

**FEDERAL HOUSING FINANCE AGENCY  
OFFICE OF INSPECTOR GENERAL**

**The Housing Government-Sponsored Enterprises'  
Challenges in Managing Interest Rate Risks**





## FEDERAL HOUSING FINANCE AGENCY OFFICE OF INSPECTOR GENERAL

# AT A GLANCE

### The Housing Government-Sponsored Enterprises' Challenges in Managing Interest Rate Risks

#### Why OIG Did This White Paper

The housing Government-Sponsored Enterprises (GSEs)—Fannie Mae, Freddie Mac, and the Federal Home Loan Banks (FHLBanks)—face considerable risk of loss from fluctuations in prevailing interest rates. For example, an increase in interest rates of just one percentage point could expose Fannie Mae and Freddie Mac (collectively, the Enterprises) to an estimated loss of nearly \$2 billion in the fair value of their assets, such as 30-year fixed-rate whole mortgages. Ultimately, FHFA officials said such losses, under certain circumstances, could limit Treasury's capacity to recover some of the financial assistance that it has provided to the Enterprises during their conservatorships. To date, that financial assistance stands at \$187.5 billion.

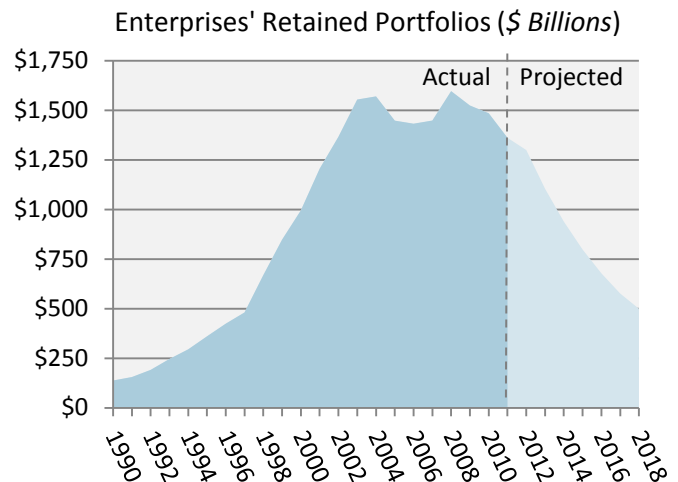
In this white paper, the Federal Housing Finance Agency (FHFA or Agency) Office of Inspector General (OIG) provides a primer on interest rate risk. Specifically, it (1) defines interest rate risk, (2) identifies strategies by which such risk may be managed, (3) traces the Enterprises' historical exposure to interest rate risk and their management thereof, (4) describes recent efforts to limit the Enterprises' interest rate risks, (5) discusses the Enterprises' ongoing interest rate risk management challenges, and (6) sets forth the issues and challenges the FHLBanks face in managing interest rate risk.

#### Summary

Financial institutions that hold mortgage assets in their investment portfolios, such as the GSEs, face two general interest rate risks. First, they risk incurring losses if the rate of interest paid on the short-term debt they used to finance the purchase of mortgage assets rises to the level of, or exceeds the rate of, interest earned on those assets. Second, if the interest the GSEs earn on their mortgage assets falls due to declining interest rates, then they face what is known as prepayment risk, i.e., the risk that borrowers will refinance their loans and prepay their mortgages, causing a decline in the institutions' revenue and income from their mortgage assets.

Financial institutions can manage interest rate risk through several means, including financial instruments known as derivatives, which act as a form of insurance, providing financial protection when rates rise or fall. Derivatives, however, can be complex instruments that require specialized capacity, such as

Prior to mid-2008, the Enterprises' mortgage portfolios grew rapidly, thereby increasing significantly their interest rate risk exposure. Specifically, their combined portfolios more than tripled from \$481 billion in 1997 to \$1.6 trillion by 2008 (see the figure below).



Regulatory examinations conducted during that period identified significant deficiencies in the Enterprises' interest rate risk management, such as inadequate staffing and information systems.

Since the Enterprises entered into conservatorships in September 2008, Treasury and FHFA have sought to limit their interest rate and systemic risks by requiring them to reduce their portfolios to \$250 billion each. However, the Enterprises' shrinking mortgage portfolios present new challenges. Specifically, they contain a relatively high percentage of distressed assets, including delinquent mortgages. It is difficult to estimate how such assets may respond to interest rate fluctuations and, therefore, it is a challenge to discern how to use derivatives to limit potential losses.

FHLBanks also confront interest rate risks. Prior to 2008, some FHLBanks rapidly expanded their mortgage asset portfolios. One FHLBank faced significant financial deterioration in early 2009 due, in part, to adverse interest rate movements. Although FHFA has subsequently identified improvements in their management of interest rate risks, some FHLBanks face ongoing challenges due to their large mortgage asset portfolios.

FHFA and the Enterprises provided technical comments on this white paper that were incorporated as appropriate.

# TABLE OF CONTENTS

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TABLE OF CONTENTS.....	3
ABBREVIATIONS .....	5
PREFACE .....	6
DISCUSSION .....	9
I.    About the Housing GSEs and FHFA .....	9
A. The Enterprises .....	9
B. The FHLBank System .....	9
C. FHFA .....	9
II.   What is Interest Rate Risk? .....	10
A. Rising Short-Term Interest Rates Pose a Risk of Loss on Long-Term Mortgage Assets .....	12
B. Mortgage Prepayments Caused by Falling Interest Rates Create Financial Risks.....	14
III.  What Strategies and Tools Can the Housing GSEs Use to Manage Interest Rate Risks?.....	15
A. The Enterprises Can Issue Relatively More MBS to Minimize the Size of Their Retained Mortgage Portfolios.....	15
B. The Housing GSEs Can Use Derivatives as a Means to Insure Themselves Against Interest Rate Fluctuation .....	16
C. The Housing GSEs Employ Risk Management Strategies to Limit Potential Losses from Interest Rate Movements .....	17
IV.  What Interest Rate Risks Did the Enterprises Incur Prior to 2008?.....	20
A. The Enterprises Rapidly Increased the Size of Their Retained Mortgage Portfolios, Thereby Incurring Substantial Interest Rate Risk.....	21
B. Regulatory Examinations Concluded That the Enterprises Did Not Effectively Manage the Interest Rate Risk Inherent in Their Large Mortgage Asset Portfolios .....	26
V.   What Has Been Done by FHFA, Treasury, and the Enterprises Since 2008 to Limit Interest Rate Risk? .....	28

VI.	What Are Some of the Challenges that Remain for the Enterprises in Managing Interest Rate Risk? .....	30
A.	The Relatively Illiquid Nature of the Assets Remaining in the Enterprises' Mortgage Portfolios Poses New Interest Rate Risk Management Challenges, Including Model Risk.....	30
B.	The Enterprises Face Challenges in Recruiting and Retaining Experienced Interest Rate Risk Staff.....	32
VII.	What Risks Did the FHLBanks Incur Prior to 2008, and What Risks Remain? .....	33
A.	Several FHLBanks Rapidly Increased the Size of Their Mortgage Asset Portfolios and Lacked the Capacity to Manage the Associated Interest Rate Risks .....	33
B.	FHFA Has Recently Identified Some Improvements in the Management of Interest Rate Risk by the FHLBanks, but Some Challenges Remain .....	34
CONCLUSIONS.....		36
SCOPE AND METHODOLOGY .....		37
ADDITIONAL INFORMATION AND COPIES .....		38

# ABBREVIATIONS

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Fannie Mae.....	Federal National Mortgage Association
FHFA .....	Federal Housing Finance Agency
FHFB.....	Federal Housing Finance Board
FHLBank.....	Federal Home Loan Bank
Freddie Mac .....	Federal Home Loan Mortgage Corporation
GSE .....	Government-Sponsored Enterprise
HARP .....	Home Affordable Refinance Program
HERA.....	Housing and Economic Recovery Act
MBS .....	Mortgage-Backed Securities
OFHEO .....	Office of Federal Housing Enterprise Oversight
OIG .....	Federal Housing Finance Agency Office of Inspector General
PLMBS .....	Private-Label Mortgage-Backed Securities
PSPA.....	Senior Preferred Stock Purchase Agreement

**Federal Housing Finance Agency**  
**Office of Inspector General**  
Washington, DC

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## **PREFACE**

The housing GSEs and other financial institutions confront many of the same risks, including credit risk and interest rate risk. Credit risk, such as the risk that a mortgage will not be repaid, is one of the reasons that the Enterprises have suffered billions of dollars in losses since 2007.<sup>1</sup>

Interest rate risk, which is the risk of loss resulting from fluctuations in interest rates, has also posed substantial financial challenges to the housing GSEs, both historically and during the recent financial crisis. Prior to 2008, the Enterprises and some FHLBanks adopted business strategies that involved large interest rate risk exposures. However, they did not always effectively manage these risks. When the financial crisis struck in 2007 the Enterprises and some FHLBanks faced considerable financial deterioration and operational challenges resulting from interest rate and related risks as described in this white paper.

Going forward, the housing GSEs need to manage interest rate risk effectively given the significant potential losses they could incur if they fail to do so.<sup>2</sup> For example, the Enterprises estimate that if current interest rates rise by just one percentage point, then the fair value of their mortgage asset portfolios, such as their investments in 30-year fixed-rate whole mortgages, could fall by nearly \$2 billion.<sup>3</sup> Moreover, it is likely that these losses would be considerably higher if the Enterprises do not make effective use of available interest rate risk management strategies.

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<sup>1</sup> During the housing boom of 2004 through 2007 the Enterprises purchased a large volume of higher risk mortgage assets such as “stated income” or “Alt-A” mortgages and private-label mortgage-backed securities collateralized by subprime loans. The Enterprises incurred billions of dollars in credit losses on these mortgage assets. In September 2008 FHFA determined that the Enterprises’ deteriorating financial condition could destabilize financial markets, and they entered into conservatorships supervised by the Agency. As discussed in this white paper, financial market fears that the Enterprises would be unable to repay their enormous debt obligations contributed to FHFA’s determination in this regard.

<sup>2</sup> OIG observes that both short-term and long-term interest rates are at historic lows. Moreover, the Federal Reserve has stated that it intends to keep the discount rate, which is the short-term interest rate that commercial banks charge one another on overnight loans, at current levels until the U.S. unemployment rate drops to 6.5%. See Board of Governors of the Federal Reserve System, *Press Release* (December 12, 2012) (online at <http://www.federalreserve.gov/newsevents/press/monetary/20121212a.htm>). Even in the current low interest rate environment, the GSEs have an ongoing responsibility to manage actively the risk to avoid potential losses; and FHFA has a corresponding responsibility to review continuously the effectiveness of their efforts.

<sup>3</sup> As discussed in this white paper, this estimate assumes that the Enterprises have used derivatives to mitigate effectively the interest rate risks facing them. The estimated losses could be higher if the Enterprises failed to do so.

FHFA officials said that such losses, under certain circumstances, could reduce Fannie Mae's and Freddie Mac's income, and thereby limit Treasury's capacity to recover some of the \$187.5 billion in financial support that it has provided to the Enterprises during their conservatorships.<sup>4</sup>

In light of the significant interest rate risk challenges facing the housing GSEs and FHFA, OIG presents this white paper, which answers the following six questions:

- What is interest rate risk?
- What strategies and tools can the housing GSEs use to manage interest rate risk?
- What interest rate and related risks did the Enterprises incur prior to 2008 that resulted in significant financial and operational challenges?
- What actions have been taken by FHFA, Treasury, and the Enterprises since 2008 to limit interest rate risks?
- What challenges remain for the Enterprises in managing interest rate risk?
- What challenges have the FHLBanks faced in managing interest rate risk, and what challenges remain?

This white paper was prepared by Wesley M. Phillips, Senior Policy Advisor; Simon Z. Wu, Ph.D., Chief Economist; Alan Rhinesmith, Senior Financial Analyst; and Jon A. Anders, Program Analyst. OIG appreciates the assistance it has received from all who contributed to the completion of this paper or who cooperated with OIG personnel during its preparation.

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<sup>4</sup> Treasury provides financial support to the Enterprises through the Senior Preferred Stock Purchase Agreements (PSPAs) that were executed at the onset of the conservatorships in September 2008. Under recent modifications to the PSPAs, the Enterprises, subject to certain limitations, will transfer all of their profits to Treasury on a quarterly basis. These transfers will serve as dividends on the \$187.5 billion that Treasury has provided to date. To the extent that interest rate-related losses reduce the Enterprises' profits, then their transfers to Treasury would be reduced accordingly. It is also conceivable that such losses would generate an overall loss for the Enterprises, requiring Treasury to transfer additional amounts to them under the PSPAs.

This white paper has been distributed to Congress, the Office of Management and Budget, and others, and will be posted on OIG's website, [www.fhfaog.gov](http://www.fhfaog.gov).



Richard Parker  
Director, Office of Policy, Oversight, and Review



# DISCUSSION

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## I. About the Housing GSEs and FHFA

### A. The Enterprises

The Enterprises support the secondary mortgage market by purchasing residential mortgages from loan originators, such as banks and credit unions, which may use the proceeds of these transactions to originate additional mortgages. The Enterprises may hold these mortgages in their investment portfolios or package them into mortgage-backed securities (MBS) that they sell to investors. In exchange for a fee, the Enterprises guarantee that MBS investors will receive timely payment of principal and interest on their MBS investments. Each Enterprise may also purchase its own MBS and hold it in its investment portfolio along with other mortgage assets such as whole mortgages.

### B. The FHLBank System

The FHLBank System consists of 12 regionally based FHLBanks that are owned by their member financial institutions, including banks and thrifts. To carry out its housing finance mission, the FHLBank System issues debt in the capital markets, the proceeds of which are used by the FHLBanks to make “advances” (i.e., loans) to their member financial institutions that, in turn, can use the advances to fund mortgages. Like the Enterprises, the FHLBanks have investment portfolios that contain whole mortgages, Enterprise MBS, and private-label MBS (PLMBS).<sup>5</sup> Unlike the Enterprises, the FHLBanks are not authorized to issue their own MBS.

### C. FHFA

On July 30, 2008, the Housing and Economic Recovery Act (HERA) established FHFA as the regulator of Fannie Mae, Freddie Mac, and the FHLBank System. Generally, FHFA is responsible for overseeing the housing GSEs’ safety and soundness, supervising their efforts to support housing finance and affordable housing goals, and facilitating a stable and liquid mortgage market.

HERA authorizes FHFA’s Director to “appoint the Agency as conservator or receiver for a regulated entity” for a variety of reasons, including insolvency or inadequate capitalization.<sup>6</sup>

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<sup>5</sup> PLMBS are MBS issued by mortgage financing companies other than the Enterprises or federal agencies.

<sup>6</sup> 12 U.S.C. § 4617.

On September 6, 2008, FHFA became Fannie Mae's and Freddie Mac's conservator and, as such, the Agency has the authority to conserve and preserve their assets.<sup>7</sup>

HERA also expanded Treasury's authority to provide financial support to the Enterprises.<sup>8</sup> Accordingly, Treasury entered into Senior Preferred Stock Purchase Agreements (PSPAs) with the Enterprises under which Treasury agreed to provide financial support to them during their conservatorships. As of December 31, 2012, Treasury had invested \$187.5 billion in the Enterprises, thereby enabling them to remain solvent and continue operations.

## **II. What is Interest Rate Risk?**

In general, interest rate risk is the risk of loss that financial institutions, such as the housing GSEs, face due to fluctuations in prevailing interest rates.<sup>9</sup> For the housing GSEs, interest rate risk is associated primarily with their mortgage asset portfolios, which generally consist of whole mortgages, MBS,<sup>10</sup> and PLMBS. Figure 1, below, shows the housing GSEs' mortgage asset portfolios as of June 30, 2012. At that time their total value stood at slightly less than \$1.5 trillion.

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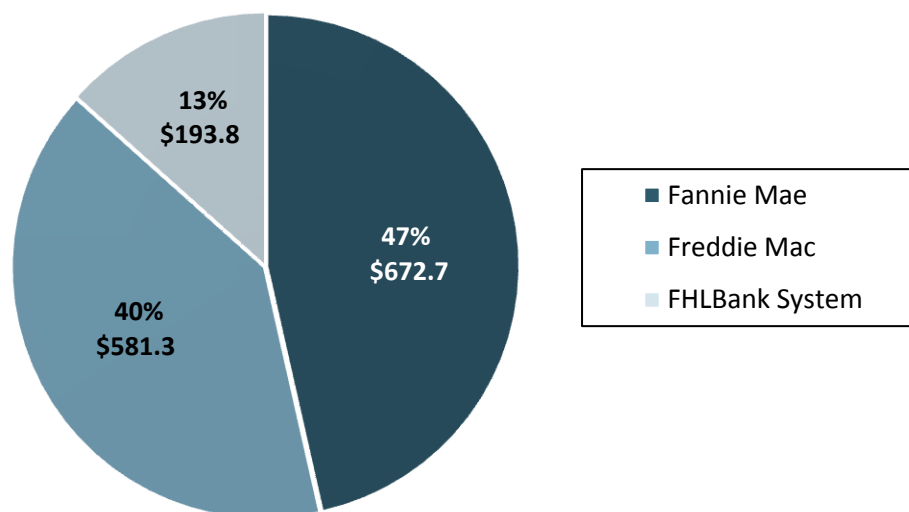
<sup>7</sup> The Enterprises incurred large credit losses due, in part, to their purchases of high risk mortgage assets, such as PLMBS. See n. 1, *supra*.

<sup>8</sup> See 12 U.S.C. § 1719(g).

<sup>9</sup> Additional information about interest rate risk management as it pertains to the housing GSEs can be found in a variety of sources. See, e.g., Federal National Mortgage Association, *2011 Annual Report on Form 10-K*, at 187-192; Federal Home Loan Mortgage Corporation, *2011 Annual Report on Form 10-K*, at 194-199; Federal Home Loan Banks Office of Finance, *Combined Financial Report for the Year Ended December 31, 2011*, at 117-124 and F-52-F-60; FHFA, Division of Federal Home Loan Bank Regulation, *Examination Manual*, Chapter 9 (April 2007) (online at <http://www.fhfa.gov/webfiles/2652/FHFB%20Manual.pdf>); and Jaffee, Dwight, *On Limiting the Retained Mortgage Portfolios of Fannie Mae and Freddie Mac* (June 30, 2005) (online at <http://escholarship.org/uc/item/52z4562n>).

<sup>10</sup> Each Enterprise may repurchase its own MBS and that of the other Enterprise and hold the MBS in its retained mortgage portfolio.

**Figure 1: Mortgage Asset Portfolios of the Housing GSEs, as of June 30, 2012**  
(in \$ billions)<sup>11</sup>



To illustrate interest rate risk, this white paper describes a hypothetical financial firm that finances the purchase of mortgages and generates revenues and profits from them.<sup>12</sup> Assume that the firm finances its purchase of mortgage assets by issuing short-term debt with maturity periods ranging from five months to four years, and further assume that the mortgage assets that the firm seeks to purchase with the proceeds from the sale of short-term debt are long-term 30-year whole mortgages that pay a fixed-rate. Longer term mortgage assets generally have a higher yield than the short-term debt used to finance their purchase.<sup>13</sup> The hypothetical firm, therefore, seeks to generate profits based upon the difference between the cost of the short-term debt and the yield earned on the long-term mortgages purchased. For example, a portfolio of 30-year fixed-rate mortgages that yield 5% per year—that was financed entirely with short-term debt costing 3% annually—would generate an annual profit or “carry” of 2% for the hypothetical firm (see Scenario 1 in Figure 2, below).<sup>14</sup>

<sup>11</sup> Source: FHFA, Office of Financial Analysis, *September 2012 Financial Performance Summary* and FHLBank System information provided to OIG by the FHFA Division of FHLBank Regulation.

<sup>12</sup> In this section of the white paper the discussion of the basic principles of interest rate risk, as exemplified by the activities of the hypothetical financial firm, has been simplified for presentational purposes. As described in later sections, the housing GSEs may employ several strategies and tools to manage interest rate risk. For example, FHFA officials told OIG that the GSEs attempt to match term funding according to the expected lifespan of the mortgage assets they purchase.

<sup>13</sup> “Yield” is defined as the rate of return on a financial asset, such as a portfolio of mortgage assets.

<sup>14</sup> FHFA officials noted that financial firms hold capital as a cushion against losses due to interest rate, credit, and other risks. However, they also noted that the Enterprises currently do not hold much capital given the financial

## **A. Rising Short-Term Interest Rates Pose a Risk of Loss on Long-Term Mortgage Assets**

Although financing long-term mortgage assets with short-term debt can be profitable, it can also involve significant risks, as when short-term interest rates rise substantially. In such a case, a financial institution may face diminishing revenues and profitability due to the narrowing between the yield on its long-term mortgage assets and its short-term debt costs. In extreme situations, a financial firm's short-term debt costs could even exceed the yield on its long-term mortgage assets.

Returning to the example above, suppose that short-term interest rates rose from 3% to 6% while the hypothetical firm continued to earn 5% per year on its portfolio of 30-year fixed-rate mortgages (see Scenario 2 in Figure 2, below). In that case, the value of the firm's mortgage portfolio would decline, likely resulting in financial losses.<sup>15</sup> Moreover, the firm could face a funding crisis in that it would not be feasible to continue to finance its mortgage assets by rolling-over its short-term debt when it comes due.<sup>16</sup> This, too, could lead to financial losses, and potential insolvency.

**Figure 2: Two Scenarios Demonstrating the Benefits and Risks of Interest Rate Differentials for a Hypothetical Financial Firm with a Mortgage Asset Portfolio**

	Interest Yield on 30YR Fixed-Rate Mortgage	Interest Rate of Short-Term Funding	Profit (Loss)
<b>Scenario 1</b>	5%	3%	2%
<b>Scenario 2</b>	5%	6%	(1%)

Although the example above is hypothetical, in fact, Fannie Mae's financial survival was threatened in the early 1980s when it faced an analogous funding crisis. At the time, Fannie Mae, like many thrifts, maintained a large portfolio of mortgages that was financed with short-term debt. When interest rates rose substantially in the late 1970s and early 1980s, Fannie Mae's short-term borrowing costs exceeded the income from its mortgage portfolio, and it faced

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support they receive from Treasury. In contrast, the FHLBanks are statutorily required to hold larger amounts of capital as a cushion against potential losses.

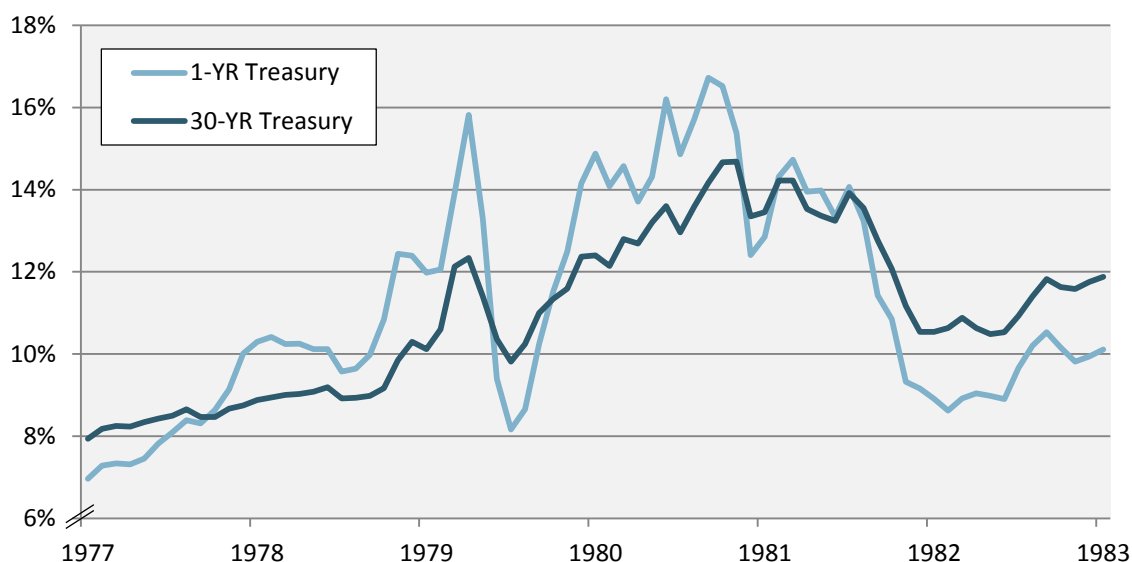
<sup>15</sup> The market value of a fixed-rate mortgage portfolio, such as one with a yield of 5% per year, rises and falls with fluctuations in prevailing interest rates. For example, if the prevailing interest rates rise to 6%, then the value of a portfolio yielding 5% would decline because it would not offer a competitive rate of return to investors.

<sup>16</sup> In effect, the financial firm would be borrowing at short-term interest rates that were higher than the yield on its long-term mortgage assets, e.g., incurring short-term borrowing costs of 6% against a yield on its mortgage assets of 5%. This would not be economically feasible, nor would lenders be likely to extend credit to the firm under such unfavorable market circumstances.

significant financial challenges. When interest rates declined sharply later in the 1980s, Fannie Mae's short-term borrowing costs were once again lower than the income generated from its mortgage portfolio, and the Enterprise's financial soundness was restored.<sup>17</sup>

Figure 3, below, depicts the general interest rate environment that led to such serious challenges for Fannie Mae in the early 1980s. In 1978, the yield on 1-year Treasuries, which serves as a proxy for Fannie Mae's short-term borrowing costs,<sup>18</sup> was consistently lower than the yield on 30-year Treasuries.<sup>19</sup> However, from late 1978 through early 1982, the 1-year Treasury rate periodically and atypically exceeded the return on the 30-year rate, which serves as a proxy for the yield on long-term mortgage assets. This difference in rates reached its maximum of nearly four percentage points in 1980. By 1983, the typical relationship between interest rates had returned, with short-term rates once again falling below long-term rates.

**Figure 3: U.S. Treasury Constant Maturity Interest Rates, 1977-1983<sup>20</sup>**



<sup>17</sup> As discussed later in Section III, the Enterprises can issue MBS to investors to mitigate interest rate risks such as those incurred by Fannie Mae in the early 1980s. During that period, Freddie Mac was largely unaffected by rising short-term rates primarily because it had issued MBS that were sold to investors rather than maintaining a large mortgage asset portfolio.

<sup>18</sup> OIG acknowledges that the data presented in the figure do not necessarily reflect fully Fannie Mae's short-term borrowing costs to finance its portfolio or the yield on the portfolio. However, the data reflect the interest rate environment at the time.

<sup>19</sup> As discussed later in this white paper, the GSEs can generally issue debt and pay interest rates that are only slightly higher than what Treasury pays on debt of comparable maturities.

<sup>20</sup> Source: Board of Governors of the Federal Reserve System, *Selected Interest Rates (Daily) – H.15* (online at <http://www.federalreserve.gov/releases/h15/data.htm>).

## **B. Mortgage Prepayments Caused by Falling Interest Rates Create Financial Risks**

Another form of interest rate risk, known as prepayment risk, can arise when mortgage interest rates decline. This is because domestic mortgage loans typically provide borrowers the right to terminate their obligations at any time by repaying the total outstanding principal balances on their mortgages. When interest rates fall, homeowners may avail themselves of the opportunity to refinance existing mortgages that have high interest rates. For example, if a homeowner holds a \$100,000 mortgage with a 5% interest rate and the option to prepay, then the homeowner is likely to refinance if interest rates fall to 3%.<sup>21</sup>

Prepayments may increase in a falling interest rate environment, causing financial firms, such as the GSEs, to forfeit a significant portion of the gains they would otherwise expect to derive from holding above-market rate mortgage assets. For example, assume that when interest rates fall to 3% a homeowner refinances his or her \$100,000 mortgage, which is being held in the hypothetical financial firm's portfolio as a whole loan with a 5% rate of interest. Under this scenario, the refinancing would require the firm to replace the whole mortgage loan with another interest-yielding asset. If the firm chose to invest in another mortgage asset, its rate of return would likely be 3%, not the 5% paid by the investment it replaced. A wave of such mortgage refinancings would be expected to significantly reduce the revenues and profits generated by the firm's mortgage portfolio.

There is also some risk that a financial firm's capacity to fund its operations and remain solvent could be jeopardized by prepayments associated with falling mortgage interest rates. For example, assume, under a different scenario, that the hypothetical firm finances the purchase of its mortgage assets with relatively longer-term debt.<sup>22</sup> Given the longer term, the firm would likely be required to make a correspondingly higher interest rate payment. If the firm's mortgage assets prepay due to declining interest rates, then—assuming a significant volume of refinancings—the firm may find that the yield from such investments is no longer sufficient to cover the cost of the debt associated with the loans that remain in its portfolio.<sup>23</sup> Consequently,

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<sup>21</sup> Borrowers must qualify to refinance their mortgages when interest rates fall; and a borrower who is behind in his or her mortgage payments may not necessarily qualify for refinancing.

<sup>22</sup> For example, the debt may have a maturity of 4 years as compared to other short-term debt that matures in 5 months or 2 years.

<sup>23</sup> Suppose, for example, that the hypothetical firm funded the purchase of a portfolio of whole mortgages yielding 5% with relatively long-term debt that required a 4% annual fixed interest rate payment for a specified period of years. If interest rates fell to 3% and many borrowers prepaid their mortgages to take advantage of the lower rate, then the return on the firm's mortgage portfolio might not be sufficient to cover the cost of the debt used to purchase it, i.e., the 3% return on the portfolio would be lower than the 4% annual cost of the debt used to purchase the mortgage assets.

the firm could face significant losses because the yield on the mortgage assets in its portfolio would not be sufficient to cover its borrowing costs. This, in turn, could cause the firm to experience a funding crisis, particularly if its capital levels are low.<sup>24</sup>

### **III. What Strategies and Tools Can the Housing GSEs Use to Manage Interest Rate Risks?**

To varying degrees, the housing GSEs can employ several strategies and tools to mitigate the interest rate risks discussed above. Specifically, the Enterprises have the option of issuing relatively more MBS to investors, such as investment banks, which transfers to the investors the interest rate risk associated with the MBS. Additionally, like other financial institutions, the housing GSEs may employ derivatives, which are financial instruments that perform in the manner of an insurance policy, providing the holder with financial compensation when interest rates rise or fall. In general, the GSEs employ derivatives and other tools, such as asset selection and debt issuances, as part of an overall risk management strategy that is intended to reduce the potential that they will incur losses caused by fluctuations in interest rates.<sup>25</sup> Employing derivatives to manage interest rate risk in this way can be a complex undertaking that entails costs and risks.

#### **A. The Enterprises Can Issue Relatively More MBS to Minimize the Size of Their Retained Mortgage Portfolios**

When the Enterprises issue MBS they retain the credit risk on the underlying mortgages because they guarantee that investors will continue to receive the timely payment of principal and interest regardless of the performance of the underlying mortgage collateral.<sup>26</sup> However, unlike the credit risk, the Enterprises transfer to their MBS investors the interest rate risk associated with

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<sup>24</sup> As described later in this white paper, the FHLBank of Chicago's financial situation was significantly impaired in 2008 and early 2009 when it was faced with such a situation.

The discussion contained in this white paper does not cover every possible interest rate risk faced by financial firms. For example, firms face basis risk, which is caused by a shift in the relationship among the rates in different financial markets or different financial instruments. Thus, basis risk occurs when market rates for different financial instruments or the indices used to price assets and liabilities change at different times or by different amounts.

<sup>25</sup> As described in this section, the Enterprises seek to manage interest rate risk by purchasing mortgage assets with attractive prepayment characteristics, i.e., those whose value is less likely to fluctuate based on interest rate volatility. They may also use callable and non-callable debt issuances to hedge interest rate risk. Callable debt can be redeemed by the issuer prior to its maturity.

<sup>26</sup> The Enterprises charge guarantee fees to compensate for potential credit losses associated with the guarantees provided to MBS investors.

the mortgages underlying their MBS.<sup>27</sup> That is, MBS investors assume the risk of loss if interest rates rise or fall. For example, if prevailing long-term interest rates rise above the yield on the MBS, then the investors may incur losses on associated declines in the value of their MBS holdings. Likewise, MBS investors incur the risk that borrower prepayments will increase if prevailing mortgage interest rates decline.

As described previously, FHLBanks are not authorized to issue their own MBS and, therefore, cannot use them to manage interest rate risk. Consequently, the FHLBanks retain all of the interest rate risk associated with mortgage assets that they elect to purchase and hold in their portfolios.

### **B. The Housing GSEs Can Use Derivatives as a Means to Insure Themselves Against Interest Rate Fluctuation**

As stated previously, the housing GSEs employ derivatives to manage the interest rate and prepayment risks associated with their mortgage assets by transferring these risks to their counterparties, such as investment and commercial banks.<sup>28</sup> In general, derivatives permit the GSEs to manage – or “hedge” – the risk that their short-term borrowing costs will increase relative to the yield on their longer term mortgage assets, or that declining mortgage interest rates will increase borrower prepayments.

Principally, the housing GSEs employ derivatives in two ways:

- To hedge against the risk of rising short-term interest rates, the GSEs use **interest rate swaps** under which they trade the fixed-rate interest payments characteristic of mortgage loans for floating-rate interest payments that correspond more closely to their short-term borrowing costs.<sup>29</sup> If short-term interest rates rise, then the GSEs gain additional cash flow from floating-rate interest payments under the swaps.

**Interest Rate Swaps** are a form of derivative in which two entities agree to exchange interest payments on a predetermined amount of principal for an agreed-upon time period. One party pays their counterparty a floating-rate of interest, typically based on an index of short-term rates. In return, their counterparty pays a fixed-rate of interest for the life of the swap.

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<sup>27</sup> The Enterprises retain interest rate risk when they purchase their own MBS and hold it in their portfolios rather than selling it to investors.

<sup>28</sup> Derivatives generally take the form of a contract between two financial institutions such as an interest rate swap agreement between a GSE and an investment or commercial bank.

<sup>29</sup> The GSEs may use callable and non-callable debt as a hedge against increasing interest rates.



For example, if a GSE's mortgage portfolio is situated such that an increase in short-term interest rates from 5% to 7% would yield a \$1,000,000 loss, then the GSE could invest in interest rate swaps that would return a \$1,000,000 profit from the same increase in interest rates. In effect, the purchase of the swap would leave the GSE in a neutral position with respect to the fluctuation in interest rates, minus the cost of the hedge.<sup>30</sup>

- Generally, the GSEs manage prepayment risks by issuing callable debt and buying **call options** in the capital markets. In the event of a decline in rates, the GSEs can redeem their callable debt at lower rates, if necessary, to match the declining rate of their mortgage investments. Call options on interest rate swaps, commonly known as “swaptions,” offer the same general protection.<sup>31</sup>

### **C. The Housing GSEs Employ Risk Management Strategies to Limit Potential Losses from Interest Rate Movements**

#### *Risk Management Strategies Generally*

According to the housing GSEs, they employ overall risk management strategies that rely upon asset selection and derivatives,<sup>32</sup> including callable debt, to mitigate the interest rate risks associated with their mortgage asset portfolios.<sup>33</sup> In general, the GSEs' boards of directors and senior managers review and approve these risk management strategies and regularly monitor their effectiveness.

**Call Options** are agreements between a buyer and a seller. For a set price, or “premium,” the buyer purchases the right, but not the obligation, to enter into a specific future transaction with the seller at a predetermined timeframe and price. For example, by paying the seller an option premium, the buyer of a call option on a mortgage loan could obtain the right to purchase the loan at 100% of face value on or before its maturity date. If interest rates subsequently fell and pushed the price of the loan up to 110%, then the buyer could profitably exercise the option with the seller. This, in turn, would provide the buyer an asset worth 110% of face value for only 100%, leaving a 10% profit. However, if interest rates rose and thereby lowered the value of the loan to 90%, then the buyer presumably would not invoke the purchase right.

<sup>30</sup> Note: as described below, the GSEs may not always be able to hedge perfectly their portfolios as in this example.

<sup>31</sup> In other sources, such as the Enterprises' public securities filings, callable debt is not discussed in terms of the Enterprises' use of derivatives as a means to manage interest rate risk. We do so in this white paper because callable debt has features, such as embedded options, that are also features of derivatives contracts.

<sup>32</sup> For example, the Enterprises attempt to acquire mortgage assets with attractive prepayment characteristics, i.e., those whose value is less likely to fluctuate based on interest rate volatility.

<sup>33</sup> For a more in-depth discussion of the housing GSEs' interest rate risk mitigation strategies, see Federal National Mortgage Association, *2011 Annual Report on Form 10-K*, at 187-192; and Federal Home Loan Mortgage Corporation, *2011 Annual Report on Form 10-K*, at 194-199.

A primary goal of the Enterprises' strategies is to limit interest rate risk through a process that is known as "**net-flat**" hedging. Net-flat hedging is intended to minimize the potential for loss or gain if interest rates rise or fall.<sup>34</sup> The Enterprises continually monitor key measures of interest rate risk, such as duration and convexity, to help ensure that interest rate risks associated with retained mortgage portfolios are mitigated.<sup>35</sup> Officials from one Enterprise said that it seeks to minimize, over the long term, the potential for Treasury draws pursuant to its PSPA by following a corporate strategy of keeping interest rate risks low.

Although a variety of factors can influence the Enterprises' ability to maintain net-flat positions, the Enterprises provided data to OIG that they said indicate the general

**"Net-flat" Hedging:** In net-flat hedging, the Enterprises seek to ensure that their mortgage investment portfolios and combinations of derivatives and callable debt contain offsetting positive and negative positions. In theory, the hedging positions completely offset the position of the underlying assets, resulting in a scenario in which the Enterprises' positions will remain the same regardless of changes in interest rates. The Enterprises periodically readjust their derivative and callable debt positions to respond to changes in interest rates that may affect their ability to maintain a net-flat hedge of their retained mortgage portfolios.

<sup>34</sup> The FHLBanks do not have an expressed objective of maintaining a net-flat hedge of their mortgage investment portfolios. However, like the Enterprises, the FHLBanks use a combination of derivatives and debt to manage interest rate risks in their portfolios. Further, FHFA regulations limit FHLBank interest rate risk by restricting the types of MBS the FHLBanks may own. FHLBanks may own only those securities that present limited risk under certain interest rate shock scenarios. See Federal Home Loan Banks Office of Finance, *Combined Financial Report for the Year Ended December 31, 2011*, at 117-124 and F-52-F-60.

<sup>35</sup> Duration is a measure of the sensitivity of the inverse relation between the price of a fixed-rate investment, e.g., a whole mortgage, and changes in interest rates. Rising interest rates cause the price of fixed-rate assets to fall, because the comparatively lower rate of the asset does not offer a competitive yield to investors; and conversely, falling interest rates result in higher asset prices because investors will receive a higher yield than what is offered by similar investments under current market rates. In addition, long-term fixed-rate investments, such as whole mortgages, are generally more sensitive to fluctuations in interest rates, i.e., they experience greater changes in price than do short-term fixed-rate investments.

Duration gap, as applied to the GSEs, is the difference between the sensitivity to changes in market interest rates of the GSEs' interest-yielding assets, such as retained mortgage portfolios, and their liabilities, such as Enterprise-issued debt securities, as well as derivatives. The duration gap is usually expressed as a period of time, in this case months. For example, a duration gap of "zero," or no time, indicates equally matched durations for assets and liabilities and, therefore, it represents generally low risk for small changes in rates; whereas a duration gap of 12 months would represent substantial risk, due to a significant mismatch between the expected duration of the GSEs' yield-bearing assets and their liabilities. According to the Enterprises, they seek to use a variety of hedging techniques to achieve a duration gap of zero, which means that, as a general matter, their objective is a portfolio that would not face a fluctuation in fair value based upon interest rate fluctuations in either direction.

Convexity is the principal measurement of prepayment risk. In the context of the GSEs, it is a measure of the relationship between mortgage asset prices and market interest rates that demonstrates the manner in which the duration of the asset changes as interest rates change. Mortgage-related assets are said to have negative convexity; that is, due to prepayment risk, the GSEs' mortgage asset prices may not rise as much in a declining interest rate environment as might otherwise be expected. In such an environment, prepayments can reduce expected revenue and profits from mortgage assets, thereby impairing their value.

effectiveness of their risk management strategies.<sup>36</sup> Specifically, the Enterprises' data purportedly illustrate the manner in which their use of derivatives, including callable debt, can substantially reduce their potential losses under a variety of interest rate fluctuation scenarios. According to the Enterprises, at the end of 2011 a one percentage point increase in prevailing interest rates would have resulted in a combined loss of nearly \$8 billion had they not employed derivatives to manage the interest rate risks inherent in their retained mortgage portfolios (see Figure 4, below). The Enterprises added that their hedging strategies, which included the use of interest rate swaps, reduced their exposure to \$1.7 billion.

**Figure 4: Potential Effects of a One Percentage Point Increase in Interest Rates on the Enterprises' 2011 Mortgage Asset Portfolios (in \$ millions)<sup>37</sup>**

	Estimated (Loss) or Gain
<b>Impact without Derivatives</b>	(\$7,908)
<b>Impact of Derivatives</b>	\$6,182
<b>Net Result</b>	(\$1,726)

*The Employment of Derivatives Can Be Complex and Involves Costs and Risks*

Derivatives are essential to the management of interest rate risk, but employing them successfully requires a comprehensive understanding of the instruments themselves, as well as the business of the housing GSEs.<sup>38</sup> As Figure 4 illustrates, the failure to employ derivatives to properly manage interest rate risk can cause significant financial losses if prevailing interest rates rise or fall sharply. However, there are costs and risks associated with the use of derivatives, including:

- **Increased expenses:** As with any insurance product, hedging with derivatives could involve the payment of a premium to protect against downside risks. Paying this premium raises the GSEs' cost of doing business.

<sup>36</sup> Although GSEs may use derivatives to manage interest rate risks, they are not necessarily a perfect hedge against potential losses under varying interest rate fluctuation scenarios. For example, Freddie Mac states in its 2011 10-K report that ongoing high risks of prepayment model error—due to uncertainties regarding future unemployment rates and house price appreciation—could result in losses on derivative hedges.

<sup>37</sup> Source: Enterprise data provided to OIG.

<sup>38</sup> For further information about the use of derivatives in interest rate risk management, see FHFA, Division of Federal Home Loan Bank Regulation, *Examination Manual*, Chapter 11 (April 2007) (online at <http://www.fhfa.gov/webfiles/2652/FHFB%20Manual.pdf>).

- Financial reporting complexities: The accounting rules pertaining to the use of derivatives are complex and may require financial institutions to report financial losses on their derivative contracts even if the derivatives are serving their intended function of mitigating interest rate risk.<sup>39</sup>
- Increased counterparty risks: Successfully hedging against interest rate risk through the use of derivatives necessarily requires the housing GSEs to do business with counterparties and, thus, take on counterparty risk. If a counterparty fails to perform its obligations under a derivative contract, then a GSE could experience a loss related to counterparty risk that may be comparable to the interest rate risk it contracted to avoid.<sup>40</sup>

#### **IV. What Interest Rate Risks Did the Enterprises Incur Prior to 2008?**

From the late 1990s through 2008, the Enterprises adopted business strategies that involved substantial increases in their interest rate risk exposure. That is, they rapidly increased the size of their retained mortgage asset portfolios, and did so relative to the amount of MBS they issued to investors. According to the Federal Reserve, Treasury, the Office of Federal Housing Enterprise Oversight (OFHEO),<sup>41</sup> and other contemporary observers, the Enterprises' decisions to expand their mortgage portfolios in this way involved significant risk. Further, it was driven largely by the profit opportunities offered by the federal government's implicit financial support for them rather than market fundamentals.<sup>42</sup> Regulatory examinations conducted from 2003 through early 2008 also concluded that, in many cases, the Enterprises did not effectively manage the risks associated with their large mortgage portfolios. Moreover, financial market

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<sup>39</sup> Generally, U.S. accounting standards stipulate that changes in the value of an entity's mortgage loan and bond holdings should be excluded from reported net income or loss. However, changes in the market value of the Enterprises' derivatives investments factor immediately into reported net income or loss. Thus, although the derivatives component of the paired movements is reported as net income or loss, the mortgage component is not so reported. This anomaly of the accounting standards can drive substantial variances in a reporting organization's net income or losses for periods during which interest rate movements result in significant but offsetting changes in the current market value of both mortgage assets and their corresponding derivative investments.

<sup>40</sup> Officials from one Enterprise said they viewed counterparty risk as primarily the costs of replacing the derivatives if a counterparty fails.

<sup>41</sup> OFHEO was the Enterprises' safety and soundness regulator prior to the establishment of FHFA in 2008.

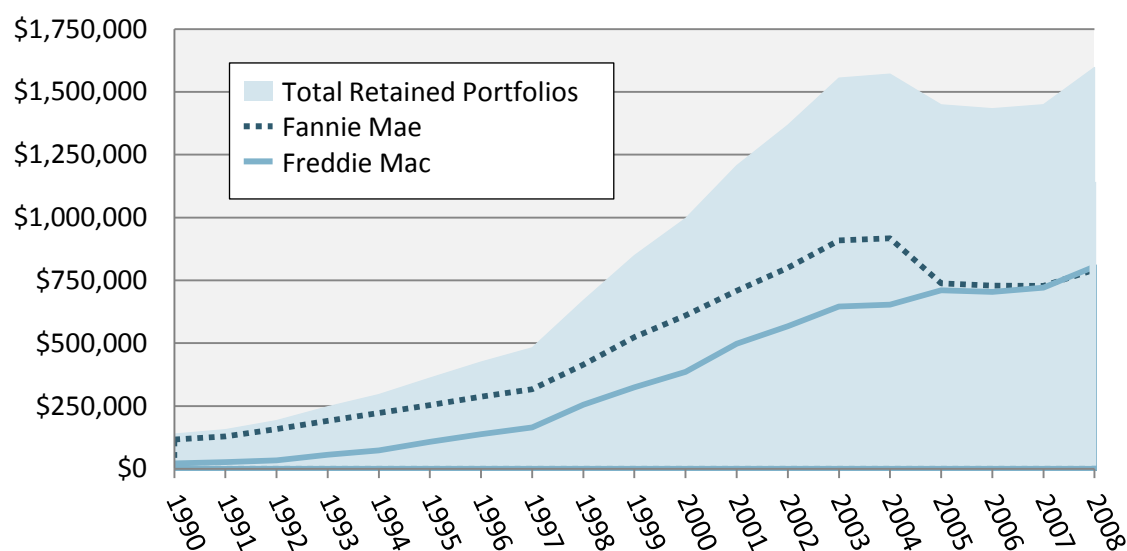
<sup>42</sup> The financial markets' perception that the federal government would provide financial support for the Enterprises allowed them to issue debt to finance mortgage purchases at relatively low costs, i.e., levels not much higher than that which Treasury pays on its securities. The Federal Reserve has long argued that the Enterprises were thus provided with an incentive to reap the short-term profits to be made by issuing debt and purchasing mortgages assets to be held in their retained portfolios. The Federal Reserve has also pointed out that these large portfolios, funded through enormous short-term debt issuances, also presented significant interest rate risk to the Enterprises, as well as systemic risks to the U.S. and international financial systems.

fears that the Enterprises would be unable to repay the large debt incurred to fund the growth of their retained mortgage portfolios contributed to the decision to place them into conservatorships in September 2008.

### **A. The Enterprises Rapidly Increased the Size of Their Retained Mortgage Portfolios, Thereby Incurring Substantial Interest Rate Risk**

As shown in Figure 5, below, the Enterprises' combined mortgage portfolios grew from slightly less than \$200 billion in 1992 to \$1.6 trillion by 2004 – an eight-fold increase over this period. The majority of the growth occurred during the seven-year period from 1997 through 2004, when their portfolios grew from about \$481 billion to \$1.6 trillion. The Enterprises' combined portfolios briefly declined to \$1.4 trillion from 2005 through 2007, but returned to their 2004 peak of \$1.6 trillion in 2008.<sup>43</sup>

**Figure 5: The Enterprises' Retained Mortgage Portfolios from 1990 Through 2008**  
(in \$ millions)<sup>44</sup>

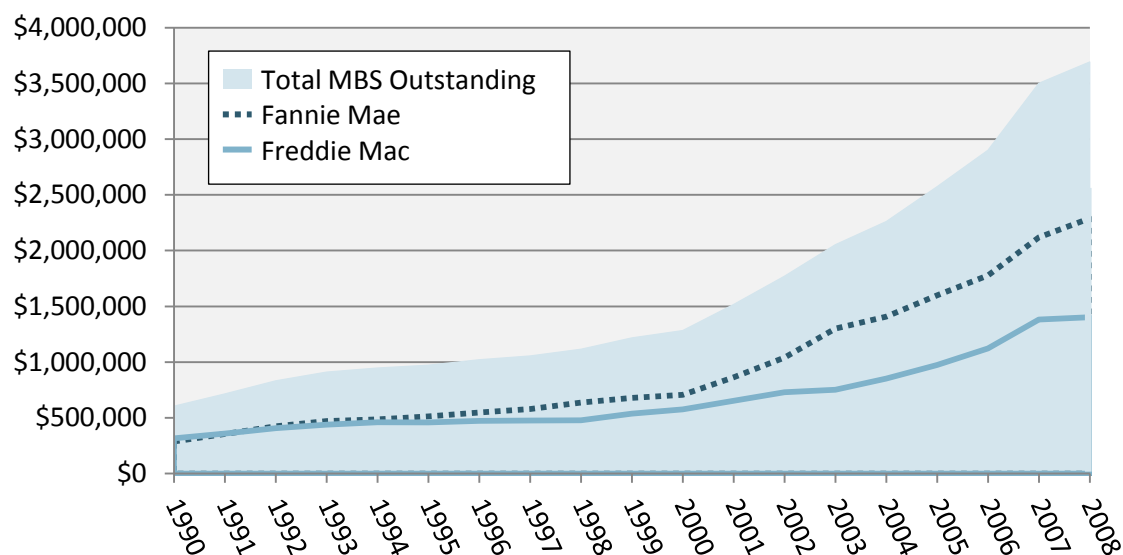


<sup>43</sup> This temporary decline in the size of the Enterprises' portfolios was likely due to regulatory initiatives. In 2006, OFHEO imposed caps on the growth of the Enterprises' portfolios due to concerns about the safety and soundness of the Enterprises' large mortgage portfolios. In early 2008, however, OFHEO lifted these caps after determining that the Enterprises had made progress in complying with the terms of previously established supervisory requirements. The Enterprises' portfolios subsequently rose dramatically in 2008. An FHFA official also said that OFHEO classified Fannie Mae as "significantly undercapitalized" in December 2004, which required the Enterprise to shrink its retained portfolio by almost \$200 billion between October 2004 and November 2005.

<sup>44</sup> Source: FHFA, *2011 Report to Congress*, at 75 and 92 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCongr11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCongr11_6_14_508.pdf)).

During this period, there was also a substantial increase in the Enterprises' net MBS issuances, i.e., MBS held by investors rather than MBS held in the Enterprises' retained mortgage portfolios. Specifically, Enterprise MBS held by investors increased from slightly more than \$600 billion in 1990 to \$3.7 trillion in 2008—a six-fold increase (see Figure 6, below). In contrast to the growth rate of the Enterprises' retained mortgage portfolios, the growth of MBS held by investors was gradual in the 1990s and did not begin to increase rapidly until after 2001.

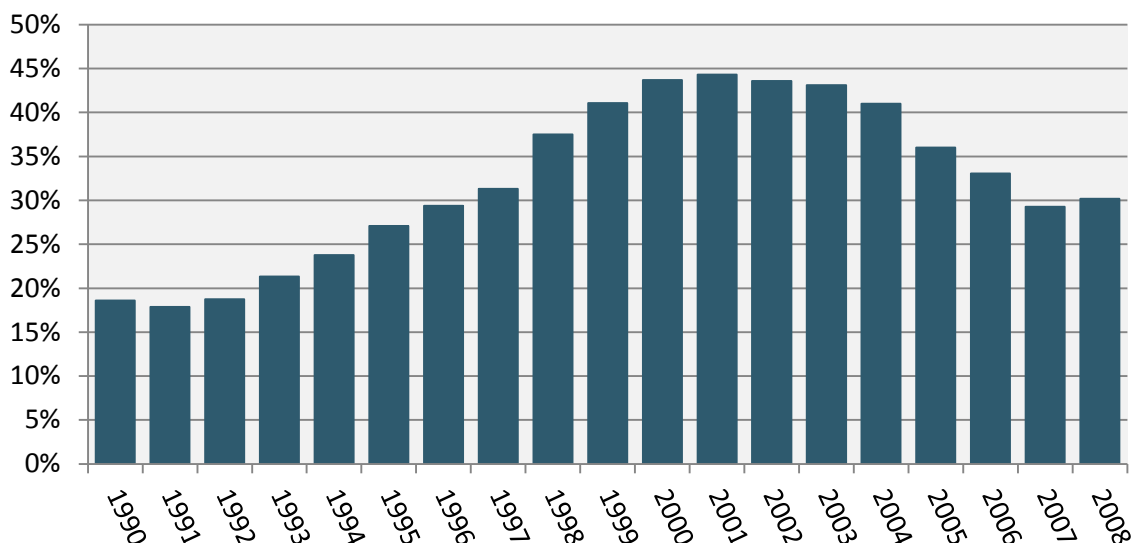
**Figure 6: Enterprise MBS Held by Investors, 1990 Through 2008 (in \$ millions)**



The Enterprises' retained mortgage portfolios came to represent a relatively larger share of their overall business due to their exponential growth from 1997 through 2004. As shown in Figure 7, below, the Enterprises' retained mortgage portfolios grew from 19% of their total "mortgage book" in 1990 to a peak of nearly 45% in 2001, before steadily declining to 30% in 2008.<sup>45</sup> In other words, by keeping a relatively larger share of mortgage assets in their portfolios, the Enterprises also kept a relatively increasing share of the associated interest rate risk instead of transferring it to MBS investors.

<sup>45</sup> "Mortgage book" is defined as the entire portfolio of mortgage assets that the Enterprises own or guarantee. Specifically, the total mortgage book for each Enterprise equals its retained whole mortgages and MBS, plus the outstanding MBS that it guarantees. See Federal National Mortgage Association, *Monthly Summary*, at 1 and 4 (March 2012) (online at <http://www.fanniemae.com/resources/file/ir/pdf/monthly-summary/033112.pdf>).

**Figure 7: The Enterprises' Retained Mortgage Portfolios as a Percentage of Their Total Mortgage Books of Business, 1990 Through 2008<sup>46</sup>**



*Significant Increases in the Enterprises' Debt Issuances and Their Use of Derivatives*

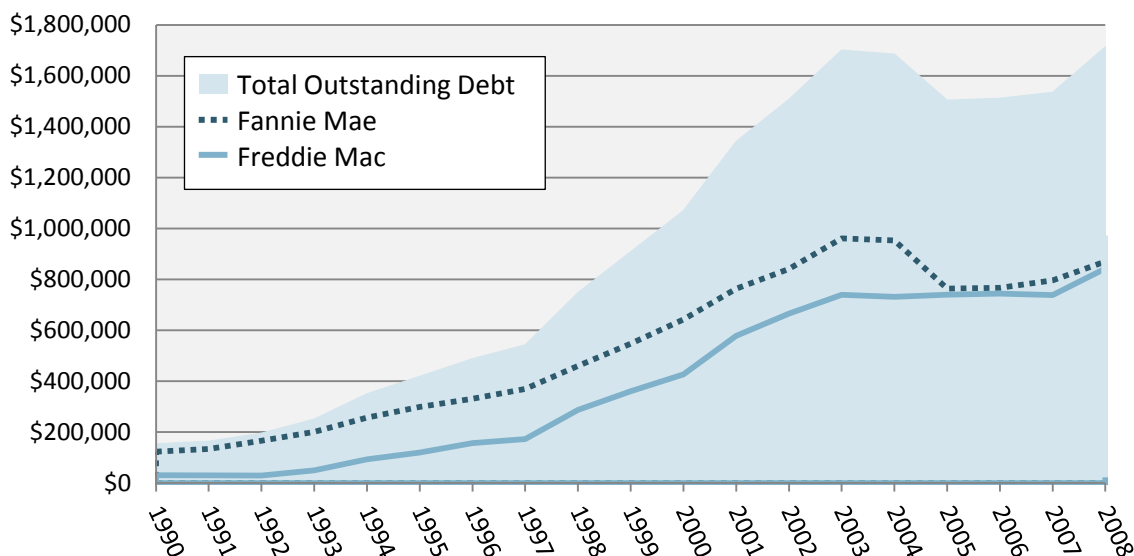
From 1990 through 2007, the Enterprises increased their issuance of debt securities in order to fund the acquisition of new mortgage assets for their retained portfolios. As shown in Figure 8, below, the Enterprises' total outstanding debt mirrored the increase in their retained portfolio holdings, with the highest periods of growth occurring between 1997 and 2003. The amount of their outstanding debt increased three-fold during this period, from \$542 billion to \$1.7 trillion.<sup>47</sup>

<sup>46</sup> Source: FHFA, *2011 Report to Congress*, at 74, 75, 91, and 92 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCong11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCong11_6_14_508.pdf)).

<sup>47</sup> Due to the implied federal guarantee, the Enterprises could generally issue such debt at rates comparable to those paid by Treasury on its debt securities. See n. 42, *supra*.



**Figure 8: The Enterprises' Total Outstanding Debt from 1990 Through 2008**  
(in \$ millions)<sup>48</sup>



To manage the increasing interest rate risks on their balance sheets, the Enterprises also dramatically increased their use of derivatives.<sup>49</sup> As shown in Figure 9 below, the “notional value” of the Enterprises’ derivative contracts was below \$300 billion in 1997 before increasing rapidly to \$2.2 trillion by 2003.<sup>50</sup> After falling to \$1.4 trillion in 2005, the notional value of the Enterprises’ derivatives contracts rose again to nearly \$2.6 trillion by 2008.<sup>51</sup>

<sup>48</sup> Source: FHFA, *2011 Report to Congress*, at 73 and 90 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCongr11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCongr11_6_14_508.pdf)).

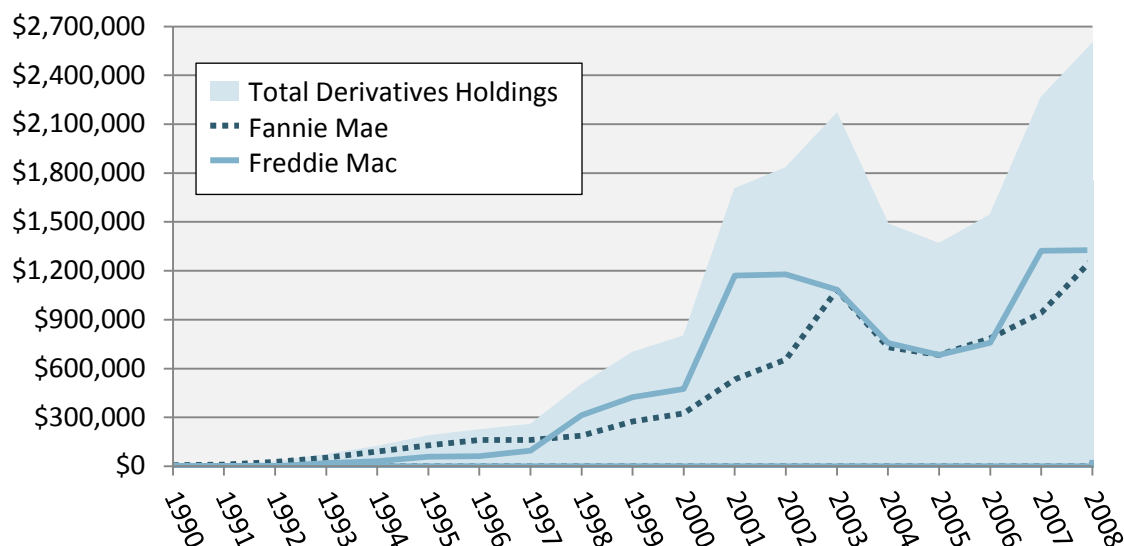
<sup>49</sup> For a contemporary discussion of the rapid growth in the Enterprises’ retained mortgage portfolios and their surging use of derivatives to offset the associated interest rate risks, see OFHEO, *Mortgage Markets and the Enterprises in 2003* (October 2004) (online at <http://www.fhfa.gov/webfiles/1149/MME2003.pdf>).

<sup>50</sup> The notional value represents the value of the reference items underlying financial derivatives contracts and is the amount upon which payments are computed between the parties to derivatives contracts (e.g., the value of a GSE mortgage portfolio that is involved in an interest rate swap). The notional amount does not represent money exchanged, nor does it necessarily represent the risk exposure of a particular derivatives contract. But it is a reference that is commonly used to estimate the size of the derivatives market or a particular participant’s derivatives contracts.

<sup>51</sup> The decline in derivatives is consistent with the decline in the Enterprises’ retained mortgage portfolios from 2005 through 2007.



**Figure 9: Notional Value of Enterprise Derivatives Contracts, 1990 Through 2008**  
(in \$ millions)<sup>52</sup>



*Federal Agencies Raised Concerns About the Risks Associated with the Enterprises' Rapidly Expanding Retained Mortgage Portfolios in Real Time*

During the period prior to 2008, various federal agencies, including the Federal Reserve, Treasury, and OFHEO stated that the rapid growth in the Enterprises' mortgage portfolios was driven largely by the federal government's implicit financial support for them rather than market fundamentals, and that the risks associated with their portfolios were very high.<sup>53</sup> Specifically, the financial markets' perceived that the federal government would provide financial support to the Enterprises in an emergency, thereby making it possible for them to finance the expansion of their retained mortgage portfolios by issuing enormous amounts of short-term debt at relatively low-cost. Although large mortgage portfolios offered significant profit opportunities to the

<sup>52</sup> Source: FHFA, *2011 Report to Congress*, at 80 and 97 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCongr11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCongr11_6_14_508.pdf)).

<sup>53</sup> See U.S. Senate Committee on Banking, Housing, and Urban Affairs, Written Testimony of Alan Greenspan, Chairman of the Board of Governors of the Federal Reserve System, *Government-sponsored enterprises* (February 24, 2004); U.S. Senate Committee on Banking, Housing, and Urban Affairs, Written Testimony of Alan Greenspan, Chairman of the Board of Governors of the Federal Reserve System (April 6, 2005); U.S. House of Representatives Committee on Financial Services, Written Testimony of John W. Snow, Secretary of the Treasury (April 13, 2005); U.S. House of Representatives Committee on Financial Services, Written Testimony of James B. Lockhart III, Director of the Office of Federal Housing Enterprise Oversight, *Legislative Proposals on GSE Reform* (March 15, 2007); and Jaffee, Dwight, *On Limiting the Retained Mortgage Portfolios of Fannie Mae and Freddie Mac* (June 30, 2005) (online at <http://escholarship.org/uc/item/52z4562n>).

Enterprises,<sup>54</sup> the current Chairman of the Federal Reserve concluded in 2007 that they posed significant risks to the stability of the U.S. financial system.<sup>55</sup> He specifically noted that their large portfolios involved significant interest rate and prepayment risks, among others, and that the failure to manage properly these risks could disrupt financial markets.

## **B. Regulatory Examinations Concluded That the Enterprises Did Not Effectively Manage the Interest Rate Risk Inherent in Their Large Mortgage Asset Portfolios**

### *Pre-conservatorship Examination Results*

Contemporary regulatory examinations confirmed many of the concerns raised by the Federal Reserve and others about the Enterprises' capacity to manage the interest rate and other risks associated with their large mortgage portfolios. For example, at the height of the Enterprises' exposure to interest rate risk in 2002, OFHEO found that there was a "substantial duration gap" imbalance between Fannie Mae's mortgage assets and its liabilities. In other words, there was a significant risk that declining mortgage interest rates, and the resulting prepayments from refinances, would cause a mismatch between the reduced cash flows Fannie Mae received from its retained portfolio and its existing, and now relatively higher-rate, debt obligations. OFHEO required Fannie Mae to submit a plan to address this deficiency in its interest rate risk management.<sup>56</sup> Subsequently, in 2003 and 2004, OFHEO identified significant "operational" deficiencies associated with managing the risks of the Enterprises' large mortgage portfolios. Specifically, OFHEO found that the Enterprises lacked key capacities, such as information systems and personnel, that were necessary for the successful management of the operational risks associated with their large mortgage portfolios.<sup>57</sup>

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<sup>54</sup> As discussed previously, the Enterprises generate profits on the difference or "spread" between the interest rates they pay on the short-term debt used to finance the purchase of mortgage assets and the yield on such mortgage assets. The spread was likely wider—and thus more profitable—than would otherwise have been the case due to the federal government's implicit support of the Enterprises, which lowered their short-term borrowing costs. See n. 42, *supra*.

<sup>55</sup> See *GSE portfolios, systemic risk, and affordable housing*, Remarks by Ben S. Bernanke, Chairman of the Board of Governors of the Federal Reserve System, before the Independent Community Bankers of America's Annual Convention and Techworld, Honolulu, Hawaii (via satellite) (March 6, 2007).

<sup>56</sup> See OFHEO, *Report to Congress*, at 3 (June 2003) (online at <http://www.fhfa.gov/webfiles/1217/WEBSITEOFHEOREPtoCongress03.pdf>); and Julie Haviv, *Fannie Narrows Duration Gap, As Rate Volatility Risk Declines*, Wall Street Journal (November 17, 2002).

<sup>57</sup> OFHEO also found that the Enterprises had manipulated their reported financial results by misapplying accounting standards pertaining to derivatives. They subsequently restated their previous earnings for certain years, decreasing the amounts by billions of dollars.

Moreover, in 2006, OFHEO imposed caps on the growth of the Enterprises' mortgage portfolios due to its concerns about their safety and soundness. In so doing, OFHEO observed that the portfolios entailed not only credit risk, but also significant interest rate and operational risks.<sup>58</sup> Further, OFHEO observed that the Enterprises were still facing significant systems, control, and risk management challenges dating from the problems identified earlier in the decade that compromised their capacity to manage the risks inherent in their large mortgage portfolios. However, OFHEO lifted the growth caps on March 1, 2008, when it determined that the Enterprises had made progress in complying with the terms of established supervisory requirements.

In examinations of the Enterprises later in 2008, FHFA, which replaced OFHEO in July 2008, criticized their interest rate risk management practices and capabilities.<sup>59</sup> For example, in its examination of Fannie Mae, FHFA stated that the Enterprise had set "aggressive" interest rate risk limits and that it had violated those limits 11 times in 2008 alone. FHFA also stated that Fannie Mae's interest rate risk positions were "... excessive in relation to (its weak) earnings and capital." Moreover, FHFA concluded that, among other weaknesses, both Enterprises lacked the ability to assess adequately and report on their interest rate risk exposures, and they faced increasing risks that counterparties would be unable to meet the obligations under their derivative contracts.

*Soaring Enterprise Debt Costs Contributed to the Decision to Place Them into Conservatorships in September 2008*

The Enterprises' credit related losses, and not their interest rate risk, was the primary reason that Fannie Mae and Freddie Mac entered into conservatorships supervised by FHFA in September 2008. The conservatorship decisions were informed, however, by the financial markets' perceptions about the Enterprises' relative ability to repay the short-term debt used to fund their large mortgage portfolios. At that time the Enterprises' traditionally low borrowing costs rose as lenders became increasingly concerned that the Enterprises' credit-related losses would impair their ability to meet their short-term debt obligations.<sup>60</sup> According to FHFA, the crisis in 2008

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<sup>58</sup> See, e.g., OFHEO, *Mortgage Market Note 07-1, Portfolio Caps and Conforming Loan Limits* (September 6, 2007) (online at <http://www.fhfa.gov/webfiles/1246/MMNOTE9607.pdf>).

<sup>59</sup> This discussion is summarized from FHFA's 2008 Report to Congress. OIG also observes that in its 2009 examinations, FHFA rated the Enterprises' market risk management, which includes interest rate risk management, as a "critical concern." At that time, "critical concern" was the Agency's most serious regulatory classification.

<sup>60</sup> During 2007, the yield rate on the Enterprises' long-term bonds increased by one-half of one percent above the rate for U.S. Treasury bonds of the same vintage. By September 2008, the spread between the bond rates had doubled, causing an increase in the Enterprises' borrowing costs. See National Commission on the Causes of the Financial and Economic Crisis in the United States, *The Financial Crisis Inquiry Report*, at 316 (January 2011) (online at [http://fcic-static.law.stanford.edu/cdn\\_media/fcic-reports/fcic\\_final\\_report\\_full.pdf](http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf)).

was so severe that the Enterprises faced challenges in raising relatively longer-term debt, e.g., debt with a maturity of more than one year and, thus, were forced to fund their day-to-day operations with very short-term debt, e.g., debt with maturities ranging from overnight to less than one year. This increasing reliance on very short-term debt exposed the Enterprises to “roll-over risk,” i.e., the risk that lenders would cut off the Enterprises’ short-term credit and they would default on their obligations.<sup>61</sup> The concerns about the Enterprises’ capacity to meet their debt obligations, as well as the potentially destabilizing consequences of default, were among the reasons supporting the decision to place them into conservatorships and provide them financial assistance.<sup>62</sup>

## **V. What Has Been Done by FHFA, Treasury, and the Enterprises Since 2008 to Limit Interest Rate Risk?**

Given the ongoing concerns about the size of the Enterprises’ retained mortgage portfolios and their associated interest rate and systemic risks, it has been the policy of FHFA and Treasury to significantly reduce the size of the portfolios and thereby limit such risks. Under the terms of the initial PSPAs, the Enterprises were required to reduce their portfolios by 10% annually until they each reached \$250 billion for a combined total of \$500 billion. The \$500 billion ceiling roughly equals the size of their retained portfolios in 1997.

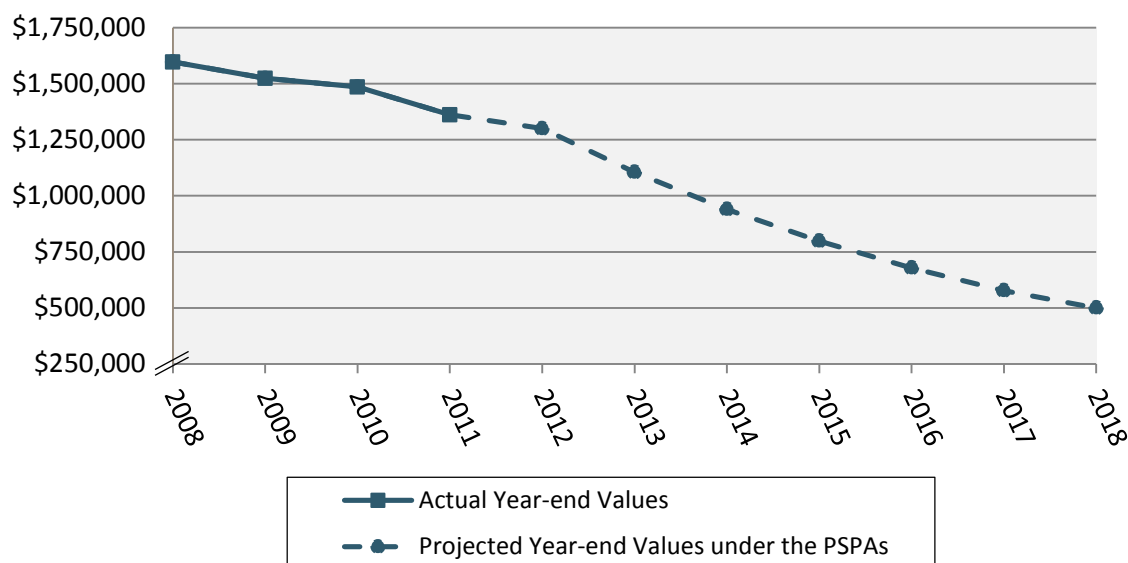
On August 17, 2012, Treasury revised the terms of the PSPAs to, among other things, accelerate the decline in the Enterprises’ retained mortgage portfolios. Specifically, the revisions required each Enterprise to reduce the size of its retained mortgage portfolio by 15% annually after 2012, to reach a maximum size of \$250 billion each (or \$500 billion combined) by 2018. Figure 10, below, shows the actual and projected declines in the Enterprises’ retained mortgage portfolios pursuant to the revised PSPAs.

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<sup>61</sup> The analysis in this paragraph is based upon information contained in FHFA’s *Report to Congress 2008* (May 18, 2009).

<sup>62</sup> In its 2008 Report to Congress, FHFA noted that “[c]ertain risk management decisions that occurred before the conservatorship, coupled with continued financial market deterioration, led to net losses and eroded capital [for the Enterprises]. Weakened earnings and market conditions led to difficulties in raising capital and issuing long-term debt, which contributed to the Director’s decision to appoint FHFA as conservator.” FHFA, *Report to Congress 2008*, at 21 and 37 (May 18, 2009) (online at: [http://www.fhfa.gov/webfiles/2335/FHFA\\_ReportToCongress2008508rev.pdf](http://www.fhfa.gov/webfiles/2335/FHFA_ReportToCongress2008508rev.pdf)).

**Figure 10: Actual Total Retained Portfolios and Projected Retained Portfolios Under the Terms of the PSPAs (in \$ millions)<sup>63</sup>**



Although the significant scheduled reductions in the Enterprises’ mortgage portfolios will likely reduce the associated interest rate risk over time, the portfolios are still large—they were valued at \$1.3 trillion at the end of 2011. Thus, considerable interest rate risks remain, and the portfolios must be managed effectively on an ongoing basis. In this regard, we note that FHFA’s 2011 examinations of the Enterprises found that their management of market risks, including interest rate risks, was classified as a “significant concern” under the Agency’s then-current supervisory rating system.<sup>64</sup> Although this supervisory classification was an improvement over the Enterprises’ 2008 “critical concern” rating, it was still the second most serious classification, and it signified the need for substantial improvements in the Enterprises’ management of interest rate risk, especially as their portfolios are downsized. These risks are discussed in detail in the next section of this white paper.

<sup>63</sup> Source: FHFA, *2011 Report to Congress*, at 75 and 92 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCongr11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCongr11_6_14_508.pdf)). See also *Third Amendment to Fannie Mae’s Senior Preferred Stock Purchase Agreement with Treasury* (August 2012) and *Third Amendment to Freddie Mac’s Senior Preferred Stock Purchase Agreement with Treasury* (August 2012), both available online at <http://www.fhfa.gov/Default.aspx?Page=364>.

<sup>64</sup> See FHFA, *2011 Report to Congress*, at 17 and 23 (June 13, 2012) (online at [http://www.fhfa.gov/webfiles/24009/FHFA\\_RepToCongr11\\_6\\_14\\_508.pdf](http://www.fhfa.gov/webfiles/24009/FHFA_RepToCongr11_6_14_508.pdf)).

## **VI. What Are Some of the Challenges that Remain for the Enterprises in Managing Interest Rate Risk?**

Although the Enterprises' overall interest rate risks are expected to decline as a consequence of the PSPAs' mandated reductions of their retained portfolios, significant challenges remain. These challenges have their genesis in the relatively higher proportion of illiquid assets in their portfolios and the relatively new interest rate challenges (e.g., model risk) that they present. Moreover, the Enterprises continue to face human capital risks.

### **A. The Relatively Illiquid Nature of the Assets Remaining in the Enterprises' Mortgage Portfolios Poses New Interest Rate Risk Management Challenges, Including Model Risk**

FHFA has observed that as the Enterprises decrease the size of their retained mortgage portfolios the assets remaining within them are increasingly illiquid. In general, the Enterprises can most efficiently comply with mandated reductions in their retained mortgage portfolios by selling performing assets that are readily marketable, such as their own MBS. On the other hand, distressed assets, such as non-performing whole mortgages or distressed PLMBS, may be more difficult to sell for a variety of reasons.<sup>65</sup>

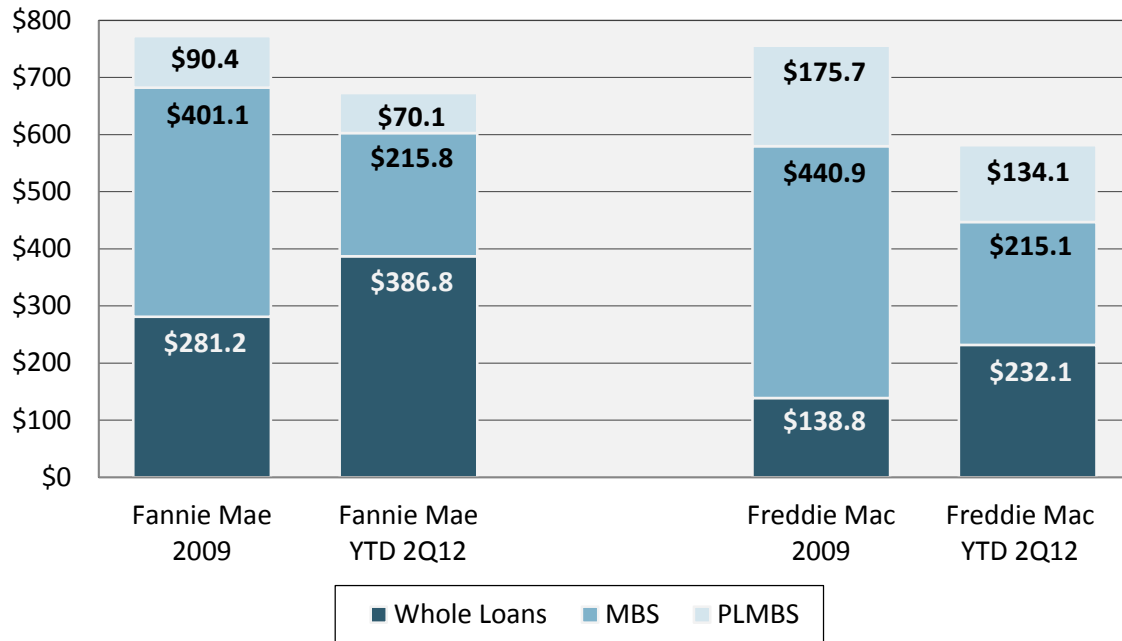
As shown in Figures 11 and 12 below, there has been a shift in the composition of the Enterprises' retained mortgage portfolios to more illiquid assets over the past several years. Specifically, there was a significant decline in readily marketable MBS from 2009 to 2012, as well as a significant increase in the relative proportion of whole loans in both Fannie Mae's and Freddie Mac's portfolios (Figure 11). Moreover, distressed whole loans, i.e., those that are delinquent or modified, accounted for 60% of Fannie Mae's whole mortgages and 50% of Freddie Mac's as of June 30, 2012 (Figure 12).<sup>66</sup>

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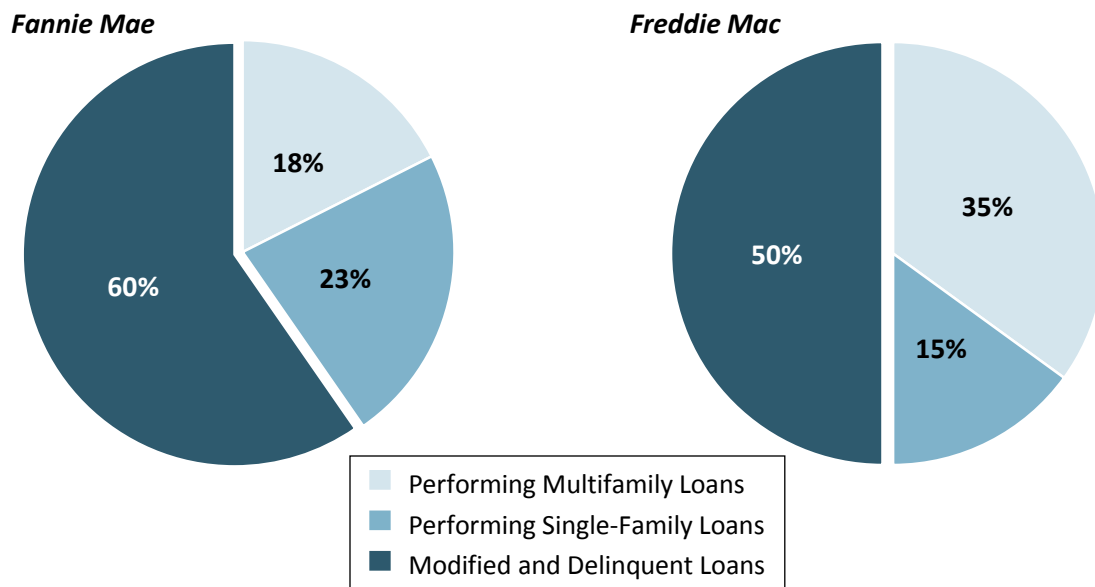
<sup>65</sup> Distressed assets may be difficult to value and may not be readily marketable.

<sup>66</sup> According to information provided by FHFA, it is unlikely that the distressed mortgage assets in the Enterprises' portfolios contain significant numbers of loans refinanced under Treasury's Home Affordable Refinance Program (HARP) which, among other things, permits the refinancing of mortgages with loan-to-value ratios of 125% or more. Rather, the overwhelming majority of HARP loans are likely packaged into MBS and sold to investors, thereby limiting any interest rate risk they may pose to the Enterprises. FHFA officials also stated that HARP loans are in high demand from an MBS perspective because borrowers cannot refinance into another HARP loan, meaning that such loans present a diminished prepayment risk. Finally, an Agency representative also said that most HARP loans are likely in MBS held by investors since the Enterprises are reducing their mortgage portfolios and, therefore, are generally no longer buying their own MBS.

**Figure 11: Composition of Enterprise Retained Mortgage Portfolios: 2009 vs. 2012**  
(in \$ billions)<sup>67</sup>



**Figure 12: Composition of the Whole Loans in the Enterprises' Retained Portfolios by Unpaid Principal Balance as of June 30, 2012**<sup>68</sup>



<sup>67</sup> Source: FHFA, Office of Financial Analysis, *September 2012 Financial Performance Summary*.

<sup>68</sup> *Id.*



According to FHFA, distressed mortgage assets present two challenges relating to interest rate risk management. The first is that, as a general matter, such assets would be expected to remain in the Enterprises' portfolios for an extended period, perhaps until their maturity, unless they are sold at a reduction—perhaps a significant reduction—from their face amount. Although short-term interest rates are at historically low levels, the risk of a sharp increase in them cannot be discounted. Thus, the management of the interest rate risk associated with the illiquid assets in the Enterprises' retained mortgage portfolios is a potentially long-term prospect.

The second interest rate risk management challenge associated with these distressed assets involves what is known as “model risk.” In general, the Enterprises use computer models to assist in the management of interest rate and other risks. For example, a model could be employed to estimate the rate at which mortgages will be prepaid under a variety of interest rate scenarios. However, FHFA has stated that distressed mortgage assets are less likely to be prepaid in a manner that is consistent with the historical performance record that forms the basis for most of the Enterprises' computer models. Given the relatively increasing percentage of distressed assets in the Enterprises' mortgage portfolios, they may be unable to employ their existing models to estimate reliably things such as the speed at which mortgages will be prepaid and, thus, employ derivatives to hedge effectively against the risk of prepayment.<sup>69</sup>

According to FHFA, the Enterprises have sought to address these challenges by revising their existing models of mortgage asset prepayment speeds and other interest rate risk management issues. However, FHFA has also stated that these “on top adjustments” to existing models are a stop-gap measure. Over the long-term, FHFA says, the Enterprises must develop improved models that better reflect the risks in mortgage portfolios that contain relatively higher levels of distressed assets.

## **B. The Enterprises Face Challenges in Recruiting and Retaining Experienced Interest Rate Risk Staff**

Through its examinations of the Enterprises, FHFA has also found that they face human capital risks that could limit the effectiveness of their interest rate risk management. For example, in its 2011 examination of one the Enterprises, FHFA noted the departure of a key executive responsible for interest rate risk management. At the other Enterprise, FHFA noted that there had been considerable attrition in its risk-modeling unit. Thus, FHFA concluded, the Enterprise

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<sup>69</sup> Two senior FHFA officials agreed that the Enterprises' shrinking portfolios present model risk, but they observed that the portfolios are, as a whole, relatively less subject to prepayment risk because, at present, the percentage of borrowers eligible to prepay is relatively low. They also observed that if there is a continued turnaround in housing markets (*i.e.*, price escalation) then there may be an increase in the percentage of loans eligible for prepayment.



may face challenges in updating the models used to estimate the risks posed by the illiquid assets in its retained mortgage portfolio.

## **VII. What Risks Did the FHLBanks Incur Prior to 2008, and What Risks Remain?**

From the late 1990s through 2008, some FHLBanks adopted business strategies that were, in some respects, similar to those of the Enterprises. Specifically, several FHLBanks rapidly increased the size of their mortgage asset portfolios. And, like the Enterprises, these FHLBanks did not always manage the associated interest rate risks effectively. Indeed, one FHLBank faced a severe financial crisis in early 2009 due, in part, to adverse interest rate movements. Although FHFA has recently observed improvements in the FHLBanks' ability to manage their interest rate risks, several continue to maintain large mortgage asset portfolios and, thus, face ongoing interest rate risk management responsibilities and challenges.

### **A. Several FHLBanks Rapidly Increased the Size of Their Mortgage Asset Portfolios and Lacked the Capacity to Manage the Associated Interest Rate Risks**

Beginning in the late 1990s, some FHLBanks began to increase the size of their mortgage asset portfolios in two principal ways. First, several FHLBanks began to purchase mortgages directly from their members and then hold them on their balance sheets. The FHLBanks believed that they could offer their members, particularly smaller banks and thrifts, better prices on mortgages than could the Enterprises.<sup>70</sup> Second, during the housing boom years of 2005 through 2007, several FHLBanks purchased larger amounts of PLMBS.<sup>71</sup> According to FHFA officials, some FHLBanks took this step, in part, to offset the loss of revenue and interest income associated with the decreasing demand for advances from member institutions.

Some FHLBanks faced significant challenges in managing the interest rate risks associated with their expanding mortgage asset portfolios. As discussed previously, unlike the Enterprises, the FHLBanks do not have the authority to package mortgages into MBS and sell them to investors to limit their interest rate risk. Consequently, they had to use derivatives and other strategies to mitigate the interest risk rate associated with their mortgage assets.

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<sup>70</sup> Under these programs, the member institution that sold the mortgage loan to the FHLBank retained the credit risk on it while the FHLBank assumed the interest rate risk.

<sup>71</sup> FHFA officials observed that the FHLBanks' investments in whole mortgages peaked in 2004.

However, the Federal Housing Finance Board (FHFB), another predecessor of FHFA, identified significant interest rate risk management deficiencies at the FHLBanks of Chicago and Seattle.<sup>72</sup> FHFB entered into written enforcement agreements with the Chicago and Seattle FHLBanks in 2004. Under the enforcement agreements, the FHLBanks were required to make significant improvements in their interest rate risk management practices. FHFB placed limits on the Chicago FHLBank's whole mortgage purchases, and the Seattle FHLBank exited the business entirely.

According to FHFA, in 2008 and 2009, during the height of the financial crisis, the FHLBank of Chicago faced a significant financial crisis caused, in part, by adverse interest rate movements. Due to a significant decline in interest rates in 2007 and 2008, many of the whole mortgages on the FHLBank of Chicago's balance sheet were expected to prepay. However, because the bank had funded these whole mortgages with relatively long-term debt, their prepayment would have put it in a funding crisis. That is, the FHLBank of Chicago would not have been able to identify and compile mortgage assets that generated a yield high enough to cover the payments necessary to service its associated debt costs. In response, FHFA took the "extraordinary" step of authorizing the FHLBank's plan to purchase up to \$10 billion in non-housing mission student loans that offered a yield high enough to cover the cost of the debt associated with its whole mortgage purchases.<sup>73</sup>

#### **B. FHFA Has Recently Identified Some Improvements in the Management of Interest Rate Risk by the FHLBanks, but Some Challenges Remain**

FHFA conducts annual examinations of the 12 FHLBanks and, in general, has reported some improvements in their interest rate exposure and risk management. In particular, FHFA lifted the FHLBank of Chicago's written enforcement agreement in 2012 after, among other improvements, the bank submitted to FHFA a plan that the Agency viewed as offering an effective strategy by which to manage its interest rate risks.

Going forward, several FHLBanks continue to face challenges in managing the interest rate risks associated with their large mortgage asset portfolios. As shown in Figure 13, below, seven

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<sup>72</sup> FHFB was the FHLBank System's safety and soundness and housing mission regulator prior to 2008 when it was abolished under HERA and replaced by FHFA.

<sup>73</sup> FHFA officials said that in early 2009 the FHLBank's models predicted a wave of prepayments based on past borrower responses to comparably lower interest rates. On that basis, FHFA approved the FHLBank's request to purchase student loans as a means to rebalance its portfolio. However, the expected wave of prepayments did not materialize in 2009 because many borrowers did not qualify for refinancing due to the general deterioration in credit quality during the period. The FHFA officials said that this trend was not anticipated in early 2009, and that authorizing the FHLBank to purchase the student loans was thought to be necessary to prevent a substantial decline in its financial condition.

FHLBanks' mortgage asset portfolios are greater than 25% of their total assets. FHFA has expressed concern over the fact that certain assets in these portfolios, such as PLMBS and MBS, which are classified as “non-core” mission activities, do not materially contribute to the FHLBanks' housing mission and, over the years, have increased risks within the FHLBank System. Further, FHFA has stated that FHLBanks should increasingly focus on their advance business.<sup>74</sup> However, the Agency has not specifically directed the FHLBanks to reduce their mortgage asset portfolios to address these concerns and risks as the Enterprises have been required to do.<sup>75</sup>

**Figure 13: Mortgage Asset Portfolios as a Percentage of FHLBank Total Assets, as of June 30, 2012 (in \$ billions)<sup>76</sup>**

FHLBank	Mortgage Asset	
	Portfolio	% of Assets
<b>Chicago</b>	\$35.5	51.7%
<b>Indianapolis</b>	\$13.4	33.3%
<b>Topeka</b>	\$10.9	31.1%
<b>Des Moines</b>	\$14.5	31.0%
<b>Cincinnati</b>	\$19.0	28.1%
<b>San Francisco</b>	\$26.3	25.6%
<b>Seattle</b>	\$9.1	25.1%

Moreover, the FHLBanks face model risk challenges that are, in some respects, similar to those faced by the Enterprises. In particular, modeled prepayments have been much greater than actual prepayments. Consequently, the FHLBanks may face challenges in using derivatives to hedge effectively against the prepayment risks associated with their mortgage asset portfolios.

<sup>74</sup> FHFA Acting Director Edward J. DeMarco, *The Franchise Value of Federal Home Loan Banks*, 2011 Federal Home Loan Bank Directors Conference, Washington DC, May 11, 2011. FHFA classifies MBS and PLMBS as “non-core” housing mission assets.

<sup>75</sup> As the Enterprises' conservator, FHFA has far greater authority to control and direct the Enterprises' business activities than it has over the FHLBanks as their independent supervisor. Further, Treasury's PSPAs with the Enterprises specifically direct them to reduce the size of their mortgage portfolios.

<sup>76</sup> Source: FHLBank data provided by FHFA. Figures reflect the carrying value of assets.

# CONCLUSIONS

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For many years, the Enterprises and some FHLBanks did not consistently demonstrate that they could effectively manage interest rate risks. Since 2008, FHFA and Treasury have taken steps to limit the Enterprises' interest rate and related risks by requiring them to downsize substantially their mortgage asset portfolios. However, interest rate risk management remains a significant priority as the Enterprises' portfolios still contain \$1.3 trillion in assets and some FHLBanks maintain large portfolios as well. Moreover, the increasingly illiquid nature of the GSEs' mortgage asset portfolios presents new challenges in terms of limiting potential losses due to fluctuations in interest rates. Given such challenges, OIG will initiate audits and evaluations of the Agency's oversight of the GSEs' management of interest rate risk as warranted.

## SCOPE AND METHODOLOGY

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To address this report's objectives, OIG interviewed FHFA officials, Enterprise representatives, and officials from several FHLBanks. Further, FHFA reviewed Agency publications and documents—such as examination reports, and documents from other federal entities, including the Federal Reserve and Treasury. Moreover, OIG obtained and analyzed historical data on the housing GSEs' interest rate exposures.

The preparation of this white paper was conducted under the authority of the Inspector General Act of 1978, and in accordance with the *Quality Control Standards for Inspection and Evaluation* (January 2012), which were promulgated by the Council of the Inspectors General on Integrity and Efficiency. These standards require OIG to plan and perform evaluations to obtain evidence sufficient to provide a reasonable basis for its findings and recommendations. OIG believes that this white paper meets these standards.

OIG provided FHFA staff with briefings and presentations concerning the results of its field work and provided FHFA with the opportunity to respond to a draft of this white paper. FHFA and the Enterprises provided technical comments on a draft of this report that were incorporated as appropriate.

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