Market Estimation Model for the 2012 - 2014 Enterprise Single-Family Housing Goals

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PREFACE

This Federal Housing Finance Agency (FHFA) research paper discusses the forecast models used in establishing housing goal benchmarks for 2012 through 2014. The paper is part of FHFA's ongoing effort to enhance public understanding of the nation's housing finance system. The paper was prepared by Jay Schultz of the Office of Housing and Regulatory Policy.

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A. INTRODUCTION

In establishing benchmarks for the 2012 through 2014 single-family mortgage housing goals for Fannie Mae and Freddie Mac (the Enterprises), the Federal Housing Finance Agency (FHFA) is required to measure the size of the mortgage market. This paper documents the methodology used to establish the market size for the Low-Income Borrower Home Purchase Housing Goal (share of borrowers with incomes no greater than 80 percent of the area median income (AMI)), the Very Low-Income Borrower Home Purchase Housing Goal (share of borrowers with incomes no greater than 50 percent of AMI), the Low-Income Area Home Purchase Housing Subgoal (share of borrowers living in low-income areas (where census tract median income is no greater than 80 percent of AMI) and high minority areas), and the Low-Income Borrower Refinance Housing Goal (share of borrowers with incomes no greater than 80 percent of AMI).[1]

The housing goals are defined in terms of percentages of mortgages on owner-occupied properties, either home purchase or refinance, acquired during a calendar year. For example, the low-income borrower home purchase goal is expressed as the percentage of home purchase mortgages where the borrower's income is no greater than 80 percent of the area median income. Likewise, the low-income borrower refinance mortgage acquisitions are relative to all owner-occupied property refinance mortgages acquired.[2] The market is estimated in terms of

[1] High minority areas are defined as census tracts where the percent minority is at least 30 percent of the population and the census tract median income is less than AMI. There is also a provision for designated disaster areas in the Low-Income Areas Home Purchase Goal (see Section E).

[2] To be eligible to count toward the housing goals, mortgages acquired have to meet certain counting rules. These counting rules are defined in 12 CFR 1282.

percentages of mortgage originations.[3] The results of the market estimation model are provided in **Table 1** where, for example, it expected that 25.4 percent of home purchase mortgage

Table 1

Enterprise Single-Family Housing Goals
Market Estimates 2011 - 2013

Year [1]	Low-Income Borrower Home Purchase Goal	Very Low-Income Borrower Home Purchase Goal	Low-Income Area Home Purchase Goal	Low-Income Borrower Refinance Goal
2004	27.2%	6.6%	16.7%	28.0%
2005	24.2%	5.7%	15.3%	26.0%
2006	24.0%	5.9%	15.8%	24.7%
2007	26.0%	6.1%	16.2%	24.2%
2008	25.3%	6.5%	14.1%	23.4%
2009	29.6%	8.8%	13.0%	20.8%
2010 [2]	27.2%	8.1%	12.1%	20.2%
2010-11 Benchmarks[3]	**27%**	**8%**	**13%**	**21%**
2011 [4]	25.2% ± 3.1%	7.6% ± 1.4%	11.7% ± 2.0%	21.9% ± 3.2%
2012 [4]	22.4% ± 5.4%	7.5% ± 3.0%	11.9% ± 3.9%	21.2% ± 5.2%
2013 [4]	19.6% ± 7.1%	7.3% ± 4.4%	11.8% ± 5.4%	24.1% ± 6.7%
2012-14 Benchmarks[6]	**20%**	**7%**	**11%**	**21%**

[1] Historical market performance is based on historical HMDA data for first-lien, conventional, ARRA-equivalent conforming limit loans, excluding higher-cost and HOEPA loans (see Section B).

[2] The refinance goal market performance does not include the impact of loan modifications.

[3] The 2010-11 refinance goal benchmark includes a +200 basis point adjustment to account for the impact of loan modifactions on Enterprise performance.

[4] Estimated (95% confidence), does not include adjustment for loan modifications.

[5] Estimated (95% confidence), primarily a function of time trends, does not include adjustment for loan modifications.

[6] Proposed.

[3] The size of the market for each goal shall be established annually by FHFA based on data reported pursuant to the Home Mortgage Disclosure Act for a given year. Unless otherwise adjusted by FHFA, the size of the market shall be determined based on the following criteria: (1) Only owner-occupied, conventional loans shall be considered; (2) Purchase money mortgages and refinancing mortgages shall only be counted for the applicable goal or goals; (3) All mortgages flagged as HOEPA loans or subordinate lien loans shall be excluded; (4) All mortgages with original principal balances above the conforming loan limits for single unit properties for the year being evaluated (rounded to the nearest $1,000) shall be excluded; (5) All mortgages with rate spreads of 150 basis points or more above the applicable average prime offer rate as reported in the Home Mortgage Disclosure Act data shall be excluded; and (6) All mortgages that are missing information necessary to determine appropriate counting under the housing goals shall be excluded. (12 CFR 1282.12(b))

originations on owner occupied properties will be made to low-income borrowers in 2012. While the housing goal benchmarks will extend to 2014, data are only sufficient to estimate market performance through 2013. Based on the information available today, affordability levels estimated for the 2012-2013 period are expected to extend through 2014. The remainder of this paper describes the methodology used to produce the housing goal share market estimates in Table 1.

Section B provides background and descriptions of the economic drivers in the mortgage market. Section C describes the data used in estimating the market size models and Section D reviews the economic and market forecast data used to project the market size of each of the single-family mortgage housing goals. Section E presents the four econometric time series models used to estimate market size. The market estimates for all four goals are adjusted to remove the impact of manufactured housing chattel loans, as discussed in Section F. Finally, the conclusion is provided in Section G.

B. BACKGROUND

The Housing and Economic Recovery Act of 2008 (HERA) mandates that, beginning in 2010, FHFA establish a new set of housing goals.[4] No longer are there goals based on the entire single-family and multifamily mortgage market, as was the case for the goals prior to 2010. The goals for the single-family mortgage market are based on mortgages acquired, as opposed to the previous unit-based goals. There are now separate goals for home purchase mortgages and refinance mortgages and only mortgages associated with 1-4 unit owner-occupied properties are counted. The housing goal benchmarks for 2010 and 2011 were set by regulation in 2010.[5]

Expectations for 2012 to 2013 are for modest improvements in the single-family mortgage market environment similar to what was experienced in 2011. Quantifiable factors influencing FHFA's outlook for the mortgage market include general growth in the economy, employment, inflation, and the interest rate environment. Industry observers expect subprime market activity to remain minimal through 2013. The FHA insured mortgage market share is expected to continue to be a major factor in the affordability levels in the conventional market as FHA loans will continue to be an attractive option for low-income homebuyers.

Several factors can have a direct or indirect impact on the affordability of home purchases or the refinancing of mortgages. The effects of unemployment, FHA market share, refinancing, interest rates, house prices, the overall housing market, manufactured housing, and the market outlook are discussed below.

Interest Rates. Affordability in the mortgage market relies in part on the interest rate environment. Mortgage interest rates are impacted by many factors. Interest rates on longer term financial instruments such as mortgages typically follow the fluctuations of the 10-Year

[4] 12 U.S.C. 1331(a)
[5] 12 CFR 1282.12.

Treasury Note yield, with approximately an 180 basis point spread reflecting the differences in liquidity and credit risk. With uncertainty in the financial markets of the European Union, the U.S. financial markets have seen increased demand as financial instruments here are seen as a "safe haven." Overall, interest rates in the United States are heavily influenced by the monetary policies of the Federal Reserve Board's Federal Open Market Committee (FOMC). During the current economic environment, since mid-2008, the FOMC has maintained an accommodative monetary policy in support of its dual mandate, of fostering maximum employment and price stability. In its April 24-25, 2012 meeting, the FOMC stated that it is committed to a low federal funds rate policy (at 0 to 0.25 percent) as it "anticipates that economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through late 2014."[6] This accommodative monetary policy, combined with the international demand for U.S. financial instruments, has led to historically low interest rates in the mortgage market. The longer term 30-year fixed-rate mortgage interest rate fell to 4.2 percent in October 2010, before increasing to 4.9 percent by February 2011 and was reported at 3.83 percent in Freddie Mac's May 10, 2012 Primary Mortgage Market Survey. Shorter term fixed- and adjustable-rate mortgage interest rates remain at historical lows, for example on May 10th, Freddie Mac reported that the average one-year adjustable-rate mortgage rate was 2.73 percent. As a major contributor to the cost of mortgage financing, lower interest rates directly affect the affordability of buying a home or refinancing a mortgage. As the economic recovery strengthens in the near future and the European situation stabilizes it is expected that interest rates, particularly longer term interest rates, will rise. For the 2012-2013 period, as shown in **Table 5**, forecasts show that all interest

[6] Federal Open Market Committee, Press Release, April 25, 2012.

rates are expected to rise, including the interest rate on a 30-year fixed-rate mortgage, which is expected to reach 4.2 percent by the fourth quarter of 2012 and to average 4.7 percent in 2013.

Unemployment. In addition to being an indicator of the health of the economy in general, the employment situation affects the housing market more directly because buying a house is considered a large investment and a long-term commitment that requires stable employment. Nonfarm payroll employment increased by 115,000 in April 2012. The unemployment rate has steadily fell from 9.1 percent in August 2011 to 8.1 percent in April 2012.[7] While the unemployment rate is still historically high; however it is down 200 basis points from the October 2009 high mark. To the extent that lower-income jobs are affected more by the employment situation, the affordable home purchase market is affected.

House Prices. Trends in house prices influence the housing and mortgage markets. In periods of house price appreciation, home sales and mortgage originations increase as the expected return on investment rises. In periods of price depreciation or price uncertainty, home sales and mortgage originations decrease as risk-averse homebuyers are reluctant to enter the market. House prices generally fell during 2009 through 2011, and are expected to fall slightly in 2012 before rebounding in 2013. Industry forecasts show a decrease in the S&P/Case Shiller Home Price Index of -0.5 percent in 2012 and an increase of 0.8 percent in 2013.

Housing Market. An active housing market is generally good for the affordable home market. When there are more homes are for sale, potential home buyers have more options, prices tend to be more competitive and the search costs to find affordable housing decrease. Total home sales reached a 10-year annual low in 2010 at 4.5 million units. Home sales increased slightly in 2011 to 4.6 million units and industry observers expect that home sales will

[7] Bureau of Labor Statistics, News Release: The Employment Situation – April (May 4, 2012).

increase to 4.9 million units in 2012 and to 5.1 million units in 2013 – well below 2004-2006 levels..

During 2009 and early 2010, special homebuyers tax credits were available for first-time and repeat homebuyers. Mortgages to first-time homebuyers tend to be more likely to qualify for housing goals than those for repeat homebuyers, who tend to be older and have higher incomes. Many first-time homebuyers whose mortgages might otherwise have been available to receive goal-qualifying loans for home purchases in 2012-2014, instead bought their homes in 2009 or 2010 to take advantage of the first-time homebuyers tax credit.

FHA Market Share. The composition of the affordable conventional mortgage market is also influenced by FHA's market share, which rose significantly during 2008 through 2010, reaching a share of the home purchase mortgage market near of 40 percent in the first half of 2010. Since then its market share has decreased, and is expected to fall to 24 percent in 2012 and 22 percent in 2013. These loans generally are pooled into mortgage-backed securities guaranteed by GNMA. Purchases of mortgages insured by FHA and VA ordinarily do not receive housing goals credit.

Refinance Rate. The size of the refinance mortgage market has an impact on the share of affordable refinance mortgages. Historically, refinance mortgage volume increases when the refinancing of mortgages is motivated by low interest rates, "rate and term refinances," and this increased volume is dominated by higher income borrowers. As a result, in periods of low interest rates the share of lower income borrowers will decrease. Likewise, refinancings that occurred when interest rates were high tended to have a higher proportion of lower income homeowners who were consolidating their debts or who were drawing equity out of their homes for other uses, while higher income homeowners dropped out of the refinance mortgage market.

While mortgage interest rates are expected to rise in 2012 to 2013, there is reason to expect that the refinance patterns observed in the past may not occur. In the current economic environment, lower income homeowners tend to have less equity—or negative equity—in their homes because the prices of lower-valued homes have fallen more than the prices of higher-valued homes.[8] At the same time, lenders have tightened underwriting requirements, requiring higher down payments and higher credit scores. As a result, fewer lower-income homeowners may be able to refinance in 2012 and 2013. In addition, programs established in the wake of the financial crisis have affected refinancings. The Home Affordable Refinance Program (HARP), which became effective in March 2009, is an effort by the Enterprises to enhance the opportunity for owners to refinance. Homeowners whose mortgages are owned or guaranteed by Fannie Mae or Freddie Mae and who are current on their mortgages have the opportunity to reduce their monthly mortgage payments to take advantage of historically low mortgage interest rates. An essential element of this program is the permission to carry forward into the new loan any existing MI from prior mortgages or, if no MI existed, none would be required for the refinanced mortgage. Even under favorable interest rate conditions, however, refinancings may not mirror previous years.

Manufactured Housing Loans. Manufactured housing is an important source for affordable housing. Loans used to purchase a manufactured housing unit can be placed in two different categories. In the first category, the manufactured housing unit and the land where it sits is considered real estate and a mortgage is used to acquire it. In the second category, the manufactured housing unit is considered personal property, or chattel, and the loan used to acquire it is called a chattel loan. Because it is a personal property loan, chattel loans generally

[8] See The Joint Center for Housing Studies of Harvard University, "The State of the Nation's Housing, 2011," 40 (2010) (Table A-8), available at http://www.jchs.harvard.edu/publications/markets/son2011/son2011.pdf.

have higher contract interest rates and terms than a mortgage loan would have. By definition, to be eligible to count toward a housing goal a mortgage must be on real estate, therefore chattel loans do not count.[9] The mortgage data used in the models described in Section E below include chattel loans and therefore an adjustment is made to the market estimates. This adjustment is described in Section F.

[9] 12 CFR 1282.1, and "2010–2011 Enterprise Housing Goals; Enterprise Book-entry Procedures; Final Rule." Federal Register. (September 14, 2010), p. 55894.

C. ECONOMIC AND MORTGAGE MARKET DATA

Historical monthly time series data used in the housing goals models were obtained from a variety of sources. Gross Domestic Product, the unemployment rate, inflation rates, median prices for new homes, housing starts and new housing sales are from the Census Bureau, the Bureau of Economic Analysis and the Bureau of Labor Statistics.[10] Constant maturity interest rates on Government notes and bonds came from the U.S. Department of the Treasury, while mortgage interest rates are provided by Freddie Mac's Primary Mortgage Market Survey. Median house prices for existing homes and the Housing Affordability Index were obtained from the National Association of Realtors (NAR), and FHFA produced the House Price Index. For 2009 and previous years the refinance rate and FHA market share were calculated from Home Mortgage Disclosure Act (HMDA) data. Preliminary refinance rates for 2010 and the first quarter of 2011 are as reported by the Mortgage Bankers Association. Preliminary FHA market shares are calculated from home sales and FHA endorsement volume as reported monthly by FHA. For the list of data sources, see the Appendix.

FHFA measures the market performance for the single-family owner-occupied property mortgage housing goals by analyzing HMDA data.[11] HMDA data are loan level records of mortgage applications, originations and acquisitions that occurred during a calendar year and are considered to be broadly representative of the mortgage market in the United States.[12] The Federal Financial Institutions Examination Council has made available a monthly nationwide

[10] U.S. Department of Commerce and the U.S. Department of Labor.
[11] HMDA data are made available from the Federal Financial Institutions Examination Council, http://www.ffiec.gov/hmda/default.htm.

[12] Avery, Robert B., et al. "The Mortgage Market in 2010: Highlights from the Data Reported under the Home Mortgage Disclosure Act." Federal Reserve Bulletin, (forthcoming), p. 1. The 2010 HMDA data covered 7,900 home lenders including the nation's largest mortgage originators.

time series from the loan level HMDA records with various attributes and specifications, including the performance of the four single-family housing goals and the one subgoal. For the purposes of estimating the single-family mortgage market for goal qualifying loans, FHFA defines the market as conventional conforming prime home purchase (refinance) mortgages.[13]

One of the issues with regard to HMDA data is the considerable delay in releasing the database. At this time the most current publicly available HMDA data are for 2009. To inform the forecasted estimates with more current information FHFA uses two supplemental data time series. For the three home purchase goals and subgoal an estimate of goal qualifying shares are calculated from FHFA's Monthly Interest Rate Survey (MIRS) data through September 2011 , which are produced from a statistical model developed by Freddie Mac. The refinance goal time series is also extended using the combined Enterprise goal performance through December 2011. This is discussed in more detail in the methodology section(s).

Figures 1 through 4 show both the HMDA and the alternative time series for the four single-family housing goals and illustrate the seasonal characteristics of each series. The low-income (LIP) and very low-income (VLIP) borrower home purchase series are characterized by significant seasonality prior to 2000 and a dip in share during the subprime bubble from 2004 to 2006 (see Figures 1 and 2). The low-income areas home purchase subgoal (LAP) shares exhibit seasonality throughout the entire 16 year analysis period. Also, as can be seen in Figure 3, the series shifts up nearly four percent between 2002 and 2003 due to transitioning to the 2000 Census as the source for determining income and minority composition of the census tracts.

[13] To be consistent with the conforming loan limits established in the American Recovery and Reinvestment Act (ARRA 2009), the conforming loan limit is defined as 1.15 times the Area Median House Price (from NAR), where the maximum (ceiling) must not exceed 1.75 times the original conforming limit for the given year. A loan is considered subprime if the lender is included in HUD's subprime lender list. The market estimates are based on originations of first- and second-lien mortgages.

Figure 1

Low-Income Borrower Home Purchase Goal

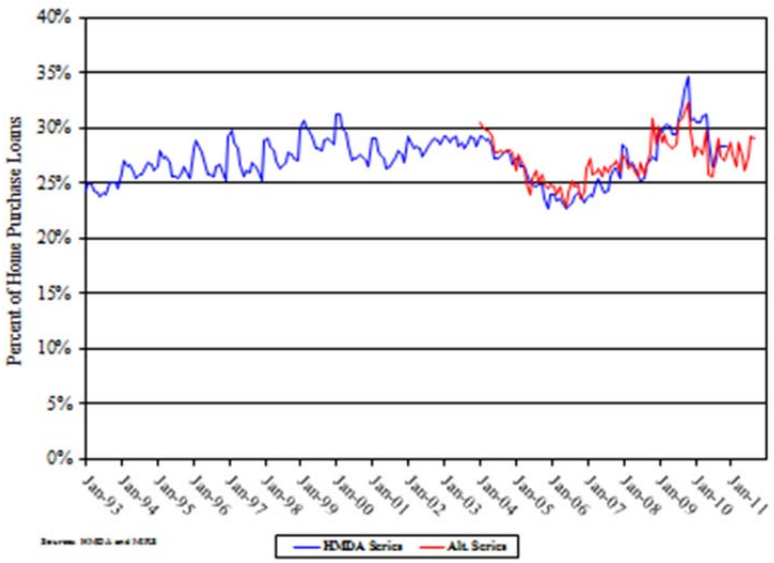


Figure 2

Very Low-Income Borrower Home Purchase Goal

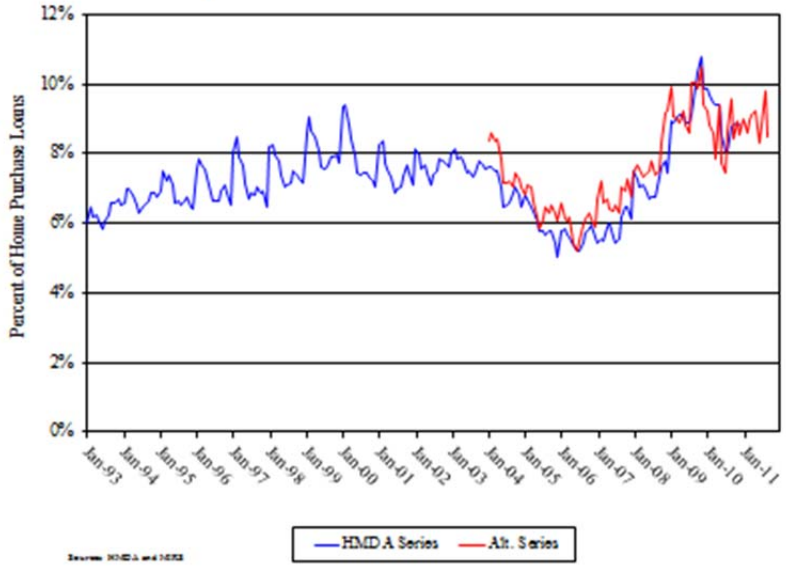


Figure 3

Low-Income Area Home Purchase Subgoal

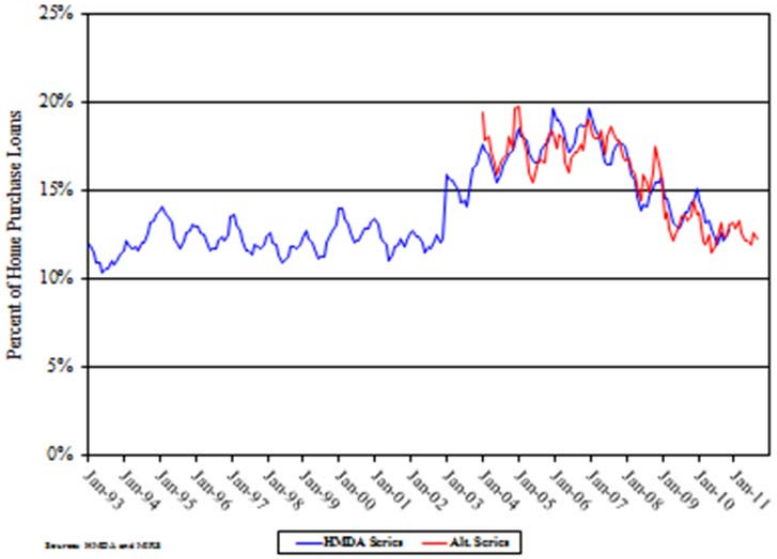
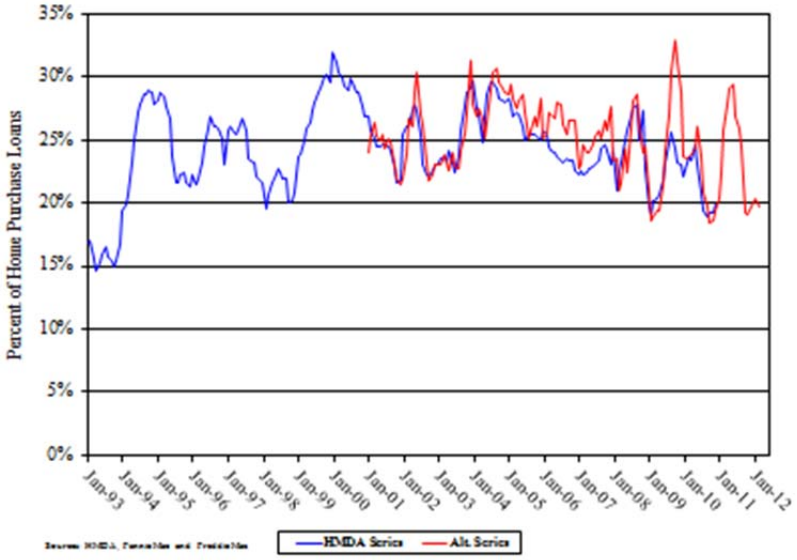


Figure 4

Low-Income Borrower Refinance Goal



While not as evident as the home purchase goals, the low-income borrower refinance goal (LIR) series is characterized by seasonality prior to 2000. The dominant feature, however is the large swings in low-income mortgage shares coinciding with refinance booms (see Figure 4). Figures 1 through 4 also show the correlation between the HMDA series and the alternative series.

D. MARKET FORECAST

FHFA compiled forecasts from twelve industry and government sources (industry observers). The list of forecasters, along with each forecasters' annualized projections for 2012 and 2013 of the market indicators are provided in **Tables 2 and 3**. The forecasts are all provided on either a quarterly or annual basis for each market indicator.

A summary (including forecast averages) of these key market indicators, on a quarterly basis, is provided in **Tables 4 and 5**, where the shaded area represents forecasts. On average, industry forecasters project the economy to continue to grow in 2012 and 2013, with real Gross Domestic Product (GDP) growing at rates of 2.3 and 2.6 percent, respectively. The industry observers expect the unemployment rate to remain just above 8.0 percent in 2012, and falling to 7.6 percent in the fourth quarter of 2013. For the 2012 and 2013 period, the forecasts polled by FHFA show that all interest rates are expected to rise, including the interest rate on a 30-year fixed rate mortgage, however, remaining below 5.0 percent through 2012 and 2013.

In addition to the expected moderate rebound in home sales, housing starts are expected to grow at a rate of 19 percent in 2012 and 21 percent in 2013 -- a big expected improvement over the single-digit and negative growth rates of the past seven years. Single-family originations are expected to fall 7 percent in 2012 and 9 percent in 2013. Expectations are that home values will continue to fall in 2012, before rebounding modestly in 2013, as evidenced in forecasts of the FHFA and Case-Shiller Home Price Indices. Generally affordability of housing, as measured by NAR's Housing Affordability Index, is expected to fall throughout 2012. Median sales prices of homes are expected to remain relatively flat over in 2012 and 2013.

Table 2

Forecasts of Economic Indicators by Source

Forecast[1]	Real GDP Growth Rate		Residential Constr. Growth Rate		Inflation Rate (CPI)[2]		Inflation Rate (Core CPI)[2]		Inflation Rate (Core PCE)[2]		Unemployment Rate		10-Year Const. Mat. Treas. Yield		1-Year Const. Mat. Treas. Yield		Prime Rate		Federal Funds Rate	
	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013	2012	2013
Mortgage Bankers Assiociation [3]	2.2%	2.3%	9.2%	9.1%	2.5%	2.1%					8.1%	7.6%	2.2%	2.8%					0.1%	0.2%
Fannie Mae [4]	2.3%	2.4%	8.6%	13.1%	7.6%	8.5%	6.8%	9.1%			8.2%	7.7%	2.3%	2.7%	0.2%	0.5%			0.1%	0.2%
Freddie Mac [5]	2.6%	3.5%			2.1%	2.0%					8.2%	7.8%	2.3%	3.1%	0.3%	0.6%				
National Association of Realtors [6]	2.3%	3.1%									8.2%	7.6%							0.1%	0.1%
Wells Fargo [7]	2.0%	2.0%	14.7%	19.3%	2.1%	2.3%	1.7%	1.9%			8.2%	7.9%	2.1%	2.4%			3.3%	3.3%	0.3%	0.3%
PNC Financial [8]	2.4%	2.7%	9.6%	6.6%	2.2%	2.4%			2.0%	2.0%	8.1%	7.6%	2.1%	2.6%			3.3%	3.3%	0.1%	0.1%
Standard and Poor's [9]	2.1%	2.5%	9.9%	16.4%	2.0%	1.7%	2.0%	1.9%			8.2%	7.9%	2.2%	2.7%					0.1%	0.1%
National Association of Home Builders [10]													2.3%	3.1%	0.2%	0.3%	3.2%	3.2%	0.1%	0.1%
The Conference Board [11]	2.1%	2.4%																		
Wall Street Journal Survey [12]	2.5%	2.6%			2.3%	2.3%					8.0%	7.6%	2.3%	3.0%					0.1%	0.3%
Federal Open Market Committee [13]	2.7%	2.9%							2.0%	1.9%	7.9%	7.5%								
Raymond James Financial [14]	2.4%	2.6%	8.3%	3.8%	2.4%	2.1%	2.1%	2.0%	2.0%	1.9%	8.0%	7.5%	2.2%	2.6%					0.2%	0.2%
Philadelphia FRB Survey [15]	2.4%	2.7%	9.8%	7.9%	2.3%	2.1%	2.0%	2.0%	1.7%	1.7%	8.1%	7.7%	2.2%	2.6%						
Average [16]	2.3%	2.6%	9.9%	9.7%	3.2%	2.9%	2.9%	3.4%	1.9%	1.9%	8.1%	7.7%	2.2%	2.8%	0.2%	0.4%	3.2%	3.2%	0.1%	0.2%
Minimum	*2.0%*	*2.0%*	*8.6%*	*6.6%*	*2.0%*	*1.7%*	*1.7%*	*1.9%*	*2.0%*	*1.9%*	*7.9%*	*7.5%*	*2.1%*	*2.4%*	*0.2%*	*0.3%*	*3.2%*	*3.2%*	*0.1%*	*0.1%*
Maximum	*2.7%*	*3.5%*	*14.7%*	*19.3%*	*7.6%*	*8.5%*	*6.8%*	*9.1%*	*2.0%*	*2.0%*	*8.2%*	*7.9%*	*2.3%*	*3.1%*	*0.3%*	*0.6%*	*3.3%*	*3.3%*	*0.3%*	*0.3%*

[1] Forecasts are annual averages of quarterly forecasts, where applicable.

[2] Fourth Quarter over Fourth Quarter Percent Change.

[3] Last Updated 4/17/2012

[4] Last Updated 4/10/2012

[5] Last Updated 4/24/2012

[6] Last Updated 4/26/2012

[7] Last Updated 5/9/2012 , U.S. Economic Forecast and 5/3/2012

[8] Last Updated 5/15/2012

[9] Last Updated 4/23/2012

[10] Last Updated 5/4/2012

[11] Last Updated 5/9/2012

[12] Last Updated 5/15/2012 , survey of 57 forecasters.

[13] Last Updated 4/25/2012 , midpoint of the central tendency projection.

[14] Last Updated 4/16/2012

[15] Last Updated 5/11/2012 , survey of 45 forecasters.

Table 3

Forecasts of Housing and Mortgage Market Indicators by Source

Forecast[1]	Housing Starts[2] 2012	Housing Starts[2] 2013	Housing Starts (1-Unit)[2] 2012	Housing Starts (1-Unit)[2] 2013	Total Home Sales[2] 2012	Total Home Sales[2] 2013	New Home Sales[2] 2012	New Home Sales[2] 2013	Existing Home Sales[2] 2012	Existing Home Sales[2] 2013	Single-Family Originations[3] 2012	Single-Family Originations[3] 2013	Refinance Mortgage Rate 2012	Refinance Mortgage Rate 2013	FHA Market Share 2012	FHA Market Share 2013
Mortgage Bankers Assiociation	738	845	505	580	5,007	5,227	345	395	4,663	4,832	$1,097	$1,063	60.0%	33.7%		
Fannie Mae	731	883	500	606	4,927	5,103	343	430	4,584	4,673	$1,255	$1,065	61.4%	51.7%		
Freddie Mac	728	905			4,395	4,825					$1,250	$1,070	66.3%	59.5%	24.1%	24.2%
National Association of Realtors	770	970			5,080	5,280	400	530	4,680	4,750						
Wells Fargo	733	845	500	575	4,850	5,070	350	420	4,500	4,650						
PNC Financial	714	776					343	365								
Standard and Poor's	740	1,000														
National Association of Home Builders	717	895	503	660			361	505								
The Conference Board	730	820														
Wall Street Journal Survey	750															
Philadelphia FRB Survey	705	820														
Average [4]	729	879	499	605	4,872	5,102	351	439	4,604	4,727	$1,175	$1,066	62.4%	48.3%	25.0%	24.2%
Minimum	*714*	*776*	*500*	*575*	*4,395*	*4,825*	*343*	*365*	*4,500*	*4,650*	*$1,097*	*$1,063*	*60.0%*	*33.7%*	*24.1%*	*24.2%*
Maximum	*770*	*1,000*	*505*	*660*	*5,080*	*5,280*	*400*	*530*	*4,680*	*4,832*	*$1,255*	*$1,070*	*66.3%*	*59.5%*	*24.1%*	*24.2%*

Forecast[1]	30-Year Mortgage Fixed Rate 2012	30-Year Mortgage Fixed Rate 2013	1-Year ARM Rate 2012	1-Year ARM Rate 2013	Change in Home Prices (FHFA ALL)[5] 2012	Change in Home Prices (FHFA ALL)[5] 2013	Change in Home Prices (FHFA PO)[5] 2012	Change in Home Prices (FHFA PO)[5] 2013	Change in Home Prices (Case-Shiller)[6] 2012	Change in Home Prices (Case-Shiller)[6] 2013	Median Sales Price - New Homes[7] 2012	Median Sales Price - New Homes[7] 2013	Median Sales Price - Existing Homes[7] 2012	Median Sales Price - Existing Homes[7] 2013	ARM Market Share 2012	ARM Market Share 2013
Mortgage Bankers Assiociation	4.2%	4.8%			0.7%	3.7%					$225	$226	$167	$172	5.3%	6.8%
Fannie Mae	4.1%	4.4%	2.9%	3.2%			-1.2%	1.2%			$221	$218	$162	$160	6.5%	6.0%
Freddie Mac	4.2%	4.9%	2.9%	3.2%					-0.3%	0.4%					15.5%	15.0%
National Association of Realtors	4.2%	4.9%											$170	$173		
Wells Fargo	3.9%	4.2%	3.1%	3.2%			-0.8%	0.9%	-1.4%	0.2%	$222	$224	$165	$166		
PNC Financial	3.9%	4.2%							0.1%	1.8%						
Standard and Poor's	4.0%	4.2%														
National Association of Home Builders	4.2%	4.9%	2.8%	3.1%												
Wall Street Journal Survey					0.5%											
Average [4]	4.0%	4.6%	2.9%	3.2%	0.3%	3.7%	-1.0%	1.1%	-0.5%	0.8%	$223	$223	$165	$168	7.8%	9.2%
Minimum	*3.9%*	*4.2%*	*2.8%*	*3.1%*	*0.5%*	*3.7%*	*-1.2%*	*0.9%*	*-1.4%*	*0.2%*	*$221*	*$218*	*$162*	*$160*	*5.3%*	*6.0%*
Maximum	*4.2%*	*4.9%*	*3.1%*	*3.2%*	*0.7%*	*3.7%*	*-0.8%*	*1.2%*	*0.1%*	*1.8%*	*$225*	*$226*	*$170*	*$173*	*15.5%*	*15.0%*

[1] Forecasts are annual averages of quarterly forecasts, where applicable. See Table3C for update information. The FOMC and Raymond James & Associates only provide forecasts on basic macroeconomic series and therefore are omitted from the mortgage/housing forecast table (see Table 3C).

[2] Thousands of units

[3] Billions of dollars

[4] 2011 averages include actual values for months when available. Therefore the average line may not equal the average of the above numbers.

[5] Federal Housing Finance Agency: All transactions and home Purchase only home price indicies (Q4/Q4 % Change).

[6] Standard & Poor's / Case-Shiller Home Price Index, 10-City Composite (Q4/Q4 % Change).

[7] Thousands of dollars

Table 4

Economic and Mortgage Market Outlook

	2010				2011				2012				2013							
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	2010	2011	2012	2013
Low-Income Borrower HP Share [1]	31.5%	29.2%	29.0%	25.7%	26.9%	25.9%	25.2%	25.0%	24.6%	23.5%	22.6%	22.1%	21.5%	20.6%	19.9%	19.2%	27.2%	25.2%	22.4%	19.6%
Very Low-Income Borrower HP Share [2]	9.8%	9.2%	8.6%	7.8%	8.3%	8.0%	7.7%	7.2%	7.4%	7.6%	7.5%	7.5%	7.5%	7.5%	7.3%	7.1%	8.1%	7.6%	7.5%	7.3%
Low-Income Area HP Share [3]	13.5%	13.8%	12.5%	11.6%	11.9%	12.3%	11.7%	11.3%	11.6%	11.8%	12.0%	11.9%	11.9%	11.8%	11.8%	11.8%	12.1%	11.7%	11.9%	11.8%
Low-Income Borrower Refi. Share [4]	23.3%	22.8%	23.5%	19.5%	19.2%	22.0%	23.3%	22.4%	19.6%	18.6%	20.1%	22.3%	23.3%	23.5%	24.1%	24.5%	21.5%	21.9%	21.2%	24.1%
Real GDP [5]	3.9%	3.7%	2.5%	2.3%	0.4%	1.3%	1.8%	2.9%	2.2%	2.3%	2.4%	2.5%	2.5%	2.6%	2.7%	2.8%	3.0%	1.7%	2.3%	2.6%
Nominal GDP [5]	5.4%	5.3%	3.8%	4.1%	3.1%	3.9%	4.4%	3.8%	3.7%	4.3%	4.1%	4.2%	4.3%	4.5%	4.7%	4.8%	4.2%	3.9%	4.1%	4.4%
Real Personal Consumption [5]	2.7%	2.9%	2.6%	3.5%	2.1%	0.7%	1.7%	2.1%	2.9%	2.2%	2.2%	2.3%	2.1%	2.2%	2.3%	2.3%	2.0%	2.2%	2.2%	2.2%
Real Residential Construction [5]	-16.2%	21.0%	-31.1%	2.5%	-2.5%	4.1%	1.2%	11.2%	17.8%	6.2%	7.7%	8.4%	8.5%	10.1%	12.2%	13.5%	-4.3%	-1.3%	9.9%	9.7%
Inflation Rate (CPI, Y/Y % Change) [5]	2.4%	1.8%	1.2%	1.3%	2.1%	3.4%	3.8%	3.3%	2.8%	2.1%	2.3%	3.2%	3.1%	2.9%	2.9%	2.9%	1.3%	3.3%	3.2%	2.9%
Core Infl. Rate (CPI, Y/Y % Change) [5]	1.3%	0.9%	0.9%	0.7%	1.1%	1.5%	1.9%	2.2%	2.2%	2.3%	2.6%	2.9%	3.3%	3.3%	3.4%	3.4%	0.7%	2.2%	2.9%	3.4%
Core Infl. Rate (PCE, Y/Y % Change) [5]	1.7%	1.5%	1.3%	1.0%	1.1%	1.3%	1.6%	1.8%	1.9%	1.9%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	1.0%	1.8%	1.9%	1.9%
Unemployment Rate	9.7%	9.6%	9.6%	9.6%	9.0%	9.1%	9.1%	8.7%	8.2%	8.1%	8.1%	8.0%	7.8%	7.7%	7.6%	7.6%	9.6%	8.9%	8.1%	7.7%
10-Year Treasury Yield	3.7%	3.5%	2.8%	2.9%	3.5%	3.2%	2.4%	2.1%	2.0%	2.2%	2.3%	2.4%	2.6%	2.7%	2.8%	2.9%	3.2%	2.8%	2.2%	2.8%
1-Year Treasury Yield	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.5%	0.5%	0.3%	0.2%	0.2%	0.4%
Prime Rate	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.3%	3.2%	3.2%
Federal Funds Target Rate	0.13%	0.19%	0.19%	0.19%	0.16%	0.09%	0.08%	0.07%	0.10%	0.11%	0.10%	0.20%	0.20%	0.20%	0.20%	0.20%	0.18%	0.10%	0.13%	0.20%
Consumer Confidence	51.9	58.3	51.0	52.5	66.7	61.8	50.3	53.6	67.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	53.4	58.0	n.a.	n.a.

Note: Shaded area indicates forecasted values. Forecasts are an average forecast of Mortgage Bankers Association (MBA), Fannie Mae, Freddie Mac, National Association of Realtors, Wells Fargo, PNC Financial,the National Association of Home Builders, Standard and Poor's, the Wall Street Journal Survey, the Conference Board, Raymond James Financial, the Federal Reserve Bank of Philadelphia and the Federal Open Market Committee.

[1] Share of home purchase mortgage originations made to low-income borrowers in that quarter (year).

[2] Share of home purchase mortgage originations made to very low-income borrowers in that quarter (year).

[3] Share of home purchase mortgage originations on properties located in low-income areas, excluding those in designated disaster areas, in that quarter (year).

[4] Share of refinance mortgage originations made to low-income borrowers in that quarter (year).

[5] Quarter over quarter change, annual rate.

n.a. Not available at this time.

Table 5

Economic and Mortgage Market Outlook

	2010				2011				2012				2013							
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	2010	2011	2012	2013
Housing Starts [1]	615	602	584	539	584	572	615	670	687	725	743	762	836	864	897	916	585	611	729	879
Housing Starts, 1-Unit [1]	521	492	434	436	415	425	426	467	478	500	505	513	575	592	615	639	470	433	499	605
Total Home Sales [2]	4,769	5,070	3,852	4,345	4,643	4,485	4,542	4,691	4,906	4,853	4,857	4,873	5,010	5,061	5,139	5,194	4,506	4,590	4,872	5,102
New Home Sales [1]	359	335	291	300	299	309	296	325	336	353	356	360	423	432	443	456	321	307	351	439
Existing Home Sales [1]	4,411	4,735	3,561	4,044	4,344	4,176	4,246	4,366	4,569	4,609	4,611	4,627	4,690	4,706	4,749	4,761	4,185	4,283	4,604	4,727
Single-Family Originations [3]	$342	$367	$401	$462	$302	$290	$309	$361	$319	$346	$270	$240	$238	$306	$294	$228	$1,572	$1,262	$1,175	$1,066
Refinance Mortgage Share [4]	63%	49%	70%	77%	65%	62%	65%	78%	75%	66%	55%	54%	54%	48%	46%	46%	65%	68%	62%	48%
FHA Home Purchase Market Share [5]	36%	39%	33%	32%	32%	35%	28%	28%	26%	24%	25%	25%	26%	25%	24%	22%	35%	31%	25%	24%
ARM Market Share	5%	5%	6%	5%	6%	7%	4%	4%	4%	9%	9%	9%	9%	9%	9%	9%	5%	5%	8%	9%
Investor Share	9%	9%	9%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	9%	8%	8%	8%
30-Year Mortgage Fixed Rate [6]	5.0%	4.9%	4.5%	4.4%	4.9%	4.7%	4.3%	4.0%	3.9%	4.0%	4.1%	4.2%	4.4%	4.5%	4.6%	4.7%	4.7%	4.5%	4.0%	4.6%
1-Year ARM Rate [6]	4.3%	4.0%	3.6%	3.3%	3.3%	3.1%	2.9%	2.9%	2.8%	2.8%	3.0%	3.0%	3.1%	3.1%	3.2%	3.2%	3.8%	3.0%	2.9%	3.2%
Change in Housing Prices (FHFA ALL) [7]	-6.5%	-4.9%	-1.4%	-1.5%	-3.1%	-4.0%	-4.0%	-3.0%	-1.2%	0.1%	0.2%	0.3%	-0.2%	0.2%	2.4%	3.7%	-1.5%	-3.0%	0.3%	3.7%
Change in Housing Prices (FHFA PO) [8]	-2.9%	-1.6%	-2.6%	-3.9%	-5.3%	-5.5%	-3.5%	-2.4%	-0.2%	-0.5%	-1.0%	-1.0%	0.0%	0.3%	0.5%	1.1%	-3.9%	-2.4%	-1.0%	1.1%
Change in Housing Prices (CS HPI) [9]	1.5%	5.0%	2.6%	-0.6%	-2.8%	-3.7%	-3.5%	-3.8%	-2.9%	-2.3%	-2.3%	-0.5%	1.6%	0.8%	0.8%	0.8%	-0.6%	-3.8%	-0.5%	0.8%
Housing Affordability Index [10]	168	170	180	178	178	181	191	195	196	197	195	194	192	191	190	187	174	186	196	190
Median Sales Price - New Homes [11]	$222	$220	$222	$222	$227	$229	$222	$219	$230	$224	$221	$219	$223	$224	$222	$223	$221	$224	$223	$223
Median Sales Price - Existing Homes [11]	$166	$177	$177	$170	$158	$169	$169	$162	$158	$168	$167	$166	$165	$169	$169	$167	$172	$165	$165	$168

Note: Shaded area indicates forecasted values. Forecasts are an average forecast of Mortgage Bankers Association (MBA), Fannie Mae, Freddie Mac, National Association of Realtors, Wells Fargo, PNC Financial,the National Association of Home Builders, Standard and Poor's, the Wall Street Journal Survey, the Conference Board, Raymond James Financial, the Federal Reserve Bank of Philadelphia and the Federal Open Market Committee.

[1] Thousands of units

[2] Thousands of units, forecasted amount does not equal the sum of the existing plus new home sales because differences in forecasts.

[3] FHFA and MBA, Billions of dollars

[4] The refinance shares for 2004-2009 are calculated from Home Mortgage Disclosure Act (HMDA) data. Preliminary estimates in 2010 are as reported by MBA.

[5] The FHA market shares for 2008 are calculated from HMDA data. Preliminary estimates for 2009 are the FHA endorsements (FHA Outlook) share of home sales (Census Bureau), scaled to match the mortgage market FHA market share.

[6] Freddie Mac, Primary Mortgage Market Survey

[7] FHFA House Price Index, all transactions (Y/Y % Change)

[8] FHFA House Price Index, purchase transactions only (Y/Y % Change, Seasonally Adjusted)

[9] Standard & Poor's Case-Shiller 10 City Index (Y/Y % Change, Seasonally Adjusted)

[*] Freddie Mac's Conventional Mortgage Home Price Index (Y/Y % Change, Annual Rate)

[10] National Association of Realtors

[11] Thousands of dollars

The refinance share of the market, as measured by the Mortgage Bankers Association, averaged 68 percent in 2011, although finished the year at 78 percent. With interest rates projected to rise during the 2012 - 2013 period, industry observers also expect the refinance share of originations to decrease. The share of the market that is made up by refinance loans is expected to slowly decrease to 46 percent by the fourth quarter of 2013. Generally speaking, decreasing refinance shares lead to a higher percentage of refinance originations from lower income borrowers. This is mainly due to higher income, rate-and-term refinance, borrowers dropping out of the market.

FHFA's estimates of the market performance for the two single-family owner-occupied home purchase housing goals and one subgoal, and the refinancing mortgage housing goal, are provided at the top of **Table 4**. FHFA estimates that the low-income borrower shares of the home purchase mortgage market will be 22.4 percent in 2012 and 19.6 percent in 2013. FHFA estimates that the very low-income borrower shares of the home purchase mortgage market will be 7.5 percent and 7.3 percent, respectively, in 2012 and 2013. The estimates for the share of goal-qualifying mortgages in low-income areas in the home purchase mortgage market, excluding designated disaster areas, are 11.9 percent of home purchase mortgages in 2012 and 11.8 percent in 2013. FHFA estimates that 21.2 percent of refinance mortgages will be made to low-income borrowers in 2012 and 24.1 percent in 2013.

To arrive at these estimates, FHFA used an econometric state space methodology to extend the trends of the market performance for each goal, based on a monthly time series database provided by the Federal Financial Institutions Examination Council (FFIEC) and the Federal Reserve Board. For the low-income areas goal, this model produced only the market estimates for the subgoal. The remainder of the market estimates for this goal relates to the

designated disaster areas. The 2012 and 2013 estimates of the share of home purchase mortgages that will qualify for the designated disaster areas portion of the low-income areas goal will be provided in January of each year.

FHFA used all relevant information when determining the benchmark levels for the 2012 through 2014 housing goals. While the tightening of underwriting standards is not included in the market estimates calculation, it was considered in the determination of the benchmark levels. FHFA attempts to use the most current data possible when estimating market size, including information from the Monthly Interest Rate Survey (MIRS) and Enterprise refinance mortgage acquisitions to extend HMDA goal performance data.

E. STATISTICAL MODELS OF THE SINGLE-FAMILY HOUSING GOALS

As stated previously, one of the issues with HMDA data is its age. Currently the most recent year for which HMDA data are available is 2009. There exists more recent data that can be used to inform our forecasts, which only lags by one or two months.

To estimate the 2012 and 2013 affordability market size for the four single-family housing goals, FHFA implemented a state space form (SSF) with the associated algorithms of the Kalman filter and smoother.[14] This SSF approach is a method by which we can statistically fill in the time series gap left by HMDA data with a similar time series which is highly correlated with it. In our case we use an estimate of monthly market affordability levels for the home purchase goals from MIRS data, an estimated time series of goal-qualifying shares provided by Freddie Mac that are based on MIRS date from 2004 through August of 2011. We also estimate the market size of the refinance goal using the SSF approach based on the combined Fannie Mae and Freddie Mac goal shares for January 2002 – September 2011. **Figures 1 through 4** show for each housing goal how the alternative data series correlates with the HMDA series.

Several specifications of the ARIMA model were tested for each housing goal. All of the time series, both the dependent (goal qualifying share) and independent (explanatory), were found to be stationary when integrated at the first level.[15] While several exogenous variables had the expected sign, many were found to be insignificant at a 10 percent level of confidence. The best fitting estimation equations for each of the goals are described below.

[14] The methodology followed is an adaptation of a state space model developed by Freddie Mac, Housing Analysis and Research. For a thorough discussion of the state space approach see Harvey, Andrew. "Forecasting with Unobserved Components Time Series Models," in Handbook of Economic Forecasting. G. Elliott, C.W.J. Granger and A. Timmermann eds. North Holland, 2006, pp. 327-412.

[15] In simple terms, a stationary time series has no trend, has a constant variance over time, has a constant autocorrelation structure and has no periodic fluctuations (seasonality).

Some of the equations were fitted with monthly binary variables to capture seasonality effects. In addition, it was found that a seasonal moving average term was required in each of the four housing goal models.

Low-Income Borrower Income Home Purchase Goal. The ARIMA model estimation results for the Low-Income Borrower Income Home Purchase Goal (LIP) are presented in **Table 6**. As indicated in Figure 1 above, there is a strong seasonal effect prior to 2000. The model in Table 5 accounts for this with a set of 11 monthly binary variables, *JAN2000* to *NOV2000*, (the December effect is captured in the constant) for the years 1993 to 1999 and equals zero in 2000 and after. Also, a binary variable, *DUM2000*, that is equal to 1 prior to 2000 and 0 otherwise is added to account for any shift in the time series. The best fitting equation was found to be a first differenced seasonal ARIMA model with autoregressive terms at lags of 2, *AR(2)*, and 6 months, *AR(6)*, and a seasonal moving average term at 12 months, *MA(12)*. In addition to the time series components, drivers of this housing goal include the rate of core inflation, *INFLATION*, the yield on a 10-year Treasury Note, *TREAS_10*, the log of mortgage originations, *ln(ORIG)*, the unemployment rate lagged one month, $UNEMP_{t-1}$, and a dummy variable to account for the 2009 first time homebuyer tax credit, *TAXCRED2009*.

The signs on the respective explanatory variables are what is expected. Changes in the low-income borrower mortgage share are negatively related to changes in inflation, interest rates and origination volume. As prices and interest rates increase, housing affordability is expected to fall. Periods of increasing origination volume are typically dominated by higher income homebuyers which has the effect of lowering the share of low-income borrower mortgages.

Table 6

Low-Income Borrower Home Purchase Goal

Variable	Parameter Estimates	t-stat	
MA(12)	-0.5379	(-6.24)	***
AR(2)	-0.2243	(-2.87)	***
AR(6)	0.1944	(2.36)	**
INFLATION	-0.6518	(-2.23)	**
TREAS_10	-0.4655	(-2.50)	**
ln(ORIG)	-0.0055	(-1.70)	*
$UNEMP_{t-1}$	1.2630	(4.58)	***
TAXCRED2009	0.0027	(1.63)	*
JAN2000	0.0254	(4.88)	***
FEB2000	0.0051	(1.07)	
MAR2000	-0.0027	(-0.55)	
APR2000	-0.0026	(-0.53)	
MAY2000	-0.0053	(-1.09)	
JUN2000	-0.0054	(-1.15)	
JUL2000	-0.0030	(-0.63)	
AUG2000	-0.0027	(-0.55)	
SEP2000	0.0097	(2.01)	**
OCT2000	-0.0006	(-0.12)	
NOV2000	-0.0003	(-0.06)	
DUM2000	-0.0013	(-1.50)	

σ^2 = 4.5893E-05

χ^2 = 4.20

Prob(χ^2) = 0.240

* Significant at 10 percent level.

** Significant at 5 percent level.

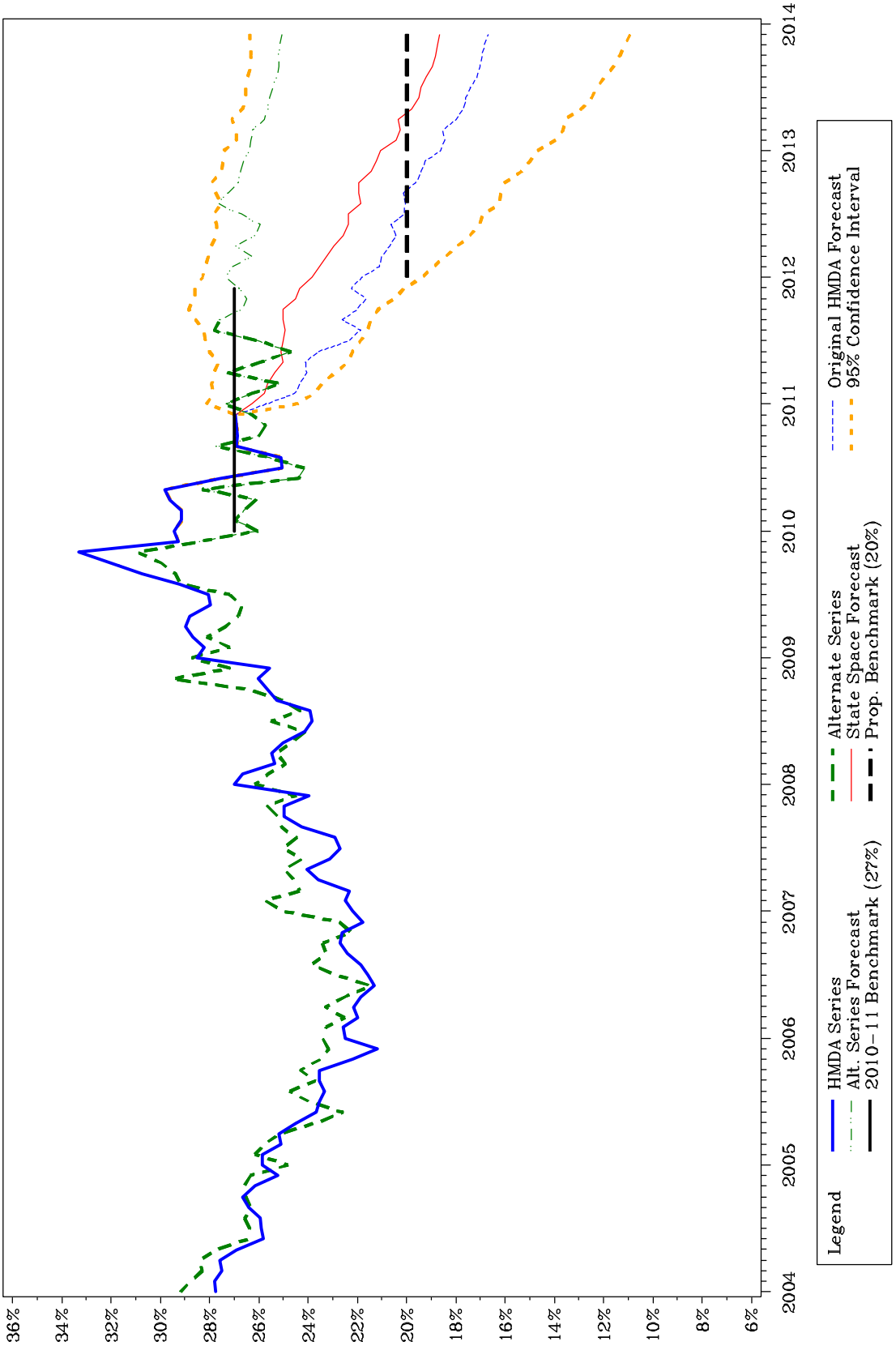
*** Significant at 1 percent level.

The first-time homebuyer tax credit has the expected positive coefficient, although weakly significant, as first-time homebuyers have a higher incidence of low-income borrowers. The positive coefficient on the lagged change in the unemployment rate is more difficult to interpret, although it is very statistically significant. The Chi-Square statistic indicates that we cannot reject the hypothesis that the residuals are white noise, implying that the residuals have a random distribution.

The forecasts for the LIP goal is shown in Figure 5. While FHFA has determined that the state space form provided the best forecast, the forecasts based on HMDA data alone and a where the HMDA time series is merely amended with the alternative time series are shown in Figure 5. Also, for reference, the figure is annotated with the 2010-2011 goal benchmark (27 percent) and the proposed benchmark (20 percent).

Figure 5

Low—Income Borrower Home Purchase Goal



Very Low-Income Borrower Income Home Purchase Goal. The model estimation results for the Very Low-Income Borrower Income Home Purchase Goal (VLIP) are presented in Table 7. As with the Low-Income Borrower Goal there is a strong seasonal effect prior to 2000 (see Figure 2). The model in Table 6 also accounts for this with a set of 11 monthly binary variables, *JAN-2000* to *NOV-2000*, (the December effect is captured in the constant) for the years 1993 to 1999 and a binary variable, *DUM2000*, that is equal to 1 prior to 2000 and 0 otherwise.

The best fitting equation was found to be a first differenced seasonal ARIMA model with a seasonal moving average term at 12 months, *MA(12)*. In addition to the time series component, drivers of this housing goal include house prices lagged one month, HPI_{t-1}, the mortgage rate for a 30-year fixed rate mortgage, *RATE_F30*, the log of mortgage originations, *ln(ORIG)*, and the 2009 first time homebuyer tax credit, *TAXCRED2009*.

The signs on the respective explanatory variable are as expected. The very low-income borrower mortgage share is negatively related to changes in house prices, changes in the mortgage interest rate, and mortgage origination volume. The tax credit had a statistically significant positive impact on the share of very low-income borrower share of home purchase mortgages as it drew in more lower-income borrowers in the real estate market. The Chi-Square statistic indicates that we cannot reject the hypothesis that the residuals are white noise.

The forecast for the VLIP goal is shown in Figure 6. The state space form forecast exceeds both forecasts based on HMDA data alone and a where the HMDA time series is merely amended with the alternative time series, as shown in Figure 6. Therefore the 2012-2014 benchmark is based on the original HMDA data forecast. Also, for reference, the figure is annotated with the 2010-2011 goal benchmark (8 percent) and proposed benchmark (7 percent).

Table 7

Very Low-Income Borrower Home Purchase Goal

Variable	Parameter Estimates	t-stat	
MA(12)	-0.6016	(-7.83)	***
HPI_{t-1}	-0.0872	(-1.85)	*
RATE_F30	-0.3704	(-4.01)	***
ln(ORIG)	-0.0039	(-2.81)	***
TAXCRED2009	0.0015	(2.00)	**
JAN2000	0.0108	(4.89)	***
FEB2000	0.0042	(2.09)	**
MAR2000	-0.0009	(-0.43)	
APR2000	0.0001	(0.03)	
MAY2000	-0.0032	(-1.63)	
JUN2000	-0.0024	(-1.20)	
JUL2000	0.0001	(0.07)	
AUG2000	0.0005	(0.25)	
SEP2000	0.0033	(1.67)	*
OCT2000	0.0005	(0.25)	
NOV2000	-0.0009	(-0.43)	
DUM2000	-0.0001	(-0.26)	

σ^2 = 8.2350E-06

χ^2 = 4.10

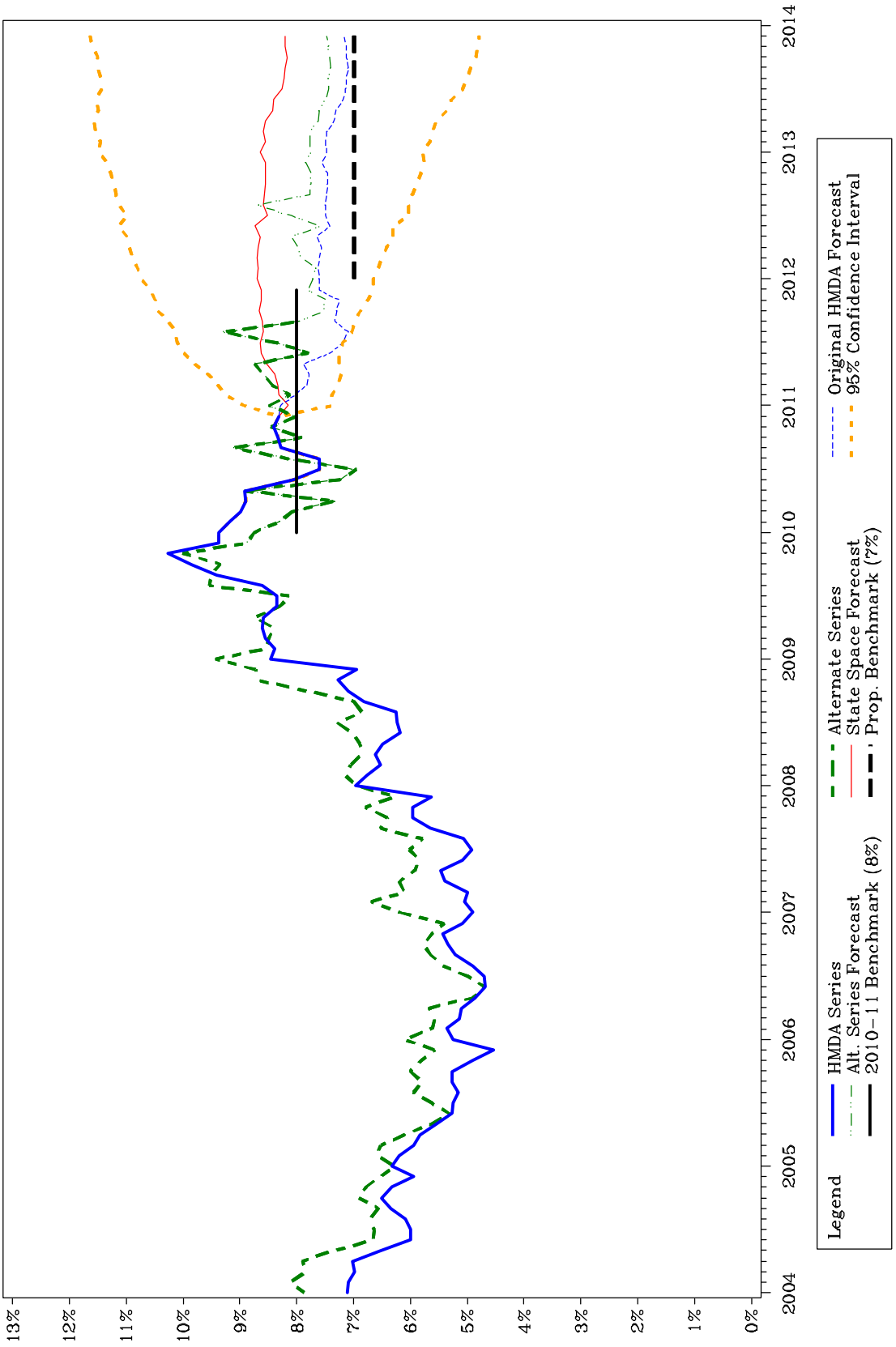
Prob(χ^2) = 0.536

* Significant at 10 percent level.

** Significant at 5 percent level.

*** Significant at 1 percent level.

Figure 6
Very Low−Income Borrower Home Purchase Goal



Low-Income Area Home Purchase Subgoal. The model estimation results for the Low-Income Area Home Purchase Subgoal (LAP) are presented in Table 8. As indicated in Figure 3, for the LAP goal, there is a strong seasonal effect throughout the estimation period, which is adequately accounted for by the *MA(12)* term.. In addition to the *MA(12)* term, the best fitting equation for the LAP subgoal was found to be a first differenced seasonal ARIMA model. It includes a one month lagged moving average term, *MA(1)*, and two autoregressive terms lagged one month, *AR(1)* and five months, *AR(5)*. Additionally, the drivers of this housing goal include investor share, *INVESTOR_SHR*, FHA market share for home purchase mortgages lagged three months, FHA_SHR_{t-3}, and the log of NAR's housing affordability index, *ln(HAI)*.

The low-income area subgoal share is positively related to the investor share. The investor share (*i.e.*, more investors) is a measure of the viability of the mortgage market. As the general market is improving it is expected that lower-income, other underserved, areas will benefit disproportionately. Low-income areas have historically had a large presence of Federal Housing Administration (FHA) insured loans. Therefore, as expected, the larger is FHA's market share, the smaller will be the share of conventional mortgages from low income areas. General affordability trends are expected to have a positive impact on the share of loans from low-income areas, as the results shown in **Table 8** show. The Chi-Square statistic indicates that we cannot reject the hypothesis that the residuals are white noise.

Table 8

Low-Income Area Home Purchase Subgoal

Variable	Parameter Estimates	t-stat
MA(1)	0.3186	(2.72) ***
MA(12)	-0.4469	(-6.22) ***
AR(1)	0.3478	(2.83) ***
AR(5)	-0.2337	(-3.35) ***
INVESTOR_SHR	0.1757	(2.81) ***
FHA_SHR_{t-3}	-0.0462	(-1.64) *
ln(HAI)	0.0405	(2.45) **

$\sigma^2 = 1.9056E\text{-}05$

$\chi^2 = 1.63$

$Prob(\chi^2) = 0.443$

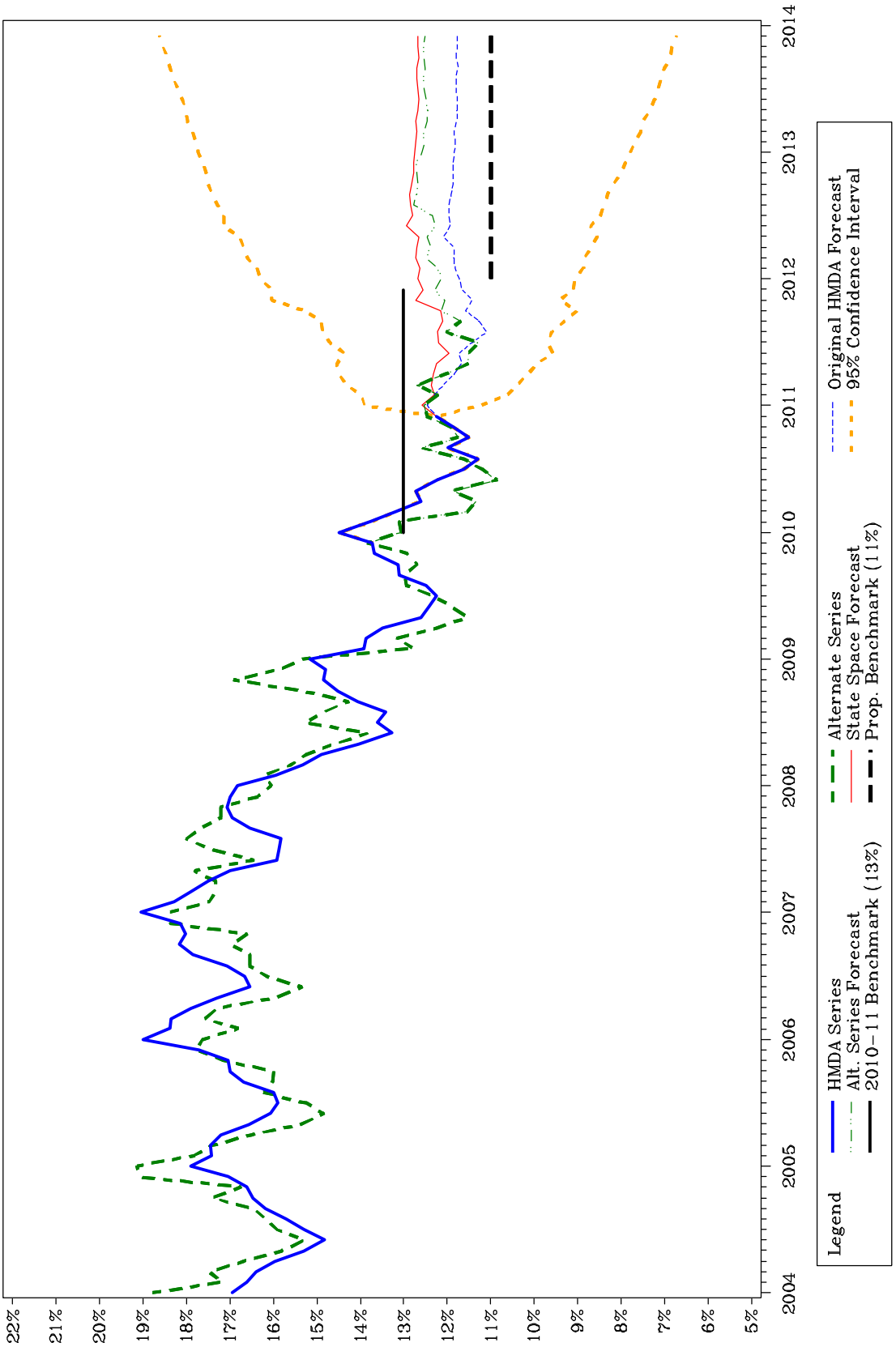
* Significant at 10 percent level.

** Significant at 5 percent level.

*** Significant at 1 percent level.

Figure 7

Low—Income Area Home Purchase Subgoal



The forecast for the LAP subgoal is shown in Figure 7. The state space form forecast exceeds both forecasts based on HMDA data alone and a where the HMDA time series is merely amended with the alternative time series, as shown in Figure 7. Therefore the 2012-2014 benchmark is based on the original HMDA data forecast. Also, for reference, the figure is annotated with the 2010-2011 goal benchmark (13 percent) and the proposed benchmark (11 percent).

Low-Income Borrower Income Refinance Goal. The best fitting equation for the Low-Income Borrower Income Refinance Goal (LIR), shown in Table 9, was found to be a first differenced seasonal ARIMA model. That is, it includes one 12 month seasonal moving average term, *MA(12)*, and one autoregressive term, *AR(1)*, lagged one month. Other drivers of this housing goal include the yield spread between the 1-year and 10-year Treasury Notes constant maturity rates lagged one month, $RATE\_SPRD_{t-1}$, the share of mortgages that are refinance loans, *REFI_SHR*, the log of mortgage originations, *ln(ORIG)*, and the log of NAR's housing affordability index, *ln(HAI)*.

The signs on the respective explanatory variables are what are expected. The very low-income borrower refinance mortgage share is positively related to changes in the Treasury Note yield spread. Generally a larger rate spread is the result of tighter monetary policies and means higher mortgage rates. As a result "rate and term" refinances, which disproportionately consist of higher income homeowners, will fall. The end result is that the denominator in the low-income refinance share decreases faster than the numerator and therefor the low-income share will increase. It is negatively related to the share of the market that includes refinance mortgages. As the number of refinanced mortgages increase, and thus the refinance rate, a disproportionate share of the refinances is made by higher income homeowners. So while the number of low-

income borrower refinanced mortgages increase, an even larger number of higher income mortgages are refinanced. In any expanding real estate/mortgage market higher income borrowers dominate, therefore it is not surprising to see a negative relationship between changes in the number of mortgage originations and the low-income borrower share for refinance loans. The negative sign on the coefficient for the HAI most likely results from fewer cash-out refinances as house prices decrease, however that does not explain why the coefficient for the HAI is significant while a coefficient on a home price index was not. The Chi-Square statistic indicates that we cannot reject the hypothesis that the residuals are white noise.

Table 9

Low-Income Borrower Refinance Goal

Variable	Parameter Estimates	t-stat
MA(12)	-0.3087	(-3.83) ***
AR(1)	-0.2236	(-2.93) ***
$RATE\_SPRD_{t-1}$	0.8336	(3.17) ***
REFI_SHR	-0.1438	(-10.94) ***
ln(ORIG)	-0.0133	(-2.93) ***
ln(HAI)	-0.0855	(-2.86) ***

σ^2 = 5.5903E-05

χ^2 = 3.05

Prob(χ^2) = 0.549

* Significant at 10 percent level.

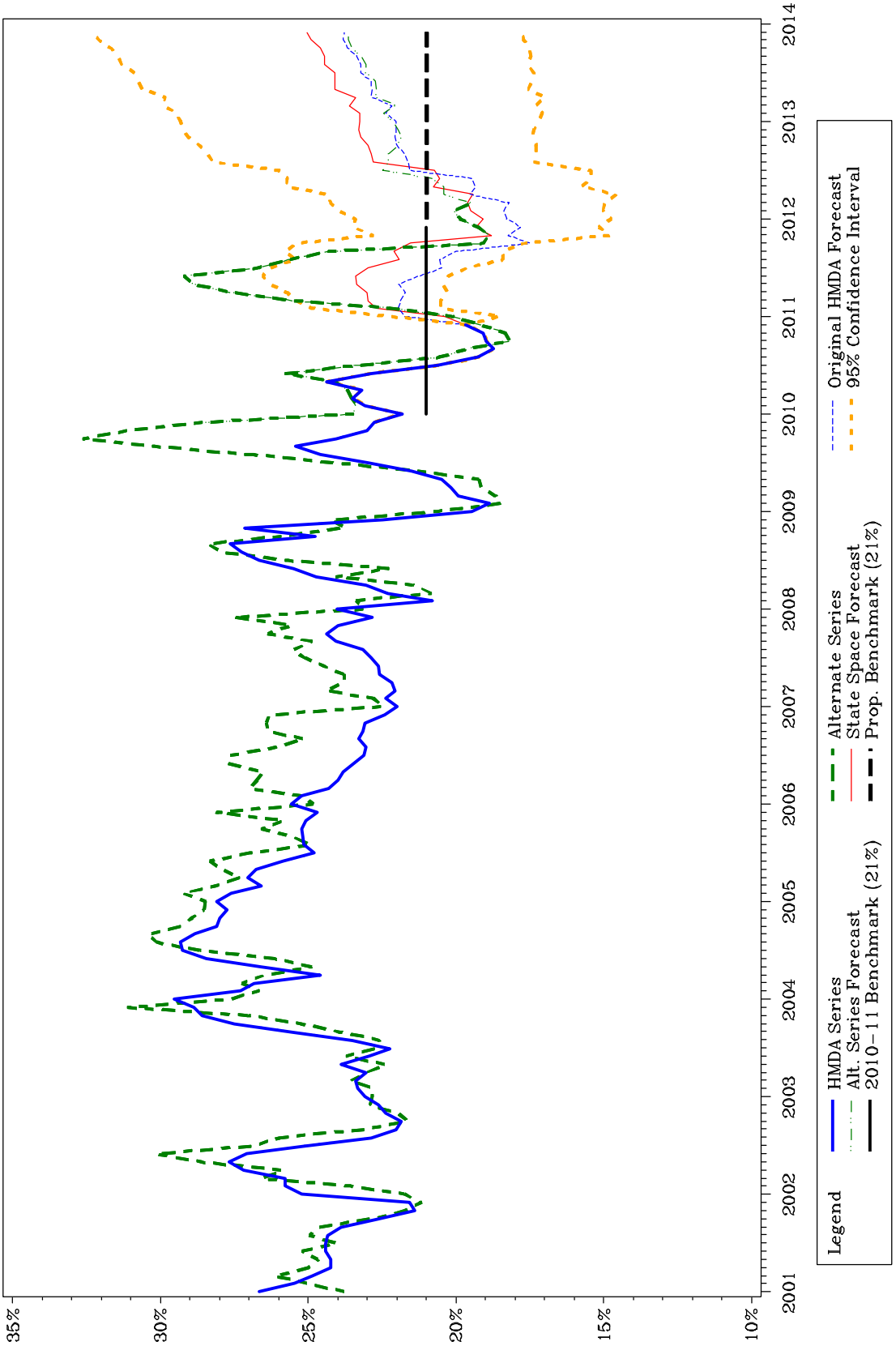
** Significant at 5 percent level.

*** Significant at 1 percent level.

The forecast for the LIR goal is shown in Figure 8. While FHFA has determined that the state space form provided the best forecast, the forecasts based on HMDA data alone and a where the HMDA time series is merely amended with the alternative time series are shown in Figure 7. Also, for reference, the figure is annotated with the 2010-2011 goal benchmark (21 percent) and the proposed benchmark (21 percent).

Figure 8

Low–Income Borrower Refinance Goal



F. ADJUSTMENT FOR MANUFACTURED HOME LOANS

Beginning in 2004 mortgage originators are required to identify higher-cost loans. For the current housing goals, beginning in 2010, FHFA utilizes this information to proxy for subprime loans and manufactured housing chattel loans when calculating the market's housing goal shares. During 2004 to 2010, 58 percent of manufactured housing loans were higher-cost, according to the HMDA data. Only 6.2 percent of manufactured housing loans, with most being refinance loans, were originated by subprime lenders.[16] From this information, we infer that the majority of higher-cost manufactured housing loans were originated by non-subprime lenders, and we can safely assume that these higher-cost loans are chattel.

For the forecast models in Section E, we use a monthly time series that uses the subprime lender list to identify subprime loans. This is done so that we can use the longest time series from the HMDA data possible, back to 1996. Therefore, the potential manufactured housing chattel loans remain in the data. Table 10 shows the share of manufactured housing loans that are higher-cost and manufactured housing's incremental contribution to each of the housing goals for the years 2004 to 2010. To adjust the market estimates of the housing goals to account for the effect from chattel loans on manufactured housing, FHFA weighted the average 2008 to 2010 manufactured housing contribution to the goals market estimates by 80 percent for the home purchase mortgage goals and 50 percent for the refinance mortgage goal.

[16] The Department of Housing and Urban Development, Subprime Lender List (see http://www.huduser.org/portal/datasets/manu.html).

Table 10

Manufactured Housing Loans

	Home Purchase loans				Refinance Loans	
		Contribution to Goal:				
	Percent Higher Cost	Very Low-Income Borrower	Low-Income Borrower	Low-Income Area	Percent Higher Cost	Contribution to Low-Income Borrower Goal
2004	55.0%	0.6%	1.6%	0.7%	44.7%	0.6%
2005	58.3%	0.5%	1.4%	0.6%	54.0%	0.6%
2006	50.5%	0.5%	1.3%	0.6%	52.6%	0.7%
2007	61.5%	0.6%	1.6%	0.7%	55.1%	0.7%
2008	75.4%	0.7%	1.7%	0.8%	62.2%	0.7%
2009	76.0%	0.7%	1.6%	0.6%	48.5%	0.4%
2010	80.0%	0.9%	2.2%	0.9%	33.9%	0.3%
3-Year Ave.	76.9%	0.7%	1.7%	0.7%	50.5%	0.5%
Adjustment	**80%**	-0.5%	-1.4%	-0.6%	**50%**	-0.2%

Source: HMDA data.

This results in the market estimate for the Low-Income Borrower Home Purchase Housing Goal being adjusted by -1.4 percent, the Very Low-Income Borrower Home Purchase Housing Goal by -0.5 percent, the Low-Income Area Home Purchase Housing Subgoal by -0.6 percent, and the Low-Income Borrower Refinance Housing Goal by -0.2 percent. The projected market estimates in Tables 1 and 4 reflect these adjustments.

G. CONCLUSION

FHFA is required to consider market size when establishing housing goals. This paper describes the methodologies used to estimate market size of the four single-family housing goals for 2012 through 2014. The 2012-2014 market size estimates for the four housing goals are:

- Low-Income Borrower Home Purchase Goal 20 %
- Very Low-Income Borrower Home Purchase Goal 7 %
- Low-Income Area Home Purchase Subgoal 11 %
- Low-Income Borrower Refinance Goal 21 %

The market projections are based on econometric state space form time series models, incorporating industry and government economic, housing and mortgage market forecasts. The benchmarks are set such that they are expected to be feasible during 2012 and 2013. These benchmarks are from market estimates utilizing information known as of October 2011.

APPENDIX

Data Sources

Federal Financial Institutions Examination Council, Home Mortgage Disclosure Act Data

Low-Income Borrower Home Purchase Mortgage Share
Very Low-Income Borrower Home Purchase Mortgage Share
Low-Income Area Home Purchase Mortgage Share
Low-Income Borrower Refinance Mortgage Share
Refinance Mortgage Share, 1993 - 2009
FHA Home Purchase Mortgage Market Share, 1993 - 2009
Investor Share
http://www.ffiec.gov/hmda/default.htm

Federal Housing Finance Agency

House Price Index
http://www.fhfa.gov/Default.aspx?page=14

U.S Department of Commerce, Bureau of Economic Analysis

Gross Domestic Product
http://www.bea.gov/national/index.htm#gdp

U.S Department of Commerce, Census Bureau

Housing Starts
http://www.census.gov/const/www/newresconstindex.html

New Home Sales
Median and Sales Price of New One-Family Houses Sold
http://www.census.gov/const/www/newressalesindex.html

U.S Department of Labor, Bureau of Labor Statistics

Consumer Price Index
http://www.bls.gov/cpi/data.htm

Unemployment Rate
http://www.bls.gov/cps/

Federal Reserve Bank of St. Louis

Monthly average of the 10-Year Treasury Constant Maturity Rate
Monthly average of the 1-Year Treasury Constant Maturity Rate
http://research.stlouisfed.org/fred2/categories/115

Federal Housing Administration

FHA Endorsements
http://www.hud.gov/offices/hsg/comp/rpts/ooe/olmenu.cfm

Mortgage Bankers Association

Single-Family Originations
Refinance Mortgage Share, 2009
Forecast
http://www.mbaa.org/ResearchandForecasts/EconomicOutlookandForecasts

Freddie Mac

Monthly average of the 30-Year Fixed Rate Mortgage Rate
http://www.freddiemac.com/pmms/pmms30.htm

Forecast
http://www.freddiemac.com/news/finance/

Fannie Mae

Forecast
http://www.fanniemae.com/media/economics/index.jhtml?p=Media&s=Economics+&+Mortgage+Market+Analysis

National Association of Realtors

Monthly Housing Affordability Index
Existing-Home Sales
Median Sales Price - Existing-Homes
http://www.realtor.org/research/research/ehspage

Forecast
http://www.realtor.org/research/research/reportsstatistics

Wells Fargo

Forecast
https://www.wachovia.com/foundation/v/index.jsp?vgnextoid=957e10a2090aa110VgnVCM1000004b0d1872RCRD&vgnextfmt=default

PNC Financial

Forecast
https://www.pnc.com/webapp/unsec/NCAboutMicrositeNav.do?siteArea=/pnccorp/PNC/Home/About+PNC/Media+Room/Economic+Reports

National Association of Home Builders

Forecast
http://www.nahb.org/reference_list.aspx?sectionID=138

Standard and Poor's

Forecast
http://www.standardandpoors.com/home/en/us/

Wall Street Journal Survey

Forecast
http://online.wsj.com/public/resources/documents/info-flash08.html?project=EFORECAST07

The Conference Board

Forecast
http://www.conference-board.org/data/chiefeconomist.cfm

Federal Reserve Board of Governors, Federal Open Market Committee

Forecast
http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm

Raymond James Financial

Forecast
http://raymondjames.com/monit2.htm

Federal Reserve Bank of Philadelphia

Community Outlook Survey
http://www.philadelphiafed.org/community-development/community-outlook-survey/

Forecast
http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/