

# U.S. RMBS Sustainable Home Price and Economic Risk Factor Report – November 2013

Quarterly Update  
Special Report

This report is intended to provide analysis and updated values for sustainable home price and economic risk factors, which are key assumptions in Fitch Ratings' U.S. RMBS Loan Loss Model.

**Slow, but Steady Economic Recovery Continues:** The national economic recovery continues, with unemployment rates and income growth continuing to improve. However, the rate of improvement remains slow, if steady, with a seasonally adjusted unemployment rate of 7.2% in September 2013, more than 2.0% higher than the pre-recession 10-year average. Average real incomes remain below their 2008 peak, but are projected to set new highs within the year.

**Broad-Based Home Price Gains:** Confirming a broad and drastic turnaround, all of the top 50 most populous cities experienced home price growth in the past year for the first time since 4Q05 and the first time since Q300 in real terms. As recently as 2011, 47 of the top 50 cities experienced year-over-year declines. National prices are up approximately 11% in the past year, with the highest growth rates concentrated in the western region.

**Approaching Bubble-Year Peaks:** With price increases over past year of more than 20%, year-over-year growth rates in the San Francisco Bay Area are now higher than at any point in the past 10 years and prices are approaching historical highs. At the current rate of growth, San Francisco and San Jose will set new housing price records in the next six months. Fitch's sustainable housing price model identifies much of coastal California to be more than 20% overvalued.

**Strains on Affordability:** Price growth is pushing through despite rising interest rates which have started to affect the affordability of new mortgages. Since May 2013, rates have risen nearly 100 basis points to 4.3%, with the effects of this rise not yet captured in the latest available home price data. Fitch expects the rise in interest rates to continue over the next year will strain affordability, especially if prices remain at elevated and growing levels.

**National Risk Index Rises:** The University Financial Associates National Risk Index (NRI), which measures relative default risk by considering the totality of the housing market and general economy, leapt upwards in response to higher rates and expected depressed prepayments.

## Related Research

Fitch Fundamentals Index — U.S.  
Index Trend Analysis — 3Q13

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## Growth Rates Begin to Rival Peak

(Top 10 Year-over-Year [YoY] Growth Cities)

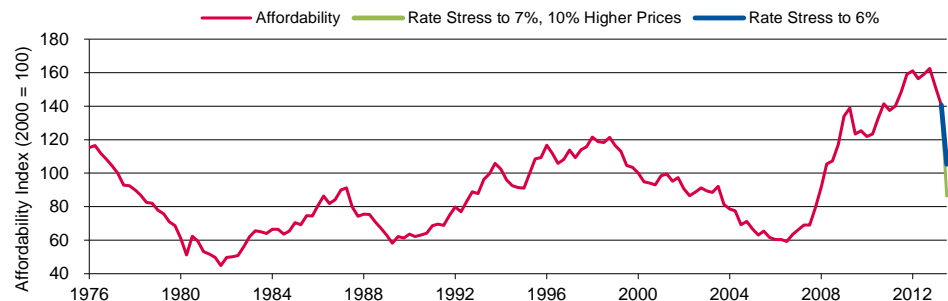
City, State	Peak Growth Rate (YoY)	Quarter of Peak Growth	Current Growth Rate (YoY) (%)	At Current Rate, Years to Set New Price Record
San Francisco, CA	22.5	1Q13	19.3	0.4
San Jose, CA	23.6	1Q13	21.9	0.6
Santa Ana, CA	36.7	2Q04	20.3	1.4
Oakland, CA	25.6	1Q05	23.5	1.6
San Diego, CA	32.2	2Q04	19.2	1.8
Los Angeles, CA	31.5	2Q04	20.2	1.8
Sacramento, CA	28.8	1Q05	25.8	2.3
Phoenix, AZ	49.2	3Q05	20.1	2.8
Las Vegas, NV	52.9	3Q04	24.6	3.2
Riverside, CA	36.8	3Q04	19.9	3.4

## Economic Recovery Continues, National Prices Rise

Since 3Q11, national incomes have grown more than 2.0% above the rate of inflation, unemployment numbers have dropped by more than 1.7%, and home prices have risen nearly 13.0%. As a whole, the signs of a strengthening economic recovery are present, with momentum continuing to trend in a positive direction. Fitch expects these trends to continue, although the high rate of home price growth is not considered to be sustainable. Currently, Fitch's Sustainable Home Price Model estimates national prices to be approximately 17% overvalued in real terms, with individual geographic regions varying widely.

### Affordability High, but Declining, and Susceptible to Rate Shock

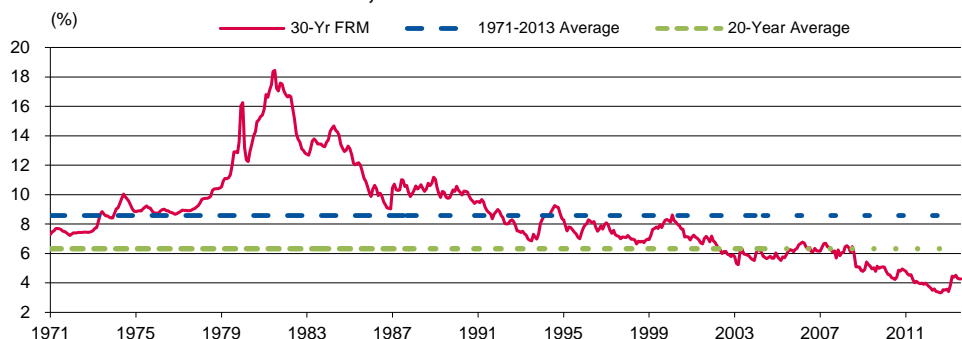
(California Affordability Based on Rates, Prices, and Incomes)



This analysis does not suggest a prediction of declines. Rather, based on the historic relationship between home price levels and the primary drivers of supply and demand in the market, there is a misalignment. A continuing recovery and exuberant home-buying population could well push prices further for many more quarters, or even years. However, Fitch identifies a bubble risk in continuing price rises and sees several factors which could halt or even reverse recent gains in the market.

An additional 10% gain in home prices coupled with an increase in mortgage rates to 7% would drop affordability below its 2000 level.

### 30-Year FRM Rate Near Lows; Poised to Rise



Particularly, continued economic growth is likely to be met by increasing interest rates. Prevailing interest rates are now approximately 1% above their nadir in November of 2012 but rates remain far below historic values. In the past 20 years, 30-year mortgage rates have averaged 6.4% and 7.0% when excluding the low rate environment following the market crash. When an expectation of rising rates is coupled with rising price levels, there could be increased pressure on the housing market that could reverse recent gains.

### Related Criteria

U.S. RMBS Loan Loss Model Criteria  
(August 2013)

However, many regions remain highly affordable, and some of the highest growth rates have been in cities that were amongst the hardest hit in the downturn. Amongst the 10 cities that saw the largest declines from the 2000s peak to their post-crash values, home price growth over the past year has averaged nearly 20%, twice the national average, with nearly all of this

growth seen as sustainable. On average, these cities currently are seen as appropriately valued, compared to a national number showing 17% overvaluation.

### Largest Decline Cities Showing Strong Sustainable Price Growth

(%, Home Price Growth for Cities with Top 10 Declines from Peak)

City, State	Peak-to-Trough	YoY Growth	Current sMVD
Merced, CA	(71)	16	Undervalued
Modesto, CA	(65)	25	Sustainable
Salinas, CA	(64)	14	Undervalued
Stockton, CA	(63)	26	Sustainable
Las Vegas-Paradise, NV	(62)	25	Undervalued
Cape Coral-Fort Myers, FL	(61)	12	Sustainable
Vallejo-Fairfield, CA	(61)	23	5-10
Punta Gorda, FL	(61)	14	Sustainable
Detroit-Livonia-Dearborn, MI	(60)	19	5-10
Bakersfield-Delano, CA	(58)	19	Undervalued
<b>U.S. National</b>	<b>(34)</b>	<b>10</b>	<b>15-20</b>

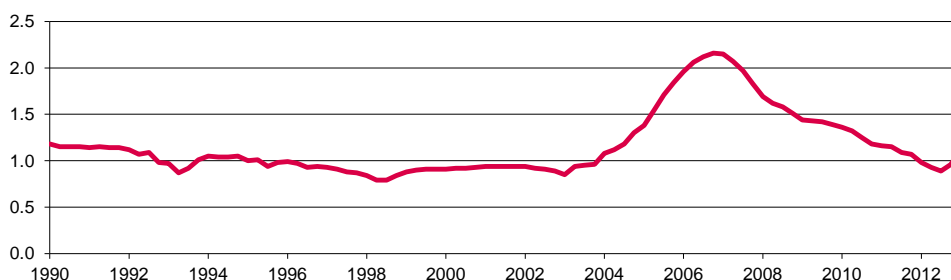
YoY – Year over year. sMVD – Sustainable market value decline.

### On Interest Rate Concerns, National Risk Index Rises

The NRI, which measures the relative default risk of a constant quality loan as compared to average originations of the 1990s, has risen in two consecutive quarters, showing a rise for the first time since 2007. Currently at 1.14, the NRI implies that the default risk of a loan originated today is 14% higher than the 1990s average. Since the peak in early 2007, risk has been declining for newly originated loans as the bubble unwound and prices reverted towards historic averages. On the back of the abrupt price rises across the country and interest rate rises which are expected to limit prepayment speeds for the next several years, the NRI has now increased. The chart below shows the NRI values since 1990.

#### National Risk Index Jumps For First Time Since Crisis

(Population-Weighted Default National Risk Index)



### In Coastal California, Prices Approach Bubble-Year Peaks

Having avoided the worst of the downturn, but participating fully in the drastic growth of the past year, much of coastal California is now approaching the peaks of home prices seen during the expansionary bubble of the early 2000s. In particular, the San Francisco Bay Area has seen some of the largest unchecked growth and at current rates will eclipse its 2006 levels within six months. Overall, the economy in the Bay Area, including San Francisco, San Jose, and Oakland has generally been stronger than the U.S. as a whole. On the back of a resurgence in the tech sector, unemployment rates in San Francisco have dropped to 5.4%, close to their long-term historical average. Although San Jose and Oakland have experienced

Home price gains in many areas of California are outpacing economic fundamentals.

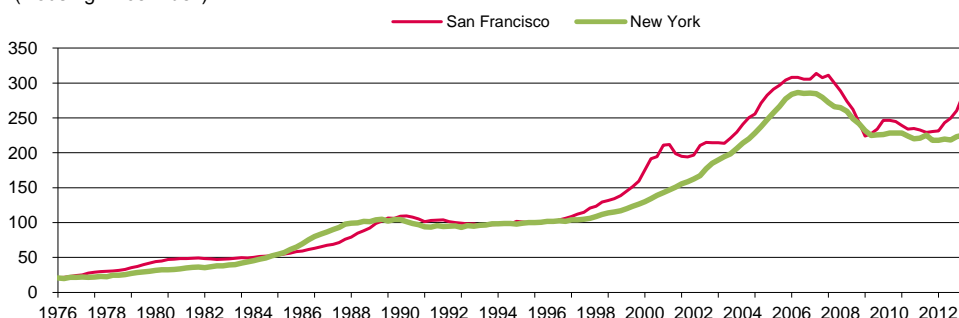
more modest improvement, economic conditions are still continuing to improve at an above-average rate.

However, the extreme rate of home price growth is a cause for caution. Prices remain below the pre-recession peak, but the region never saw the extent of declines that much of inland California did, and prices never fully unwound the effects of the bubble. In San Francisco, prices hit a bottom in 2009 at nearly 125% above 1995 prices and have grown another 30% from that point. In San Jose, prices are up 48% from their post-crash trough and are now only 11% away from setting new highs.

Of course, rising prices are a positive indicator for a recovery and the growth is encouraging to a region that has seen the largest up- and down-swings in the housing market over the past few decades. However, Fitch expects that unprecedented home price growth should be paired with economic health that is similarly unprecedented, the evidence for which is lacking in this case. Based on the historic relationship between home prices and a basket of econometric factors, Fitch considers Bay Area home prices to be nearly 30% overvalued, which approximates the environment in 2003, three years into the formation of the previous home price bubble.

Most concerning, there is growing evidence that recent gains have been bolstered by an increase in investment sales, both to institutions and local investors. Buying a selling a home within a short time window (flipping) is on the rise and the percentage of all-cash sales has risen dramatically from a year ago, standing now at nearly 50%. Cash sales are often indicative of investor behavior and the concern is that housing prices are being driven up more through speculative buying than from an increasing base demand.

## Despite Similar Histories, SF Price Growth Far Outpaces NY, Approaching Peak (Housing Price Index)



## CA Prices Skyrocket

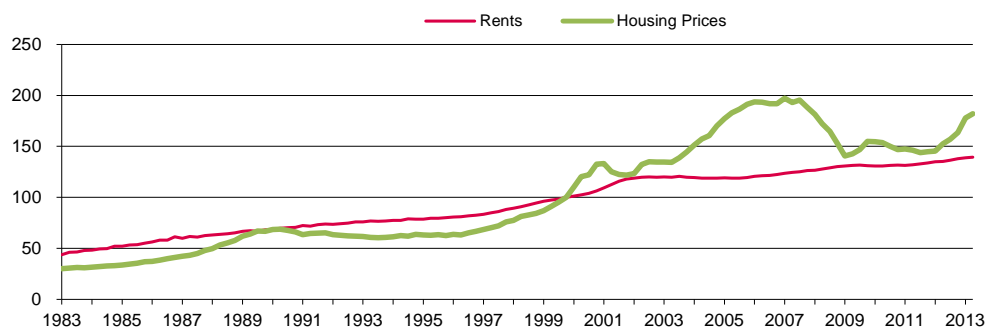
City	Home Price Growth, from Post-Crash Low (%)
San Jose	48
Oakland	38
Sacramento	31
San Francisco	30
Los Angeles	27
Riverside	26
San Diego	25
Santa Ana	23
U.S. National	14

Rent prices are weighed heavily in the sustainable home price calculations and to the extent that rising rental yields are driving increased investment behavior and increased prices, this movement would be considered to be supported by the market fundamentals. However, increases in home prices have significantly outpaced growth in rents. In the past year, as prices have risen by 20% in San Francisco, rent costs rose by only 3%. In absence of rental yields or other significant economic growth as a driving force for price gains, there will remain concern that current growth levels are unsustainable.

Typically, bubble cycles form when an initial catalyst causes prices to rise and the increase in prices drives investment activity to the market, hoping to cash in on the rising prices. As investment activity increases, demand builds artificially, reflecting a level of demand that fluctuates drastically with the growth rate of prices instead of long-term demand based on housing necessity. This behavior can become cyclical, growing both profits and the percentage of investor-driven sales until the cycle breaks when investors can no longer anticipate further gains and the artificial demand base evaporates from the market. Until price growth can be tied

to fundamental demand levels, Fitch will continue to identify prices as overvalued in regions with excessive growth.

**San Francisco Recent Price Growth Rate Six Times Greater than Rental Growth**



## Appendix A

### sMVD Values Over Time — Top 25 Most Populous Cities and Subdivisions

(% Projected Declines as of 2Q13)

No.	City	MSA Name	Peak	2008	2009	2010	2011	Current
1	<b>Atlanta</b>	Atlanta-Sandy Springs-Marietta, GA	15-20	5-10	Sustainable	Sustainable	Undervalued	Undervalued
2	<b>Baltimore</b>	Baltimore-Towson, MD	>30	>30	25-30	25-30	15-20	15-20
3	<b>Boston</b>	Boston-Quincy, MA (Division)	25-30	10-15	5-10	10-15	5-10	Sustainable
4		Cambridge-Newton-Framingham, MA (Division)	20-25	5-10	Sustainable	5-10	Sustainable	Sustainable
5		Peabody/Essex County, MA (Division)	20-25	Sustainable	Sustainable	Sustainable	Sustainable	Undervalued
6	<b>Chicago</b>	Chicago-Joliet-Naperville, IL	25-30	10-15	Sustainable	Sustainable	Undervalued	Undervalued
7		Gary, IN (Division)	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
8		Lake County-Kenosha County, IL-WI (Division)	20-25	10-15	Sustainable	Sustainable	Undervalued	Undervalued
9	<b>Cincinnati</b>	Cincinnati-Middletown, OH-KY-IN	10-15	5-10	Sustainable	Sustainable	Undervalued	Undervalued
10	<b>Cleveland</b>	Cleveland-Elyria-Mentor, OH	15-20	Sustainable	Sustainable	Sustainable	Sustainable	Undervalued
11	<b>Dallas</b>	Dallas-Plano-Irving, TX (Division)	Sustainable	Sustainable	Sustainable	Sustainable	Undervalued	Sustainable
12		Fort Worth-Arlington, TX (Division)	Sustainable	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued
13	<b>Denver</b>	Denver-Aurora-Broomfield, CO	5-10	Undervalued	Undervalued	Undervalued	Undervalued	Undervalued
14	<b>Detroit</b>	Detroit-Livonia-Dearborn, MI (Division)	20-25	Sustainable	Undervalued	Undervalued	Undervalued	Undervalued
15		Warren-Troy-Farmington Hills, MI (Division)	20-25	Undervalued	Undervalued	Undervalued	Undervalued	Undervalued
16	<b>Houston</b>	Houston-Sugar Land-Baytown, TX	5-10	Sustainable	Sustainable	Sustainable	Undervalued	Sustainable
17	<b>Los Angeles</b>	Los Angeles-Long Beach-Glendale, CA (Division)	>30	25-30	10-15	15-20	15-20	10-15
18		Santa Ana-Anaheim-Irvine, CA (Division)	>30	>30	>30	>30	>30	25-30
19	<b>Miami</b>	Miami-Miami Beach-Kendall, FL (Division)	>30	25-30	Sustainable	Sustainable	Sustainable	Sustainable
20		West Palm Beach-Boca Raton-Boynton Beach, FL (Division)	>30	>30	10-15	10-15	Sustainable	Sustainable
21		Fort Lauderdale-Pompano Beach-Deerfield Beach, FL (Division)	>30	>30	15-20	15-20	10-15	10-15
22	<b>Minneapolis</b>	Minneapolis-St. Paul-Bloomington, MN-WI	>30	20-25	5-10	10-15	Sustainable	Sustainable
23	<b>New York</b>	New York-White Plains-Wayne, NY-NJ (Division)	>30	20-25	10-15	15-20	10-15	5-10
24		Nassau-Suffolk, NY (Division)	>30	>30	20-25	20-25	15-20	10-15
25		Newark-Union, NJ-PA (Division)	>30	25-30	15-20	15-20	10-15	5-10
26		Edison-New Brunswick, NJ (Division)	>30	>30	25-30	25-30	20-25	15-20
27	<b>Philadelphia</b>	Philadelphia, PA (Division)	>30	25-30	25-30	25-30	20-25	15-20
28		Camden, NJ (Division)	>30	25-30	20-25	20-25	10-15	5-10
29	<b>Phoenix</b>	Phoenix-Mesa-Glendale, AZ	>30	25-30	Undervalued	Sustainable	Undervalued	Sustainable
30	<b>Pittsburgh</b>	Pittsburgh, PA	10-15	10-15	10-15	10-15	5-10	5-10
31	<b>Portland</b>	Portland-Vancouver-Hillsboro, OR-WA	>30	>30	20-25	20-25	5-10	5-10
32	<b>Riverside</b>	Riverside-San Bernardino-Ontario, CA	>30	20-25	Sustainable	Sustainable	Sustainable	Sustainable
33	<b>San Diego</b>	San Diego-Carlsbad-San Marcos, CA	>30	>30	20-25	>30	25-30	20-25
34	<b>San Francisco</b>	San Francisco-San Mateo-Redwood City, CA (Division)	>30	25-30	15-20	25-30	15-20	15-20
35		Oakland-Fremont-Hayward, CA (Division)	>30	20-25	5-10	15-20	10-15	10-15
36	<b>Seattle</b>	Seattle-Bellevue-Everett, WA	>30	25-30	15-20	10-15	5-10	5-10
37		Tacoma, WA (Division)	>30	15-20	Sustainable	Sustainable	Undervalued	Undervalued
38	<b>St. Louis, MO</b>	St. Louis, MO-IL	25-30	20-25	20-25	15-20	5-10	5-10
39	<b>Tampa</b>	Tampa-St. Petersburg-Clearwater, FL	>30	25-30	10-15	5-10	Sustainable	Sustainable
40	<b>Washington, D.C.</b>	Washington-Arlington-Alexandria, DC-VA-MD-WV	>30	>30	20-25	25-30	20-25	25-30
41		Bethesda-Rockville-Frederick, MD (Division)	>30	>30	>30	>30	>30	25-30

sMVD – Sustainable market value decline.



## Appendix B

## Sustainable Market Value Decline Projections

(%)

	2008	2009	2010	2011	2012	Current As of 2Q13
AK	15-20	10-15	10-15	5-10	5-10	5-10
AL	20-25	20-25	15-20	5-10	10-15	10-15
AR	10-15	10-15	10-15	Sustainable	5-10	5-10
AZ	25-30	Sustainable	Sustainable	Undervalued	Sustainable	10-15
CA	25-30	10-15	15-20	5-10	5-10	20-25
CO	25-30	25-30	>30	25-30	20-25	25-30
CT	25-30	20-25	20-25	15-20	10-15	10-15
DC	>30	>30	>30	>30	>30	>30
DE	>30	25-30	20-25	15-20	10-15	10-15
FL	>30	15-20	10-15	5-10	5-10	10-15
GA	10-15	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued
HI	>30	>30	>30	25-30	25-30	>30
IA	15-20	10-15	10-15	Sustainable	Sustainable	5-10
ID	25-30	25-30	10-15	Sustainable	5-10	10-15
IL	10-15	Sustainable	Undervalued	Undervalued	Undervalued	Undervalued
IN	10-15	10-15	5-10	Sustainable	Sustainable	Sustainable
KS	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
KY	15-20	15-20	15-20	15-20	15-20	10-15
LA	10-15	15-20	10-15	10-15	10-15	10-15
MA	>30	25-30	25-30	20-25	20-25	20-25
MD	>30	20-25	20-25	10-15	10-15	15-20
ME	>30	>30	>30	25-30	25-30	25-30
MI	15-20	Sustainable	Sustainable	Sustainable	Sustainable	Sustainable
MN	25-30	10-15	20-25	5-10	5-10	15-20
MO	15-20	15-20	15-20	5-10	5-10	5-10
MS	5-10	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
MT	25-30	>30	>30	25-30	25-30	25-30
NC	15-20	15-20	10-15	5-10	5-10	5-10
ND	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued	Sustainable
NE	5-10	5-10	5-10	Sustainable	Sustainable	5-10
NH	>30	>30	>30	25-30	20-25	25-30
NJ	>30	>30	>30	>30	>30	>30
NM	10-15	5-10	Sustainable	Undervalued	Undervalued	Undervalued
NV	25-30	Sustainable	Undervalued	Undervalued	Undervalued	Sustainable
NY	>30	>30	>30	>30	25-30	25-30
OH	5-10	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
OK	Sustainable	Sustainable	Sustainable	Sustainable	Undervalued	Sustainable
OR	>30	20-25	15-20	Sustainable	Sustainable	10-15
PA	20-25	15-20	15-20	5-10	Sustainable	5-10
RI	>30	20-25	20-25	15-20	5-10	5-10
SC	20-25	20-25	15-20	5-10	5-10	10-15
SD	Sustainable	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
TN	10-15	5-10	5-10	Sustainable	Sustainable	Sustainable
TX	Sustainable	Sustainable	Sustainable	Sustainable	Sustainable	Sustainable
UT	20-25	15-20	15-20	5-10	10-15	15-20
VA	25-30	20-25	25-30	25-30	25-30	25-30
VT	20-25	20-25	15-20	10-15	5-10	5-10
WA	25-30	15-20	15-20	5-10	Sustainable	5-10
WI	15-20	10-15	5-10	Sustainable	Sustainable	Sustainable
WV	5-10	Sustainable	Sustainable	Undervalued	Undervalued	Undervalued
WY	10-15	10-15	5-10	Sustainable	Sustainable	Sustainable
U.S.	25-30	15-20	15-20	10-15	10-15	15-20

## Appendix C

### Leading Indicators by State

(As of August 2013)

	60+ Day Delinquency – Prime (%) <sup>a</sup>	REO – Prime (%) <sup>b</sup>	Avg. Liquidation Timeline (Mos.) <sup>c</sup>	Liquidation Rate (%) <sup>d</sup>	Unemployment Rate (%) <sup>e</sup>	YoY HPI (%) <sup>f</sup>	Peak to (Today HPI (%) <sup>g</sup>	Price to Income Ratio – Peak <sup>h</sup>	Price to Income Ratio – Today <sup>i</sup>
U.S. State	11	0.6	22	1.9	7.3	2	(34)	7.8	5.0
AK	5	1.1	12	2.6	6.5	1	(7)	5.8	5.2
AL	9	2.3	23	2.0	6.3	1	(17)	3.4	2.8
AR	9	0.2	27	0.9	7.4	1	(13)	3.2	2.6
AZ	6	0.4	16	4.5	8.3	17	(46)	7.8	4.4
CA	8	0.2	19	2.9	8.9	21	(42)	13.2	7.6
CO	6	0.8	22	3.1	7.0	7	(12)	5.5	4.7
CT	14	0.4	28	0.9	8.1	2	(27)	5.9	4.0
DE	9	1.1	31	1.2	7.3	4	(27)	6.1	4.6
FL	21	1.4	32	1.7	7.0	3	(48)	6.5	3.5
GA	8	1.1	22	2.7	8.7	11	(30)	3.9	2.8
HI	16	0.9	25	0.8	4.3	18	(22)	18.6	13.5
IA	7	1.7	32	2.0	4.9	10	(8)	3.2	2.5
ID	8	0.5	21	3.0	6.8	2	(26)	5.7	4.4
IL	15	1.3	30	1.9	9.2	8	(37)	5.2	3.2
IN	10	1.1	31	2.1	8.1	4	(13)	3.5	2.9
KS	12	1.6	25	2.3	5.9	2	(11)	3.1	2.5
KY	13	2.4	30	1.9	8.4	2	(10)	3.5	3.0
LA	8	1.1	27	1.6	7.0	1	(7)	3.5	3.1
MA	9	0.5	26	1.0	7.2	4	(24)	7.5	5.2
MD	12	1.1	23	0.9	7.0	5	(32)	7.9	5.1
ME	14	2.2	28	1.0	7.0	4	(17)	5.4	4.1
MI	7	1.8	26	3.4	9.0	2	(38)	4.2	2.6
MN	7	2.1	24	2.8	5.1	11	(33)	4.9	3.1
MO	7	1.4	19	2.5	7.2	10	(18)	3.7	2.8
MS	11	2.5	22	1.5	8.5	2	(17)	3.2	2.5
MT	14	1.9	26	2.1	5.3	4	(10)	5.4	4.7
NC	10	1.7	24	2.0	8.7	6	(16)	4.0	3.4
ND	6	0.0	18	1.5	3.0	4	At Peak	3.1	2.4
NE	7	1.1	23	2.3	4.2	6	(8)	3.1	2.5
NH	7	1.3	23	2.1	5.0	3	(30)	6.0	3.9
NJ	20	0.1	27	0.5	8.5	5	(34)	8.1	5.1
NM	16	3.3	19	1.5	6.8	1	(22)	5.0	3.9
NV	18	0.4	26	2.8	9.5	0	(56)	8.5	4.4
NY	17	0.2	31	0.4	7.6	24	(24)	6.9	4.9
OH	12	1.9	20	2.0	7.3	2	(22)	3.8	2.7
OK	10	1.8	21	1.5	5.3	3	(4)	2.9	2.5
OR	13	0.3	27	1.4	8.1	4	(25)	8.0	6.0
PA	12	0.9	25	1.1	7.7	11	(19)	4.5	3.4
RI	13	1.0	26	1.2	9.1	2	(34)	8.0	4.8
SC	11	1.7	23	1.9	8.1	4	(17)	3.7	3.2
SD	7	2.7	23	2.7	3.8	2	(3)	3.0	2.4
TN	9	1.4	22	2.1	8.5	2	(18)	3.6	2.9
TX	5	0.5	21	1.8	6.4	1	At Peak	3.0	2.8
UT	10	1.0	20	2.4	4.7	6	(20)	7.3	6.0
VA	6	0.6	31	2.2	5.8	11	(31)	6.4	4.2
VT	12	2.7	24	0.8	4.6	5	(12)	5.9	4.7
WA	12	0.9	29	1.7	7.0	1	(28)	7.5	5.4
WI	9	1.8	21	2.3	6.7	10	(19)	4.6	3.5
WV	9	0.7	22	2.0	6.3	3	(9)	3.3	2.7
WY	4	1.4	21	3.0	4.6	2	(11)	3.9	3.4

<sup>a</sup>Prime, securitized, non-agency loans only, includes fc and REO. Source: Loan Performance. <sup>b</sup>Prime, securitized, non-agency loans only. Source: Loan Performance.

<sup>c</sup>For loans liquidating in the past 12 months. Prime, securitized, non-agency loans only. Source: Loan Performance. <sup>d</sup>Percentage of 60+ DQ loans liquidating each month. Source: Loan Performance. <sup>e</sup>Seasonally adjusted rate as of August 2013. Source: BLS. <sup>f</sup>Year-over-year real home price change. Source: Case-Shiller, IHS Global Insight.

<sup>g</sup>Change in real prices from 2000s peak to today. Source: Case-Shiller, IHS Global Insight. <sup>h</sup>Price to income ratio, 2000s peak. Source: Case-Shiller, IHS Global Insight.

<sup>i</sup>Price to income ratio, current. Source: Case-Shiller, IHS Global Insight.



## Appendix D

### Sustainable Home Price Model Calculation/Process

Fitch's Sustainable Home Price (SHP) model was created to determine the overvaluation or undervaluation in regional housing markets by associating movements in home prices with long-term shifts in supply and demand factors that influence the market. In the course of Fitch's analysis, it identified six key drivers of long-term home price movements and examined their effect over the long run using regression analysis. Factors determined significant in the model are unemployment, income, rental values, population levels, housing units and mortgage rates. Sustainable market value declines (sMVDs), which are used in the mortgage loss model to inform the true value of a property in sustainable loan-to-value ratio (sLTV) calculations, are generated by comparing long-term sustainable prices with observed home prices in the origination period.

The observation period of the SHP model ranges from 1976–2011, although the model is fit to only a subset of these years to avoid fitting to price bubbles, the timing of which will vary by region. For example, California is fit from 1976–2000, and the bubble in the late 1980s/early 1990s is excluded. The concept behind avoiding the fit to bubble years is that there are two main sources of movement in home prices. First, there are those generally associated with fundamentals, such as the rising popularity of an area. An area rises to prominence and there is a corresponding population influx. The rate of population growth generates demand pressure in the market and prices correspondingly increase.

This should be contrasted with the second source of movement, endogenous growth, whereby prices fluctuate in response to price fluctuations, causing a feedback loop that generates the ups and downs of bubble cycles. Because of the strength of this price source in bubble years, it is excluded from model fit observations. Many home price models include an autoregressive variable that attempts to take this behavior into account. To be sure, the momentum of home prices can be a strong indicator of periodic movements and often ranks as a top variable in these models. However, Fitch's SHP model does not include this term in the regression analysis, specifically to prevent short-term market momentum from being a driver of long-term ratings. With 30-year term bonds and a peak loan default window between three and seven years of seasoning, capturing the long-term price level has more value in Fitch's processes than projecting periodic price movements in a still-volatile market.

Emphasizing this goal of identifying long-term sustainable prices and acknowledging the slowly developing dynamics of the market, each fundamental market factor is averaged over a four-year observation period including 12 quarters of historical data and four quarters of projections for use in the model. Even large flash changes in an indicator do not impact prices instantaneously but can, instead, take several years to show their full impact on prices. For example, an overnight increase in real incomes will not lead to a rush to buy homes the next day, but it will certainly change the financial calculus of long-term planning, tipping the demand balance over the next several years. Fitch believes this long-term averaging methodology allows for results that remain true to the objective of projecting long-term prices.

## Appendix E

### Economic Risk Factor Description

The economic risk factor (ERF) is a dynamic input employed in Fitch's default probability analysis and loan loss model that accounts for regional and local economic risk. This variable isolates regional economic conditions from other key drivers of mortgage default such as borrower, loan, and property characteristics. The ERF variable is used as an input into the agency's default regression model and scales default probability estimates along with nine other credit dimensions/attributes in the model.

The ERF variable is determined at the state and zip code level and updated on a quarterly basis. This variable consists of two components, the National Risk Index (NRI), and regional multipliers calculated at the state and zip code level. These components used in determining the ERF values are provided to Fitch by University Financial Associates, LLC (UFA), a mortgage analysis and data provider.

#### National Risk Index

Assuming a constant loan credit quality, the NRI provides a default probability scaling factor for loans originated today relative to those during the 1990s. The NRI forecast provided by UFA for 3Q12 was 1.14, making borrowers 14% more likely to default than their identical counterparts in the 1990s.

Key drivers of the NRI include GDP growth, unemployment, incomes, interest rates, and demographics, among other factors.

#### Regional Risk Multipliers

The regional risk multipliers (state and zip code level) represent the level of expected default risk over the life of a loan relative to the national average on a constant quality basis during 1990s, similar in concept to the NRI, but provided on a more granular geographic level.

The total ERF used in the loss model is the product of the NRI and the related regional risk multiplier. A list of current ERF factors for selected states can be found in Appendix F.

The ERF variable is incorporated in Fitch's loan loss model as a probability of default (PD) factor that raises or lowers the expected PD for a given mortgage loan to reflect national and regional economic risk forecasts. The ERF is not applied as a simple multiple to a loan's default expectation. Rather, the ERF is considered in conjunction with 11 other variables in the regression model including loan-level characteristics such as the sustainable loan-to-value ratio, FICO score, documentation type, product type, and others. The ERF is not considered in the loss severity calculation.

## Appendix F

### Economic Risk Factor Values

#### 3Q13 Top 25 MSA ERF

Metropolitan Statistical Area	3Q13	2Q13
Atlanta-Sandy Springs-Marietta, GA	0.78	0.71
Baltimore-Towson, MD	1.37	1.18
Boston-Quincy, MA	1.53	1.33
Chicago-Naperville-Joliet, IL	1.39	1.24
Dallas-Plano-Irving, TX	0.8	0.71
Denver-Aurora, CO	1.08	0.96
Houston-Sugar Land-Baytown, TX	0.85	0.75
Las Vegas-Paradise, NV	0.64	0.62
Los Angeles-Long Beach-Glendale, CA	1.42	1.23
Miami-Miami Beach-Kendall, FL	1.06	0.93
Minneapolis-St. Paul-Bloomington, MN-WI	1.1	0.98
New York-White Plains-Wayne, NY-NJ	2.23	1.96
Orlando-Kissimmee, FL	0.77	0.7
Oxnard-Thousand Oaks-Ventura, CA	0.99	0.87
Philadelphia, PA	1.7	1.48
Phoenix-Mesa-Scottsdale, AZ	0.66	0.6
Portland-Vancouver-Hillsboro, OR-WA	1.29	1.14
Riverside-San Bernardino-Ontario, CA	0.88	0.8
Sacramento-Arden-Arcade-Roseville, CA	0.79	0.72
San Diego-Carlsbad-San Marcos, CA	1.13	0.99
San Francisco-San Mateo-Redwood City, CA	1.46	1.26
San Jose-Sunnyvale-Santa Clara, CA	1.53	1.34
Seattle-Bellevue-Everett, WA	1.28	1.12
Tampa-St. Petersburg-Clearwater, FL	0.83	0.74
Washington-Arlington-Alexandria, DC-VA-MD-WV	1.16	1.01

#### 3Q13 Composite ERF: Top 20 States by Origination Volume

State	3Q13	2Q13
AZ	0.69	0.62
CA	1.2	1.06
CO	1.06	0.93
CT	1.25	1.1
FL	0.92	0.81
GA	0.8	0.71
IL	1.33	1.17
MA	1.4	1.23
MD	1.22	1.06
MI	1.02	0.91
MN	1.04	0.92
NC	0.96	0.84
NJ	2.07	1.81
NV	0.64	0.61
NY	1.9	1.67
OH	1.05	0.93
PA	1.47	1.28
TX	0.81	0.71
VA	1.11	0.96
WA	1.19	1.04

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