Market Estimates for the 2010 and 2011 Enterprise Single-Family Housing Goals

A. Introduction

The purpose of this document is to describe the process and methodology for estimating the market performance for the three single-family owner-occupied home purchase goals and the single-family owner-occupied refinance goal, as defined in the Housing and Economic Recovery Act of 2008 (HERA). Several aspects of the housing goals have changed for 2010 and 2011 from how the goals were calculated in the past. No longer are there goals for the entire mortgage market, both single-family and multifamily. Also, the goals are based on mortgages, as opposed to the previous unit-based goals. Beginning in 2010 there are separate goals for low-income borrower home purchase, very low-income borrower home purchase, home purchase mortgages on properties in low-income areas, and low-income borrower refinance mortgages.[1]

FHFA projected the market performance for the three single-family owner-occupied property home purchase and one refinance mortgage housing goals and the results are provided in Table A.1. FHFA estimates that the low-income and very low-income borrower mortgage shares of the home purchase market will be in the range of 24 percent to 30 percent and six percent to nine percent, respectively, in 2010 - 2011. The share of goal qualifying mortgage in low-income areas in the home purchase market is estimated to be 11 percent to 15 percent in 2010 - 2011. With a projected refinance rate of 46 percent in 2010 (down from 67 percent in 2009), FHFA estimates that 19 percent to 30 percent of refinance mortgages will be made to low-income borrowers. In 2011 the refinance rate is expected to fall to 37 percent, resulting in an

[1] In addition to all home purchases on properties in low-income areas, the goal low-income area home purchase goal includes home purchase mortgages to low- and moderate-income borrowers who reside in high minority census tracts whose median incomes are below the area median income and low- and moderate-income borrowers who reside in "designated disaster areas."

estimate of the low-income borrower mortgage share in the refinance mortgage market will be 19 percent to 33 percent. To arrive at these estimates, FHFA used econometric methods 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 of Governors.

Table A.1

Enterprise Housing Goals
Market Estimates 2009 - 2011

Year	Low-Income Borrower PMM Goal	Very Low-Income Borrower PMM Goal	Low-Income Area PMM Goal	Low-Income Borrower Refinance Goal
2004	27.1%	6.8%	16.3%	27.0%
2005	24.8%	5.8%	17.2%	25.6%
2006	23.5%	5.6%	18.4%	23.7%
2007	25.4%	6.2%	17.8%	23.3%
2008	26.5%	7.1%	15.4%	24.1%
2009 *	28.0% ± 1.1%	8.4% ± 0.5%	12.4% ± 0.7%	20.8% ± 3.4%
2010 *	28.2% ± 2.2%	8.3% ± 1.0%	12.2% ± 1.6%	24.9% ± 5.5%
2011 *	27.1% ± 2.8%	7.6% ± 1.3%	13.1% ± 2.3%	26.1% ± 6.6%

*Estimated (95% confidence)

B. Economic and Mortgage Market Data

FHFA measures the market performance for the single-family owner-occupied property mortgage housing goals through analyzing Home Mortgage Disclosure Act (HMDA).[2] 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

[2] HMDA data are made available from the Federal Financial Institutions Examination Council, http://www.ffiec.gov/hmda/default.htm.

the United States.[3] The Federal Financial Institutions Examination Council has made available a monthly nationwide time series from the loan level HMDA records with various attributes and specifications, including the four single-family housing goal performance. For the purposes of the estimating the market for goal qualifying loans, FHFA defines the market as conventional conforming prime home purchase (refinance) mortgages.[4]

In addition to the market performance data, FHFA compiled economic and mortgage market data from various sources as explanatory variables in the market estimation models. As indicators of the economic environment in general, the unemployment rate and Treasury note yields (1-year and 10-year notes) are included in the models described below.[5] Housing market conditions are measured by the National Association of Realtors (NAR) Housing Affordability Index and the ratio of housing starts to existing home sales.[6] The mortgage market environment is represented by changes in the 30 year fixed rate for prime mortgages, the share of conforming loan originations insured by FHA and the refinance rate.[7]

The low-income and very low-income borrower home purchase series are characterized by significant seasonality prior to 2000 and a dip in share during the subprime bubble in 2004 to 2006 (see Figures B.1 and B.2). The low-income areas home purchase goal shares exhibit seasonality throughout the entire 16 year period the HMDA data are available. Also, as can be

[3] Avery, Robert B., et al. "The 2008 HMDA Data: The Mortgage Market during a Turbulent Year." Federal Reserve Bulletin, (2009) Forthcoming, p. 2. "The 2008 HMDA data covered 8,400 home lenders including the nation's largest mortgage originators."

[4] 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. The definition of prime is based on HUD's subprime lender list. The market estimates are based on originations of first- and second-lien mortgages.

[5] Department of Labor, Bureau of Labor Statistics and the U.S. Treasury Department.

[6] National Association of Realtors, Economics and Research Division and the U.S. Department of Commerce, Bureau of the Census.

[7] Freddie Mac Primary Mortgage Market Survey and HMDA data.

seen in Figure B.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. While not as evident as the home purchase goals, the low-income borrower refinance goal series is characterized by seasonality prior to 2000. The dominate feature, however is the large swings in low-income mortgage shares coinciding with refinance booms (see Figure B.4).

Figure B.1

Low-Income Borrower Home Purchase Goal

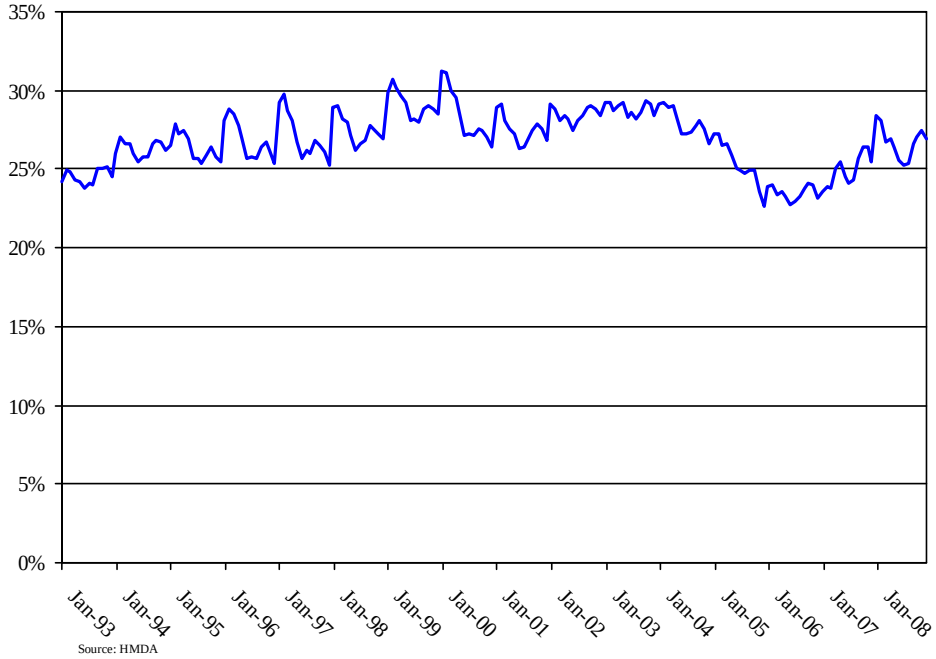
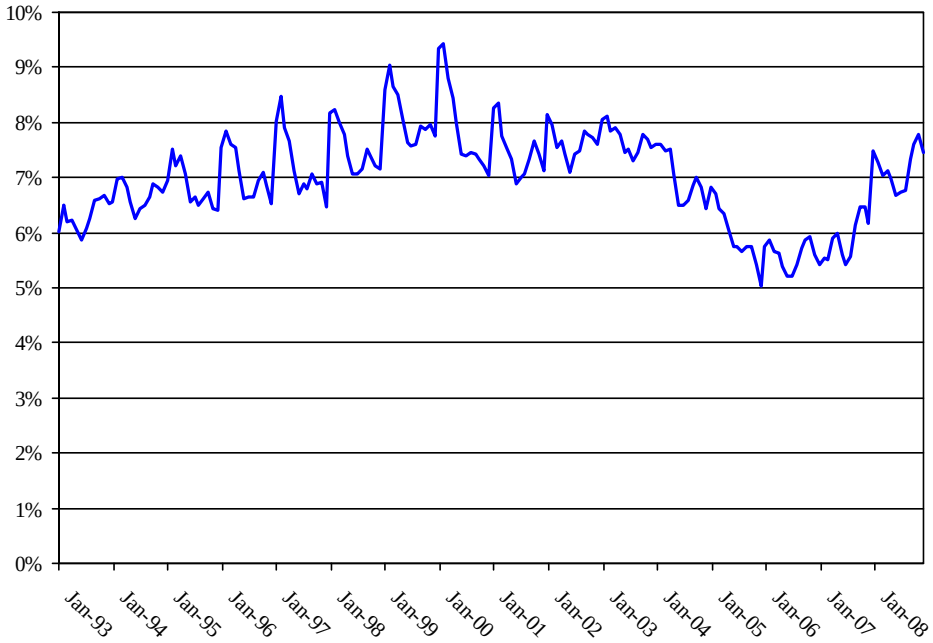


Figure B.2

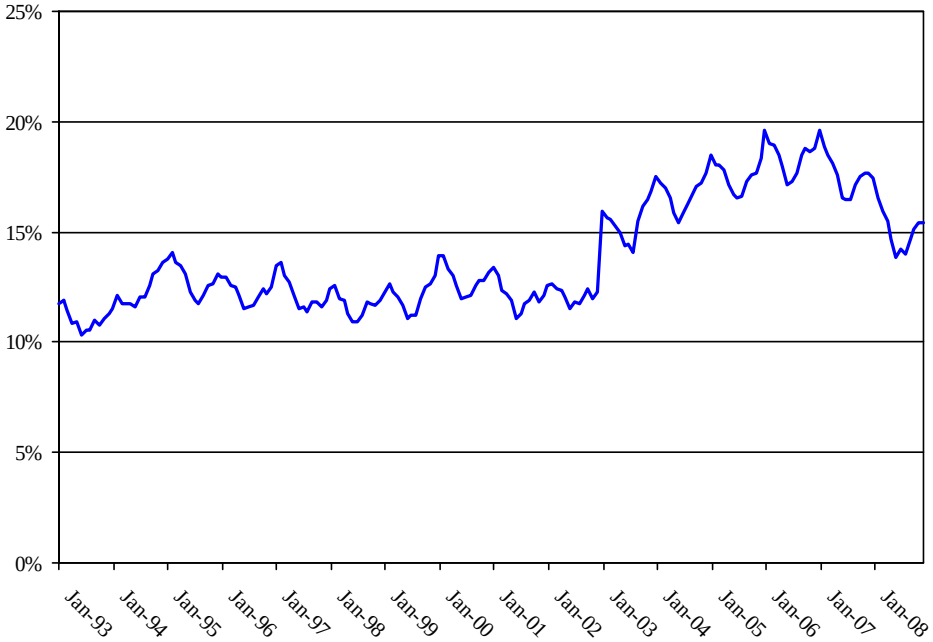
Very Low-Income Borrower Home Purchase Goal



Source: HMDA

Figure B.3

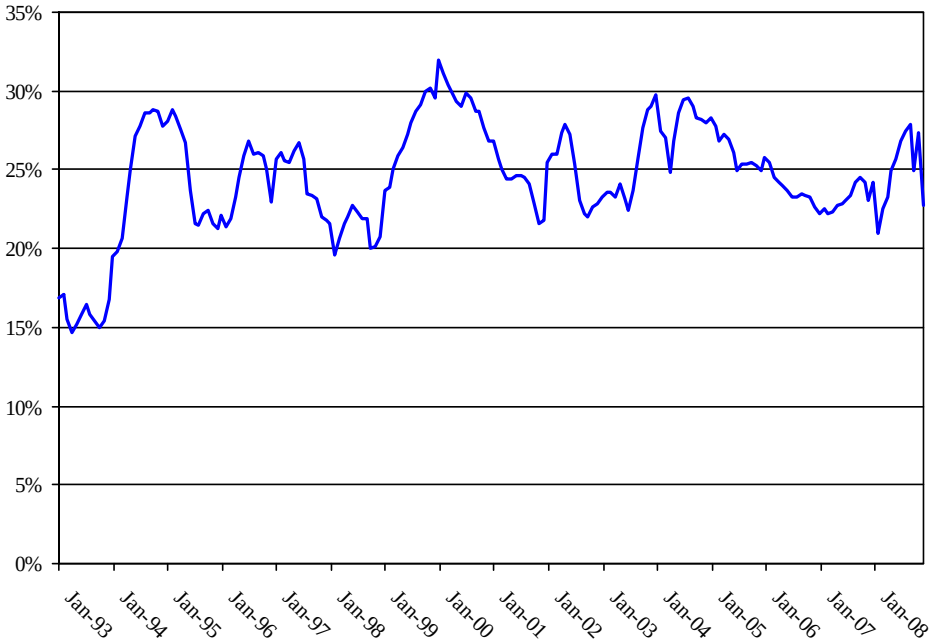
Low-Income Area Home Purchase Goal



Source: HMDA

Figure B.4

Low-Income Borrower Refinance Goal



Source: HMDA

C. Mortgage Market and Economic Outlook

The mortgage market environment in 2009, 2010 and 2011 will be influenced highly by the participation of the Federal Housing Administration's (FHA's) market share, which has risen significantly since 2008. Given that underwriting standards are expected to be tight in 2010 and 2011, FHA will most likely continue to have a much larger presence in the mortgage market. In addition, rising interest rate over the next couple of years will have the effect of pushing down the number of home-owners refinancing their mortgage lowering the refinance rate.

FHFA took an average of economic and mortgage market forecasts from industry participants, the results of which are shown in Table C.1. The outlook for the housing and mortgage markets over the 2010 to 2011 period remains guarded. "Housing markets are beginning to slowly recover from the worst recession in decades, but are vulnerable to additional

Table C.1

Economic and Mortgage Market Outlook

	2008				2009				2010				2011			
	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
Real GDP Growth (Annual Rate)	-0.7%	1.4%	-2.7%	-5.5%	-6.6%	-0.7%	2.2%	3.6%	2.3%	2.6%	3.1%	2.8%	2.5%	2.9%	3.0%	2.9%
Unemployment Rate	4.9%	5.4%	6.1%	6.9%	8.1%	9.3%	9.6%	10.1%	10.2%	10.1%	10.0%	9.9%	9.6%	9.5%	9.3%	9.2%
Inflation Rate (Y/Y)[1]	2.4%	2.3%	2.5%	2.0%	1.7%	1.8%	1.5%	1.7%	1.5%	1.1%	1.0%	0.9%	1.0%	1.0%	1.0%	0.9%
1-Year Treasury Yield	2.1%	2.1%	2.1%	1.0%	0.6%	0.5%	0.4%	0.4%	0.6%	0.7%	0.8%	1.0%	1.3%	1.4%	1.5%	1.6%
10-Year Treasury Yield	3.7%	3.9%	3.9%	3.3%	2.7%	3.3%	3.5%	3.5%	3.8%	3.9%	4.1%	4.2%	4.6%	4.7%	4.7%	4.7%
30-Year Mortgage Fixed Rate[2]	5.9%	6.1%	6.3%	5.9%	5.1%	5.0%	5.2%	4.9%	5.2%	5.5%	5.6%	5.8%	6.1%	6.2%	6.2%	6.2%
Housing Starts[3]	1,058	1,016	869	658	526	540	587	553	653	706	752	790	945	994	1,031	1,070
Home Sales[3]	5,490	5,411	5,466	5,133	4,917	5,128	5,694	6,473	5,850	6,079	5,802	5,967	6,316	6,444	6,524	6,580
Single-Family Originations[4]	$490	$445	$305	$260	$445	$550	$453	$473	$315	$359	$352	$289	$301	$374	$387	$353
Change in Housing Prices[5]	-6.8%	-6.7%	-8.4%	-11.8%	-2.0%	-2.3%	0.9%	2.7%	-2.1%	-2.7%	1.1%	3.8%	-1.4%	-2.2%	1.3%	4.6%
Housing Affordability Index[6]	135	129	129	148	174	169	159	169	160	150	142	145	138	130	131	131
Refinance Mortgage Share	64%	52%	39%	48%	75%	70%	57%	65%	61%	46%	40%	36%	40%	35%	35%	37%
FHA Market Share	14%	23%	30%	31%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Median Sales Price - New Homes[7]	$235	$237	$228	$221	$208	$219	$212	$213	$207	$219	$214	$217	$212	$224	$219	$222
Median Sales Price - Existing Homes[7]	$199	$208	$202	$181	$168	$174	$178	$172	$167	$176	$181	$173	$171	$179	$183	$179

Note: Shaded area indicates forecasted values. Forecasts are an average forecast of Mortgage Bankers Association, Fannie Mae, Freddie Mac, National Association of Realtors, Wells Fargo, Wall Street Journal Forecast Survey, PNC Financial, forecast.org, Standard and Poor's and the National Association of Home Builders.

[1]Annual change in Core CPI (less food and energy)

[2]Freddie Mac, Primary Mortgage Market Survey

[3]Thousands of units (Annual Rate)

[4]Billions of dollars

[5]FHFA House Price Index, quarter over quarter changed (annual rates)

[6]National Association of Realtors

[7]Thousands of dollars

macroeconomic shocks."[8] The growth in the economy, as measured by Gross Domestic Product (GDP) is expected to be on the positive side once more in late 2009, 2010 and 2011. However, unemployment rates in the 10 percent range will likely continue over the next two years, which is not good news for the housing market. According to the National Association of Realtors, "[a] weak labor market recovery will strain the housing market recovery."[9] However, as long as unemployment remains high, the Federal Reserve should continue to support low interest rates.[10] The average forecast indicates that the economy will rebound in 2010 and 2011, with real GDP growing at a rate of 2.3 percent to 3.1 percent during 2010. The economic growth is then expected to continue at the same pace in 2011, growing at a rate of between 2.5 percent and 3.0 percent. Unemployment is expected to remain high, above 10 percent for most of 2010 and dropping slightly during 2011 to 9.2 percent in the fourth quarter. However, the average forecast is that inflation should remain low, never rising above two percent over the next two years. Yet, there is still concern in the market over the possibility of inflation creeping up.

> "Market participants continue to worry, however, that rising inflation may lie ahead. These fears appear to stem in part from the fall in the dollar, from rising commodity prices, or from a judgment that the increase in gold prices must be signaling inflation ahead."[11]

Interest rates are expected to rise, with the rate on a 30-year mortgage fixed rate averaging 5.2 percent in the first quarter of 2010 and 6.2 percent by last half of 2011. The single-family mortgage market is expected to contract from the refinance influenced $1.9 trillion in 2009 to $1.4 trillion in 2011 due mostly to a drop off in level of mortgage refinancing. The refinance rate

[8] Mortgage Bankers Association, Mortgage Finance Commentary, November 10, 2009.

[9] National Association of Realtors, Daily Forecast Update: Jobless Claims, Delinquency Data, November 19, 2009

[10] "High unemployment should keep the Fed on the sidelines through most of the year but we still expect to see short-term interest rates rise before the end of 2010," Wells Fargo Economics Group, Monthly Outlook, November 11, 2009.

[11] Mortgage Bankers Association, Economic Commentary, November 10, 2009.

is expected to fall to 35 percent by the middle of 2011 from the first quarter 2009 high of 75 percent. House prices are expected to level off in 2010 before increasing slightly in 2011. The modest increase in house prices during the period, along with the rise in interest rates, results in the expected housing affordability (as measured by NAR's Housing Affordability Index) to decrease slightly. The prospects for the mortgage market in 2010 are summed up by the Mortgage Bankers Association in their November 10, 2009 commentary.

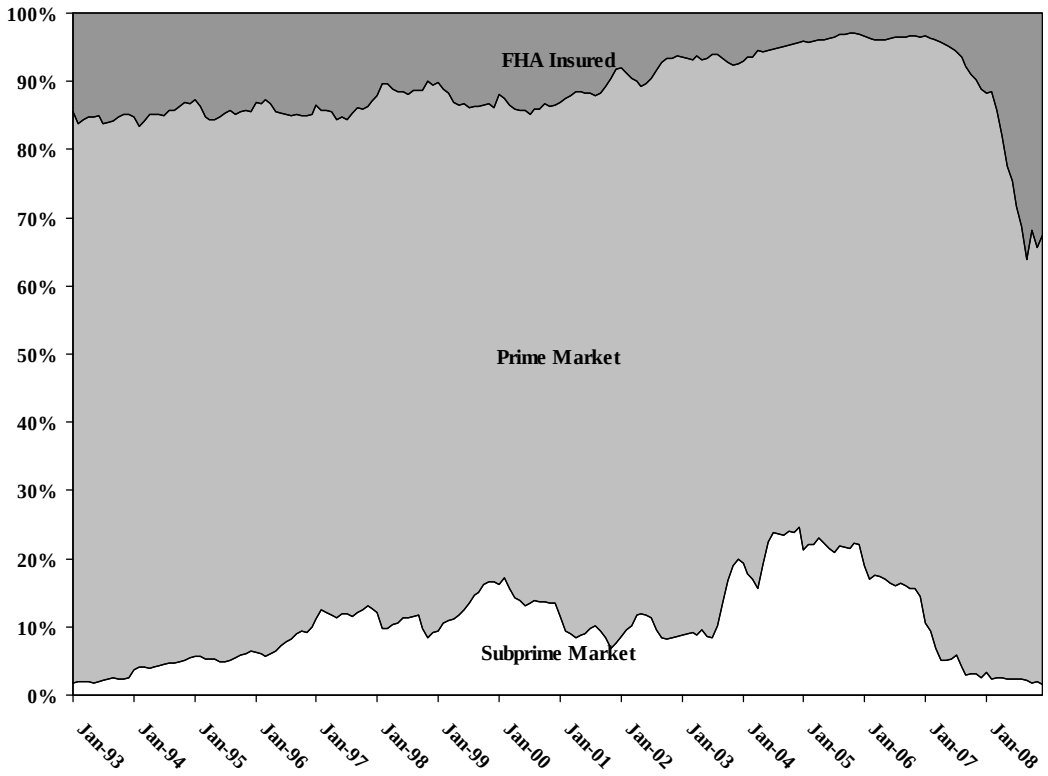
> "2010 will be a tough year for the industry, as the unemployment rate peaks, but remains high, leading to continued high levels of delinquencies and foreclosures. Home sales should begin to pick up modestly, and home prices should begin to stabilize, leading to some growth in purchase originations. However, rising rates should significantly curtail [refinance] originations."[12]

Mortgages insured by the FHA are likely to continue to maintain an increased share of the conforming mortgage market in 2010 and 2011. Purchases of mortgages insured by FHA and VA ordinarily do not receive affordable housing goals credit. In general, the impact of the FHA market on the goal-richness of the conventional market depends on: (1) the goal-richness of the overall market (conventional plus FHA); (2) the share of the market accounted for by FHA mortgages; and (3) the goal-richness of FHA mortgages.

As shown in Figure C.1, the market share of all mortgages insured by FHA increased dramatically, from a low of 2.5 percent in 2005 to a high of 30 percent in September 2008. A key reason for this growth is that Fannie Mae and Freddie Mac generally cannot buy loans with original LTV ratios greater than 80 percent without some form of credit enhancement. With the stresses on private mortgage insurers, borrowers without substantial down payments are increasingly dependent on government insurance programs.

[12] Mortgage Bankers Association, Mortgage Finance Commentary, November 10, 2009.

Figure C.1
Market Distribution by Mortgage Type



Source: HMDA

With the increase in the FHA loan limit in 2008, FHA is able to endorse larger mortgages. These mortgages would otherwise have been originated as a conventional mortgage. In 2008, nearly 80 percent of FHA's endorsements of refinance mortgages came from mortgages that were previously conventional mortgages and this share increased throughout the year.[13] FHA's market share for home purchase mortgages increased from 3.8 percent of the home purchase conforming market in January 2007 to 32 percent in December 2008. The share of FHA endorsed refinance loans increased from four percent in 2007 to 15 percent of the conforming market in 2008. As expected these additional mortgages were dilutive to FHA's share of low- and very low-income borrower mortgages. While the share of lower income borrower FHA loans

[13] FHA Outlook. 2008 was the first year FHA reported refinance endorsements by whether they were a refinance of a conventional mortgage or whether it was originally an FHA mortgage.

decreased, the share of lower income borrower loans increased in the conventional conforming market between 2007 and 2008 (see Table A.1). While this increase in lower income borrower share is most likely a result of the first-time homebuyer tax credit policy in 2008, whose participants tend to be younger and thus lower income, it is also possible that these additional mortgages endorsed by FHA that would ordinarily been originated through a conventional mortgage contain a larger share of higher borrower income mortgages than lower income borrower mortgages (this would seem the be corroborated by FHA's increased average credit risk scores). Since lower income borrowers, whose mortgages were below the 2007 FHA loan limits, and who found FHA mortgage terms more beneficial than a conventional mortgage would have taken an FHA mortgage anyway, this scenario is conceivable.

The experience for the low-income areas goal is different. While FHA endorsed more loans on properties located in low-income areas, they endorsed an even larger amount in higher income areas. As a result, FHA's market share of qualifying mortgages on properties from low-income areas fell. However, unlike the borrower income based goals, the low-income area share of the conventional market decreased also. While the volume of conventional conforming mortgages in 2008 was 50 percent of that in 2007, conventional conforming mortgages from low-income areas in 2008 was only 40 percent of the level in 2007. The low-income area share of the conventional conforming market fell by 240 basis points between 2007 and 2008. As shown in Table C.1, FHA market share is expected to be 30 percent in 2009, 2010 and 2011.

D. Statistical Models of the Single-Family Owner-Occupied Property Housing Goals

FHFA used the HMDA monthly time series for 1993-2008 to estimate statistical models of the four single-family owner-occupied property housing goals. The model estimation results

are presented in Tables D.1 to D.4 below. The historical data for borrower income based goals show a large and significant seasonal effect prior to 2000. A set of monthly binary variables, for the years 1993 to 1999, were incorporated in the model to account for the seasonality in the data. The data for the low-income area goal is characterized by seasonality during the entire 1993 to 2008 period. There is also a discontinuity in the time series of the low-income areas goal data due to switching from the 1990 to 2000 Census as the basis for determining area median incomes and minority populations beginning in 2003.

Both the low-income and very low-income borrower home purchase mortgage shares in the market are impacted positively as expected by increased housing affordability (NARHAI), negatively by increasing unemployment (UNEMPL) and positively by a steeper yield curve (SPREAD10_1). Tables D.1 and D.2 show the parameter estimates generated from the model for the low-income and very low-income borrower home purchase goals, respectively.

The parameter estimates for the low-income area home purchase goal are presented in Table D.3. The negative coefficients indicate that rising mortgage rates (MORTRATE_GHG) and larger market shares for FHA (FHA_SHARE) decrease the share of qualifying home purchase mortgages originated in low-income areas in the conventional conforming mortgage market. As expected, but not as significant, the ratio of housing starts to housing sales (STARTS-TO-SALES), an indicator of expanding affordable housing market, has a positive impact on the low-income area home purchase mortgage share in the market.

The share of refinance mortgages made to low-income borrowers is heavily influenced by the share of refinance mortgages in market (REFI_RATE), as shown in the table of parameter estimates, Table D.4. Refinance booms tend to pull a larger share of higher income borrowers into the market. Increased interest rates (TREAS_1) and a larger gap between the 10-year

Treasury yield and the 1-year Treasury yield (SPREAD10_1), as indicators of loose monetary policy and an expanding economy, have a positive impact on the share of low-income borrower refinance mortgages. Finally, as with home purchase loans, housing affordability has a positive impact on the share of low-income borrower refinance mortgages. This most certainly is due more to the mortgage cost component of housing affordability than the house price component.

All of the model equations include autoregressive components to take in account the inherent cross time correlations in the time series data. All three home purchase goals show a 12 month seasonality effect. All four models show that the current month affordability is highly correlated with the previous month.

Table D.1

Low-Income Borrower Owner-Occupied Home Purchase Goal

Maximum Likelihood Estimation

Parameter	Standard Estimate	Approx Error	t Value	Pr > |t|	Lag
μ	-0.24335	0.07607	-3.20	0.0014	0
MA1,1	-0.44618	0.08150	-5.47	< 0.0001	12
AR1,1	0.90396	0.03398	26.60	< 0.0001	1
log(NARHAI)	0.10612	0.01601	6.63	< 0.0001	0
UNEMPL	-0.00513	0.00217	-2.36	0.0182	0
SPREAD10_1	0.00476	0.00176	2.70	0.0070	1
Jan-00	0.02282	0.00290	7.87	< 0.0001	0
Feb-00	0.02664	0.00381	6.99	< 0.0001	0
Mar-00	0.02277	0.00428	5.32	< 0.0001	0
Apr-00	0.01947	0.00458	4.25	< 0.0001	0
May-00	0.01438	0.00475	3.02	0.0025	0
Jun-00	0.00802	0.00483	1.66	0.0967	0
Jul-00	0.00859	0.00474	1.81	0.0698	0
Aug-00	0.00581	0.00453	1.28	0.1989	0
Sep-00	0.01176	0.00415	2.83	0.0046	0
Oct-00	0.00969	0.00357	2.71	0.0067	0
Nov-00	0.00550	0.00267	2.06	0.0393	0
DUM2000	0.02292	0.00460	4.98	< 0.0001	0

Constant Estimate	-0.02337
Variance Estimate	0.000027
Std Error Estimate	0.005243
AIC	-1511.04
SBC	-1451.67
Number of Residuals	200

Table D.2

Very Low-Income Borrower Owner-Occupied Home Purchase Goal

Maximum Likelihood Estimation

Parameter	Standard Estimate	Approx Error	t Value	Pr > |t|	Lag
μ	-0.20569	0.03662	-5.62	< 0.0001	0
MA1,1	-0.48507	0.07980	-6.08	< 0.0001	12
AR1,1	0.88224	0.03594	24.54	< 0.0001	1
log(NARHAI)	0.05601	0.00774	7.24	< 0.0001	0
UNEMPL	-0.00113	0.00099	-1.14	0.2550	0
SPREAD10_1	0.00121	0.00084	1.43	0.1520	1
Jan-00	0.00870	0.00148	5.89	< 0.0001	0
Feb-00	0.01111	0.00193	5.76	< 0.0001	0
Mar-00	0.00905	0.00216	4.20	< 0.0001	0
Apr-00	0.00869	0.00230	3.77	0.0002	0
May-00	0.00604	0.00238	2.53	0.0113	0
Jun-00	0.00376	0.00242	1.55	0.1201	0
Jul-00	0.00390	0.00237	1.65	0.0996	0
Aug-00	0.00345	0.00227	1.52	0.1280	0
Sep-00	0.00495	0.00208	2.37	0.0176	0
Oct-00	0.00365	0.00180	2.03	0.0426	0
Nov-00	0.00244	0.00135	1.80	0.0717	0
DUM2000	0.01234	0.00217	5.68	< 0.0001	0

Constant Estimate	-0.02337
Variance Estimate	0.000027
Std Error Estimate	0.005243
AIC	-1511.04
SBC	-1451.67
Number of Residuals	200

Table D.3

Low-Income Area Owner-Occupied Home Purchase Goal

Maximum Likelihood Estimation

Parameter	Standard Estimate	Approx Error	t Value	Pr > |t|	Lag
μ	0.12872	0.00873	14.75	< 0.0001	0
MA1,1	-0.34056	0.09676	-3.52	0.0004	12
AR1,1	0.95766	0.02313	41.41	< 0.0001	1
MORTRATE_CHG	-0.00280	0.00090	-3.13	0.0018	0
FHA_SHARE	-0.04478	0.02642	-1.69	0.0902	0
STARTS-TO-SALES	0.01148	0.01026	1.12	0.2630	1
JAN	0.00401	0.00106	3.77	0.0002	0
FEB	0.00129	0.00140	0.92	0.3592	0
MAR	-0.00119	0.00162	-0.73	0.4632	0
APR	-0.00420	0.00175	-2.39	0.0167	0
MAY	-0.00848	0.00182	-4.65	< 0.0001	0
JUN	-0.01415	0.00184	-7.68	< 0.0001	0
JUL	-0.01264	0.00181	-6.96	< 0.0001	0
AUG	-0.01176	0.00174	-6.75	< 0.0001	0
SEP	-0.00648	0.00161	-4.03	< 0.0001	0
OCT	-0.00322	0.00139	-2.32	0.0202	0
NOV	-0.00286	0.00103	-2.77	0.0056	0
DUM2003	0.03164	0.00304	10.42	< 0.0001	0

Constant Estimate	-0.02337
Variance Estimate	0.000027
Std Error Estimate	0.005243
AIC	-1511.04
SBC	-1451.67
Number of Residuals	200

Table D.4

Low-Income Borrower Owner-Occupied Refinance Goal

Maximum Likelihood Estimation

Parameter	Standard Estimate	Approx Error	t Value	Pr > |t|	Lag
μ	-0.24554	0.13560	-1.81	0.0702	0
MA1,1	0.03056	0.08494	0.36	0.7190	1
AR1,1	0.98717	0.01070	92.26	< 0.0001	1
log(NARHAI)	0.09813	0.02669	3.68	0.0002	0
TREAS_1	0.00962	0.00378	2.55	0.0109	1
SPREAD10_1	0.01837	0.00377	4.88	< 0.0001	1
REFI_RATE	-0.18620	0.02155	-8.64	< 0.0001	0
Jan-00	0.02096	0.00302	6.93	< 0.0001	0
Feb-00	0.01619	0.00394	4.11	< 0.0001	0
Mar-00	0.01509	0.00437	3.45	0.0006	0
Apr-00	0.01223	0.00467	2.62	0.0089	0
May-00	0.00851	0.00492	1.73	0.0833	0
Jun-00	0.00681	0.00512	1.33	0.1839	0
Jul-00	0.00361	0.00508	0.71	0.4763	0
Aug-00	0.00073	0.00480	0.15	0.8798	0
Sep-00	0.00194	0.00434	0.45	0.6548	0
Oct-00	0.00306	0.00370	0.83	0.4080	0
Nov-00	0.00299	0.00276	1.08	0.2784	0
DUM2000	0.02789	0.00771	3.62	0.0003	0

Constant Estimate	-0.02337
Variance Estimate	0.000027
Std Error Estimate	0.005243
AIC	-1511.04
SBC	-1451.67
Number of Residuals	200

Appendix

SAS Output of

Estimation Models

Maximum Likelihood Estimation							
Parameter	**Estimate**	**Standard Error**	**t Value**	**Approx Pr > |t|**	**Lag**	**Variable**	**Shift**
MU	-0.24335	0.07607	-3.20	0.0014	0	LIP	0
MA1,1	-0.44618	0.08150	-5.47	<.0001	12	LIP	0
AR1,1	0.90396	0.03398	26.60	<.0001	1	LIP	0
NUM1	0.10612	0.01601	6.63	<.0001	0	log_nar	0
NUM2	-0.0051346	0.0021747	-2.36	0.0182	0	UNEMPL	0
NUM3	0.0047550	0.0017630	2.70	0.0070	0	spread10_1_lag1	0
NUM4	0.02282	0.0029010	7.87	<.0001	0	jan2000	0
NUM5	0.02664	0.0038122	6.99	<.0001	0	feb2000	0
NUM6	0.02277	0.0042787	5.32	<.0001	0	mar2000	0
NUM7	0.01947	0.0045783	4.25	<.0001	0	apr2000	0
NUM8	0.01438	0.0047541	3.02	0.0025	0	may2000	0
NUM9	0.0080234	0.0048300	1.66	0.0967	0	jun2000	0
NUM10	0.0085906	0.0047376	1.81	0.0698	0	jul2000	0
NUM11	0.0058139	0.0045257	1.28	0.1989	0	aug2000	0
NUM12	0.01176	0.0041514	2.83	0.0046	0	sep2000	0
NUM13	0.0096852	0.0035727	2.71	0.0067	0	oct2000	0
NUM14	0.0054994	0.0026680	2.06	0.0393	0	nov2000	0
NUM15	0.02292	0.0046008	4.98	<.0001	0	dum2000	0

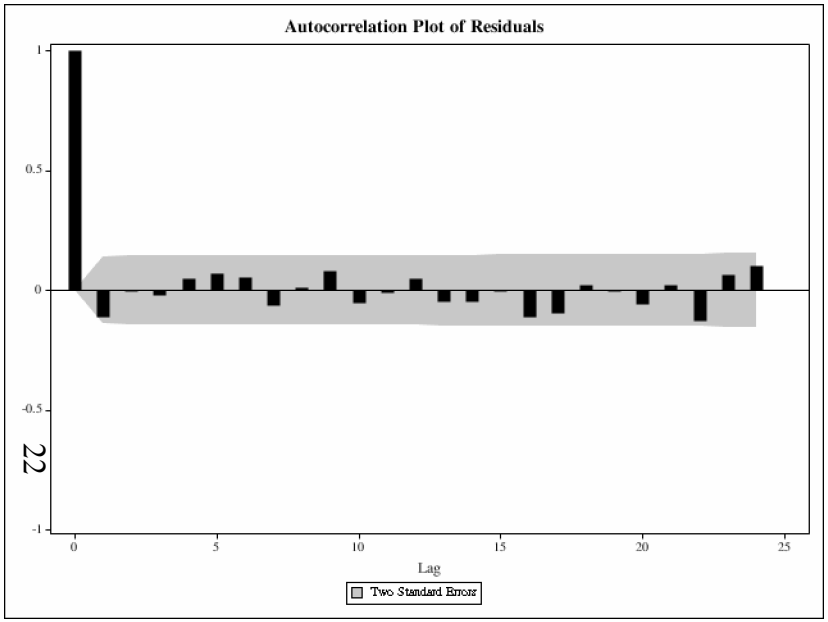
Constant Estimate	-0.02337
Variance Estimate	0.000027
Std Error Estimate	0.005243
AIC	-1511.04
SBC	-1451.67
Number of Residuals	200

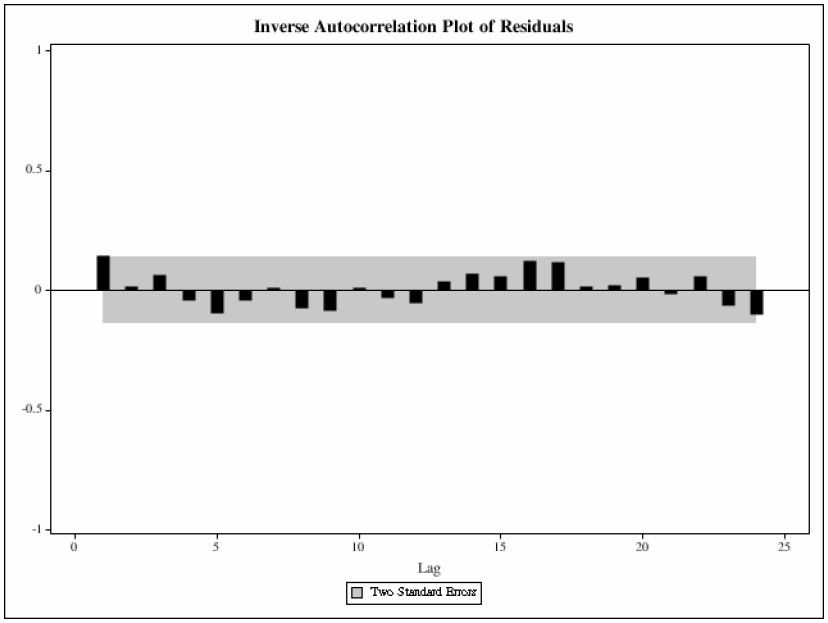
Correlations of Parameter Estimates										
Variable	Parameter	LIP MU	LIP MA1,1	LIP AR1,1	log_nar NUM1	UNEMPL NUM2	spread10_1_lag1 NUM3	jan2000 NUM4	feb2000 NUM5	mar2000 NUM6
LIP	MU	1.000	-0.158	-0.065	-0.985	0.160	-0.187	0.022	0.096	0.015
LIP	MA1,1	-0.158	1.000	0.129	0.181	-0.174	-0.043	-0.011	-0.046	-0.021
LIP	AR1,1	-0.065	0.129	1.000	0.024	0.291	0.034	0.006	0.010	0.039
log_nar	NUM1	-0.985	0.181	0.024	1.000	-0.306	0.192	-0.037	-0.116	-0.037
UNEMPL	NUM2	0.160	-0.174	0.291	-0.306	1.000	-0.254	-0.017	0.036	0.036
spread10_1_lag1	NUM3	-0.187	-0.043	0.034	0.192	-0.254	1.000	0.074	-0.019	-0.016
jan2000	NUM4	0.022	-0.011	0.006	-0.037	-0.017	0.074	1.000	0.669	0.529
feb2000	NUM5	0.096	-0.046	0.010	-0.116	0.036	-0.019	0.669	1.000	0.785
mar2000	NUM6	0.015	-0.021	0.039	-0.037	0.036	-0.016	0.529	0.785	1.000
apr2000	NUM7	-0.018	0.009	0.040	0.002	-0.012	-0.015	0.436	0.641	0.818
may2000	NUM8	-0.075	0.021	0.062	0.053	0.024	-0.043	0.361	0.531	0.682
jun2000	NUM9	-0.162	0.028	0.063	0.143	-0.015	-0.015	0.302	0.435	0.568
jul2000	NUM10	-0.146	0.048	0.061	0.130	-0.028	-0.007	0.258	0.368	0.480
aug2000	NUM11	-0.139	0.043	0.070	0.119	0.006	-0.011	0.217	0.308	0.403
sep2000	NUM12	-0.101	0.052	0.059	0.086	-0.006	-0.025	0.179	0.255	0.331
oct2000	NUM13	-0.011	0.021	0.052	-0.005	0.027	-0.026	0.144	0.208	0.261
nov2000	NUM14	0.013	0.012	0.040	-0.026	0.033	-0.034	0.098	0.144	0.178
dum2000	NUM15	-0.171	0.052	-0.117	0.143	-0.079	-0.006	0.209	0.170	0.165

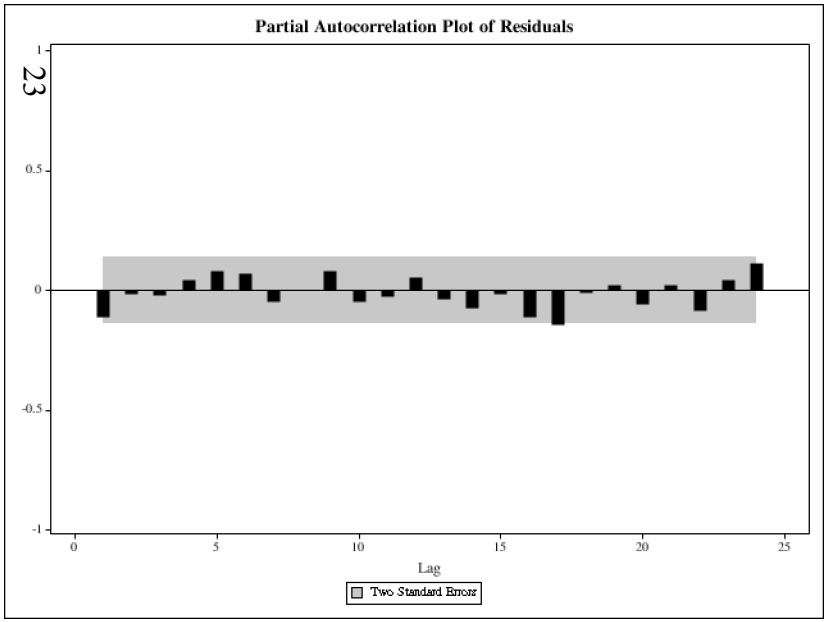
Correlations of Parameter Estimates										
Variable	Parameter	apr2000 NUM7	may2000 NUM8	jun2000 NUM9	jul2000 NUM10	aug2000 NUM11	sep2000 NUM12	oct2000 NUM13	nov2000 NUM14	dum2000 NUM15
LIP	MU	-0.018	-0.075	-0.162	-0.146	-0.139	-0.101	-0.011	0.013	-0.171
LIP	MA1,1	0.009	0.021	0.028	0.048	0.043	0.052	0.021	0.012	0.052
LIP	AR1,1	0.040	0.062	0.063	0.061	0.070	0.059	0.052	0.040	-0.117
log_nar	NUM1	0.002	0.053	0.143	0.130	0.119	0.086	-0.005	-0.026	0.143
UNEMPL	NUM2	-0.012	0.024	-0.015	-0.028	0.006	-0.006	0.027	0.033	-0.079
spread10_1_lag1	NUM3	-0.015	-0.043	-0.015	-0.007	-0.011	-0.025	-0.026	-0.034	-0.006
jan2000	NUM4	0.436	0.361	0.302	0.258	0.217	0.179	0.144	0.098	0.209
feb2000	NUM5	0.641	0.531	0.435	0.368	0.308	0.255	0.208	0.144	0.170
mar2000	NUM6	0.818	0.682	0.568	0.480	0.403	0.331	0.261	0.178	0.165
apr2000	NUM7	1.000	0.833	0.697	0.589	0.492	0.404	0.314	0.212	0.162
may2000	NUM8	0.833	1.000	0.840	0.708	0.593	0.484	0.372	0.251	0.159
jun2000	NUM9	0.697	0.840	1.000	0.843	0.704	0.573	0.434	0.289	0.161
jul2000	NUM10	0.589	0.708	0.843	1.000	0.833	0.678	0.515	0.343	0.151
aug2000	NUM11	0.492	0.593	0.704	0.833	1.000	0.812	0.619	0.413	0.137
sep2000	NUM12	0.404	0.484	0.573	0.678	0.812	1.000	0.765	0.511	0.120
oct2000	NUM13	0.314	0.372	0.434	0.515	0.619	0.765	1.000	0.669	0.089
nov2000	NUM14	0.212	0.251	0.289	0.343	0.413	0.511	0.669	1.000	0.061
dum2000	NUM15	0.162	0.159	0.161	0.151	0.137	0.120	0.089	0.061	1.000

Autocorrelation Check of Residuals									
To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	4.56	4	0.3353	-0.110	-0.004	-0.021	0.046	0.069	0.053
12	8.05	10	0.6239	-0.066	0.011	0.082	-0.052	-0.010	0.050
18	14.00	16	0.5986	-0.045	-0.048	-0.004	-0.114	-0.095	0.022
24	22.06	22	0.4566	-0.004	-0.060	0.020	-0.128	0.065	0.104

Autocorrelation Check of Residuals									
To Lag	**Chi-Square**	**DF**	**Pr > ChiSq**	**Autocorrelations**					
30	32.18	28	0.2673	-0.035	-0.099	0.065	0.155	-0.030	0.056
36	38.67	34	0.2669	-0.030	0.023	0.096	-0.014	-0.061	0.109




Inverse Autocorrelation Plot of Residuals
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors


Partial Autocorrelation Plot of Residuals
23
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors

Model for variable LIP	
Estimated Intercept	-0.24335

Autoregressive Factors	
Factor 1:	1 - 0.90396 B**(1)

Moving Average Factors	
Factor 1:	1 + 0.44618 B**(12)

Input Number 1	
Input Variable	log_nar
Overall Regression Factor	0.10612

Input Number 2	
Input Variable	UNEMPL
Overall Regression Factor	-0.00513

Input Number 3	
Input Variable	spread10_1_lag1
Overall Regression Factor	0.004755

Input Number 4	
Input Variable	jan2000
Overall Regression Factor	0.022819

Input Number 5	
Input Variable	feb2000
Overall Regression Factor	0.026641

Input Number 6	
Input Variable	mar2000
Overall Regression Factor	0.022771

Input Number 7	
Input Variable	apr2000
Overall Regression Factor	0.019474

Input Number 8	
Input Variable	may2000
Overall Regression Factor	0.014377

Input Number 9	
Input Variable	jun2000
Overall Regression Factor	0.008023

Input Number 10	
Input Variable	jul2000
Overall Regression Factor	0.008591

Input Number 11	
Input Variable	aug2000
Overall Regression Factor	0.005814

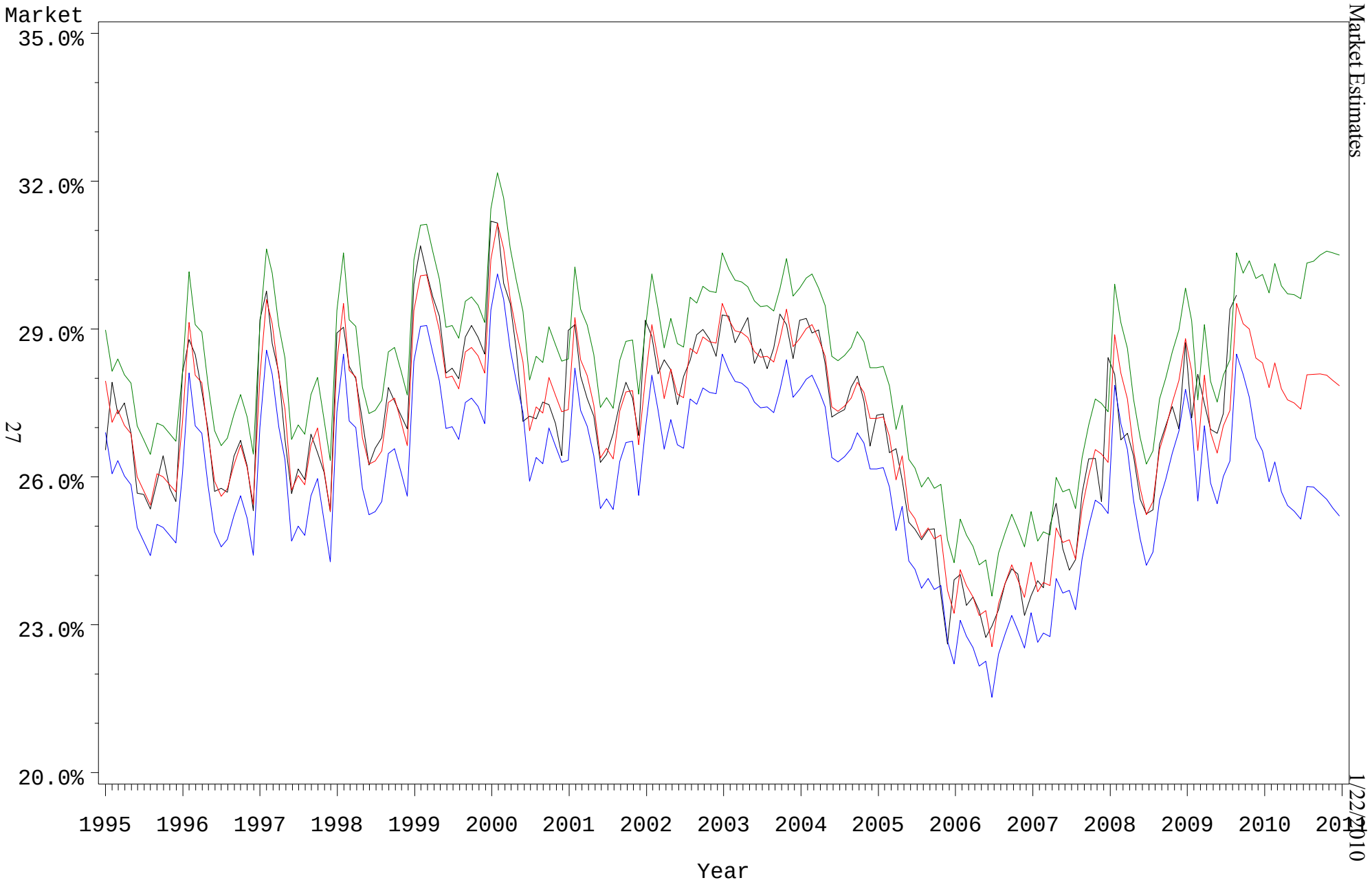
Input Number 12	
Input Variable	sep2000
Overall Regression Factor	0.01176

Input Number 13	
Input Variable	oct2000
Overall Regression Factor	0.009685

Input Number 14	
Input Variable	nov2000
Overall Regression Factor	0.005499

Input Number 15	
Input Variable	dum2000
Overall Regression Factor	0.022921

Low—Income Borrower Home Purchase Goal



Maximum Likelihood Estimation							
Parameter	**Estimate**	**Standard Error**	**t Value**	**Approx Pr > |t|**	**Lag**	**Variable**	**Shift**
MU	-0.20569	0.03662	-5.62	<.0001	0	VLIP	0
MA1,1	-0.48507	0.07980	-6.08	<.0001	12	VLIP	0
AR1,1	0.88224	0.03594	24.54	<.0001	1	VLIP	0
NUM1	0.05601	0.0077407	7.24	<.0001	0	log_nar	0
NUM2	-0.0011269	0.0009900	-1.14	0.2550	0	UNEMPL	0
NUM3	0.0012085	0.0008437	1.43	0.1520	0	spread10_1_lag1	0
NUM4	0.0087036	0.0014766	5.89	<.0001	0	jan2000	0
NUM5	0.01111	0.0019293	5.76	<.0001	0	feb2000	0
NUM6	0.0090541	0.0021557	4.20	<.0001	0	mar2000	0
NUM7	0.0086853	0.0023014	3.77	0.0002	0	apr2000	0
NUM8	0.0060353	0.0023836	2.53	0.0113	0	may2000	0
NUM9	0.0037581	0.0024176	1.55	0.1201	0	jun2000	0
NUM10	0.0039048	0.0023714	1.65	0.0996	0	jul2000	0
NUM11	0.0034511	0.0022673	1.52	0.1280	0	aug2000	0
NUM12	0.0049486	0.0020848	2.37	0.0176	0	sep2000	0
NUM13	0.0036545	0.0018019	2.03	0.0426	0	oct2000	0
NUM14	0.0024355	0.0013521	1.80	0.0717	0	nov2000	0
NUM15	0.01234	0.0021734	5.68	<.0001	0	dum2000	0

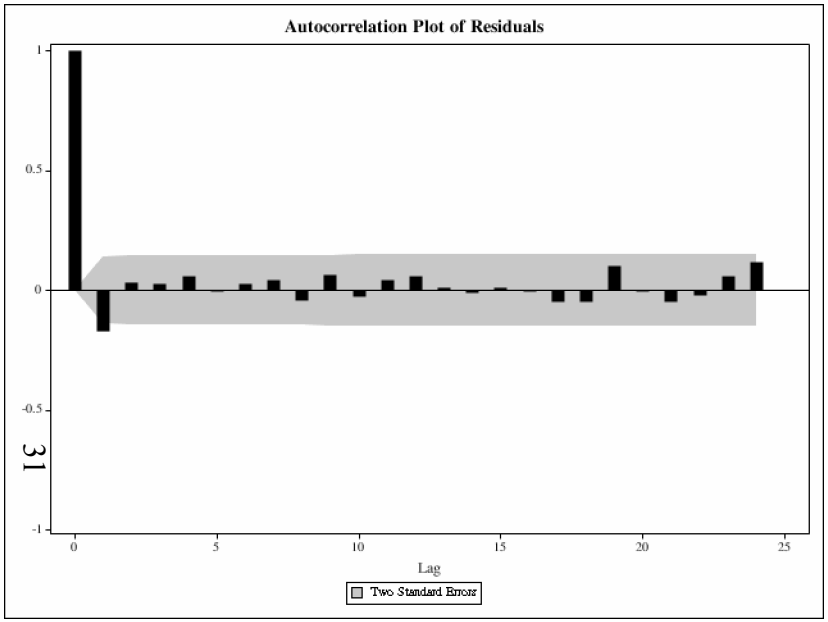
Constant Estimate	-0.02422
Variance Estimate	6.695E-6
Std Error Estimate	0.002587
AIC	-1793.18
SBC	-1733.81
Number of Residuals	200

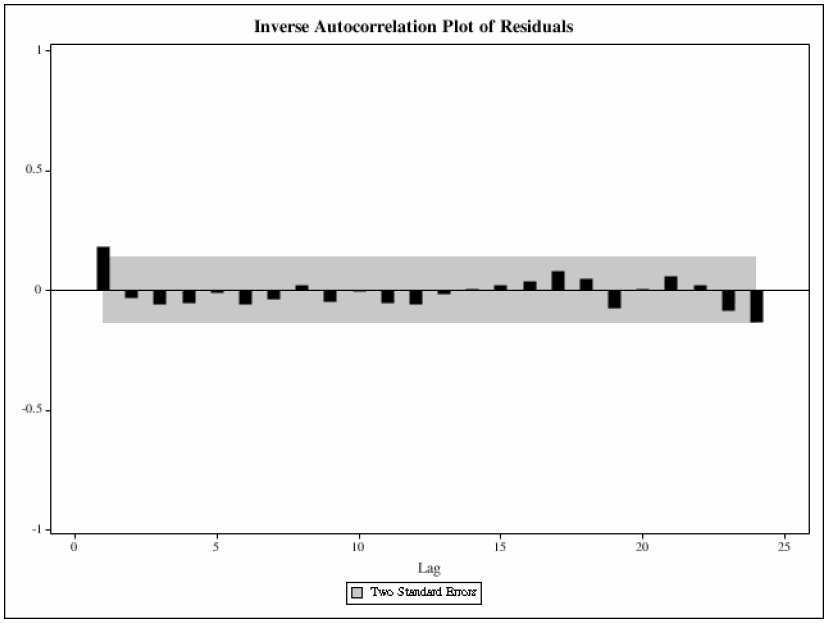
Correlations of Parameter Estimates										
Variable	Parameter	VLIP MU	VLIP MA1,1	VLIP AR1,1	log_nar NUM1	UNEMPL NUM2	spread10_1_lag1 NUM3	jan2000 NUM4	feb2000 NUM5	mar2000 NUM6
VLIP	MU	1.000	-0.108	-0.015	-0.987	0.200	-0.167	0.019	0.091	0.012
VLIP	MA1,1	-0.108	1.000	0.124	0.121	-0.085	-0.114	-0.006	-0.066	-0.013
VLIP	AR1,1	-0.015	0.124	1.000	-0.016	0.234	0.030	-0.002	-0.009	0.005
log_nar	NUM1	-0.987	0.121	-0.016	1.000	-0.334	0.176	-0.034	-0.111	-0.034
UNEMPL	NUM2	0.200	-0.085	0.234	-0.334	1.000	-0.291	-0.021	0.032	0.025
spread10_1_lag1	NUM3	-0.167	-0.114	0.030	0.176	-0.291	1.000	0.070	-0.014	-0.018
jan2000	NUM4	0.019	-0.006	-0.002	-0.034	-0.021	0.070	1.000	0.668	0.529
feb2000	NUM5	0.091	-0.066	-0.009	-0.111	0.032	-0.014	0.668	1.000	0.782
mar2000	NUM6	0.012	-0.013	0.005	-0.034	0.025	-0.018	0.529	0.782	1.000
apr2000	NUM7	-0.017	-0.005	-0.003	0.000	-0.022	-0.015	0.437	0.639	0.815
may2000	NUM8	-0.069	0.025	0.011	0.047	0.013	-0.049	0.363	0.528	0.678
jun2000	NUM9	-0.154	0.024	0.007	0.135	-0.030	-0.021	0.305	0.434	0.564
jul2000	NUM10	-0.136	0.034	0.008	0.119	-0.037	-0.015	0.262	0.368	0.477
aug2000	NUM11	-0.131	0.022	0.015	0.111	-0.006	-0.016	0.221	0.309	0.399
sep2000	NUM12	-0.093	0.022	0.010	0.077	-0.012	-0.029	0.184	0.256	0.328
oct2000	NUM13	-0.008	0.014	0.014	-0.008	0.020	-0.031	0.148	0.208	0.258
nov2000	NUM14	0.021	-0.033	0.008	-0.034	0.032	-0.030	0.101	0.147	0.176
dum2000	NUM15	-0.179	0.028	-0.022	0.145	-0.047	-0.009	0.242	0.209	0.210

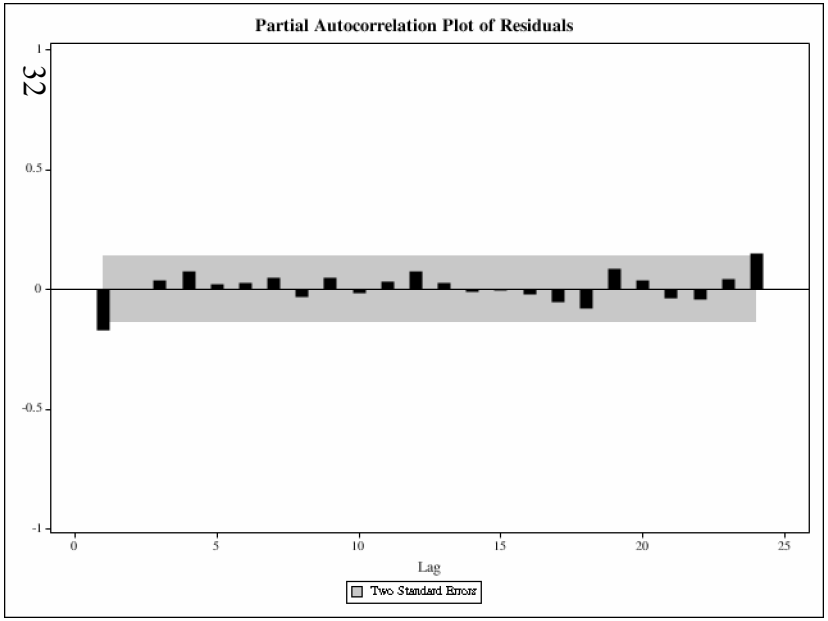
Correlations of Parameter Estimates										
Variable	Parameter	apr2000 NUM7	may2000 NUM8	jun2000 NUM9	jul2000 NUM10	aug2000 NUM11	sep2000 NUM12	oct2000 NUM13	nov2000 NUM14	dum2000 NUM15
VLIP	MU	-0.017	-0.069	-0.154	-0.136	-0.131	-0.093	-0.008	0.021	-0.179
VLIP	MA1,1	-0.005	0.025	0.024	0.034	0.022	0.022	0.014	-0.033	0.028
VLIP	AR1,1	-0.003	0.011	0.007	0.008	0.015	0.010	0.014	0.008	-0.022
log_nar	NUM1	0.000	0.047	0.135	0.119	0.111	0.077	-0.008	-0.034	0.145
UNEMPL	NUM2	-0.022	0.013	-0.030	-0.037	-0.006	-0.012	0.020	0.032	-0.047
spread10_1_lag1	NUM3	-0.015	-0.049	-0.021	-0.015	-0.016	-0.029	-0.031	-0.030	-0.009
jan2000	NUM4	0.437	0.363	0.305	0.262	0.221	0.184	0.148	0.101	0.242
feb2000	NUM5	0.639	0.528	0.434	0.368	0.309	0.256	0.208	0.147	0.209
mar2000	NUM6	0.815	0.678	0.564	0.477	0.399	0.328	0.258	0.176	0.210
apr2000	NUM7	1.000	0.829	0.691	0.583	0.486	0.398	0.309	0.208	0.207
may2000	NUM8	0.829	1.000	0.835	0.702	0.585	0.477	0.366	0.245	0.207
jun2000	NUM9	0.691	0.835	1.000	0.838	0.697	0.565	0.427	0.283	0.209
jul2000	NUM10	0.583	0.702	0.838	1.000	0.828	0.670	0.508	0.336	0.196
aug2000	NUM11	0.486	0.585	0.697	0.828	1.000	0.807	0.613	0.406	0.181
sep2000	NUM12	0.398	0.477	0.565	0.670	0.807	1.000	0.761	0.504	0.160
oct2000	NUM13	0.309	0.366	0.427	0.508	0.613	0.761	1.000	0.664	0.124
nov2000	NUM14	0.208	0.245	0.283	0.336	0.406	0.504	0.664	1.000	0.086
dum2000	NUM15	0.207	0.207	0.209	0.196	0.181	0.160	0.124	0.086	1.000

Autocorrelation Check of Residuals									
To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.38	4	0.1169	-0.173	0.031	0.029	0.062	-0.003	0.025
12	10.37	10	0.4085	0.042	-0.040	0.066	-0.029	0.044	0.061
18	11.45	16	0.7807	0.011	-0.013	0.009	-0.004	-0.048	-0.047
24	18.43	22	0.6803	0.099	-0.003	-0.047	-0.023	0.061	0.120

Autocorrelation Check of Residuals									
To Lag	**Chi-Square**	**DF**	**Pr > ChiSq**	**Autocorrelations**					
30	20.85	28	0.8315	0.010	-0.033	0.022	0.055	-0.026	0.070
36	26.66	34	0.8108	-0.057	0.004	0.102	-0.016	0.001	0.099




Inverse Autocorrelation Plot of Residuals
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors


Partial Autocorrelation Plot of Residuals
32
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors

Model for variable VLIP	
Estimated Intercept	-0.20569

Autoregressive Factors	
Factor 1:	1 - 0.88224 B**(1)

Moving Average Factors	
Factor 1:	1 + 0.48507 B**(12)

Input Number 1	
Input Variable	log_nar
Overall Regression Factor	0.056011

Input Number 2	
Input Variable	UNEMPL
Overall Regression Factor	-0.00113

Input Number 3	
Input Variable	spread10_1_lag1
Overall Regression Factor	0.001209

Input Number 4	
Input Variable	jan2000
Overall Regression Factor	0.008704

Input Number 5	
Input Variable	feb2000
Overall Regression Factor	0.011106

Input Number 6	
Input Variable	mar2000
Overall Regression Factor	0.009054

Input Number 7	
Input Variable	apr2000
Overall Regression Factor	0.008685

Input Number 8	
Input Variable	may2000
Overall Regression Factor	0.006035

Input Number 9	
Input Variable	jun2000
Overall Regression Factor	0.003758

Input Number 10	
Input Variable	jul2000
Overall Regression Factor	0.003905

Input Number 11	
Input Variable	aug2000
Overall Regression Factor	0.003451

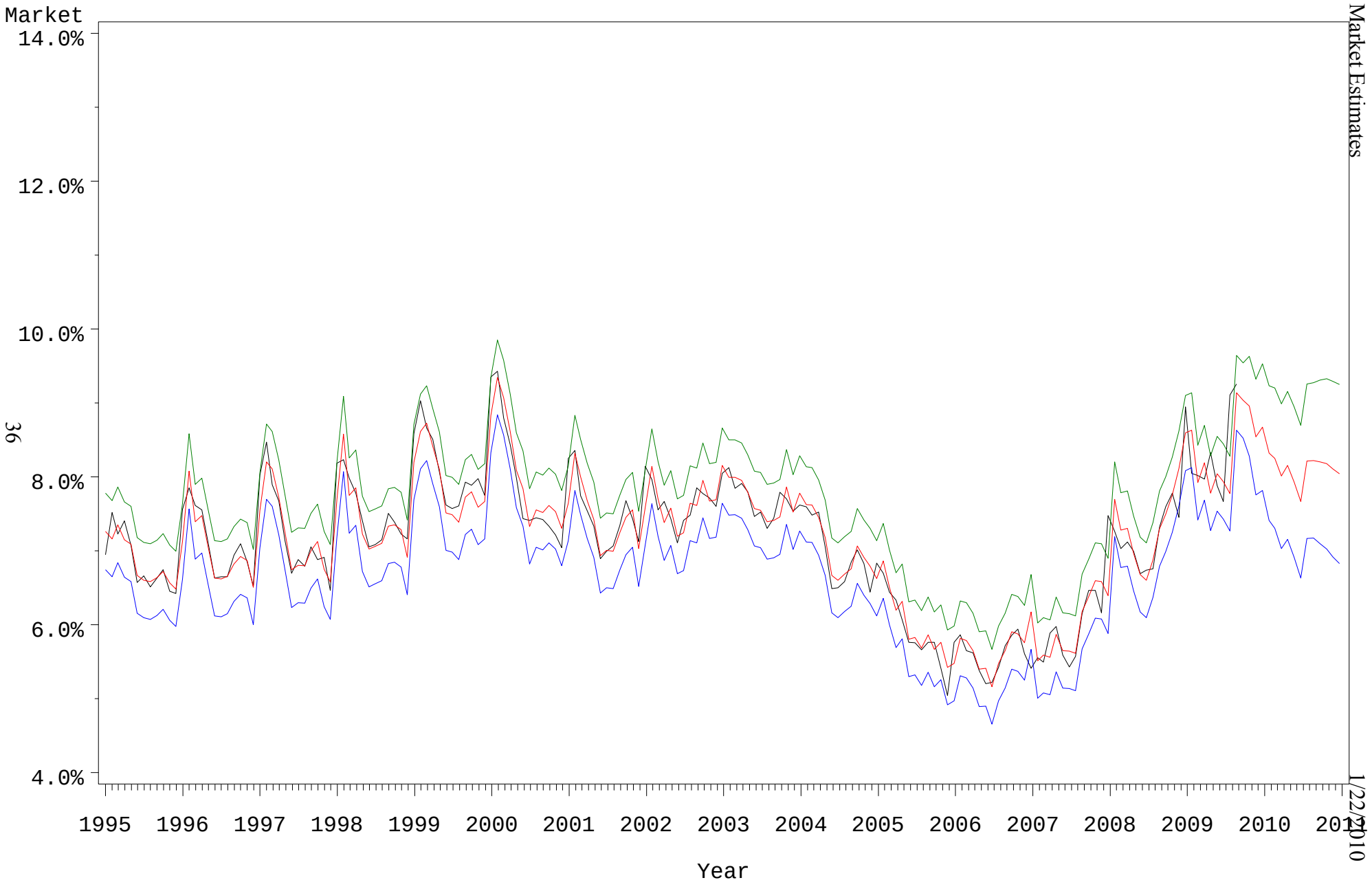
Input Number 12	
Input Variable	sep2000
Overall Regression Factor	0.004949

Input Number 13	
Input Variable	oct2000
Overall Regression Factor	0.003654

Input Number 14	
Input Variable	nov2000
Overall Regression Factor	0.002436

Input Number 15	
Input Variable	dum2000
Overall Regression Factor	0.01234

Very Low—Income Borrower Home Purchase Goal



Maximum Likelihood Estimation							
Parameter	**Estimate**	**Standard Error**	**t Value**	**Approx Pr > |t|**	**Lag**	**Variable**	**Shift**
MU	0.12872	0.0087250	14.75	<.0001	0	LAP	0
MA1,1	-0.34056	0.09676	-3.52	0.0004	12	LAP	0
AR1,1	0.95766	0.02313	41.41	<.0001	1	LAP	0
NUM1	-0.0028044	0.0008965	-3.13	0.0018	0	f30_dif1	0
NUM2	-0.04478	0.02642	-1.69	0.0902	0	pctfha_hp_1	0
NUM3	0.01148	0.01026	1.12	0.2630	0	starts_sales_lag1	0
NUM4	0.0040072	0.0010631	3.77	0.0002	0	jan	0
NUM5	0.0012850	0.0014016	0.92	0.3592	0	feb	0
NUM6	-0.0011871	0.0016181	-0.73	0.4632	0	mar	0
NUM7	-0.0041986	0.0017549	-2.39	0.0167	0	apr	0
NUM8	-0.0084847	0.0018242	-4.65	<.0001	0	may	0
NUM9	-0.01415	0.0018429	-7.68	<.0001	0	jun	0
NUM10	-0.01264	0.0018149	-6.96	<.0001	0	jul	0
NUM11	-0.01176	0.0017413	-6.75	<.0001	0	aug	0
NUM12	-0.0064820	0.0016067	-4.03	<.0001	0	sep	0
NUM13	-0.0032239	0.0013885	-2.32	0.0202	0	oct	0
NUM14	-0.0028647	0.0010338	-2.77	0.0056	0	nov	0
NUM15	0.03164	0.0030357	10.42	<.0001	0	DUM2003	0

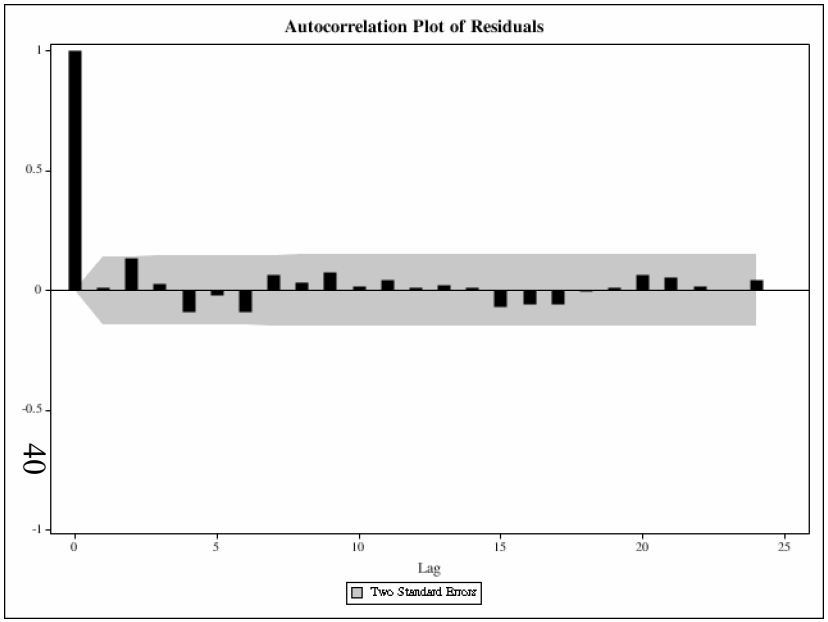
Constant Estimate	0.00545
Variance Estimate	0.00001
Std Error Estimate	0.003233
AIC	-1696.11
SBC	-1636.83
Number of Residuals	199

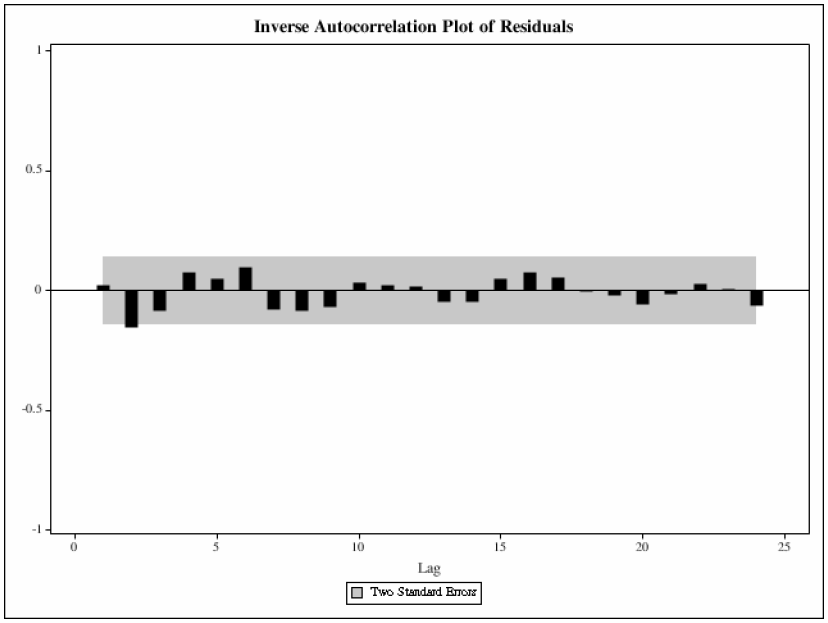
Correlations of Parameter Estimates										
Variable	Parameter	LAP MU	LAP MA1,1	LAP AR1,1	f30_dif1 NUM1	pctfha_hp_1 NUM2	starts_sales_lag1 NUM3	jan NUM4	feb NUM5	mar NUM6
LAP	MU	1.000	0.014	-0.189	-0.100	-0.511	-0.406	-0.134	-0.069	-0.071
LAP	MA1,1	0.014	1.000	0.178	-0.081	-0.041	-0.016	0.004	0.091	0.046
LAP	AR1,1	-0.189	0.178	1.000	0.042	0.070	0.009	0.015	0.013	-0.002
f30_dif1	NUM1	-0.100	-0.081	0.042	1.000	0.183	0.061	0.030	-0.054	-0.092
pctfha_hp_1	NUM2	-0.511	-0.041	0.070	0.183	1.000	0.061	0.193	0.023	-0.035
starts_sales_lag1	NUM3	-0.406	-0.016	0.009	0.061	0.061	1.000	0.008	-0.030	-0.002
jan	NUM4	-0.134	0.004	0.015	0.030	0.193	0.008	1.000	0.666	0.506
feb	NUM5	-0.069	0.091	0.013	-0.054	0.023	-0.030	0.666	1.000	0.773
mar	NUM6	-0.071	0.046	-0.002	-0.092	-0.035	-0.002	0.506	0.773	1.000
apr	NUM7	-0.052	0.065	0.001	-0.103	-0.065	-0.031	0.409	0.638	0.825
may	NUM8	-0.081	0.056	0.005	-0.081	-0.053	0.018	0.346	0.538	0.697
jun	NUM9	-0.131	0.017	0.010	-0.052	0.037	0.026	0.311	0.458	0.590
jul	NUM10	-0.111	0.022	0.015	-0.037	0.016	-0.000	0.263	0.391	0.503
aug	NUM11	-0.125	-0.002	0.021	-0.034	0.042	0.005	0.227	0.329	0.423
sep	NUM12	-0.094	0.017	0.033	0.011	-0.015	0.003	0.179	0.270	0.348
oct	NUM13	-0.108	0.015	0.024	-0.037	0.043	0.010	0.149	0.214	0.272
nov	NUM14	-0.067	-0.002	0.009	-0.076	0.026	-0.016	0.100	0.146	0.187
DUM2003	NUM15	-0.106	0.050	-0.034	-0.043	-0.067	0.017	-0.167	-0.101	-0.073

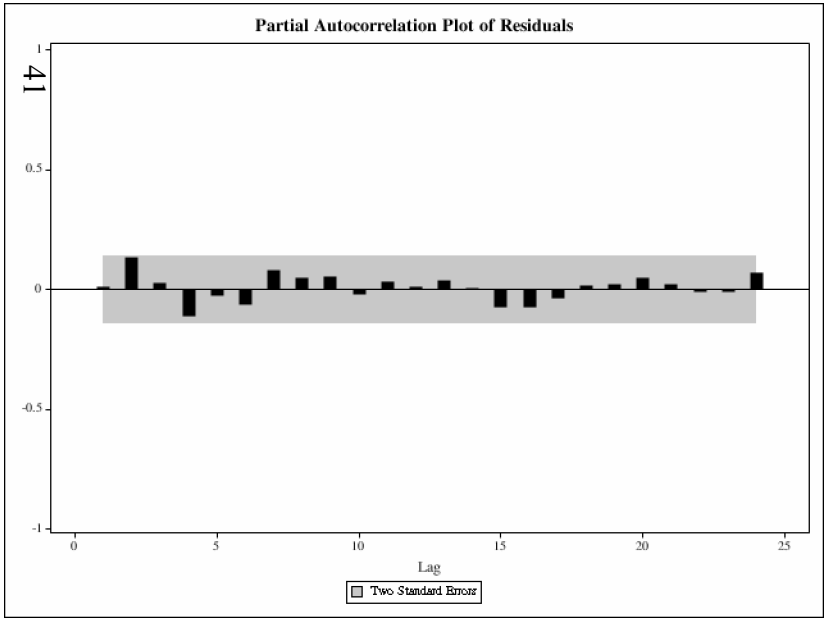
Correlations of Parameter Estimates										
Variable	Parameter	apr NUM7	may NUM8	jun NUM9	jul NUM10	aug NUM11	sep NUM12	oct NUM13	nov NUM14	DUM2003 NUM15
LAP	MU	-0.052	-0.081	-0.131	-0.111	-0.125	-0.094	-0.108	-0.067	-0.106
LAP	MA1,1	0.065	0.056	0.017	0.022	-0.002	0.017	0.015	-0.002	0.050
LAP	AR1,1	0.001	0.005	0.010	0.015	0.021	0.033	0.024	0.009	-0.034
f30_dif1	NUM1	-0.103	-0.081	-0.052	-0.037	-0.034	0.011	-0.037	-0.076	-0.043
pctfha_hp_1	NUM2	-0.065	-0.053	0.037	0.016	0.042	-0.015	0.043	0.026	-0.067
starts_sales_lag1	NUM3	-0.031	0.018	0.026	-0.000	0.005	0.003	0.010	-0.016	0.017
jan	NUM4	0.409	0.346	0.311	0.263	0.227	0.179	0.149	0.100	-0.167
feb	NUM5	0.638	0.538	0.458	0.391	0.329	0.270	0.214	0.146	-0.101
mar	NUM6	0.825	0.697	0.590	0.503	0.423	0.348	0.272	0.187	-0.073
apr	NUM7	1.000	0.842	0.711	0.606	0.508	0.420	0.326	0.224	-0.057
may	NUM8	0.842	1.000	0.846	0.720	0.604	0.499	0.387	0.263	-0.048
jun	NUM9	0.711	0.846	1.000	0.849	0.716	0.586	0.458	0.311	-0.049
jul	NUM10	0.606	0.720	0.849	1.000	0.841	0.691	0.537	0.363	-0.043
aug	NUM11	0.508	0.604	0.716	0.841	1.000	0.820	0.637	0.430	-0.040
sep	NUM12	0.420	0.499	0.586	0.691	0.820	1.000	0.770	0.516	-0.033
oct	NUM13	0.326	0.387	0.458	0.537	0.637	0.770	1.000	0.673	-0.027
nov	NUM14	0.224	0.263	0.311	0.363	0.430	0.516	0.673	1.000	-0.017
DUM2003	NUM15	-0.057	-0.048	-0.049	-0.043	-0.040	-0.033	-0.027	-0.017	1.000

Autocorrelation Check of Residuals									
To Lag	Chi-Square	DF	Pr > ChiSq	Autocorrelations					
6	7.56	4	0.1092	0.012	0.136	0.029	-0.092	-0.022	-0.092
12	10.26	10	0.4177	0.064	0.033	0.074	0.014	0.044	0.011
18	13.02	16	0.6710	0.020	0.008	-0.071	-0.058	-0.061	-0.007
24	15.06	22	0.8596	0.011	0.062	0.056	0.017	0.000	0.041

Autocorrelation Check of Residuals									
To Lag	**Chi-Square**	**DF**	**Pr > ChiSq**	**Autocorrelations**					
30	17.85	28	0.9298	-0.020	0.074	0.043	-0.058	-0.020	-0.021
36	19.46	34	0.9783	-0.040	-0.026	0.035	0.051	0.008	-0.022




Inverse Autocorrelation Plot of Residuals
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors


Partial Autocorrelation Plot of Residuals
41
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors

Model for variable LAP	
Estimated Intercept	0.128718

Autoregressive Factors	
Factor 1:	1 - 0.95766 B**(1)

Moving Average Factors	
Factor 1:	1 + 0.34056 B**(12)

Input Number 1	
Input Variable	f30_dif1
Overall Regression Factor	-0.0028

Input Number 2	
Input Variable	pctfha_hp_1
Overall Regression Factor	-0.04478

Input Number 3	
Input Variable	starts_sales_lag1
Overall Regression Factor	0.011481

Input Number 4	
Input Variable	jan
Overall Regression Factor	0.004007

Input Number 5	
Input Variable	feb
Overall Regression Factor	0.001285

Input Number 6	
Input Variable	mar
Overall Regression Factor	-0.00119

Input Number 7	
Input Variable	apr
Overall Regression Factor	-0.0042

Input Number 8	
Input Variable	may
Overall Regression Factor	-0.00848

Input Number 9	
Input Variable	jun
Overall Regression Factor	-0.01415

Input Number 10	
Input Variable	jul
Overall Regression Factor	-0.01264

Input Number 11	
Input Variable	aug
Overall Regression Factor	-0.01176

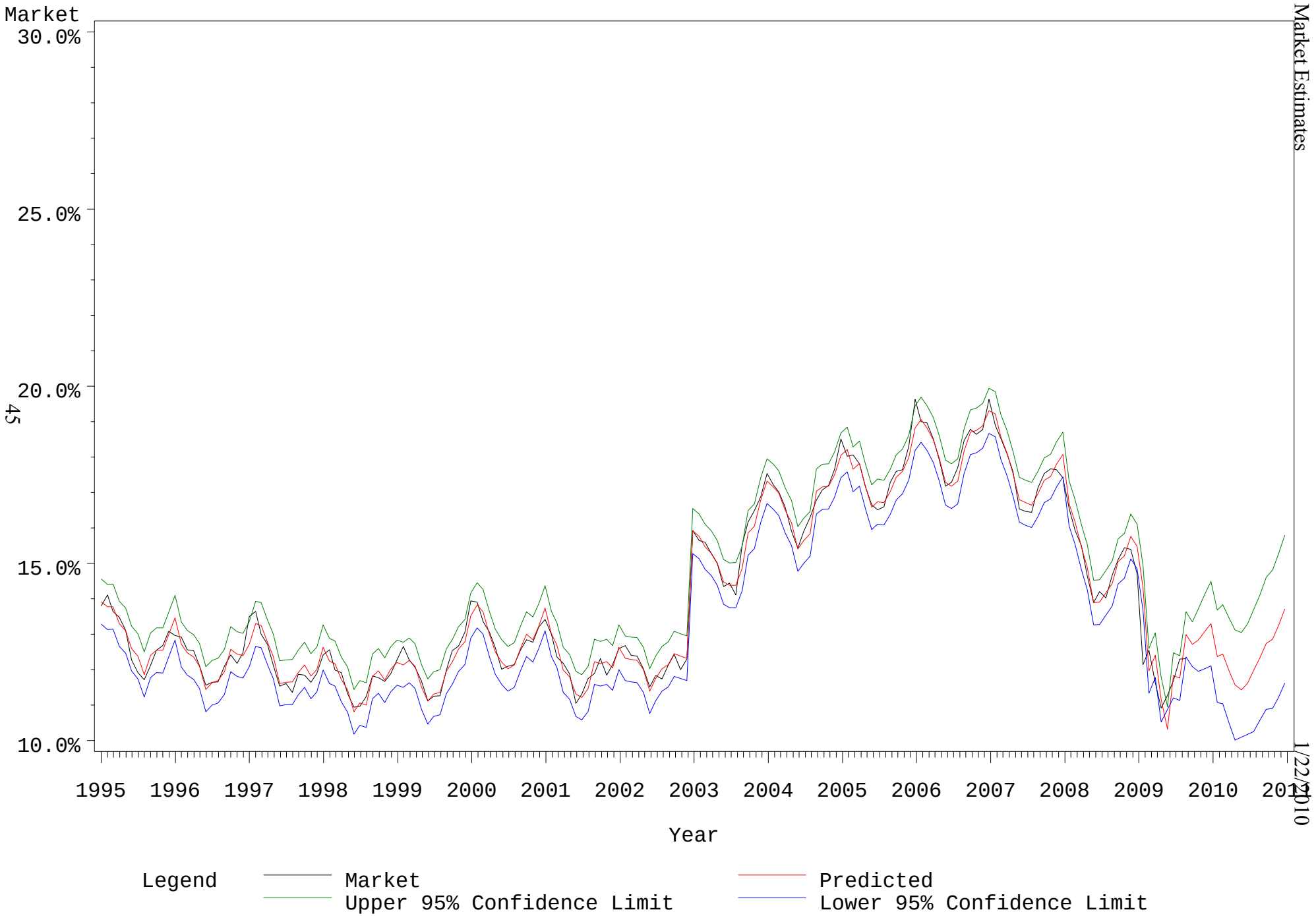
Input Number 12	
Input Variable	sep
Overall Regression Factor	-0.00648

Input Number 13	
Input Variable	oct
Overall Regression Factor	-0.00322

Input Number 14	
Input Variable	nov
Overall Regression Factor	-0.00286

Input Number 15	
Input Variable	DUM2003
Overall Regression Factor	0.031644

Low—Income Area Home Purchase Goal



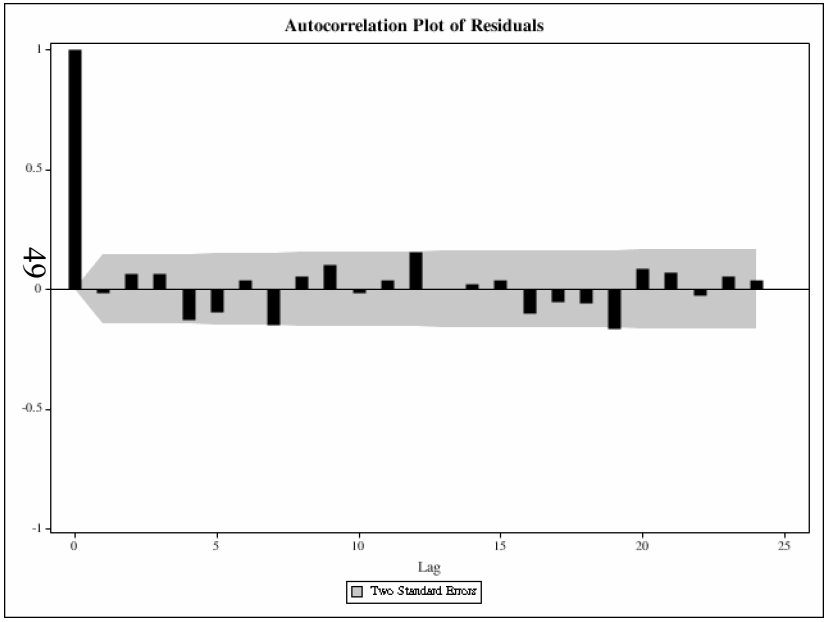
Maximum Likelihood Estimation							
Parameter	**Estimate**	**Standard Error**	**t Value**	**Approx Pr > |t|**	**Lag**	**Variable**	**Shift**
MU	-0.24554	0.13560	-1.81	0.0702	0	LIR	0
MA1,1	0.03056	0.08494	0.36	0.7190	1	LIR	0
AR1,1	0.98717	0.01070	92.26	<.0001	1	LIR	0
NUM1	0.09813	0.02669	3.68	0.0002	0	log_nar	0
NUM2	0.0096246	0.0037814	2.55	0.0109	0	treas_1_lag1	0
NUM3	0.01837	0.0037668	4.88	<.0001	0	spread10_1_lag1	0
NUM4	-0.18620	0.02155	-8.64	<.0001	0	REFI_RATE	0
NUM5	0.02096	0.0030237	6.93	<.0001	0	jan2000	0
NUM6	0.01619	0.0039440	4.11	<.0001	0	feb2000	0
NUM7	0.01509	0.0043676	3.45	0.0006	0	mar2000	0
NUM8	0.01223	0.0046714	2.62	0.0089	0	apr2000	0
NUM9	0.0085122	0.0049156	1.73	0.0833	0	may2000	0
NUM10	0.0068050	0.0051206	1.33	0.1839	0	jun2000	0
NUM11	0.0036148	0.0050752	0.71	0.4763	0	jul2000	0
NUM12	0.0007262	0.0048011	0.15	0.8798	0	aug2000	0
NUM13	0.0019406	0.0043397	0.45	0.6548	0	sep2000	0
NUM14	0.0030582	0.0036961	0.83	0.4080	0	oct2000	0
NUM15	0.0029939	0.0027620	1.08	0.2784	0	nov2000	0
NUM16	0.02789	0.0077149	3.62	0.0003	0	dum2000	0

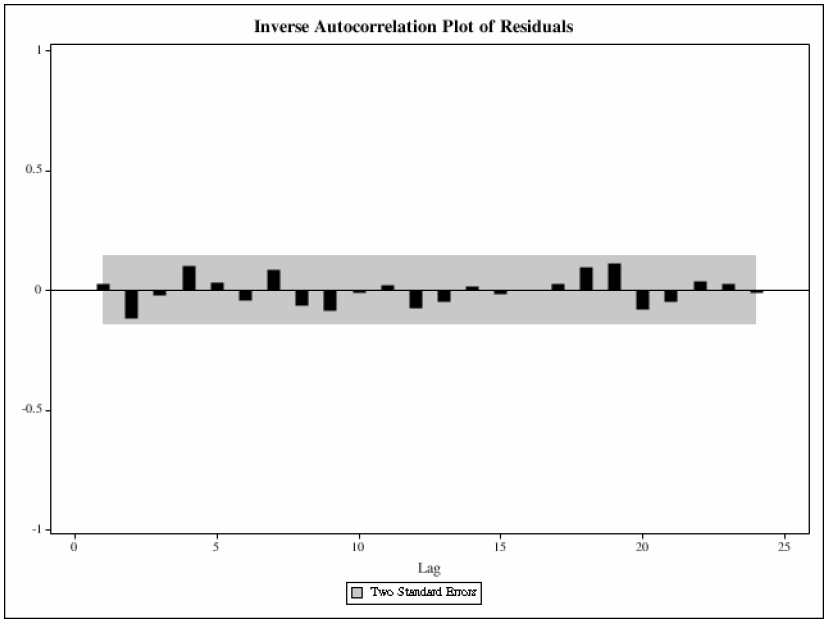
Constant Estimate	-0.00315
Variance Estimate	0.000057
Std Error Estimate	0.007521
AIC	-1304.39
SBC	-1242.59
Number of Residuals	191

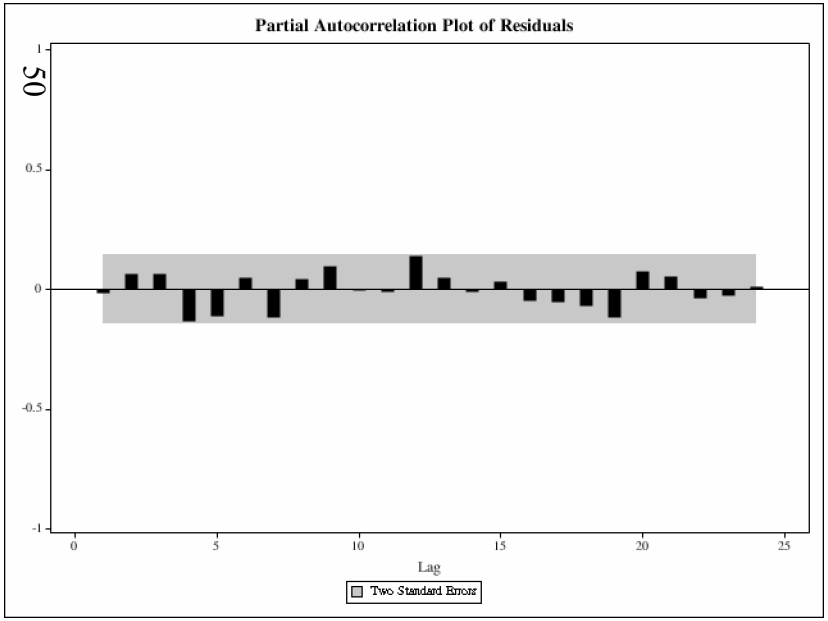
Correlations of Parameter Estimates										
Variable	Parameter	LIR MU	LIR MA1,1	LIR AR1,1	log_nar NUM1	treas_1_lag1 NUM2	spread10_1_lag1 NUM3	REFI_RATE NUM4	jan2000 NUM5	feb2000 NUM6
LIR	MU	1.000	-0.244	-0.058	-0.956	-0.304	-0.262	0.181	0.031	0.114
LIR	MA1,1	-0.244	1.000	0.187	0.245	0.121	0.076	-0.037	-0.007	-0.023
LIR	AR1,1	-0.058	0.187	1.000	0.026	0.149	0.138	0.142	0.009	0.018
log_nar	NUM1	-0.956	0.245	0.026	1.000	0.139	0.127	-0.349	-0.009	-0.101
treas_1_lag1	NUM2	-0.304	0.121	0.149	0.139	1.000	0.621	0.608	-0.148	-0.122
spread10_1_lag1	NUM3	-0.262	0.076	0.138	0.127	0.621	1.000	0.388	0.012	-0.073
REFI_RATE	NUM4	0.181	-0.037	0.142	-0.349	0.608	0.388	1.000	-0.198	-0.141
jan2000	NUM5	0.031	-0.007	0.009	-0.009	-0.148	0.012	-0.198	1.000	0.665
feb2000	NUM6	0.114	-0.023	0.018	-0.101	-0.122	-0.073	-0.141	0.665	1.000
mar2000	NUM7	-0.005	0.010	0.046	0.006	-0.024	-0.020	-0.077	0.524	0.780
apr2000	NUM8	0.002	0.007	0.056	-0.005	-0.032	-0.039	-0.008	0.423	0.638
may2000	NUM9	-0.064	0.023	0.079	0.044	0.050	-0.006	0.116	0.316	0.497
jun2000	NUM10	-0.149	0.045	0.097	0.116	0.126	0.053	0.199	0.231	0.375
jul2000	NUM11	-0.125	0.040	0.104	0.079	0.171	0.095	0.259	0.179	0.303
aug2000	NUM12	-0.119	0.039	0.098	0.077	0.167	0.086	0.239	0.148	0.253
sep2000	NUM13	-0.067	0.025	0.084	0.031	0.126	0.050	0.209	0.126	0.217
oct2000	NUM14	0.023	0.002	0.070	-0.059	0.117	0.054	0.190	0.109	0.186
nov2000	NUM15	-0.004	0.011	0.053	-0.026	0.134	0.037	0.133	0.080	0.134
dum2000	NUM16	-0.077	-0.028	-0.209	0.083	-0.151	-0.085	-0.160	0.028	0.013

Correlations of Parameter Estimates										
Variable Parameter		mar2000 NUM7	apr2000 NUM8	may2000 NUM9	jun2000 NUM10	jul2000 NUM11	aug2000 NUM12	sep2000 NUM13	oct2000 NUM14	nov2000 NUM15	dum2000 NUM16
LIR	MU	-0.005	0.002	-0.064	-0.149	-0.125	-0.119	-0.067	0.023	-0.004	-0.077
LIR	MA1,1	0.010	0.007	0.023	0.045	0.040	0.039	0.025	0.002	0.011	-0.028
LIR	AR1,1	0.046	0.056	0.079	0.097	0.104	0.098	0.084	0.070	0.053	-0.209
log_nar	NUM1	0.006	-0.005	0.044	0.116	0.079	0.077	0.031	-0.059	-0.026	0.083
treas_1_lag1	NUM2	-0.024	-0.032	0.050	0.126	0.171	0.167	0.126	0.117	0.134	-0.151
spread10_1_lag1	NUM3	-0.020	-0.039	-0.006	0.053	0.095	0.086	0.050	0.054	0.037	-0.085
REFI_RATE	NUM4	-0.077	-0.008	0.116	0.199	0.259	0.239	0.209	0.190	0.133	-0.160
jan2000	NUM5	0.524	0.423	0.316	0.231	0.179	0.148	0.126	0.109	0.080	0.028
feb2000	NUM6	0.780	0.638	0.497	0.375	0.303	0.253	0.217	0.186	0.134	0.013
mar2000	NUM7	1.000	0.815	0.666	0.537	0.447	0.379	0.317	0.255	0.183	0.004
apr2000	NUM8	0.815	1.000	0.825	0.680	0.572	0.486	0.408	0.323	0.224	-0.000
may2000	NUM9	0.666	0.825	1.000	0.842	0.721	0.616	0.515	0.400	0.276	-0.014
jun2000	NUM10	0.537	0.680	0.842	1.000	0.855	0.733	0.609	0.466	0.321	-0.022
jul2000	NUM11	0.447	0.572	0.721	0.855	1.000	0.848	0.705	0.545	0.375	-0.033
aug2000	NUM12	0.379	0.486	0.616	0.733	0.848	1.000	0.823	0.638	0.439	-0.031
sep2000	NUM13	0.317	0.408	0.515	0.609	0.705	0.823	1.000	0.771	0.528	-0.026
oct2000	NUM14	0.255	0.323	0.400	0.466	0.545	0.638	0.771	1.000	0.671	-0.029
nov2000	NUM15	0.183	0.224	0.276	0.321	0.375	0.439	0.528	0.671	1.000	-0.021
dum2000	NUM16	0.004	-0.000	-0.014	-0.022	-0.033	-0.031	-0.026	-0.029	-0.021	1.000

Autocorrelation Check of Residuals									
To Lag	**Chi-Square**	**DF**	**Pr > ChiSq**	**Autocorrelations**					
6	7.04	4	0.1339	-0.014	0.066	0.064	-0.128	-0.097	0.038
12	19.36	10	0.0360	-0.148	0.054	0.100	-0.015	0.035	0.156
18	23.31	16	0.1058	-0.001	0.023	0.039	-0.101	-0.053	-0.060
24	32.85	22	0.0640	-0.166	0.087	0.068	-0.024	0.053	0.035
30	35.87	28	0.1458	-0.030	0.067	-0.053	0.045	0.003	-0.057
36	42.73	34	0.1448	0.066	-0.007	0.058	0.144	0.003	0.030




Inverse Autocorrelation Plot of Residuals
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors


Partial Autocorrelation Plot of Residuals
50
1
0.5
0
-0.5
-1
0
5
10
15
20
25
Lag
Two Standard Errors

Model for variable LIR	
Estimated Intercept	-0.24554

Autoregressive Factors	
Factor 1:	1 - 0.98717 B**(1)

Moving Average Factors	
Factor 1:	1 - 0.03056 B**(1)

Input Number 1	
Input Variable	log_nar
Overall Regression Factor	0.098125

Input Number 2	
Input Variable	treas_1_lag1
Overall Regression Factor	0.009625

Input Number 3	
Input Variable	spread10_1_lag1
Overall Regression Factor	0.018368

Input Number 4	
Input Variable	REFI_RATE
Overall Regression Factor	-0.1862

Input Number 5	
Input Variable	jan2000
Overall Regression Factor	0.020961

Input Number 6	
Input Variable	feb2000
Overall Regression Factor	0.016193

Input Number 7	
Input Variable	mar2000
Overall Regression Factor	0.01509

Input Number 8	
Input Variable	apr2000
Overall Regression Factor	0.012225

Input Number 9	
Input Variable	may2000
Overall Regression Factor	0.008512

Input Number 10	
Input Variable	jun2000
Overall Regression Factor	0.006805

Input Number 11	
Input Variable	jul2000
Overall Regression Factor	0.003615

Input Number 12	
Input Variable	aug2000
Overall Regression Factor	0.000726

Input Number 13	
Input Variable	sep2000
Overall Regression Factor	0.001941

Input Number 14	
Input Variable	oct2000
Overall Regression Factor	0.003058

Input Number 15	
Input Variable	nov2000
Overall Regression Factor	0.002994

Input Number 16	
Input Variable	dum2000
Overall Regression Factor	0.02789

Low—Income Borrower Refinance Goal