities to better match effective asset maturities in a given rate environment. Options hedging, which hedges interest rate risk up-front, reduces the need for dynamic rebalancing in response to interest rate changes. Each Enterprise engages in both types of hedging.

In the last decade, rebalancing by the Enterprises and other investors, in the aggregate, has been large enough to affect interest rates in fixed-income markets.<sup>255</sup> The net result of such

---

<sup>250</sup> Freddie Mac recently noted that a lack of sufficient capacity or liquidity in the derivatives market could limit the Enterprise's risk management activities, increasing its exposure to interest rate risk. Limited liquidity or capacity in that market could make derivatives unavailable or prohibitively expensive. Freddie Mac, *Information Statement* (March 29, 2002), A-23, available online at <http://www.freddiemac.com/investors/infostat/>.

<sup>251</sup> *Ibid.*

<sup>252</sup> "Basis Swap Clouds Freddie Mac's Euro Programme," *Credit, the Magazine for International Credit Markets*, available online at <http://www.creditmag.com/sept00/features/credswapsmarket2.htm>. The term "basis" in the article's title refers to the difference between Euro LIBOR and U.S. LIBOR rates, where the term "LIBOR" refers to the London Interbank Offered Rate, the rate the most creditworthy international banks charge each other for large loans.

<sup>253</sup> For a brief discussion, see Freddie Mac, *2001 Annual Report*, 37, under "Hedges of Prepayment Options Embedded in Retained PCs".

<sup>254</sup> For a brief discussion, see Fannie Mae, *2001 Annual Report*, 27-28, under "Interest Rate Risk Management".

<sup>255</sup> Ferguson, R.W., Jr., "Financial Engineering and Financial Stability," (remarks at the Annual Conference of the Securities Industry, American Institute of Certified Public Accountants and the Financial Management Division of the Securities Industry Association, November 20, 2002), available online at

rebalancing can be to push interest rates further in the direction they were moving. That is, in rising (falling) rate environments efforts to hedge against losses from further increases (decreases) in interest rates tend to cause rates to rise (fall) further. More specifically, falling interest rates shorten the effective maturities of fixed-rate mortgages. Rebalancing to reduce liability maturities to match shorter asset maturities by, for example, entering into receive-fixed interest rate swaps has the effect of lowering the yields of those swaps, which puts further downward pressure on interest rates. Such “feedback” effects of rebalancing by mortgage investors can alter the shape of the yield curve, although the effects are generally short-lived and small relative to overall interest rate volatility.

Fannie Mae and Freddie Mac hold about one-fifth of U.S. residential mortgage debt outstanding. To the extent that the Enterprises rebalance more than other investors in residential mortgages, their rebalancing activities can significantly change the demand for financial instruments used to hedge interest rate risk exposure. When large changes in interest rates occur, market participants may expect significant Enterprise rebalancing and position themselves to profit if the anticipated rebalancing occurs. That happened in the second quarter of 2002, for example, when falling interest rates caused the difference or “gap” between the durations of Fannie Mae’s assets and its liabilities to rise, increasing its exposure to further declines in interest rates.<sup>256</sup> Investors, expecting that Fannie Mae would reduce that gap by buying longer-maturity Treasury or other fixed-income securities, enter into receive-fixed interest rate swaps, or take other actions, bid up the cash- and futures-market prices of 10- and 30-year Treasury securities, sending yields on those securities to lows not seen since the late 1950s.<sup>257</sup> This episode illustrates how Enterprise rebalancing may increase the volatility of interest rates in some circumstances.<sup>258</sup>

---

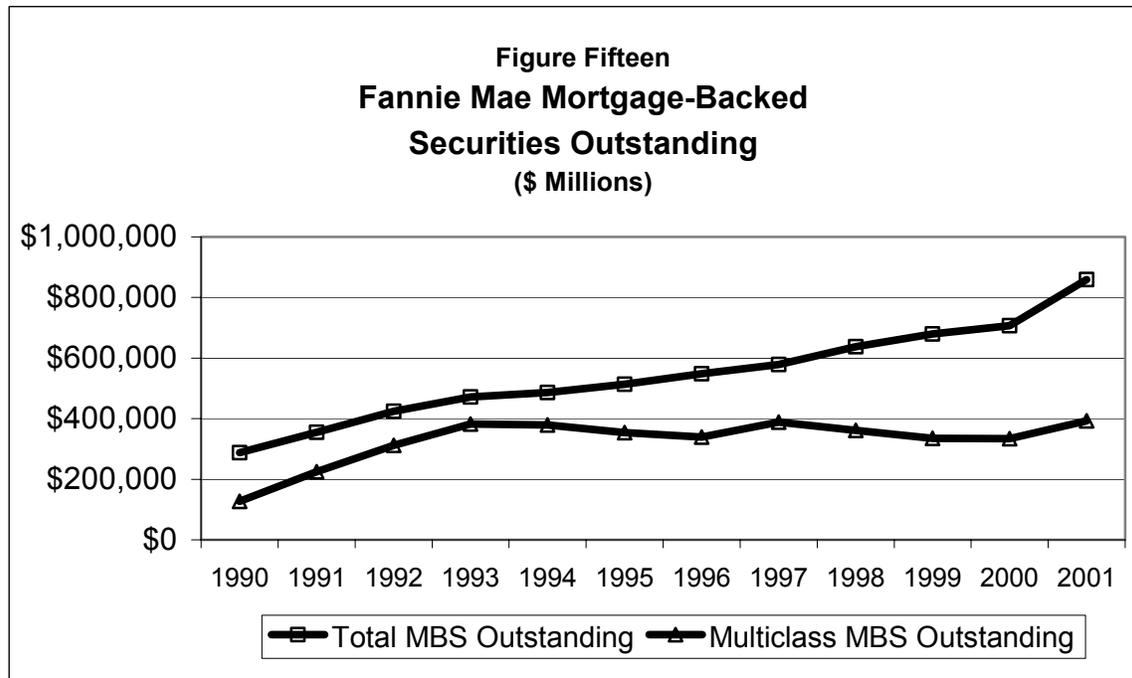
<http://www.federalreserve.gov/boarddocs/speeches/2002/20021120/default.htm>; and Kambhu, J., and Mosser, P.C., “The Effect of Interest Rate Options Hedging on Term-Structure Dynamics,” *FRBNY Economic Policy Review* (December 2001), 51-70, available online at [http://www.newyorkfed.org/rmaghome/econ\\_pol/2001/1201kamb.pdf](http://www.newyorkfed.org/rmaghome/econ_pol/2001/1201kamb.pdf).

<sup>256</sup> Fannie Mae’s effective duration gap, a measure of the difference between the durations of its assets and the durations of its liabilities, rose to negative 14 months at the end of August 2002—that is, the durations of the Enterprise’s liabilities were 14 months shorter than the durations of its liabilities. See Fannie Mae, “Voluntary Initiatives Disclosure (August 2002), available online at:

<http://www.fanniemae.com/global/pdf/initiatives/sixvoluntary/subdebt/083102.pdf>. With that gap, a decline in interest rates would cause the Enterprise’s interest expense to increase faster than its interest income, as liabilities were repaid faster than assets.

<sup>257</sup> See, for example, Zuria, K., “Debt Derivatives Diary: Market Waits for FOMC View,” *Dow Jones Capital Markets Report* (September 23, 2002); and “Treasury Yields Hit 44-Yr Low on Mortgage Mania,” *Reuters* (September 23, 2002).

<sup>258</sup> See, for example, Haviv, J., “Agencies Are Main Drivers of Bond Mkt Volatility - Bianco,” *Dow Jones Newswires* (September 27, 2002).



Source: Fannie Mae.

The “feedback” effects on interest rates of rebalancing by Fannie Mae and Freddie Mac and other mortgage investors makes such rebalancing less effective. That is, as rebalancing pushes interest rates further in the direction they are moving, greater rebalancing becomes necessary to maintain the same risk exposures, which pushes rates further, creating the potential for a downdraft. If the “feedback” effects from Enterprise rebalancing rose significantly from their current relatively low level, the Enterprises would have an incentive to increase their options hedging – that is, increase their use of callable debt and swaptions, instruments that lower their overall sensitivity to interest rate changes and reduce the need for dynamic rebalancing.<sup>259</sup> Alternatively, they might reduce their need for rebalancing by lowering their exposure to the prepayment risk of fixed-rate mortgages and MBS backed by those loans, or allow risk to increase and raise equity capital accordingly. Reduced Enterprise demand for such loans would increase their yields, which would lead borrowers to demand more adjustable-rate mortgages. Financial institutions that can write swaptions and issue callable debt would also respond to greater “feedback” effects by supplying more of those instruments used in hedging.<sup>260</sup>

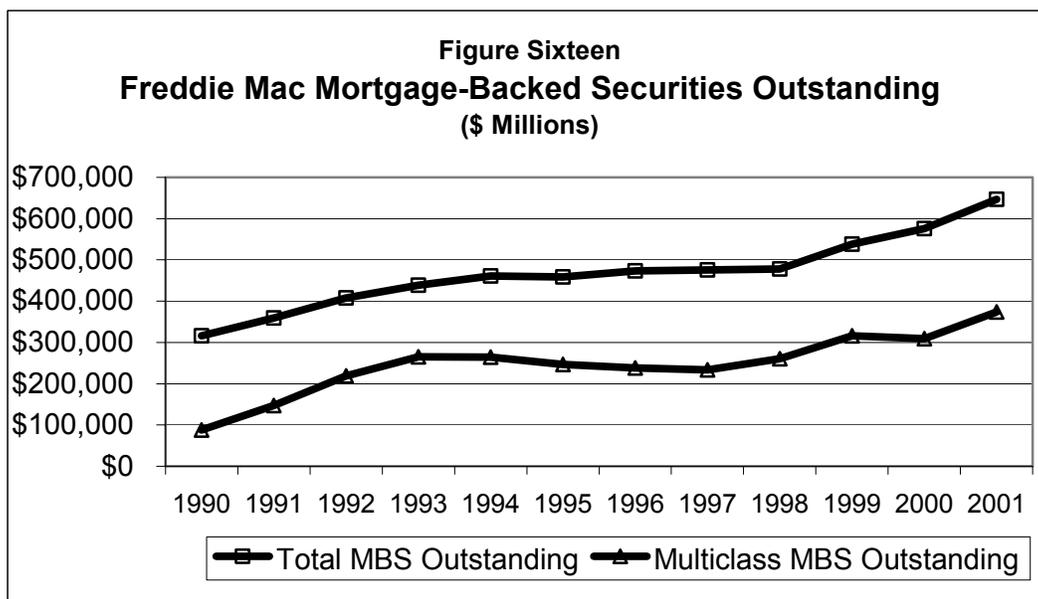
### Guaranteeing Mortgage-Backed Securities

Fannie Mae and Freddie Mac each provide corporate guarantees of MBS collateralized by residential mortgages originated by approved sellers. Each Enterprise guarantees the timely payment of interest on and principal of each MBS and the repayment of the portion of the outstanding balance of the security that corresponds to the balance of any loans that are prepaid

<sup>259</sup> Ferguson, op.cit.

<sup>260</sup> *Ibid.*

or default. In exchange, Fannie Mae and Freddie Mac receive a monthly guarantee fee, which in 2001 averaged 19 basis points of the outstanding balance of each Enterprise's outstanding MBS. Each Enterprise's outstanding MBS (excluding securities held in the Enterprise's own portfolio) has grown more slowly in most recent years than in the early 1990s (see Figures Fifteen and Sixteen).<sup>261</sup> Fannie Mae's outstanding MBS rose at an annual rate of 8 percent between 1992 and 2001 after increasing at 28 percent per year between 1986 and 1992. Similarly, Freddie Mac's outstanding MBS grew 4 percent in the recent period after rising at 16 percent a year in the earlier one. That slowdown reflected the expansion of each Enterprise's portfolio holdings of its own MBS.



Source: Freddie Mac

In addition to guaranteeing MBS, Fannie Mae and Freddie Mac each provide a limited amount of credit enhancements or guarantees of securities backed by single- or multifamily mortgages that may not meet their underwriting standards<sup>262</sup>. Examples of such securities include tax-exempt bonds issued by state and local housing agencies<sup>263</sup> and the senior tranches of multiclass MBS backed by subprime mortgages.<sup>264</sup> The Enterprises guarantee all required

<sup>261</sup> Multiclass MBS outstanding, primarily REMICs, are re-securitizations of single-class MBS and, thus, are a subset of total MBS outstanding.

<sup>262</sup> Enterprise guarantees are attractive to issuers because a security carrying such a guarantee sells for a higher price than an identical security guaranteed by a bond insurer with a triple-A credit rating.

<sup>263</sup> See, for example, Fannie Mae, *Information Statement* (April 1, 2002), 82.

<sup>264</sup> See, for example, prospectus for Fannie Mae Guaranteed Grantor Trust Pass-Through Certificates, Grantor Trust 2002-T7 (May 29, 2002); and prospectus for Freddie Mac Structured Pass-Through Certificates (SPCs), Series T-030 (October 25, 2000). Fannie Mae and Freddie Mac data indicate that each Enterprise provides a relatively small volume of such guarantees.

payments on such securities to the extent that funds generated by the underlying collateral and any credit enhancements are insufficient.<sup>265</sup> The credit risk Fannie Mae and Freddie Mac bear is a function of the credit risk of the underlying collateral, offset by any credit enhancements, such as subordinated tranches in the first example, and insurance and/or reserve funds in the second.

### Investing in Mortgage-Backed Securities

Increasingly, the Enterprises hold mortgages not as whole loans, but in the form of their own guaranteed MBS, which they purchase in the capital markets. At year-end 2001, Fannie Mae held \$431 billion of its own MBS, which represented 54 percent of the Enterprise's assets. Freddie Mac owned \$302 billion of its own MBS, which accounted for 49 percent of its assets.

Fannie Mae and Freddie Mac also each hold a large volume of MBS and other mortgage-related securities issued or guaranteed by other entities, including the Government National Mortgage Association (Ginnie Mae), the other Enterprise, private conduits, and state and local housing finance agencies. At year-end 2001, Fannie Mae owned over \$110 billion in such securities, and Freddie Mac owned nearly \$130 billion. Those securities include home equity securities, commercial mortgage securities—including a significant amount of securities backed by multifamily loans—and manufactured housing securities.

Fannie Mae and Freddie Mac bear credit risk on their holdings of some MBS issued or guaranteed by other entities. Mortgage securities guaranteed by Ginnie Mae pose no credit risk since they are backed by the full faith and credit of the U.S. government. MBS issued by private conduits and state and local housing agencies—which are generally protected by subordinated tranches, over-collateralization, reserve funds, or external credit enhancements like bond insurance<sup>266</sup>—pose greater credit risk. If the Enterprises have insufficient information about underlying collateral or security structures, they rely substantially on credit ratings provided by nationally recognized statistical rating organizations such as Moody's and Standard and Poor's to evaluate the creditworthiness of MBS.<sup>267</sup> Fannie Mae and Freddie Mac also use such credit ratings to evaluate the creditworthiness of non-mortgage investments. The Enterprises generally invest only in highly-rated credits with at least 96 percent of Fannie Mae's non-mortgage investments rated A or higher, and all of FRE's rated investment grade at time of purchase.<sup>268</sup>

Many of the multifamily transactions of Fannie Mae and Freddie Mac involve the acquisition of credit-enhanced whole loans or the senior tranches of structured MBS.<sup>269</sup> Those tranches are supported by credit enhancements that may be internal or external to the security structure. The issuer or a third party provides external credit enhancements, which include pool insurance, letters of credit, loss reserves, surety bonds, and corporate guarantees. Internal credit enhancement techniques include senior/subordinated structures, reserve funds, and spread accounts, which may be used in combination.

---

<sup>265</sup> See the sources cited in the two previous footnotes.

<sup>266</sup> See, for example, Freddie Mac, *2001 Annual Report*, 28.

<sup>267</sup> See, for example, *ibid.*, 33.

<sup>268</sup> Fannie Mae, *2001 Annual Report*, 36; and Freddie Mac, *2001 Annual Report*, 34.

<sup>269</sup> Segal, W., and E.J. Syzmanoski, "Fannie Mae, Freddie Mac, and the Multifamily Housing Market," *Cityscape*, Vol. 4, No. 1 (1998), 59-91 at 69-71.

### **Section Three: Interdependencies Between the Enterprises and Firms and Borrowers in the Primary Market**

The activities of Fannie Mae and Freddie Mac create interdependencies, both direct and indirect, between the Enterprises and other participants in the mortgage and housing markets. Many lenders and other firms that support mortgage lending rely heavily on Fannie Mae and Freddie Mac and are directly interdependent on the Enterprises. Those direct interdependencies are among the major channels through which declines in household incomes and property values could impose losses on Fannie Mae and Freddie Mac. In addition, the Enterprises, their counterparties, and other primary market firms are indirectly interdependent as a result of their similar exposures to local and regional housing markets and economies.

One key set of directly interdependent relationships is with “seller/servicers” – firms that originate mortgages, sell them to the Enterprises, service the loans, and, in some cases, provide credit enhancements of pools of loans. Seller/servicers include mortgage banks, commercial banks, savings associations, credit unions, and other types of lenders. Mortgage servicers collect mortgage and escrow payments, pay taxes and insurance costs from escrow accounts, and manage and report delinquencies and perform other required services for the Enterprises. A breach of contract by a servicer could impose credit losses on an Enterprise, and the Enterprise could incur additional costs replacing a servicer. In recent years, rapid consolidation among servicers has increasingly concentrated that segment of mortgage lending.<sup>270</sup> Consistent with that trend, servicing of single-family mortgages owned and securitized by Fannie Mae and Freddie Mac has also become more concentrated. At year-end 2001, the top five servicers for each Enterprise serviced about 50 percent of the dollar volume of mortgages in that Enterprise’s total mortgage portfolio.<sup>271</sup>

Fannie Mae and Freddie Mac also have significant direct interdependencies in the form of credit exposures to private mortgage insurers. Those firms pose credit risk because there is the possibility that they will be unable to meet their contractual obligations to cover credit losses on insured mortgages owned or securitized by the Enterprises. Seven firms provide nearly all primary (loan-level) insurance on single-family mortgages, and there is significant concentration among the coverage provided by that relatively small group.<sup>272</sup> That concentration is evident in the primary insurance of mortgages owned and securitized by Fannie Mae and Freddie Mac. The top four mortgage insurers that provided the most primary insurance coverage for each Enterprise at year-end 2001 accounted for over 70 percent of each Enterprise’s primary coverage.<sup>273</sup>

Firms that provide mortgage settlement services primarily for single-family originations funded by lenders that sell most of their production to the Enterprises are also effectively

---

<sup>270</sup> Thompson Financial, *Mortgage Industry Directory: A Statistical Guide to Residential and Commercial Lending and Servicing, 2002 Edition* (New York, NY: March 2002), 3-1 to 3-128; and Inside Mortgage Finance Publications, Inc., *op. cit.*, Vol. I, 85-94.

<sup>271</sup> OFHEO calculations based on Enterprise data.

<sup>272</sup> Fox-Pitt, Kelton Group, “2001 FPK Private Mortgage Insurance Outlook & Guidebook,” (New York, NY: January 9, 2001).

<sup>273</sup> OFHEO calculations based on Enterprise data.

exposed to losses if Fannie Mae and Freddie Mac were to suddenly reduce their purchases of single-family loans.

Other firms with direct interdependencies on the Enterprises provide services to mortgage lenders and secondary market entities. In single-family mortgage transactions these firms include: appraisers, title insurers, house inspectors, flood certification companies, hazard insurers, realtors, escrow agents, settlement attorneys, and homeowner's property warranty companies. All of these firms perform services that facilitate single-family home purchase and refinance transactions and are therefore directly interdependent with Fannie Mae and Freddie Mac.

In multifamily mortgage lending, appraisers, mortgage insurers, title insurers, hazard insurers, realtors, escrow agents, and settlement attorneys provide the same assurances as in single-family lending. Multifamily transactions that include construction financing require due diligence services such as environmental audits, site inspections, and land surveys. A large project also may require environmental and economic impact statements and analysis.

Of course, the major direct credit exposure of Fannie Mae and Freddie Mac in the primary mortgage market is to the millions of borrowers who make periodic payments on conventional mortgages. On most of the single-family loans it owns or has securitized, each Enterprise retains the primary risk of loss in the event of borrower default. Approximately 67 percent and 65 percent respectively of the loans in Freddie Mac's and Fannie Mae's single-family mortgage portfolios have no form of credit enhancement.<sup>274</sup> All of those loans have LTV ratios that are below, many substantially below, 80 percent.

The indirect interdependencies among Fannie Mae and Freddie Mac and other firms involved in the primary mortgage market result from common exposures to local and regional housing markets and economic shocks. For example, a severe downturn in one region of the U.S. would increase the credit expenses not only of each Enterprise, but also those mortgage lenders and insurers that bore the credit risk of loans collateralized by properties in that region.

Data on the geographic concentrations of the books of business of the Enterprises and private mortgage insurers shed some light on the indirect interdependencies among them. For example, of Freddie Mac's total mortgage portfolio at year-end 2001, 16 percent was concentrated in California, 6 percent in Florida, 5 percent in Illinois, and 5 percent in Texas, with the balance spread nationwide.<sup>275</sup> Of Fannie Mae's portfolio and MBS outstanding as of March 31, 2002, 18 percent was concentrated in California, 6 percent in Florida, 5 percent in Texas, 5 percent in New York and 5 percent in Illinois, with the balance spread nationwide.<sup>276</sup> The distribution of the primary risk in force of the Mortgage Guaranty Insurance Corporation (MGIC), the nation's largest private mortgage insurer, was fairly similar: 12 percent was

---

<sup>274</sup> Freddie Mac, Second Quarter 2002 Earnings Release, Table 2-B, available online at <http://www.freddiemac.com/investors/er/1q02.htm>; and Fannie Mae, *2001 Annual Report*, 31, available online at <http://www.fanniemae.com/ir/annualreport/2001/>.

<sup>275</sup> Freddie Mac, *op. cit.*, at 82.

<sup>276</sup> Fannie Mae, "Portfolio and Mortgage-Backed Securities Outstanding by State," *Credit Information Supplement*, First Quarter 2002, at 3, available online at <http://www.fanniemae.com/global/pdf/ir/financial/pack/2002/cis1q.pdf>.

concentrated in California, 6 percent in Texas, 6 percent in Florida, 5 percent in Michigan, and 5 percent in Illinois, with the balance spread nationwide.<sup>277</sup>

---

<sup>277</sup> Mortgage Guaranty Insurance Corporation, Form 10-K405 for the Fiscal Year ended December 31, 2001, at 18, available online at <http://www.mgic.com/newsandfinancials.html>.

## Section Four: Interdependencies Between the Enterprises and Firms in Securities and Derivatives Markets

The major global securities firms and commercial banks that serve as counterparties to the financial derivatives contracts that the Enterprises use to lower their borrowing costs and other forms of market risk, and securities firms that sell Enterprise debt and guaranteed MBS are also directly interdependent on the Enterprises. In April 2002, Federal Reserve Board Chairman Alan Greenspan raised the question of whether Enterprise counterparties may “apply less vigorously some of the risk controls that they apply to manage their over-the-counter derivatives exposures.”<sup>278</sup> With respect to derivatives, although the uncollateralized credit exposures of end-users generally constitute tiny fractions of the notional balances of their outstanding contracts, in times of volatile markets those exposures can increase many times over, and some counterparties of Fannie Mae and Freddie Mac could find themselves with serious exposures.

Investors in debt issued by Fannie Mae and Freddie Mac are directly exposed to the Enterprises. Federal law explicitly exempts Fannie Mae’s, Freddie Mac’s and other GSEs’ securities from the statutory limitation on commercial banks’ investment in the “investment securities” of individual firms.<sup>279</sup> That limitation generally limits a bank’s investment in the debt obligations of any one issuer to 10 percent of the bank’s unimpaired capital and surplus.<sup>280</sup> That exemption and the perception of an implicit federal guarantee of the Enterprises’ obligations lead investors to not limit their holdings of those securities in the same way they limit their investments in debt issued by non-GSEs.<sup>281</sup>

Previous analyses have estimated the amount of GSE debt securities that banks hold and, in particular, the size of those investments relative to bank equity. In March 2000 the Undersecretary of the Treasury for Domestic Finance reported that at mid-year 1999 commercial banks held over \$210 billion in GSE debt, representing just under 4 percent of total bank assets and over one-third of total bank capital.<sup>282</sup> In a response to OFHEO’s solicitation of public comments on systemic risk, Fannie Mae presented an analysis of commercial bank holdings of Fannie Mae debt as of mid-year 2000.<sup>283</sup> The Enterprise’s analysis assumed banks invest in the debt of each GSE in the same proportion that each GSE’s outstanding debt bears to the

---

<sup>278</sup> Remarks by Chairman Alan Greenspan at the Institute of International Finance, New York, New York, April 22, 2002, available online at <http://www.federalreserve.gov/boarddocs/speeches/2002/20020422/default.htm>.

<sup>279</sup> See, for example, 12 U.S.C. 1757(7)(e), and 12 U.S.C. 1452(e).

<sup>280</sup> 12 U.S.C. 24; 12 U.S.C. 335.

<sup>281</sup> In addition, the SEC requires fixed-income funds that invest in debt of non-GSE issuers to meet certain minimum diversification requirements (15 USC 2(D)(1)(80a-5(b)(1))). Fixed-income mutual funds may invest generally in the debt of the Enterprises and other GSEs (12 CFR Part 1). Funds that invest in Enterprise securities are generally much less diversified than those that invest in non-GSE securities. See, for example, the descriptions of Fidelity Investments fixed-income mutual funds available online at <http://www.fidelity.com>.

<sup>282</sup> Testimony of Treasury Undersecretary Gary Gensler before the Subcommittee on Capital Markets, Securities, and Government-Sponsored Enterprises of the House Committee on Banking and Finance, March 22, 2000, available online at <http://treas.gov/press/releases/ls479.htm>.

<sup>283</sup> Letter from Arne Christenson, Senior Vice President, Regulatory Policy, Fannie Mae, to Robert S. Seiler, Jr., Manager, Policy Analysis, Office of Federal Housing Enterprise Oversight (January 29, 2001), 33, Exhibit 13, available online at <http://www.ofheo.gov/docs/sysrisk/Fannie.pdf>

outstanding debt of all GSEs. That assumption may lead to an understatement or overstatement of bank exposures to specific GSEs.

For this report, OFHEO updated Fannie Mae's analysis, using the same methodology, to estimate bank holdings of each Enterprise's outstanding debt as of year-end 2001 (see Tables Three and Four). Using Fannie Mae's methodology, OFHEO estimates that more than 30 percent of commercial banks with assets above \$1 billion held debt of Fannie Mae or Freddie Mac exceeding 10 percent of their equity. Fannie Mae's analysis found that the very largest banks were not heavily invested in its debt. The Enterprise estimated that only one bank with over \$50 billion in assets held Fannie Mae debt in excess of 25 percent of their equity. OFHEO's analysis indicates that banks whose holdings of Enterprise debt represent a substantial share of equity appear generally to be institutions with less than \$1 billion assets.

Changes in market conditions in securities or derivatives markets could impose losses on, and increase the risk of, Fannie Mae and Freddie Mac and other financial institutions that participate in those markets. It is likely that the indirect interdependencies among the Enterprises and other institutions are substantial enough that such changes would adversely affect them in comparable ways and magnitudes. However, at present the nature and magnitude of those correlated exposures are not fully known.

Finally, government sponsorship contributes significantly to the size and continuing growth of Fannie Mae and Freddie Mac and their major and expanding roles in securities and derivative markets. The perception of an implicit federal guarantee encourages market participants to view the Enterprises' obligations as almost riskless and makes Fannie Mae and Freddie Mac favored counterparties in the market for OTC derivatives. The Enterprises are so large that the direct interdependencies between them and other participants in securities and derivatives markets may exceed those of any other privately owned financial institutions. The magnitude of those interdependencies implies that, if either Enterprise became insolvent or illiquid, investors in its debt and, potentially, its derivatives counterparties could incur losses. Fannie Mae and Freddie Mac are themselves vulnerable to conditions in the market for OTC interest rate derivatives.

<b>Table Three</b>						
<b>Estimated Distribution of Commercial Bank Holdings of Fannie Mae Debt Securities as a Percent of Equity Capital</b>						
<b>Year-End 2001</b>						
<b>Number of Institutions</b>						
	<b>Fannie Mae Debt as a Percent of Capital</b>					
<b>Asset Size</b>	<b>Less than 10 %</b>	<b>10% to 25%</b>	<b>26% to 50%</b>	<b>51% to 100%</b>	<b>Over 100%</b>	<b>Total</b>
<b>Over \$1 Billion</b>	227	77	49	37	10	400
<b>\$100 M to \$1 Billion</b>	932	742	872	531	117	3,194
<b>Less than \$100 M</b>	1,040	823	1,130	1,123	370	4,486
<b>Total</b>	2,199	1,642	2,051	1,691	497	8,080
<b>Percent Distribution</b>						
	<b>Fannie Mae Debt as a Percent of Capital</b>					
<b>Asset Size</b>	<b>Less than 10%</b>	<b>10% to 25%</b>	<b>26% to 50%</b>	<b>51% to 100%</b>	<b>Over 100%</b>	<b>Total</b>
<b>Over \$1 Billion</b>	56.8%	19.3%	12.3%	9.3%	2.5%	100%
<b>\$100 M to \$1 Billion</b>	29.2	23.2	27.3	16.6	3.7	100%
<b>Less than \$100 M</b>	23.2	18.3	25.2	25.0	8.2	100%
<b>Total</b>	27.2	20.3	25.4	20.9	6.2	100%

Source: Office of Federal Housing Enterprise Oversight based on data from Federal Deposit Insurance Corporation.

<b>Table Four</b>						
<b>Estimated Distribution of Commercial Bank Holdings of Freddie Mac Debt Securities as a Percent of Equity Capital</b>						
<b>Year-End 2001</b>						
<b>Number of Institutions</b>						
	<b>Freddie Mac Debt as a Percent of Capital</b>					
<b>Asset Size</b>	<b>Less than 10 %</b>	<b>10% to 25%</b>	<b>26% to 50%</b>	<b>51% to 100%</b>	<b>Over 100%</b>	<b>Total</b>
<b>Over \$1 Billion</b>	251	78	40	25	6	400
<b>\$100 M to \$1 Billion</b>	1,101	893	822	330	48	3,194
<b>Less than \$100 M</b>	1,414	1,319	1,192	507	54	4,486
<b>Total</b>	2,766	2,290	2,054	862	108	8,080
<b>Percent Distribution</b>						
	<b>Freddie Mac Debt as a Percent of Capital</b>					
<b>Asset Size</b>	<b>Less than 10%</b>	<b>10% to 25%</b>	<b>26% to 50%</b>	<b>51% to 100%</b>	<b>Over 100%</b>	<b>Total</b>
<b>Over \$1 Billion</b>	62.8%	19.5%	10.0%	6.3%	1.5%	100%
<b>\$100 M to \$1 Billion</b>	34.5	28.0	25.7	10.3	1.5	100%
<b>Less than \$100 M</b>	25.1	23.4	21.1	9.0	1.0	100%
<b>Total</b>	34.2	28.3	25.4	10.7	1.3	100%

Source: Office of Federal Housing Enterprise Oversight based on data from Federal Deposit Insurance Corporation.

<intentionally blank>

### CHAPTER THREE: ECONOMIC EFFECTS OF THE ACTIVITIES OF THE ENTERPRISES

The previous discussion of existing interdependencies implies that severe financial difficulties at Fannie Mae or Freddie Mac could damage the economy as a whole. To assess the nature and magnitude of such adverse effects, it is necessary to examine how the Enterprises affect the economy under stable economic and financial conditions.

The activities of Fannie Mae and Freddie Mac benefit housing finance markets and the housing sector as a whole. Local and regional markets for conforming fixed-rate mortgages have been integrated with the capital markets, and the interest rates on those loans have been reduced. Lending practices in the primary market have become more standardized, competition among lenders that originate conventional mortgages has increased, the up-front costs of financing a home purchase or refinancing a mortgage have been reduced, and households have a broader menu of financing options from which to choose. Those effects have contributed to greater housing activity and homeownership, but it is not clear by how much.

Since the mid-1980s, securitization by Fannie Mae and Freddie Mac has integrated local and regional markets for conforming fixed-rate mortgages with the national and international capital markets.<sup>284</sup> In the 1970s, issuance of MBS guaranteed by Ginnie Mae had achieved the same objective for fixed-rate loans insured by the Federal Housing Administration (FHA) or guaranteed by the Veterans Administration (VA). Securitization transforms illiquid mortgages into liquid securities that can be traded over-the-counter like corporate debt or U.S. Treasury securities. Securitization ties the pricing of mortgages in the primary market directly to the yields of MBS in the capital markets. Research has found that the yields on conforming fixed-rate mortgages now adjust quickly and fully to changes in capital market rates.<sup>285</sup>

The integration of conventional mortgage markets with the capital markets provides a linkage between the housing sector and financial markets, one based on speed, efficiency, and instantaneous pricing. That linkage effectively frees local and regional housing markets from potential volatility associated with a local credit supply dependent on depository institutions.<sup>286</sup> As a result, illiquidity at local financial institutions is less likely to exacerbate a local economic downturn by limiting the supply of mortgage credit. Further, the linkage minimizes regional differences in the interest rates for conforming fixed-rate loans.<sup>287</sup> In addition, investors' perception of an implicit guarantee of the debt of Fannie Mae and Freddie Mac limits the spreads between the yields on Enterprise and Treasury obligations, thereby providing considerable protection to the primary market for conforming mortgages and the housing sector from flights to quality in the capital markets.<sup>288</sup>

---

<sup>284</sup> See, for example, Hendershott and Van Order, *op. cit.*.

<sup>285</sup> *Ibid.*

<sup>286</sup> Colton, *op.cit.*, 158.

<sup>287</sup> See, for example, Meyer, R., "Regional Rate Differences Narrow Dramatically," *Freddie Mac Reports* (McLean, Virginia: September, 1982), at 5.

<sup>288</sup> Tejada, *op.cit.*

The activities of Fannie Mae and Freddie Mac keep interest rates lower on the fixed-rate mortgages they purchase and securitize. Investors require lower yields on securities issued by the Enterprises than on comparable MBS issued by non-GSEs because of the perception of an implicit federal guarantee of the Enterprises' MBS. Competition between Fannie Mae and Freddie Mac and among mortgage lenders has passed a portion of the reduction in the yields on the Enterprises' fixed-rate MBS through to borrowers who take out conforming fixed-rate loans. However, the size of the reduction in the interest rates on those mortgages achieved by Fannie Mae and Freddie Mac is subject to debate.

Several studies have attempted to quantify the effect of the activities of Fannie Mae and Freddie Mac on the interest rates of conforming fixed-rate mortgages.<sup>289</sup> Generally, those studies use data on the terms of a sample of fixed-rate mortgages to estimate the yields on conforming and jumbo loans. The studies presume that the estimated differential, after some adjustments, between the yields of jumbo fixed-rate mortgages, which Fannie Mae and Freddie Mac cannot purchase, and the yields of fixed-rate loans with balances below the conforming loan limit, indicates the impact of the Enterprises' activities on the interest rates of the latter mortgages.

The most widely available data set that captures the terms and conditions at origination of both jumbo and non-jumbo loans is the Federal Housing Finance Board's Monthly Interest Rate Survey (MIRS). Virtually all analyses of the effect of the activities of Fannie Mae and Freddie Mac on interest rates on conforming fixed-rate mortgages have used the MIRS data. Each of the many studies on the topic estimates a positive spread between the yields of jumbo and non-jumbo fixed-rate loans. That research has also found that the spread has declined over the last 15 years. Early estimates of the spread in the late 1980s ranged from 30 to 40 basis points (a basis point is 1/100<sup>th</sup> of one percent).<sup>290</sup> Later studies estimate that the spread had declined to the 20 to 25 basis point range by the late 1990s.<sup>291</sup>

---

<sup>289</sup> See Hendershott, P. and J. Shilling, "The Impact of the Agencies on Conventional Fixed-Rate Mortgage Yields," *Journal of Real Estate Finance and Economics*, Vol. 2 (1989), 101-115; ICF Incorporated, *Effects of the Conforming Loan Limit on Mortgage Markets*, report prepared for U.S. Department of Housing and Urban Development, Office of Policy Development and Research, March 1990; Cotterman, R. and J.E. Pearce, "The Effect of the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation on Conventional Fixed-Rate Mortgage Yields," in *Studies on Privatizing Fannie Mae and Freddie Mac*, (Washington, D.C.: U.S. Department of Housing and Urban Development, Policy Development and Research, May 1996) 97-168; Pearce, J.E., "Conforming Loan Differentials: 1992-1999," Welch Consulting, College Station, November 2000 (unpublished); Ambrose, B., R. Buttimer, and T. Thibodeau, "A New Spin on the Jumbo/Conforming Loan Rate Differential," *Journal of Real Estate Finance and Economics*, Vol. 23 (2001), 309-335; Naranjo, A., and A. Toevs, "The Effects of Purchases of Mortgages and Securitization by Government-Sponsored Enterprises on Mortgage Yield Spreads and Volatility," *Journal of Real Estate Finance and Economics*, Vol. 25, No. 2 (2002), 173-19; Passmore, W., R. Sparks, and J. Ingpen, "GSEs, Mortgage Rates, and the Long-Run Effects of Mortgage Securitization," *Journal of Real Estate Finance and Economics*, Vol. 25, No. 2 (2002), 215-242; U.S. Congressional Budget Office, *Interest Rate Differentials Between Jumbo and Conforming Mortgages: 1995-2000* (Washington, DC: U.S. Government Printing Office, May 2001); and McKenzie, J.A., "A Reconsideration of the Jumbo/Non-Jumbo Mortgage Rate Differential," *Journal of Real Estate Finance and Economics*, Vol. 25, No. 2 (2002), 197-213.

<sup>290</sup> Hendershott and Shilling, *op.cit.*, estimated the spread to be 29 to 39 basis points in May/June 1986. Cotterman and Pearce, *op.cit.*, estimated the differential to be 24 to 60 basis points for the period 1989-1993.

<sup>291</sup> McKenzie, *op.cit.*, estimated the spread to be 22 basis points for the 1986-2000 period and 19 basis points for the 1996-2000 period. U.S. Congressional Budget Office, *Interest Rate Differentials Between Jumbo and Conforming*

It is important to note that the MIRS data have limitations.<sup>292</sup> First, MIRS does not collect demographic data or information about the credit history of borrowers. Second, while the MIRS series can be used to distinguish between jumbo and non-jumbo mortgages, it cannot be used to distinguish between conforming loans—non-jumbo mortgages that meet the underwriting standards of Fannie Mae and Freddie Mac—and non-jumbo loans that do not meet those standards.

The studies also often assume that the estimated differential between the yields of all jumbo and non-jumbo fixed-rate mortgages is a good proxy for the reduction in the yields of conforming loans that results from the activities of Fannie Mae and Freddie Mac. However, factors other than the Enterprises' activities may explain some of that spread. For example, one study found that house prices are generally more volatile in the jumbo market.<sup>293</sup> Another study found that jumbo mortgages have higher rates of prepayment and default than conforming mortgages.<sup>294</sup> In addition, a higher proportion of jumbo mortgages may not be underwritten according to the Enterprises' standards.<sup>295</sup> On the other hand, jumbo loans are likely to have lower fixed costs per dollar of principal.<sup>296</sup> Consequently, while the basic conclusion that the yields of conforming, fixed-rate mortgages are lower than they would be in the absence of Fannie Mae and Freddie Mac appears to be well established, some of the estimated spread between the yields of those loans and the yields of jumbo fixed-rate mortgages may be due to differences in the credit and prepayment risks and the fixed costs of the loans.

To the extent the activities of Fannie Mae and Freddie Mac are pro-cyclical, they could contribute to lending booms, which in turn could lead to higher prices and potentially even more investment in real estate. That combination of factors could drive up real estate prices to unsustainable levels. The eventual correction of asset prices could lead to a slowdown in economic growth, declining household net worth, and rising levels of non-performing loans, which could threaten the solvency of mortgage lenders, mortgage insurers, and ultimately Fannie Mae and Freddie Mac.

Several factors affect house price appreciation in a local housing market: local economic activity, relative wealth and incomes in the market, the cost of capital, the local demand for housing, and the elasticity of the local supply of housing.<sup>297</sup> The combination of those factors

---

*Mortgages: 1995-2000*, *op. cit.*; Passmore, Sparks and Ingpen, *op. cit.*; and McKenzie, *op. cit.*, estimated the differential to be between 18 and 23 basis points for the 1995-2000 period.

<sup>292</sup> For extensive discussions of the limitations of the MIRS data, see U.S. Congressional Budget Office, *Interest Rate Differentials Between Jumbo and Conforming Mortgages: 1995-2000*, *op. cit.*, and McKenzie, *op. cit.*

<sup>293</sup> Ambrose, B., Buttimer, R. and Thibodeau, T., *op. cit.*

<sup>294</sup> See Lundstedt, K., "The Influence of Non-Option-Related Variables Upon Corporate Default and Residential Mortgage Terminations" (Ph.D. Dissertation, University of California at Berkeley, 1997).

<sup>295</sup> See, for example, McKenzie, *op. cit.*, 208-209.

<sup>296</sup> Settlement costs are comprised of fixed and variable costs. Fixed costs (e.g., obtaining a credit report, a pest inspection, etc.) are the same regardless of the dollar amount of the mortgage. Variable costs (e.g., a yield spread premium, a mortgage origination fee, etc.) are calculated as a percentage of the mortgage amount. Fixed costs represent a smaller proportion of the loan balance for a jumbo mortgage (a mortgage greater than \$300,700 in 2002) than for a non-jumbo mortgage. For example, while fixed costs of \$1,000 represent 0.50 percent of a \$200,000 mortgage, they represent only 0.25 percent of a \$400,000 mortgage.

<sup>297</sup> See, for example, DiPasquale, D. and W. Wheaton, *Urban Economics and Real Estate Markets* (Englewood Cliffs, NJ, Prentice-Hall, 1996), Chapters 1 and 2.

determines the size and direction of house price appreciation. Nationally in the second half of the 1990s, housing markets benefited from the strong economy and low interest rates, which pushed housing activity to record levels in 1998 through 2001.<sup>298</sup> The relatively high demand for housing caused a significant rise in home values in the later half of the 1990s.<sup>299</sup> Single-family home prices, as measured by OFHEO's House Price Index, rose 7.7 percent in 2001, after rising 8.3 percent in 2000 and 5.9 percent in 1999. In the five years from 1997 through 2001, U.S. house prices increased 35.7 percent. Those rapid increases followed very restrained house price growth of 12.3 percent in the previous five years.

There is evidence that house price appreciation in some local markets has recently exceeded the rates that can be explained by economic fundamentals—local economies, supply of homes available for sale, and current housing demand.<sup>300</sup> OFHEO has found no evidence of speculative house price bubbles on a regional or national basis.<sup>301</sup> Home price appreciation in the last several years has been fueled, in large part, by rapidly rising incomes, low interest rates, and shortages of homes available for sale in many local housing markets.<sup>302</sup> Statistics from the National Association of Realtors (existing homes) and the U.S. Bureau of the Census (new homes available for sale) indicate that inventories have been at historically low levels in recent years. Federal Reserve Board Chairman Alan Greenspan has noted that the analogy between a stock bubble and a housing price bubble is imperfect, due in part to the fact that homes have a much lower ownership turnover rate than stocks.<sup>303</sup> While some local housing markets have experienced declines in house prices, those drops can typically be explained by weaknesses in local economic activity rather than the collapse of speculative bubbles.

As the market share of Fannie Mae and Freddie Mac increased, their activities encouraged mortgage lenders to change their business practices in ways that benefited homebuyers. The Enterprises' securitization of conforming fixed-rate mortgages effectively forced most underwriting, documentation, and other essential terms of mortgage lending to adhere to Enterprise standards.<sup>304</sup> Standardization in turn has heightened competition among

---

<sup>298</sup> Office of Federal Housing Enterprise Oversight, *op. cit.*, 86. National Association of Realtors data on sales of existing homes are available online at <http://www.realtor.org/research.nsf/pages/EHSdata>. U.S. Bureau of the Census data on new home sales are available online at <http://www.census.gov/const/www/newresalesindex.html>.

<sup>299</sup> For the most recent historical data, see Office of Federal Housing Enterprise Oversight, OFHEO House Price Index, Third Quarter 2002 (December 2, 2002), available online at <http://www.ofheo.gov/house/3q02hpi.pdf>.

<sup>300</sup> See, for example, Youngblood, M.D., "Is There a Bubble in Housing? New Evidence from 123 Housing Markets," *The Market Pulse*, Vol. VIII, Issue 4, 1, 3, 13-15, which finds support for the existence of bubbles in 12-20 local housing markets in 2001. The article is available from Loan Performance at [lpshelp@loanperformance.com](mailto:lpshelp@loanperformance.com).

<sup>301</sup> *Ibid.* For an extended discussion of what constitutes a house price asset bubble and what does not, see Abraham, J. and P. Hendershott, "Bubbles in Metropolitan Housing Markets," *Journal of Housing Research*, Vol. 7, No. 2 (1996), 191-207.

<sup>302</sup> National Association of Realtors data on sales of existing homes are available online at <http://www.realtor.org/research.nsf/pages/EHSdata>. U.S. Bureau of the Census data on new home sales are available online at <http://www.census.gov/const/www/newresalesindex.html>.

<sup>303</sup> Greenspan, A., Chairman, Board of Governors of the Federal Reserve, "Testimony before the Joint Economic Committee of the United States Congress, April 17, 2002, available online at <http://www.federalreserve.gov/BoardDocs/Testimony/2002/20020417/default.htm>.

<sup>304</sup> For an extended discussion of how the Enterprises dictate the terms and conditions of mortgages in the primary mortgage market, see National Association of Realtors Research Report, *The Evolution of the Mortgage Finance Industry in the 1980s* (Washington, DC: National Association of Realtors, 1989).

lenders. In addition, Fannie Mae and Freddie Mac helped to broaden the use of innovative products developed by niche lenders or mortgage insurers. For example, the use of single-family conventional reverse mortgages increased after the Enterprises decided to purchase such loans.<sup>305</sup> Further, the Enterprises' willingness to buy conventional loans with high loan-to-value (LTV) ratios has contributed to the increasing prevalence of such mortgages.<sup>306</sup>

Fannie Mae and Freddie Mac also helped to lower the upfront costs associated with buying a home or refinancing a mortgage. Borrowers can now, for example, select a standard fixed-rate, 30-year mortgage with no points or with multiple points, with the choice affecting the mortgage interest rate. That option increased the number of households selecting lower closing costs and a slightly higher mortgage rate.<sup>307</sup> The Enterprises also allow the financing of up-front or monthly mortgage insurance premiums, whether paid by the borrower or the lender.<sup>308</sup> Because upfront costs are generally the most important obstacle to households buying their first home, lowering upfront costs may have contributed to higher homeownership rates in recent years.<sup>309</sup> Financing monthly mortgage insurance premiums also lowers the after-tax cost of financing a home.

The flexible underwriting guidelines of Fannie Mae and Freddie Mac and their willingness to support niche mortgage products developed in the primary mortgage market expanded the menu of mortgage options from which homebuyers choose. The Enterprises' willingness to purchase niche products increases their liquidity, allowing lenders to originate significantly larger volumes. By supporting the development of new loan products<sup>310</sup> and

---

<sup>305</sup> Foust, D., "Reverse Mortgages Shift Into High Gear," *Business Week*, August 11, 1997.

<sup>306</sup> The smaller the downpayment made by a mortgage borrower, the higher the LTV ratio of the loan. A recent U.S. Department of Housing and Urban Development study noted that the Enterprises have been increasing their purchases of single-family mortgages with downpayments of less than five percent. Specifically, between 1997 and 2000, loans with over 95 percent LTV loans increased from 1.1 percent to 5.9 percent of Freddie Mac's purchases. At Fannie Mae, the share of such loans increased from 3.3 percent to 4.4 percent of purchases. Bunce, H. *The GSE's Funding of Affordable Loans: A 2000 Update*, (Washington, DC: U.S. Department of Housing and Urban Development, Working Paper No. HF-013, April 2002), at 36. Available online at <http://www.huduser.org/publications/hsgfin/workpap13.html>

<sup>307</sup> For a discussion of how financial innovation in the mortgage industry has allowed lenders to offer tailor-made loan products to meet borrower's needs, see Lea, M.J., "Innovation and the Cost of Mortgage Credit: A Historical Perspective," *Housing Policy Debate*, Vol. 7 (1)(1996), 147-174.

<sup>308</sup> Fannie Mae, *Selling Guide*, "Financed Borrower-Purchased Mortgage Insurance," Part V, 101.02," and "Lender Purchased Mortgage Insurance," Part V, 101.03; and Freddie Mac, *Seller/Service Guide*, Volume 1, 27.1.1: "Mortgage Insurance Premiums."

<sup>309</sup> For a discussion of factors contributing to higher homeownership rate, see Hughes, James W., "Economic Shifts and the Changing Homeownership Trajectory," *Housing Policy Debate*, Vol. 7 (2), 1996, 293-325.

<sup>310</sup> Fannie Mae offers several flexible mortgage options, including Community 97, a low downpayment mortgage with flexible credit options; Community 100, a zero downpayment mortgage designed for borrowers with good credit; and Community 100 Plus, a more aggressive zero downpayment mortgage with flexible credit guidelines for borrowers with limited cash resources. See "Affordable Housing Solutions," Fannie Mae, available online at <http://www.fanniemae.com/housingcommdev/solutions/mcm.jhtml?p=Affordable%20Housing%20&%20Community%20Development>. Among the products available at Freddie Mac are Affordable Gold 5, which allows a 5 percent down payment from the borrower that can come from a variety of borrower assets, including Individual Development Accounts; Affordable Gold 3/2, a product that combines a 95 percent LTV ratio with just 3 percent of the downpayment coming from borrower funds, with the other 2 percent of the downpayment coming from other sources, including grants and unsecured loans from government agencies, nonprofit organizations, or other eligible sources; and Affordable Gold 97, a product that allows an LTV ratio of up to 97 percent, under which borrowers

collaborating with community groups nationwide, Fannie Mae and Freddie Mac increase the ability to finance a home for populations traditionally underserved by the housing finance system. For example, the Enterprises have actively sought to purchase mortgages for properties located on Native American tribal and tribal trust lands.<sup>311</sup> Fannie Mae launched an initiative to promote affordable housing in the “colonias” along the U.S. border with Mexico through the purchase of mortgages.<sup>312</sup>

The development of the Enterprises’ automated underwriting systems—Freddie Mac’s *Loan Prospector* and Fannie Mae’s *Desktop Underwriter*—in the 1990s made the process of obtaining a single-family mortgage faster and more convenient and expanded borrower choice of loan products and terms. By streamlining the mortgage loan application and review process, those systems lower transaction costs.<sup>313</sup>

Fannie Mae and Freddie Mac reduce the cost of mortgage financing by integrating local and regional markets for conforming, fixed-rate mortgages with the capital markets, lowering the interest rates on those loans, increasing competition among mortgage lenders, and increasing the ability of prospective borrowers to qualify for loans and afford to buy homes. Thus, it is likely that the level of housing activity and the homeownership rate in the U.S. are higher than they would be in the absence of the Enterprises.

There are arguments, however, that those effects may be modest. First, there is uncertainty about the size of the reduction in the yields on conforming, fixed-rate mortgages and about the proportion of that reduction that results from the activities of Fannie Mae and Freddie Mac. Second, that reduction in mortgage rates has a relatively small effect on the cost of buying

---

only need a 3 percent down payment from borrower funds and can use a variety of sources to fund closing costs, financing costs, and prepaid expenses. See “Affordable Products,” Freddie Mac, available online at <http://www.freddie.mac.com/sell/expmkts/affprod.html>.

<sup>311</sup> See “Governor Judy Martz and Fannie Mae Announce \$400 Million Affordable Housing Success in First Year of Statewide Housing Plan and Creation of Native American Task Force as Part of Fannie Mae’s Commitment for Montana,” Fannie Mae News Release, October 26, 2001, available online at <http://www.fanniemae.com/newsreleases/2001/1597.jhtml>; and “Citizen Potawatomi Nation, Freddie Mac, and PMI Mortgage Insurance Company Announce \$5 Million Homeownership Initiative,” Freddie Mac News Release, November 16, 1998, available online at <http://www.freddie.mac.com/news/archives1998/cpnation.htm>.

<sup>312</sup> “Fannie Mae Announces Five-Year, \$1.5 Billion “House Border Region” Investment Plan to Finance Affordable Housing for 18,000 Families Living Along the Texas Border,” Fannie Mae News Release, November 16, 1999, available online at <http://www.fanniemae.com/newsreleases/1999/0542.jhtml>

<sup>313</sup> Mortech, LLC, “Mortech 99: The Analysis of Technology Use in the Mortgage Industry (Silver Spring, MD, 2000),” at 73.; and Office of Federal Housing Enterprises Oversight, *Annual Report to Congress* (Washington, D.C.: June 1995) at 5. One study suggests that automated underwriting makes identifying and processing low-risk mortgage borrowers less costly, but may not significantly lower the costs of identifying and processing relatively high-risk applicants. On that view, as the costs of identifying good credit risks are lowered, the potential grows for adverse selection against a mortgage securitizer. Passmore, S.W., and R. Sparks, “The Effect of Automated Underwriting on the Profitability of Mortgage Securitization,” *Finance and Economic Discussion Series*, Board of Governors of the Federal Reserve, FEDS Paper No. 97-14 (1997), 1-27; available online at <http://www.federalreserve.gov/pubs/feds/1997/199719/199719pap.pdf>. Critics of AUS maintain the systems may discriminate against certain minorities. A lawsuit filed September 12, 2002 in the United States District Court for the District of Columbia charged that the use of Desktop Underwriter by Fannie Mae violated the Fair Housing Act, the Equal Credit Opportunity Act and the Fair Credit Reporting Act. “Fannie Mae is Sued For Lending Practices Called Discriminatory,” *Wall Street Journal*, September 26, 2002, D2.

a home.<sup>314</sup> Third, it is arguable that most households whose costs of purchasing a home are reduced would eventually own and occupy their homes anyway. This implies that the main effect of the reduction in the interest rates on conforming, fixed-rate mortgages may be to enable such households to buy sooner and to create incentives for them to buy larger or more expensive homes.<sup>315</sup> Fourth, although the Enterprises have contributed to greater speed and efficiency of mortgage lending, the magnitude of the resulting increase in housing and homeownership is uncertain.

The diversion of funds to the housing sector accomplished by Fannie Mae and Freddie Mac indirectly raises the cost and presumably reduces the level of investment in other real sectors of the U.S. economy or other national economies.<sup>316</sup> The net effects of their activities on housing and other sectors determine the effect of the Enterprises on aggregate economic activity. The magnitude of each of those effects is quite difficult to quantify and the effect of Fannie Mae and Freddie Mac on aggregate economic activity is not clear.

Even if the increase in housing activity attributable to Fannie Mae and Freddie Mac's efforts is modest, the Enterprises' dominant position in the secondary mortgage market means that a sudden, large disruption or cessation of their mortgage purchases could result in mortgage rates rising and home sales and housing starts declining.

---

<sup>314</sup> A reduction of 25 basis points on a mortgage that would otherwise carry an interest rate of 8 percent is effectively a reduction of 2 to 2.5 percent in monthly payments on the loan. Those savings represent an even smaller percentage of the cost of buying the home if we take into account a) the after-tax effects, b) any increase in the selling price that may have occurred because of the seller's capitalization of part of the reduction in the interest rate, and c) the other costs of homeownership. For a similar example, see White, L.J., "Focusing on Fannie and Freddie: The Dilemmas of Reforming Housing Finance," (Stern School of Business, New York University, Working Paper EC-02-01, September 2001), available online at: <http://www.stern.nyu.edu/eco/wkpapers/workingpapers02/02-01White.pdf>.

<sup>315</sup> *Ibid.* Another recent study found that, although housing starts are sensitive to changes in mortgage rates, homeownership levels are not. See Painter, G., and C.L. Redfearn, "The Role of Interest Rates in Influencing Long-Run Homeownership Rates," *Journal of Real Estate Finance and Economics*, Vol. 25, No. 2 (2002), 243-267. See also Feldman, R.J., "Mortgage Rates, Homeownership Rates, and Government-Sponsored Enterprises," *The Region*, Federal Reserve Bank of Minneapolis, Vol. 16, No. 1 (April 2002), 5-23, available online at <http://minneapolisfed.org/pubs/region/02-04/2001ar.pdf>. The authors of a recent empirical analysis of the effects of HUD's affordable housing goals conclude that the analysis, though preliminary in nature, suggests that the goals help to make homeownership more affordable for target families. See Ambrose, B., T.G. Thibodeau, and K. Themkin, *An Analysis of the Effects of the GSE Affordable Goals on Low- and Moderate-Income Families* (prepared for the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, May 2002), available online at <http://www.huduser.org/publications/pdf/gsegoals.pdf>. See also, Goodman, J. and J. Nicholas, "Does FHA Increase Homeownership or Just Accelerate It?," *Journal of Housing Economics*, Vol.6, No.2 (June 1997), 184-202.

<sup>316</sup> For a discussion of the effects of federal actions that stimulate housing, see Mills, E.S., "Has the United States Overinvested in Housing?" *AREUEA Journal* 15 (Spring 1987a), 601-606; and Mills, E.S., "Dividing Up the Investment Pie: Have We Over-invested in Housing?" *Business Review* (Federal Reserve Bank of Philadelphia, March-April 1987b), 13-23.

<intentionally blank>

## CHAPTER FOUR: ASSESSING SYSTEMIC RISK

### Section One: Measuring Systemic Risk

Financial regulators and policymakers do not systematically quantify the systemic risk posed by the financial sector or the potential effect of individual financial institutions or markets on that risk. Measuring risk means estimating the probability of the occurrence of specific losses as a result of a specific type of event. Since systemic risk, as used in this report, is the possibility that a financial crisis will lead to substantial losses in aggregate economic output, economists would use macro-econometric models to measure that risk.

Unfortunately, current econometric models are not suited to measuring the potential effects of large financial institutions such as Fannie Mae and Freddie Mac on systemic risk. The typical econometric model represents the financial sector in a highly aggregated fashion, a manner that is ill designed to quantify explicitly the relationships between financial variables such as the supply of credit and interest rates on different types of financial assets and real variables such as output and employment.<sup>317</sup> That aggregation reflects the present state of macroeconomic theory, which generally “presumes that the financial system functions smoothly—and smoothly enough to justify abstracting from financial considerations.”<sup>318</sup> Moreover, data needed to estimate the interdependencies among financial institutions and markets are not available in the level of detail necessary to estimate such models.

A further obstacle to quantifying systemic risk is the inherent difficulty in using quantitative techniques to analyze catastrophic events such as wars and financial crises.<sup>319</sup> Such events are rare,<sup>320</sup> often involve significant departures from recent historical experience, and can develop from a potentially infinite set of conditions. Analysts generally do not model, simulate, or predict the course and consequences of unconditional financial crises, making it difficult to obtain a precise estimate of the likelihood of a specific level of economic losses resulting from potential financial crises. As a result, government officials who seek to plan for such events cannot rely on the usual quantitative techniques to evaluate alternative strategies for addressing them. At present, the empirical literature on banking and currency crises consists of case studies of specific crises.<sup>321</sup>

An admittedly imperfect, but increasingly popular, way to circumvent those limitations is to employ scenario analysis—the construction and elaboration of hypothetical, conditional scenarios without the use of econometric models. This is what military planners do with war

---

<sup>317</sup> For example, the model the Congressional Budget Office used to estimate the economic effects of the thrift crisis did not have a banking sector. See U.S. Congressional Budget Office, *The Economic Effects of the Savings & Loan Crisis*, *op. cit.*, 53-56 at 55.

<sup>318</sup> Gertler, *op. cit.*, 559.

<sup>319</sup> Summers, L.H., “Planning for the Next Financial Crisis,” in Feldstein, *op. cit.*, 135-158 at 135-136.

<sup>320</sup> Numerous banking, currency, and foreign debt crises have occurred around the world in the last two decades, but the U.S. has not experienced a systemic event since the Great Depression. See, for example, Schwartz, *op. cit.*, 25.

<sup>321</sup> See the literature summarized in De Bandt and Hartman, *op. cit.*, 36-44. For a discussion of difficulties in measuring and predicting the soundness or lack thereof of banking systems, see Lindgren, Garcia, and Saal, *op. cit.*, 10-19.

games.<sup>322</sup> Scenario analysis does not yield numerical estimates of the risk of specific adverse outcomes but generates insights into the potential functioning of the system in question under specific conditions of extreme stress.<sup>323</sup> As the Chairman of Royal/Dutch Shell, a leading pioneer of the technique, noted, “[s]cenarios are not predictions. They are a tool for focusing on critical uncertainties.... Those that rely on solely on forecasting in their thinking about the future can find the consequences very expensive.”<sup>324</sup>

Scenario analysis is a valuable way to analyze the potential effects on systemic risk of specific financial institutions or markets. What follows are scenario analyses attempting to arrive at reasoned conclusions about how, in particular types of stressful economic conditions, the financial health and activities of Fannie Mae and Freddie Mac can affect systemic risk.

---

<sup>322</sup> For a recent example of scenario analysis, see A. Cordesman, “An Attack on Iraq: The Military, Political, and Economic Consequences, A Background Paper on Risk Analysis and Scenarios,” (paper prepared for a conference on “After an Attack on Iraq: The Economic Consequences” hosted by the Center for Strategic and International Studies, November 12, 2002), available online at [http://www.csis.org/features/attackoniraq\\_backgroundcord.pdf](http://www.csis.org/features/attackoniraq_backgroundcord.pdf).

<sup>323</sup> PriceWaterhouseCoopers/Economist Intelligence Unit, “Taming Uncertainty: Risk Management for the Entire Enterprise” (July 2002), 21, available online at <http://www.pwcglobal.com/Extweb/pwcpublishations.nsf/docid/D6440ED83C1F8A5085256BF10049B2DE>.

<sup>324</sup> *Ibid.*, 20. Royal Dutch/Shell evidently used scenario planning originally to prepare for oil production and price shocks. See “Using Scenario Planning as a Weapon Against Uncertainty,” available online at <http://knowledge.wharton.upenn.edu/articles.cfm?catid=7&articleid=470>.

## Section Two: The Current Condition of the Enterprises

In order to place the hypothetical scenarios in a proper context, it is necessary to understand the Enterprises' current condition. The Enterprises are highly profitable and financially strong. Each Enterprise's after-tax rate of return on common equity (ROE) exceeded 20 percent from 1986 through 2001<sup>325</sup>—a period in which a moderate recession, significant fluctuations in interest rates, and periods of widespread turmoil in financial markets occurred.<sup>326</sup> Freddie Mac's ROE has exceeded 20 percent since 1981, when the economy was experiencing the most severe recession of the post-war period.<sup>327</sup> Each Enterprise maintains capital levels in excess of its regulatory capital requirements.<sup>328</sup> The Enterprises' risk-management practices are well designed and effective.<sup>329</sup>

Fannie Mae and Freddie Mac are subject to effective safety and soundness regulation. OFHEO conducts continual on-site examinations of each Enterprise that focus on the quality and effectiveness of board and management oversight, risk management practices, and internal controls. Fannie Mae and Freddie Mac are subject to a capital regime that includes: a minimum capital (leverage) requirement;<sup>330</sup> a risk-based capital requirement<sup>331</sup> that reflects each Enterprise's exposure to credit and interest rate risks, and is calculated based on projections of how each Enterprise's assets, liabilities and off-balance sheet obligations would perform during a simulated ten-year period of severe economic stress involving a high level of mortgage default losses and very large changes in interest rates,<sup>332</sup> and OFHEO's prompt supervisory responses

---

<sup>325</sup> For historical data on each Enterprise's return on equity, see appendix tables 3a and 13a, Office of Federal Housing Enterprise Oversight, *Mortgage Markets and the Enterprises in 2001*, *op. cit.*, 43 and 59, respectively.

<sup>326</sup> The National Bureau of Economic Research determined that the U.S. economy was in a moderate recession from July 1990 to March 1991. See [www.nber.org/cycles.html](http://www.nber.org/cycles.html). Contract mortgage interest rates, as reported by the Federal Housing Finance Board's Monthly Interest Rate Survey (MIRS), ranged from a high of 10.41 percent in January 1986 to a low of 6.56 percent in November 2001. See <http://fhfb.gov/MIRS/mirs.htm>. Financial market turmoil occurred following the stock market crash in October 1987, in the fall of 1998, and after the terrorist attacks of September 11, 2001. See the sources cited in footnotes 53, 54, and 55 to Chapter II and Committee on the Global Financial System, *A Review of Financial Market Developments in Autumn 1998* (Basel, Switzerland: Bank for International Settlements, October 1999), available online at <http://www.bis.org/publ/cgfs12.pdf>.

<sup>327</sup> See the National Bureau of Economic Research web site at: [www.nber.org/cycles.html](http://www.nber.org/cycles.html).

<sup>328</sup> Office of Federal Housing Enterprise Oversight, *op. cit.*, 36; and "OFHEO Announces First Official Classification of Fannie Mae and Freddie Mac Under Both Minimum and Risk-Based Capital Standards" (OFHEO News Release (December 30, 2002), available online at <http://www.ofheo.gov/docs/rbc/rbcresults123002.pdf>).

<sup>329</sup> OFHEO conducts comprehensive, annual risk-based examinations that assess the appropriateness and effectiveness of the policies and processes by which Fannie Mae and Freddie Mac manage risk. For a summary of the results and conclusions of OFHEO's 2001 examinations, see Office of Federal Housing Enterprise Oversight, *Report to Congress* (June 15, 2002), 17-63, available online at <http://www.ofheo.gov/reports/ar61402.pdf>.

<sup>330</sup> The OFHEO final rule implementing the minimum capital requirements was published in the Federal Register July 8, 1996 (61 FR 35620). The regulation is available online at <http://www.ofheo.gov/docs/regs/minicap.pdf>. For amendments to the rule, see the Federal Register of April 19, 2002 (67 FR 19321).

<sup>331</sup> The OFHEO rule implementing the risk-based capital standard was published in the *Federal Register* on September 13, 2001 (66 FR 47729) and is available online at <http://www.ofheo.gov/docs/regs/rbc.html>. Amendments to the rule were published in the *Federal Register* on March 15, 2002 (67 FR 11849); April 19, 2002 (67 FR 19321); and November 1, 2002 (67 FR 66533). Those documents are available online at <http://www.ofheo.gov/docs/regs/rbcamendfinal.pdf>, [http://www.ofheo.gov/docs/regs/rbc\\_ca41902.pdf](http://www.ofheo.gov/docs/regs/rbc_ca41902.pdf), and <http://www.ofheo.gov/docs/regs/rbcamendfinal11102.pdf>, respectively.

<sup>332</sup> As required by the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, OFHEO's risk-based capital standard requires each Enterprise to maintain sufficient total capital to maintain positive capital throughout a ten-year stress test in which: a) mortgage default losses and loss severities occur on a national basis at levels comparable to the worst historical mortgage-default loss experience in any region of the country, and 2)

and corrective actions<sup>333</sup> if the Director classified either Enterprise as undercapitalized. Further, OFHEO has the authority to intervene promptly in response to indicators that an Enterprise's risk is increasing, even absent a decline in capital,<sup>334</sup> as well as a broad array of other strong enforcement tools.

Like other government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac benefit from investors' perception that the federal government implicitly guarantees their obligations. That perception makes the Enterprises' funding costs less sensitive to deterioration in their financial condition than are the funding costs of non-GSEs and makes it less likely that, if they were to become undercapitalized, they would become illiquid.<sup>335</sup> Their liquidity is also strengthened by the nature of their assets, which are mostly prime single-family home mortgages. Their assets are more homogenous than most other types of loans and easier to value. Thus they likely could be used as collateral for substantial volumes of borrowing, if needed.

The economic benefits conveyed by government sponsorship give Fannie Mae and Freddie Mac a competitive advantage in their two principal lines of business—bearing the credit risk of and investing in residential mortgages—and provides the Enterprises with considerable insulation from competitive pressure on their earnings.

Those considerations do not establish, however, that Fannie Mae or Freddie Mac could never become insolvent<sup>336</sup> or illiquid,<sup>337</sup> only that the likelihood today of such an event is remote. Thus, it is reasonable to include these possibilities in the scenario analysis. Every firm—even one that has consistently been highly profitable, is well capitalized and highly liquid—has some probability of failure. Financial history is replete with stories of highly regarded firms that

---

interest rates increase by as much as 75 percent or decrease by as much as 50 per cent. Each Enterprise must maintain 1.3 times the amount of total capital necessary to survive the ten-year period, the additional 30 percent serving as a protection against management and operations risk. See the sources cited in footnote 4.

<sup>333</sup> The OFHEO final rule implementing prompt supervisory response and corrective action procedures was published in the *Federal Register* on January 25, 2002 (67 FR 3587), and is available online at <http://www.ofheo.gov/docs/regs/finalpsr.pdf>.

<sup>334</sup> *Ibid.*

<sup>335</sup> See U.S. General Accounting Office, *Government-Sponsored Enterprises: The Government's Exposure to Risks*, *op. cit.*, 85-89 at 86, 85. "... creditors do not react to deterioration in the financial condition of a GSE the same way they react to the deterioration of a private firm. Creditors have demanded a higher return when they learn of deterioration of a GSE's financial condition, but the GSEs have retained their AAA ratings, and creditors have continued to purchase debt securities even when the GSEs were in serious financial difficulties."

<sup>336</sup> A financial institution is insolvent if the net present value of its discounted future cash flows is negative. Insolvency occurs when: 1) the institution is mark-to-market insolvent (the market value of the institution's current on- and off-balance-sheet assets is less than the market value of its current liabilities, where those market values are measured assuming the institution is liquidated on a piecemeal basis that does not affect those values); and 2) the present value of the institution's expected future business is negative (or too small to make up the difference between the market values of the institution's liabilities and assets). Insolvency is synonymous with economic failure.

<sup>337</sup> See Poole, *op. cit.*, at 5: "I do not see any immediate risk of a GSE debt problem, but am not willing to assume that in different conditions in the future one could not occur. A judgment that there is *no* potential vulnerability seems to me to be unwarranted in light of the financial history of the United States and other countries."

faltered, became illiquid, and failed.<sup>338</sup> In fact, two GSEs—Fannie Mae and the Farm Credit System—had serious solvency problems in the 1980s. Even well-managed institutions and careful safety and soundness regulators tend to focus on those risks that historical experience suggests are potential sources of significant loss.<sup>339</sup> The future differs from the past in unexpected ways, and sometimes those differences can be great. The consequence is that unexpected events can cause institutions to suffer losses from exposures that neither they nor their regulators viewed as significant or of which few observers were even aware. Moreover, even the most diligent firms cannot fully assess the risks to which they are exposed.<sup>340</sup> Finally, the efforts of individuals who manage, audit, and regulate firms are not always successful and can sometimes contribute unintentionally to failure and the costs of failure.<sup>341</sup>

The markets for GSE debt did not become illiquid when the market value of Fannie Mae's assets was less than the market value of its liabilities in 1979 through 1984 or when the Farm Credit System suffered large losses in the 1980s.<sup>342</sup> The continued liquidity of those GSEs may have been due in part to a belief on the part of investors that each GSE's expected future business had a large, positive economic value.<sup>343</sup> Investors may also have been confident that the federal government would provide financial assistance to prevent a GSE from defaulting.<sup>344</sup> Investors may not always hold those views of the federal government, the Enterprises or other GSEs, however.<sup>345</sup> In addition, in the last fifteen to twenty years Fannie Mae and Freddie Mac have become much larger institutions,<sup>346</sup> their activities and risk management have become more

---

<sup>338</sup> Enron is a recent, well-publicized example. See also Bartholomew, P., and B. Gup, "The Decision to Close Banks: A Global View," in B. Gup, ed., *International Banking Crises: Large Scale Failures, Massive Government Intervention* (Westport, CT: Quorum Book, 1999), 204-220.

<sup>339</sup> See, for example, Sinkey, J.J., "Regulatory Attitudes Toward Risk," in Aspinwall, R.C., and R.A. Eisenbeis, *Handbook for Banking Strategy* (New York: John Wiley and Sons, 1985), 347-380.

<sup>340</sup> Firms have incomplete information about their indirect interdependencies. As a result, they cannot fully assess their risk exposures. See Hellwig, *op. cit.*, 730-731.

<sup>341</sup> For example, in an analysis of the 2001 failure of Superior Bank, the U.S. General Accounting Office said that, while an earlier response to concerns expressed in regulator examination reports may not have been sufficient to avoid the failure of the bank, it would likely have prevented subsequent growth and thus limited loss to the deposit insurance fund. U.S. General Accounting Office, *Bank Regulation: Analysis of the Failure of Superior Bank, FSB, Hinsdale, Illinois* (Washington, DC: Government Printing Office, February 2002), 2; available online at <http://www.gao.gov/new.items/d02419t.pdf>.

<sup>342</sup> For a discussion of the increase in the yields of the obligations of the Enterprises during that period, see U.S. General Accounting Office, *Government-Sponsored Enterprises: The Government's Exposure to Risks, op. cit.*, 85-89 at 85-86.

<sup>343</sup> However, two studies suggest that the value of Fannie Mae's expected future business was large enough in the late 1970s and early 1980s to give owners and managers an incentive to limit risk-taking. See Kane, E.J., and C. Foster, "Valuing and Eliminating Subsidies Associated with Conjectural Government Guarantees of FNMA Liabilities," (unpublished, May 1986), 3; and Van Order, R., and E. Schwartz, "Valuing the Implicit Federal Guarantee of the Federal National Mortgage Association," *Journal of Real Estate Finance and Economics*, Vol. 1 (1988), 23-34 at 28.

<sup>344</sup> See, for example, Ely, B. "Economic Implications of Debt Issued by Government-Sponsored Enterprises," Oral Statement to the Task Force on Housing and Infrastructure, House Committee on the Budget, July 25, 2000, 3, available online at <http://www.ely-co.com/reports/TESTIMON.HBC.PDF>.

<sup>345</sup> According to a 1992 study, "... GSE debtholders in the 1990s have a heightened sense that the taxpayers may not in the future be willing to underwrite additional GSE bailouts in the wake of a farm credit and two thrift bailouts." Cook, D.O., and Spellman, L.J., "Taxpayer Resistance, Guarantee Uncertainty, and Housing Finance Subsidies," *Journal of Real Estate Finance and Economics*, Vol. 5 (1992), 181-195 at 182.

<sup>346</sup> For historical data on the Enterprises assets' and outstanding MBS, see Office of Federal Housing Enterprise Oversight, *Mortgage Markets and the Enterprises in 2001, op. cit.*, Tables 4 and 14, at 44 and 60.

complex,<sup>347</sup> and financial markets have become more globalized.<sup>348</sup> Today, financial information is disseminated much more rapidly, and investors rebalance their portfolios in response to much smaller changes in financial market conditions and economic indicators.<sup>349</sup> Those changes and aspects of the government's relationship to the Enterprises suggest that it would be possible for the market for the debt of an Enterprise that had serious solvency problems to become illiquid.

The relevant aspects of the government's relationship to the Enterprises include:

1. The government has made no explicit commitment to protect investors in the Enterprises' debt and guaranteed MBS and has explicitly denied any legal responsibility to do so;
2. If an insolvent Enterprise became illiquid and exhausted its \$2.25 billion line of credit with the Treasury, an amount that arguably would be of no significance, there is no statutory provision that directly authorizes OFHEO, the Department of the Treasury, or another executive branch agency to provide additional resources to the Enterprise to prevent a default, and it is not clear how swiftly the Congress might act, if at all, to provide such authorization;
3. Neither the Enterprises' charters, nor the Federal Housing Enterprises Safety and Soundness Act of 1992, nor the federal bankruptcy statutes establish a means to resolve claims, in the event an Enterprise became insolvent and creditors were required to absorb losses; and,<sup>350</sup>
4. Although the Federal Reserve System may purchase the debt of or MBS guaranteed by an illiquid or insolvent Enterprise,<sup>351</sup> it does not have authority to reimburse an Enterprise's creditors for losses.

---

<sup>347</sup> Raines, F., "The Rise of Risk Management: The Challenge for Policymakers," Remarks at the FDIC Symposium *The Rise of Risk Management: Basel and Beyond*, New York, July 31, 2002; available online at <http://www.fanniemae.com/ir/speeches/2002/0731.jhtml?p=Investor+Relations&s=Speeches>

<sup>348</sup> Obstfeld, M. and A. Taylor, "Globalization and Capital Markets," paper prepared for the National Bureau of Economic Research *Globalization in Historical Perspective* conference, Santa Barbara, May 4-5, 2001, 5; available online at <http://www.nber.org/books/global/obstfeld-taylor3-12-02.pdf>

<sup>349</sup> Unger, L.S., "Electronic Trading Technology's Impact on Fixed Income Markets," Remarks of U.S. Securities and Exchange Commissioner Laura S. Unger, Bond Market Association, Fifth Annual Legal and Compliance Seminar, New York, NY, October 28, 1999; available online at <http://www.sec.gov/news/speech/speecharchive/1999/spch313.htm>.

<sup>350</sup> OFHEO does have the authority to appoint a conservatorship to manage the affairs of a critically undercapitalized Enterprise. That authority would be an important tool for OFHEO if an Enterprise faced severe financial difficulties.

<sup>351</sup> For a discussion of the legislative history of the Federal Reserve Act as it relates to discount window operations and open market operations, see Board of Governors of the Federal Reserve System, *Alternative Instruments for Open Market and Discount Window Operations*, *op. cit.*, 17.

### Section Three: The Scenarios

The three hypothetical scenarios that follow each assumes that financial conditions have deteriorated in such a way as to have specific effects on the Enterprises and other market participants. This section does not specify which, of the many different sets of conditions and adverse economic shocks that could have comparable effects, precede the deterioration in financial conditions assumed in each scenario. The first scenario assumes a change in the condition of some financial institutions, but not of the Enterprises. The second and third scenarios assume a change in the financial condition of one of the Enterprises. All three scenarios present developments in the financial sector following the changes in condition. Each scenario examines how public and private responses could influence how the hypothetical events affect the functioning of housing finance markets and the financial sector as a whole, and how deterioration in those markets and in the financial sector could affect the level of activity in the housing sector and the aggregate economy.

The three scenarios were selected as generic examples from a broad range of possibilities because they illustrate how the financial health of Fannie Mae and Freddie Mac, and the public and private responses to severe financial difficulties at an Enterprise, could affect the likelihood of macroeconomic losses. At present, the likelihood of either of the two scenarios in which an Enterprise experiences serious financial problems would occur is remote. OFHEO's strong regulatory program, the Enterprises' risk management, and market discipline provide substantial protection against such outcomes in all but quite unlikely circumstances. The low probability of the scenarios is not a shortcoming of the analysis, however. In analyzing how key financial institutions can affect systemic risk, the important issue is not the likelihood of the scenarios examined, but the magnitude of the potential adverse consequences.

#### Scenario #1: In a Period of Reduced Liquidity, the Enterprises Help to Mitigate Systemic Risk

**In Scenario #1, deterioration in economic conditions and a flight to quality in financial markets adversely affect the liquidity of many financial institutions and markets and lead to a reduction in lending and economic activity. Liquidity problems, however, do not become severely contagious. Scenario #1 is somewhat similar to, but more extreme than, events in the fall of 1998, when the Russian debt crisis was followed by a large increase in quality spreads in the markets for fixed-income securities—the differences between the yields on U.S. Treasury debt and the yields on comparable-maturity debt issued by corporate and other private borrowers. As in that episode, in Scenario #1 Fannie Mae and Freddie Mac remain solvent and liquid, continue to borrow at advantageous interest rates, and are a source of strength for firms that hold their debt and MBS, for housing finance markets, and for the economy.**

Initial Change in Financial Conditions. A deterioration in economic conditions leads to a sharp increase in the credit expenses of many financial institutions. Although many institutions are still profitable, a large number are losing money and develop solvency problems. The credit expenses of Fannie Mae and Freddie Mac increase only modestly, and each Enterprise remains

profitable and adequately capitalized. As a result of the change in economic conditions and the solvency problems of many financial institutions, investors become much less willing to bear risk.

Subsequent Developments in the Financial Sector. There is a widespread sell-off of obligations perceived to pose greater credit and liquidity risk and a large increase in demand for lower-risk obligations. Quality spreads widen significantly. As quality spreads widen, some financial institutions with solvency problems find they cannot borrow at acceptable interest rates and begin to shrink their balance sheets. The combination of solvency and liquidity problems causes a few institutions, including a few large ones, to fail. Banks and other financial institutions tighten their lending standards, and the volume of new lending and investment declines.

The continued profitability and solvency of Fannie Mae and Freddie Mac and perception of an implicit federal guarantee of their obligations contribute to continued investor confidence in the credit quality and liquidity of the Enterprises' debt. Fixed-income investors perceive the credit risk of Fannie Mae and Freddie Mac to be relatively close to that of the U.S. Treasury, and the flight to quality is accompanied by continued strong demand for the Enterprises' debt securities. As a result, the widening of the spreads between Treasury yields and those of debt issued by Fannie Mae and Freddie Mac is much less than the increase in quality spreads for debt issued by non-GSEs. For similar reasons, the quality spreads of MBS guaranteed by the Enterprises widen much less than the quality spreads of non-GSE MBS. Banks and other financial institutions with solvency problems that hold Enterprise debt and MBS are able to liquidate those holdings with minimal losses or, in some cases, with gains, which reduces their need to borrow at a time when investors require higher yields on their debt.

Private and Public Responses and Their Effects on the Financial Sector. The financial sector remains stable during Scenario #1, and neither the private nor the public sectors take extraordinary actions. The federal banking regulators intervene in the affairs of banks and thrifts that become undercapitalized or experience liquidity problems. Depositories' holdings of Fannie Mae and Freddie Mac debt and MBS remain a ready source of liquidity, and the banking regulators may have more time to address the financial difficulties of some problem institutions. Liquidity problems are not severely contagious, policy makers and financial regulators may not need to take extraordinary actions to reassure market participants that there will be adequate liquidity in the financial sector, or are successful if they do.

Effects on Economic Activity. Fannie Mae and Freddie Mac remain solvent and liquid, they continue to purchase and securitize conforming mortgages throughout Scenario #1. By increasing liquidity available to depository institutions, the Enterprises' activities help to mitigate the systemic risk they pose. The activities of Fannie Mae and Freddie Mac also benefit both the housing sector and the aggregate economy. Whether housing activity actually increases depends in part on what happens to the yields of U.S. Treasury securities and in part on the severity of problems elsewhere in the financial sector and the economy.

If Treasury yields decline significantly in Scenario #1, as occurred in the fall of 1998 following the Russian default,<sup>352</sup> the decline could more than offset the rise in the quality spreads of Fannie Mae and Freddie Mac debt and MBS. In that event, the yields of conforming, fixed-rate mortgages (FRMs) in the primary market fall, which can increase originations, especially of refinance loans, and boost activity in markets for homes financed with those mortgages.<sup>353</sup> The increase in the quality spreads of non-GSE MBS is much greater, and it is unlikely that a reduction in Treasury yields offsets that increase and leads to a rise in originations of jumbo or subprime mortgages. If Treasury yields increase, originations of all types of single-family mortgages and activity in all segments of the housing sector decline. The decline in originations is smaller for the types of mortgages financed by Fannie Mae and Freddie Mac, since the increase in the quality spreads of Enterprise debt and MBSs is smaller. For that reason, there is less of a decline in new construction or sales of homes financed with those loans.

Scenario #2: One Enterprise Develops Serious Solvency Problems But Remains Liquid, There are Few Adverse Economic Effects, and No Systemic Event Occurs

**In Scenario #2, Enterprise A unexpectedly reports large losses that lead OFHEO to classify it as significantly undercapitalized, whereas Enterprise B and other financial institutions are solvent and healthy.<sup>354</sup> The funding costs of Enterprise A increase, but investors believe it is viable, and it remains liquid, although it may need to curtail its activities in the short run. Whether mortgage interest rates, the volume of mortgage originations, or housing activity are adversely affected depends on the ability of Enterprise B and other housing finance institutions to increase their business activity quickly and smoothly. OFHEO's supervision of the safety and soundness of Fannie Mae and Freddie Mac is the most important public response to the significantly undercapitalized Enterprise's solvency problems. The functioning of the financial sector is not disrupted, and no systemic event occurs.**

---

<sup>352</sup> Russia devalued the ruble and effectively defaulted on August 17, 1998. Between mid-August and the first week of October 1998, yields on 7- and 10-year Treasury debt declined by more than 1 percentage point. See Board of Governors of the Federal Reserve System, *Federal Reserve Statistical Release H-15, Selected Interest Rates, Historical Data*, available online at <http://www.federalreserve.gov/releases/h15/data.htm>.

<sup>353</sup> On the inverse relationship between mortgage rates and housing activity, see, for example, Pozdena, R.J., *The Modern Economics of Housing* (New York, NY: Quorum Books, 1988), 160-162.

<sup>354</sup> The Federal Housing Enterprises Financial Safety and Soundness Act of 1992 requires OFHEO to classify each Enterprise at least quarterly into one of four capital classifications (“adequately capitalized,” “undercapitalized,” “significantly undercapitalized,” and “critically undercapitalized”) based on the level of capital maintained by that Enterprise. For that purpose, OFHEO assess each Enterprise’s capital with reference to minimum and risk-based capital standards. The minimum capital standard is based on ratios between core capital instruments and on-balance sheet assets and off-balance sheet obligations. The 1992 Act provides for a “minimum capital” level based on those ratios and a “critical capital” level based on lower ratios. The risk-based capital standard requires the Enterprises to maintain sufficient total capital to maintain a positive capital position during a hypothetical ten-year stress period characterized by statutorily prescribed stressful credit conditions and large movements in interest rates, plus an additional amount to cover management and operations risk. The 1992 Act requires OFHEO to classify Fannie Mae or Freddie Mac as “significantly undercapitalized” if the Enterprise does not maintain an amount of core capital that is equal to or exceeds the minimum capital level established for the Enterprise, but does maintain an amount of core capital that is equal to or exceeds the critical capital level established for the Enterprise.

Initial Change in Financial Conditions. Enterprise A unexpectedly reports sizable losses resulting from an internal cause such as major fraud or a serious failure in risk management. The losses are large enough for OFHEO to classify Enterprise A as significantly undercapitalized. There is no change in the profitability of Enterprise B, which remains adequately capitalized. Other financial institutions remain healthy.

Subsequent Developments in the Financial Sector. The quality spreads of the debt and guaranteed MBS of Enterprise A increase, reflecting heightened uncertainty about its solvency and economic viability. The rise in quality spreads is a bit larger for the Enterprise's subordinated debt than for its senior debt. Investors in Enterprise A's MBS have access to the mortgage collateral in the event of default, and the quality spreads of those securities rise less than the quality spreads of Enterprise A's senior debt. The increases in both are not very large, however, and Enterprise A's obligations remain liquid. Investors believe that Enterprise A will be able to manage risk appropriately, conduct new business activities, return to profitability, and rebuild its capital, although perhaps not immediately.<sup>355</sup> Changes in the quality spreads of the obligations of Enterprise B, which quickly differentiates itself in the market's eyes from Enterprise A, are small and transitory. The differential in the two Enterprises' borrowing costs gives Enterprise B a competitive advantage in purchasing mortgages, leading to a reduction in the new business of Enterprise A.<sup>356</sup>

Private and Public Responses and Their Effects on the Financial Sector. The private sector's response to the financial difficulties of Enterprise A determine how Scenario #2 affects mortgage rates and the volume of mortgage lending. Whether Enterprise B expands its activities quickly in response to the reduction in Enterprise A's mortgage purchases depends on two factors: 1) how fast the Enterprise raises additional capital, renegotiates agreements with customers as needed, and resolves any operational problems; and 2) whether originators that normally sell to Enterprise A can easily switch their business volumes to Enterprise B. As noted above, 2001 sales of conventional single-family mortgages to Fannie Mae and Freddie Mac by lenders that were among the top 10 originators of such loans comprised nearly one-half of their conventional originations. The sudden, large reduction in the business volume of Enterprise A in Scenario #2 requires several large single-family lenders to shift a sizable proportion of their business volume to Enterprise B.

In most cases, the top 10 lenders that are large customers of Enterprise A also sell single-family mortgages to Enterprise B. In those cases, shifting new business to Enterprise B is not operationally difficult and may not require renegotiating master commitment agreements. However, some large originators, and many medium-sized and small ones, sell most of the conventional mortgages they originate only to Enterprise A. They will need to negotiate an arrangement with Enterprise B. Enterprise B may require some time to negotiate agreements with many new lenders and renegotiate its existing agreements with some large customers.

---

<sup>355</sup> This more or less occurred in the early 1980s when the quality spreads of short-term Fannie Mae debt reached only 2 percentage points at their peak, despite the fact that the Enterprise was mark-to-market insolvent. See U.S. General Accounting Office, *Government-Sponsored Enterprises: The Government's Exposure to Risks, op.cit.*, 88, Figure 3.1.

<sup>356</sup> In recent years Fannie Mae and Freddie Mac have each purchased significant amounts of MBS guaranteed by the other Enterprise. Scenario #2 assumes that Enterprise B's purchases of Enterprise A's MBS are not large enough to affect significantly the yields of those securities.

The flexibility inherent in wholesale mortgage lending that involves mortgage brokers enhances the housing finance system's ability to adjust quickly to a reduction in the business volume of Enterprise A.<sup>357</sup> In recent years brokers have been the source of over one-quarter of single-family mortgage originations.<sup>358</sup> Brokers generally maintain relationships with multiple wholesalers and may be able to easily direct prospective applicants to lenders that have established relationships with Enterprise B. If that process works smoothly, mortgage interest rates and the volume of mortgage originations are not significantly affected by the financial difficulties of Enterprise A. In addition, if Enterprise B does not expand its activities quickly, private-label conduits and depository institutions may achieve a large increase in the volume of originations they finance, perhaps through an increase in their borrowing from the Federal Home Loan Banks. Expansion of their activities may also limit the effect of Scenario #2 on mortgage rates and originations.

Enterprise A's losses are borne by its shareholders and those investors in its debt and MBS that liquidate their positions when quality spreads on those obligations are elevated. In addition, the shareholders of Enterprise B and other housing finance institutions gain from the profits generated by the increase in the volume of mortgages purchased and securitized during the period in which Enterprise A is significantly undercapitalized and has higher funding costs.

In summary, if firms in the primary market shift their business to Enterprise B quickly and smoothly and the latter easily accommodates the increase in purchase volume, or if depository institutions (perhaps with the help of the Federal Home Loan Banks) and private-label conduits are able to increase their activities quickly, mortgage interest rates and the volume of mortgage originations are relatively unchanged. If not, mortgage rates rise and originations decline. Those adverse effects are likely to be small, however, as many firms are competing to expand their business in response to Enterprise A's difficulties. If Scenario #2 occurs during a period of relatively high interest rates and low origination volume, the adverse effects are even more likely to be small.

OFHEO is the only federal agency that figures prominently in Scenario #2. OFHEO requires and then reviews the capital restoration plan submitted by Enterprise A, supervises the implementation of the plan it approves, and assures that both Enterprises operate safely while Enterprise A rebuilds its capital and Enterprise B purchases and securitizes a greater volume of mortgages and develops business relationships with new lenders.

Effects on Economic Activity. If housing finance markets adjust quickly and easily to the reduction in the mortgage purchases of Enterprise A, so that mortgage interest rates and the volume of mortgage originations are little changed, Scenario #2 does not affect sales of single-family homes or housing starts significantly. On the other hand, if mortgage rates increase and originations drop, housing activity also falls, at least for a short period. Any decline is modest.

---

<sup>357</sup> In wholesale mortgage lending, two or more firms are involved in the origination process. Brokers introduce applicants to lenders that operate as wholesalers, take applications, and perform most of their processing. Wholesalers complete any remaining processing, underwrite the applications, and provide funds that brokers need to close approved loans. Wholesalers also buy closed loans from correspondent lenders.

<sup>358</sup> Thompson Financial Media, *op. cit.*, I-2.

Enterprise A remains liquid, there is no disruption in the functioning of the financial sector, and no systemic event occurs.

### Scenario #3: One Enterprise Suffers Large Losses and Becomes Illiquid and a Systemic Event Results

**In Scenario #3 Enterprise A unexpectedly incurs large losses. Some other financial institutions are also in a weakened position. Investors generally do not believe Enterprise A is viable and are uncertain about whether it will default, about the size of any credit losses they may incur, and about the future liquidity of its debt. That uncertainty leads to widespread selling of Enterprise A's debt as well as a large decline in the market prices of its MBS.**

**Scenario #3 may unfold in different ways that have significantly different consequences for economic activity. How the scenario develops depends largely on 1) how the private and public sectors respond to the sell-off in the markets for Enterprise A's obligations and 2) the financial health of Enterprise B.**

**In some circumstances, investors—including Enterprise B—may respond to falling prices of Enterprise A's MBS and debt by purchasing those obligations, in which case their prices remain depressed but do not collapse and the risk to the banking system is limited. Although Enterprise A is no longer able to compete for new business, if Enterprise B is financially healthy and can convince investors of that fact, the housing finance system may adjust quickly and absorb Enterprise A's business volume with slightly higher mortgage rates, without any major adverse effects on housing activity. In that case, no systemic event occurs in Scenario #3, as in Scenario #2. On the other hand, if Enterprise B cannot expand its activities quickly, a significant short-term decline in mortgage lending, home sales, and housing starts occurs, contributing to problems elsewhere in the economy and increasing the likelihood of macroeconomic losses.**

**In other circumstances, the sell-off of Enterprise A's debt becomes a panic, so that trading in those obligations virtually ceases, at least for a time. The market for Enterprise A's MBS is somewhat less affected because those securities are backed by mortgage collateral. Illiquidity in the market for Enterprise A's debt and the plunge in the market value of its MBS exacerbate liquidity problems at many banks and thrifts. Those problems increase the risk of contagious illiquidity spreading through the banking system, the markets for the obligations of other GSEs, and the financial sector as a whole, adversely affecting the U.S. and the global economy. In that worst case, the federal government faces difficult choices. Actions to bolster the liquidity of the market for Enterprise A's debt, while reducing systemic risk and protecting the economy in the short run, may cause other problems or prove to be inadequate. If the government does not prevent a financial crisis, the potential decline in aggregate economic activity may be very large.**

Initial Change in Financial Conditions. As discussed above, OFHEO's oversight of Fannie Mae and Freddie Mac, Enterprise risk management, and market discipline of the Enterprises make the likelihood of extremely adverse scenarios remote. However, it is useful to consider outcomes that could occur if unforeseen events transpired. Therefore, Scenario #3 assumes that rapid changes in economic and financial conditions, an unexpected operational or other event coupled with mistakes and other misfortunes, cause the market value of Enterprise A's assets and off-balance sheet obligations to decline relative to the market value of its liabilities to an extent that raises doubts about the Enterprise's ability to recover. Some other financial institutions have also incurred large market-value losses and have solvency problems.

Subsequent Developments in the Financial Sector. Many market participants have strong doubts about the viability of Enterprise A. Investors in Enterprise A's debt and MBS are aware that federal law neither creates an explicit legal obligation for the government to provide financial assistance to the Enterprise nor provides budgetary resources or establishes a process for doing so. In addition, there is an awareness that the government does not always act consistently when confronted by situations in which it could provide financial assistance to affected parties.<sup>359</sup> Those considerations create some uncertainty about whether Enterprise A will default, the potential credit losses that investors in its debt would incur if it defaulted, and whether that debt will remain liquid.

In this scenario those uncertainties lead to widespread selling of Enterprise A's debt. As the prices of those securities fall and their yields rise, more and more investors try to liquidate their positions before the market becomes illiquid and they can no longer do so. At the same time, the quality spreads of MBS guaranteed by Enterprise A increase much more than in Scenario #2, and bid-ask spreads in the market for those obligations widen sharply, indicating a significant reduction in liquidity. The market for Enterprise A's MBS is less likely to become illiquid than the market for its debt, however, as investors generally believe that, in the event of a default by Enterprise A, they would not incur large credit losses because the MBS are backed by mortgage collateral.

Private and Public Responses and Their Effects on the Financial Sector. How other private financial institutions and the federal government respond to a rapid decline in the liquidity of Enterprise A's debt and MBS are crucial to the course of Scenario #3. Market participants that are very confident that the government will ultimately protect investors in GSE obligations against loss or that are confident that any credit losses on Enterprise debt and MBS will be small, may respond by buying Enterprise A's debt and MBS at bargain prices. If Enterprise B is financially strong and able to borrow at reasonable rates, it may buy large amounts of Enterprise A's MBS, taking advantage of the widening in the quality spreads of those obligations. Significant purchases of Enterprise A's debt and MBS could bolster the liquidity of those securities and limit losses to investors in those obligations and adverse effects on the liquidity of depository institutions. Rapid expansion of Enterprise B's secondary mortgage market purchases could limit damage to the housing sector, mortgage lenders, and other housing finance businesses.

---

<sup>359</sup> For example, the government has not acted to protect participants in Enron's employee pension fund, after taking such actions in the case of the pension funds of failed steel companies.

The outcome would be very different under Scenario #3 if the market for the debt of Enterprise A becomes and remains illiquid. Enterprise A cancels its scheduled debt offerings and indicates that it is temporarily suspending all new purchase commitments and ceasing all purchases of MBS. The large increase in the quality spreads of Enterprise A's MBS means that it cannot compete with Enterprise B or the most efficient depository institutions and private-label conduits in financing and securitizing conforming mortgages.

Financial institutions that hold Enterprise A's debt and, to some extent, its MBS can no longer rely on those securities as a ready source of liquidity. The illiquidity of Enterprise A's debt, and the possibility of investors in that debt and that Enterprise's MBS incurring credit losses in the event of a default, lead to spikes in the yields of the uninsured deposits of and interbank loans to many depository institutions whose holdings of GSE obligations are large relative to their capital. Even institutions that do *not* hold large amounts of the obligations of Enterprise A are affected. Data on individual institution's holdings of the debt and MBS of specific GSEs are not publicly available. Market participants cannot readily distinguish institutions that hold large amounts of Enterprise A's debt and MBS from those that hold primarily or exclusively the obligations of other GSEs. Thus, there is heightened uncertainty about the liquidity of *all* depositories whose holdings of GSE debt and MBS are large relative to their equity capital, and over sixty percent of all commercial banks, and a significant number of larger banks, experience a sudden, large increase in their marginal funding costs.<sup>360</sup> The spike in funding costs worsens the solvency problems of the subset of those institutions that had recently incurred sizable losses.

Banks and thrifts whose holdings of Enterprise A's debt and MBS are small relative to their equity quickly publicize the composition of their portfolios of GSE obligations. The yields on the uninsured deposits and interbank loans of many of those institutions fall to levels close to those they paid before Enterprise A experienced financial difficulties. Liquidity problems are now concentrated at those banks and thrifts whose holdings of Enterprise A's debt and MBS are large relative to their capital. Market participants and financial regulators are concerned that a vicious circle may develop in which a large number of those institutions report declines in their net income, have to pay even higher yields on new borrowings, experience losses that create solvency problems, and become illiquid. If a very large bank or a sufficient number of smaller banks become illiquid, there could be a general decline in liquidity in the interbank loan market, which could lead to a breakdown of payment and settlement systems and a disruption in the functioning of the financial sector.

Other creditors of Enterprise A may experience difficulties as well. No federal statute or regulation establishes the priority of claimants among an Enterprise's creditors or provides a process for allocating losses among creditors in the event of a default. Market participants are uncertain about the potential severity of the losses specific investors would incur if Enterprise A

---

<sup>360</sup> Those estimates were calculated from data from the Federal Deposit Insurance Corporation, and reflect OFHEO's estimates that at year-end 2001 over 4,800 commercial banks—over sixty percent of the institutions in the banking industry—held GSE debt in excess of 50 percent of their equity capital. Nearly sixty percent of those banks have less than \$100 million in assets; over ninety-seven percent have assets of less than \$1 billion. Of banks with assets of more than \$1 billion, 123 institutions—over 30 percent of banks of that size—owned GSE debt in excess of 50 percent of their equity capital. See Tables Three and Four above.

defaulted. The proportion of Enterprise A's assets that are mortgages and the fact that its MBS are backed by mortgage collateral would keep the average loss rate of investors low. However, the total dollar amount of the Enterprise's losses could be substantial and distributed unevenly among different classes of investors.

Among those financial institutions exposed to Enterprise A are derivatives counterparties whose contracts with that Enterprise have a positive market value. The magnitude of each counterparty's loss would depend on the size of its credit exposure to Enterprise A and the severity of a default by Enterprise A. Under some circumstances, such losses could significantly impair the capital of some counterparties. For example, assume interest rates in Scenario #3 moved in favor of many of Enterprise A's counterparties, so that their positions had a positive market value. Also assume that Enterprise A defaulted and each of those counterparties incurred losses equal to 5 percent of the notional amount of its outstanding derivatives contracts with that Enterprise.<sup>361</sup> In that event, year-end 2000 data suggest that the credit losses of most of Enterprise A's major counterparties would be less than 4 percent of their equity. Other major counterparties however, would incur credit losses equal to 15 percent to 30 percent of their equity.<sup>362</sup>

All of the largest derivatives counterparties of Fannie Mae and Freddie Mac are major securities dealers and commercial banks or subsidiaries thereof.<sup>363</sup> If any of those firms incurred credit losses that were large relative to their equity as a result of a default by Enterprise A, they could experience solvency problems. Even if Enterprise A did not default, perceptions that the risk of a default was higher and uncertainty about how a default could affect the solvency and liquidity of the major derivatives dealers could lead to a temporary spike in the borrowing costs of all of them. They would all be adversely affected, at least initially, because information about the relationship of Fannie Mae and Freddie Mac to each of their derivatives counterparties is not publicly available. The spike in funding costs could be short-lived for those institutions that publicized the details of their exposure to the defaulted Enterprise and the credit losses they incurred. For others, the increase could persist, lowering their earnings and perhaps contributing to liquidity problems.

The adverse effects of Scenario #3 on broader financial markets unfold quickly. Observing the illiquidity of Enterprise A's debt, the possibility of credit losses on those obligations, and the effects on financial institutions that hold such debt, many investors become less willing to hold debt and other fixed-income obligations perceived to pose a significant degree of credit risk and liquidity risk. The demand for U.S. Treasury securities increases significantly, and the demand for higher-risk obligations declines, raising quality spreads for all non-Treasury issuers. Quality spreads for Enterprise B and other GSEs rise because of increased uncertainty about the perceived federal guarantee of their obligations. Enterprise B also suffers from contagion to the extent it cannot convince investors that it does not suffer from difficulties

---

<sup>361</sup> A dealer could incur that level of loss if, for example, its exposure to an Enterprise had a positive market value equal to 20 percent of the notional amount of outstanding derivatives contracts between the two institutions, the Enterprise defaulted, and the dealer suffered a loss equal to 25 percent of the market value of the position.

<sup>362</sup> Those estimates reflect the notional amounts of the outstanding derivatives contracts of Fannie Mae and Freddie Mac with their largest counterparties, and the equity capital of those other firms, at year-end 2000.

<sup>363</sup> Schinasi, *et al.*, *op. cit.*, 10-12.

similar to Enterprise A's.<sup>364</sup> Those developments substantially reduce the desirability of all GSE debt, not just that of Enterprise A, as suitable instruments for use in hedging or as collateral for repurchase agreements, further reducing liquidity in financial markets. Foreign investors, especially monetary authorities, seek to sell their GSE obligations, and dollar-denominated assets generally, which causes a decline in the dollar's exchange-rate value and higher interest rates in the U.S. than would otherwise be the case.

If the yields on Treasury securities and other interest rates change markedly during Scenario #3, the interest rate risk exposures of the Enterprises may increase materially. In that event, some derivatives dealers may not write new contracts with Enterprise A, or do so only if that Enterprise agrees to post high-quality, liquid collateral to cover any increases in the market value of the dealer's position. Thus, Enterprise A may face a difficult choice between not buying new hedges, which saves money in the short run but may worsen its solvency problems and make its debt and MBS even less liquid, or buying the hedges and running the risk that further movements in interest rates may require it to post collateral that depletes its liquidity portfolio. Market turmoil and increased interest rate volatility may raise the costs of new hedges substantially.

As in Scenario #2, how Enterprise B and other sources of mortgage financing respond to Enterprise A's unexpected cessation of new commitments to purchase and securitize mortgages (and, potentially, decision not to honor outstanding purchase commitments) affects the volume of lending in the primary mortgage market in Scenario #3. Even if Enterprise B is financially healthy, several considerations suggest that it may be less able to expand its activities quickly than in Scenario #2. First, the disruption in the relationships between Enterprise A and lenders is more serious. Second, the solvency and liquidity problems of some banks and thrifts could limit the volume of newly originated mortgages they could fund with newly issued liabilities. Third, the increase in the quality spreads of Enterprise B's debt, the increase in its hedging costs, and a decrease in its stock price all discourage expansion. If Enterprise B experiences any of the financial difficulties that initially affected Enterprise A, its ability to expand its activities is even more limited. The risk of an increase in mortgage rates and decline in mortgage lending is clearly much greater than in Scenario #2.

Whether all those events occur may depend significantly on policy responses by the federal government. OFHEO's primary responsibility is to take steps to limit Enterprise A's losses and to minimize, to the extent possible, collateral damage to Enterprise B. If the agency has not already done so, OFHEO may wish to take greater control of Enterprise A's activities by means of a written agreement, by a temporary cease and desist order utilizing broad remedial action authority, by downgrading the Enterprise's capital classification to significantly undercapitalized (triggering broad prompt corrective action authorities), by placing the Enterprise in conservatorship, or some combination of the above. OFHEO would also need to determine whether the goal of its actions was to wind down Enterprise A's positions as quickly as possible or to attempt to stabilize Enterprise A so that it could ultimately return to performing its public mission. At the same time, OFHEO would need to scrutinize Enterprise B's activities

---

<sup>364</sup> See Poole, *op. cit.*: "No one should underestimate the potential importance of the ambiguity over the financial status of the GSEs. It is not sufficient for any single GSE to argue that its own financial situation is sound. If one GSE comes under a cloud, others may also."

carefully in light of the less liquid, more volatile financial environment and that Enterprise's potential incentive to expand rapidly to assume some of Enterprise A's functions. OFHEO might also be able to assist financial markets by ensuring that detailed, accurate information about each Enterprise's financial condition was available at all times.

Financial market participants are likely to look to Congress and the Department of the Treasury for explicit statements of intent to protect investors in Enterprise A's debt and MBS from credit losses. Such affirmations might be made quickly. However, Congress could be in recess; could be concerned about the magnitude of the cost of such assistance, particularly if Scenario #3 occurred at a time of large budget deficits that could be viewed as contributing to the underlying financial market problems; or could be concerned about the consequences for market discipline of other firms that market participants might consider to be "too-big-to-fail." Resolution of those issues, including what, if any, form of assistance to provide and the completeness of coverage of losses, might take time. In the meanwhile, the Treasury could lend either Enterprise A as much as \$2.25 billion if asked to do so by the Enterprise. Given the size of the Enterprises, those amounts might not have much effect on their liquidity.

In the short run, a heavy burden of decision might fall on the Federal Reserve System, which has broad authority to purchase the securities of or, in certain circumstances, to make a loan to a GSE. In taking any of those actions, the Federal Reserve could be concerned about the precedent that it would create, the risk that Enterprise A's condition might deteriorate further, and potential complications for the conduct of monetary policy in an already very difficult financial environment.

Those potential government actions might well be sufficient to prevent a financial crisis. Nonetheless, their success cannot be definitively assured.

Effects on Economic Activity. The range of potential economic effects of Scenario #3 is quite broad. The best case is a modest but short-lived decline in housing activity and no substantial decline in consumption, output, and employment. That outcome occurs if Enterprise B is financially strong and, along with large investors, responds to large increases in the quality spreads of Enterprise A's MBS by buying those obligations in sizable amounts, while other investors buy sufficient quantities of Enterprise A's debt to stabilize the market for those securities. Such purchases hold down mortgage rates and reduce the severity of liquidity problems in the market for Enterprise A's debt and MBS and the risk those problems pose to the banking system. The increase in interest rates and decline in lending in the primary mortgage market would be temporary and have only a modest effect on housing activity and an even smaller effect on Gross Domestic Product (GDP).

A more severe outcome occurs if Enterprise B is financially troubled as well, the quality spreads of that Enterprise's debt and MBS increase significantly, and Enterprise B and other mortgage market participants have difficulty adjusting quickly to the cessation of new purchases by Enterprise A, so that a large increase in mortgage rates occurs. Historical experience suggests that a large, sustained increase in mortgage rates leads to a substantial decline in housing

activity, which causes mortgage originations to fall sharply.<sup>365</sup> Those effects reduce consumption and GDP for at least one quarter in this intermediate case. Aggregate activity is also affected to some degree by the decline in the value of the obligations of Enterprise B held by pension funds, mutual funds, and other investment funds, which dampens consumer spending to some degree. In the worst case, the market for Enterprise A's debt becomes illiquid and there are adverse consequences throughout the financial sector and the economy.

---

<sup>365</sup> For example, when mortgage rates jumped nearly 3.5 percentage points between January and April 1980, existing home sales fell by nearly 23 percent and new home sales declined by nearly 40 percent over the same period. For historical data, see Federal Housing Finance Board, *Monthly Interest Rate Survey*, available online at [http://www.fhfb.gov/MIRS/MIRS\\_downloads.htm](http://www.fhfb.gov/MIRS/MIRS_downloads.htm); National Association of Realtors, *Existing Home Sales*, available online at <http://www.realtor.org/Research.nsf/Pages/EHSdata>; United States Department of Commerce, Bureau of the Census, *New Home Sales*, available online at <http://www.census.gov/cgi-bin/briefroom/BriefRm>.

## Section Four: Conclusions Implied by the Scenarios

Scenario #1 indicates how, in a period of economic weakness, Fannie Mae and Freddie Mac can be a source of strength for other financial institutions, the housing finance system, the housing sector, and the aggregate economy. If the Enterprises remain solvent and liquid in a period of adverse financial conditions, their debt and MBS will be a ready source of liquidity for institutions that hold those securities, which in turn will bolster the liquidity of the financial sector as a whole and mitigate the systemic risk posed by other financial institutions and markets.

Scenario #2 indicates how, if one Enterprise develops serious solvency problems but remains viable, those problems probably do not lead to a significant reduction in housing or other economic activity. The other Enterprise and other firms that supply mortgage credit may expand their activities fast enough to minimize any temporary increase in interest rates and decline in originations in the primary mortgage market, resulting in little if any adverse effect on housing activity.

Scenario #3 illustrates how a severe deterioration in the solvency of Fannie Mae or Freddie Mac could heighten uncertainty about the viability of that Enterprise, the potential for credit losses to investors in their debt and MBS, and the liquidity of those securities. As a study of the financial sector written for the Department of the Treasury observed, “[t]he accumulation of uncertainty over time is a major, if not the major, element of systemic risk.”<sup>366</sup> Scenario #3 also illustrates how heightened uncertainty about the liquidity of the debt of an undercapitalized Enterprise could lead to contagious illiquidity in the market for those securities. Such illiquidity could cause or worsen liquidity or solvency problems at other financial institutions and disrupt the housing markets and the financial system, potentially leading to a systemic event that could impose large economic losses.

Scenario #3 would not have been possible a decade or two ago, when the failure of Fannie Mae or Freddie Mac would have posed a much smaller systemic threat to the U.S. economy. If Fannie Mae had failed at year-end 1981, when the Enterprise was insolvent on a mark-to-market basis<sup>367</sup> and had less than \$60 billion in outstanding debt and \$3 billion in guaranteed MBS, that failure would have imposed losses on investors, mortgage lenders, and related firms but probably would not have seriously threatened a collapse of the housing finance system or a disruption of financial markets generally. At the time the Federal Housing Enterprises Safety and Soundness Enhancement Act of 1992 was enacted, the outstanding debt of Fannie Mae was about one-fifth, and that of Freddie Mac was about one-twentieth, of the levels at year-end 2001. In addition, the Enterprises’ debt and MBS were much less important in financial markets, and Fannie Mae and Freddie Mac were just beginning to use financial derivatives. Although OFHEO regulation of the Enterprises has reduced the likelihood of an Enterprise failure, the potential for such a failure, if it occurred, to contribute to disruptions in the housing market and financial system is much greater now than it was then.

---

<sup>366</sup> Litan and Rauch, *op. cit.*, 123.

<sup>367</sup> For estimates of Fannie Mae’s mark-to-market net worth in the late 1970s and early 1980s, see U.S. Department of Housing and Urban Development, *1986 Report to Congress on the Federal National Mortgage Association, op. cit.*, 100.

<intentionally blank>

## CHAPTER FIVE: MITIGATING SYSTEMIC RISK

Recognizing that the activities of Fannie Mac and Freddie Mac raise systemic risk issues, it is important to examine the regulatory resources available to the principal regulator of the Enterprises, the Office of Federal Housing Enterprise Oversight.

### OFHEO's Supervisory Actions Reduce the Risk of Enterprise Failure

The purpose of safety and soundness regulation of financial institutions is to give the institutions incentives to limit their risks and countervail the incentives created by an underpriced financial safety net. Safety and soundness regulation encompasses capital standards and limitations on the assets, activities, and risk exposures of such institutions.

Effective safety and soundness regulation may limit the risk-taking of individual financial institutions and, thereby, reduce the economy's vulnerability to adverse economic shocks. Appropriate supervisory capital requirements relate to actual risk, effective monitoring of risk exposures and risk-management practices, and timely and effective intervention when risks increase or capital erodes. Effective regulation reduces the likelihood that firms will take excessive risk and, when adverse economic shocks occur, experience more numerous and severe solvency and liquidity problems. Regulations requiring the disclosure of information regarding publicly traded financial instruments, products, or services can seek to ensure that disclosures by corporations—including financial institutions enhance the market discipline of corporate activities.

The Federal Housing Enterprises Safety and Soundness Act of 1992 gives OFHEO a broad range of supervisory tools that the agency may employ not only to address Enterprise problems in a remedial fashion but also to take actions to prevent such problems from developing. The agency's use of those authorities helps mitigate systemic risk by reducing the risk of failure of Fannie Mae and Freddie Mac.

Examinations. OFHEO conducts annual risk-based examinations of Fannie Mae and Freddie Mac and provides the results and conclusions of those examinations in its annual reports to the Congress. OFHEO's examination staff updates its evaluations of each Enterprise quarterly using assessment factors that cover more than 150 features of financial safety and soundness. The assessments evaluate key aspects of risk and risk management, including credit risk, interest rate risk, liquidity management, information technology, internal controls, business process controls, internal and external audits, management information and processes, and corporate governance.

Capital Standards. As required by the Federal Housing Enterprises Safety and Soundness Act of 1992, OFHEO has established leverage-based and risk-based capital standards for Fannie Mae and Freddie Mac. OFHEO uses those standards to classify each Enterprise at least quarterly into one of four capital classifications ("adequately capitalized," "undercapitalized," "significantly undercapitalized," and "critically undercapitalized") based on the level of capital

maintained by that Enterprise. The 1992 Act also allows OFHEO to reclassify an Enterprise notwithstanding those thresholds under certain circumstances.<sup>368</sup>

As required by the 1992 Act, each Enterprise's minimum capital requirement is computed on the basis of leverage ratios, which are similar to those imposed on commercial banks and thrifts, that OFHEO applies to defined Enterprise on-balance sheet assets and off-balance sheet obligations. In addition, OFHEO's risk-based capital standard requires Fannie Mae and Freddie Mac to maintain sufficient total capital to maintain a positive capital position during a hypothetical ten-year stress period characterized by statutorily prescribed stressful credit conditions and movements in interest rates, plus an additional amount to cover management and operations risk. That standard bases the Enterprises' capital requirements on their respective exposures to credit risk and interest rate risk, varying those requirements in response to changes in Enterprise funding strategies, asset composition, and off-balance sheet exposures, and fluctuations in interest rates and home prices. The standard is highly flexible and dynamic.

Prompt Corrective Action Triggered by Declines in Capital. Under the 1992 Act, an Enterprise not classified as "adequately capitalized" by OFHEO must obtain regulatory approval for, and carry out, a capital improvement plan and may be subject to a variety of regulatory restrictions and limitations deemed appropriate by OFHEO.<sup>369</sup> The structure of OFHEO's risk-based capital stress test, which takes into account the likely effects on earnings over time of changes in Enterprise activities, home prices, and interest rates, implies that changes in an Enterprise's risk will be quickly reflected in its risk-based capital requirements and, if appropriate, in its capital classification.

Prompt Supervisory Response to Problems That Do Not Pose an Imminent Threat to Capital. OFHEO has adopted regulatory procedures to implement the prompt corrective action provisions of the 1992 Act. The agency has fashioned a system of prompt supervisory responses to be taken whenever developments internal or external to an Enterprise, as identified by the agency on a case-by-case basis, may warrant special supervisory review by OFHEO.<sup>370</sup> Such developments include, but are not limited to, substantial changes in the net income, net interest margin, or mortgage delinquencies of Fannie Mae and Freddie Mac. OFHEO's broad-based approach to early identification of potentially adverse developments and conditions and related supervisory responses is intended to address problems as they emerge, thereby limiting future Enterprise losses.

Conservatorship Authority. OFHEO has ultimate authority to appoint a conservator of an Enterprise that is classified as critically or significantly undercapitalized or engages in corporate misconduct. A conservator would have all the powers of officers, directors, and shareholders of the Enterprise. A conservatorship would, among other things, enable OFHEO to set aside and make available payments to creditors, who may be classified by their "similar" situations, in amounts determined to be prudent and consistent with the Enterprise's safe and sound operation.

---

<sup>368</sup> 12 U.S.C. 4614-4619, 4622, 4623.

<sup>369</sup> 12 U.S.C. 4614-19, 4622, 4623.

<sup>370</sup> 12 CFR 1777 (2002).

Other Supervisory Authorities. OFHEO possesses a full range of authorities to supervise Fannie Mae and Freddie Mac, including specific authority to enter into a written agreement with an Enterprise, issue a temporary cease and desist order utilizing broad remedial action authority, and downgrading an Enterprise's capital classification. The agency's enforcement regulation sets forth broad authority to craft and employ remedies to fit situations that develop that threaten the safe and sound operation of an Enterprise. OFHEO may also take such action as is appropriate to correct or remedy imprudent or unlawful conduct by an Enterprise.

Contingency Planning. OFHEO actively considers appropriate agency policies and possible responses to different types of potential adverse circumstances and crisis conditions involving Fannie Mae and Freddie Mac. The development of contingency policies, including the use of expanded internal reports and procedures concerning critical financial indicators, facilitates prompt and efficient responses by OFHEO to varied circumstances likely to have adverse consequences.

Research. OFHEO conducts economic and financial research related to Fannie Mae and Freddie Mac, the housing finance system, and broader financial markets. That research helps the agency anticipate and plan for the emergence of Enterprise problems from either internal or external sources.

#### OFHEO Has Taken Steps to Enhance its Supervisory Tools

OFHEO is engaged in an ongoing process to enhance its ability to perform its safety and soundness mission, by, among other things, significantly expanding OFHEO's examination program, adopting various substantive and procedural regulations, and enhancing its early-warning systems.

Strengthening of Examinations Staff. OFHEO is implementing a multi-year plan to double the size of its examination staff, as its budget permits, adding depth to existing areas of expertise such as credit risk, interest rate risk, financial derivatives, information technology, and internal controls, as well as adding expertise in new and emerging risk areas. OFHEO will also add to its accounting expertise to provide increased scrutiny of the accounting practices of Fannie Mae and Freddie Mac. Providing additional depth to examination teams allow OFHEO to keep pace with the evolution of the Enterprises and perform appropriate additional testing of transactions and risk management practices. Risk-based examinations require a balance between transaction testing and the regulator's qualitative assessment of the processes used to identify, measure, monitor, and control risk exposures.

Enhancement of Early Warning Systems. OFHEO currently uses on- and off-site monitoring and financial analysis of Fannie Mae and Freddie Mac to supplement information gained through examinations and the agency's risk-based capital stress test. OFHEO is addressing how those early warning systems may be enhanced in ways that complement the indicators of Enterprise financial problems monitored as part of the agency's prompt supervisory response system. Improving its early warning systems is a priority for the agency.

## OFHEO Actions Enhance Market Discipline of the Enterprises

Furthermore, market discipline plays a well-recognized role in limiting the Enterprises' risk of failure and potential to increase systemic risk. Investors in the publicly traded equity and debt of financial institution and dealers in financial derivatives have an important role to play in mitigating systemic risk. Those parties can contribute to the stability of the financial sector by providing market discipline to the institutions in which they invest or that are their counterparties.

Market discipline refers to the ability of investors to track and comprehend the changing financial condition and risk of firms and securities, to price securities accordingly, and, through pricing, to influence the actions of management. Market discipline requires that financial institutions disclose appropriate and useful information on their financial condition and risks that allows investors to make informed decisions. The comments by Federal Reserve Governor Laurence Meyer in a speech in January 2000 apply reasonably not only to large banks but also to GSEs such as Fannie Mae and Freddie Mac:

As large banking institutions become increasingly complex—and fund themselves more from non-insured sources—market discipline and its prerequisite, public disclosure, must play a greater role. Indeed, increased transparency and market discipline can also help substantially to address concerns about increased systemic risk associated with ever-larger institutions . . .<sup>371</sup>

Fannie Mae and Freddie Mac are subject to market discipline by investors in their debt securities as well as in their common and preferred stock. While market discipline may be imperfect when applied to the Enterprises, it can still be significant. For example, in September 2001 Fannie Mae reported a higher than expected duration gap in its mortgage portfolio. The market reacted with concern and Fannie Mae took appropriate steps in response. Although Fannie Mae and Freddie Mac began issuing a new type of subordinated debt in 2001, it is not clear that the issuance of that debt has materially enhanced market discipline of the Enterprises.<sup>372</sup>

Several actions by OFHEO under its existing supervisory authorities have the potential to enhance market discipline of Fannie Mae and Freddie Mac. First, the 1992 Act requires the agency to include in its annual report to Congress a summary of the findings of OFHEO's annual examinations of the Enterprises. If an examination found deficiencies in an Enterprise's risk management or operations, the public disclosure of that finding in OFHEO's next annual report would likely lead to increased investor scrutiny of the Enterprise, particularly its equity securities.

---

<sup>371</sup> Laurence Meyer, "Supervising LCBOs: Adapting to Change", remarks before a National Bureau of Economic Research Conference, Prudential Supervision: What Works and What Doesn't, Cheeca Lodge, Islamorada, Florida, January 14, 2000, 2, available online at <http://www.federalreserve.gov/boarddocs/speeches/2000/20000114.htm>.

<sup>372</sup> Frame, W.S. and Wall, L.D. "Fannie Mae and Freddie Mac's Voluntary Initiatives: Lessons from Banking," *Economic Review* (Atlanta, GA: Federal Reserve Bank of Atlanta, First Quarter 2002), 45-59 at 49-52, available online at [http://www.frbatlanta.org/filelegacydocs/frame\\_wall2.pdf](http://www.frbatlanta.org/filelegacydocs/frame_wall2.pdf).

Second, as required by the 1992 Act, each quarter OFHEO makes public its capital classification of each Enterprise. Since December 2002 those classifications have been based on the agency's minimum capital standard and its risk-based capital standard.<sup>373</sup> The reports are a potentially significant source of new information about the financial condition and risk of Fannie Mae and Freddie Mac. Sufficiently large changes in the risk exposures of an Enterprise, if not accompanied by appropriate changes in capital, would lead OFHEO to classify the Enterprise as undercapitalized.

---

<sup>373</sup> For OFHEO's capital classification of each Enterprise as of the end of the third quarter of 2002, published December 30, 2002, see [www.ofheo.gov/docs/rbc/rbcresults123002.pdf](http://www.ofheo.gov/docs/rbc/rbcresults123002.pdf).

<intentionally blank>

## CHAPTER SIX: ACTIONS AND RECOMMENDATIONS

OFHEO's examinations, capital standards and research activities help ensure that the Enterprises remain safe and sound and do not become the cause of any systemic disruptions. However, in order to ensure that OFHEO is best equipped to address systemic risk issues, the following regulatory actions will be undertaken and legislative recommendations are offered.

### Regulatory Actions

#### A. Continue the Planned Enhancements to OFHEO's Supervisory Tools

OFHEO is engaged in an ongoing process to enhance its ability to perform its safety and soundness mission by, among other things, significantly expanding its examination program, enhancing its data and analytical capabilities and its early warning systems, fully utilizing its risk-based capital stress test as an analytical tool, and completing its regulatory infrastructure project.

#### B. Conduct Additional Research

Research may help secure a better understanding of the economic effects of Enterprise activities at both a regional and national level and, building upon that, the implications of the operations of the Enterprises for systemic risk. Furthermore, more research needs to be done on the complex networks of interdependencies between Fannie Mae and Freddie Mac, mortgage borrowers, and lenders and other firms in the primary mortgage market, and between the Enterprises and other participants in securities and derivatives markets. Further research and analysis of the benefits and costs of alternative approaches to mitigating systemic risk would also be desirable.

#### C. Enhance Enterprise Transparency to Improve Market Discipline

The relationship of Fannie Mae and Freddie Mac to financial markets is critical to their viability, and they must have access to capital markets to accomplish their mission. The Enterprises access domestic and global financing sources and offer a variety of issuances demanded by these markets. They are significant participants in the MBS and agency debt markets, and in related hedging activities, and as issuers and guarantors of securities.

Enterprise access to the markets and the price of that access are directly affected by investor perceptions of the transparency of the Enterprises and the safety and soundness of their operations. All financial regulators recognize transparency as a fundamental component of safety and soundness. Disclosure strengthens market understanding, market discipline and market stability. OFHEO will continue to review ways to increase financial disclosures by Fannie Mae and Freddie Mac.

#### D. Clarify Conservatorship Authority Through Regulation

OFHEO will issue a regulation to implement the agency's conservatorship authority. A regulation would support OFHEO's ability to use that authority to manage the affairs of an Enterprise that experienced severe solvency problems.

### **Legislative Recommendations**

#### A. Permanently Fund OFHEO to Insure That It Has Adequate Resources and Budget Flexibility

OFHEO recommends that the agency be permanently funded and exempt from the appropriations process. Currently, OFHEO's assessments of Fannie Mae and Freddie Mac are subject to the annual Congressional appropriations process, whereas other regulators' assessments are exempt. Permanent funding would permit OFHEO to adapt more easily to changes in the Enterprises' activities and to act quickly should serious problems develop or a financial crisis become much more likely. OFHEO's funding mechanism should be identical to that of all other federal safety and soundness regulators.

#### B. Congress Should Grant Receivership Authority to OFHEO

OFHEO recommends that the 1992 Act be amended to allow the agency to close and appoint a receiver to manage the affairs of an insolvent Enterprise. If the condition of an Enterprise is such that it is not viable, then OFHEO should have authority to place it in receivership and wind down the business of the company. Financial markets, the housing sector and creditors all would benefit from the final resolution of a non-viable Enterprise.

The role of a receiver is to take possession of the assets of a federally regulated financial institution that has been closed, to liquidate or otherwise dispose of those assets, and use the proceeds to pay the institution's creditors. Receivership serves the function for such institutions that bankruptcy proceedings serve for other failed private corporations. The Office of the Comptroller of the Currency, the Office of Thrift Supervision, and the Farm Credit Administration have the authority to close and place in receivership national banks, federally insured thrifts, and Farm Credit System institutions, respectively. Receivership authority would provide greater procedural and substantive certainty to a failed Enterprise's creditors, would ensure greater fairness to all market participants, and would facilitate the liquidation or merger of a failed Enterprise by clearly authorizing actions relating to outstanding claims that are essential to such remedies.

The Director wishes to acknowledge the contribution of OFHEO staff in the production of this report.

It was written by a team from the Office of Policy Analysis and Research and Office of Risk Analysis and Model Development. Robert S. Seiler, Jr. led the team under the supervision of Patrick J. Lawler. Other team members were Brian M. Doherty, Forrest W. Pafenberg, Thomas J. Lutton, David Pearl and Mary Ellen Taylor. Mark A. Kinsey of the Office of Finance and Administration also made substantial contributions. Final production of the report was the responsibility of Amy L. Lakroune of the Office of External Relations as well as Stephen A. Blumenthal, Chairman and Deborah V. Olejnik of the Director's Editorial Review Board.