

5 August 2009

## Securitization Reports

# Drowning in Debt – A Look at "Underwater" Homeowners

The U.S. economy has been overwhelmingly a consumer economy. For much of the past decade, U.S. consumers have been greatly enriched by rising home values coupled with "easy credit," enabling them to monetize their home equity early, and often. Some economists estimate that homeowners were extracting 25-30% of every dollar of increase in home equity, primarily for consumption.<sup>2</sup> But now, the Joint Center for Housing Studies reports that home equity had *fallen* 43%<sup>1</sup>—\$5.9 trillion—from 2005 (peak) levels to the end of 2008.

Even if home prices stabilize, it seems unlikely that we will again see the confluence of factors (or one might say mistakes and debacles) that facilitated the millennial wave of consumption. For many, the home has morphed from piggy bank to albatross. The questions now are, how will this wealth destruction drag on consumption and how will outsized mortgage burdens be resolved?

In this paper we look at the issue of "negative equity,"<sup>3</sup> the situation where the borrower's total debt obligations exceed the home's current market value. We estimate both the number of borrowers who *currently* have negative equity, and, using our home price forecast,<sup>4</sup> the number of borrowers who we believe will reach a negative equity position before prices stabilize.

### Market Update

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<sup>1</sup> In real terms.

<sup>2</sup> Atif Mian and Amir Sufi at University of Chicago Ssn.com/abstract=1397607, April 2009.

<sup>3</sup> We define that a borrower (mortgagor) has negative equity if and only if the combined loan-to-value ratio (CLTV) >105%. The combined loan to value includes first and second mortgages. As a practical matter, 90-105% CLTV is "borderline negative equity." For our analysis, we only include CLTVs >= 105%. Therefore, our negative equity estimations are more conservative than most published estimations based on CLTV >= 100%.

<sup>4</sup> Karen Weaver, Ying Shen and Katie Reeves, June 15, 2009, "Update: The Outlook for U.S. Home Prices."

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 Deutsche Bank Securities Inc.

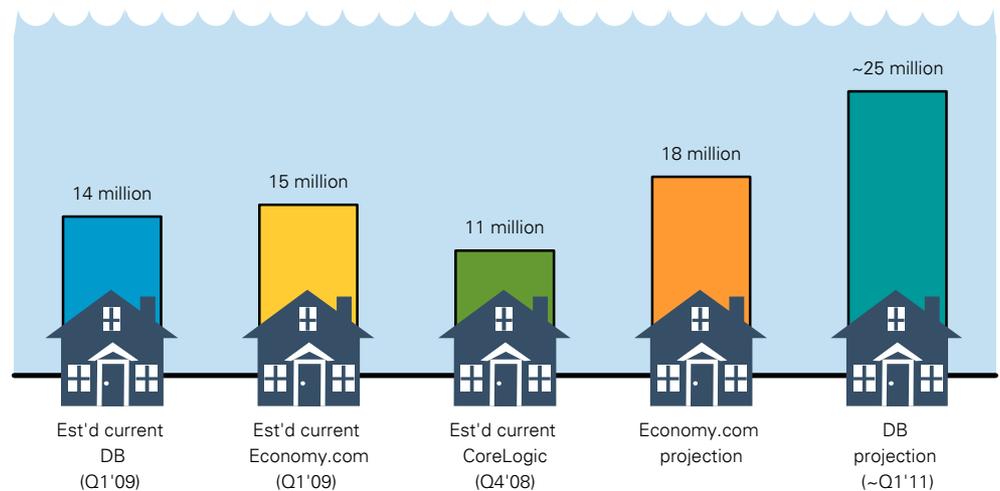
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**Sizing the problem**

There are approximately 110 million households in the U.S. Of the 110 million, about 75.5 million are homeowners. Of those 75.5 million homeowners, approximately 68%, or 51.6 million have mortgages.<sup>1</sup> DB estimates that, as of the end of Q1 2009, 14 million U.S. homeowners had negative equity, or approximately 27% of all homeowners with mortgages. Applying DB's most recent MSA-level home price projections,<sup>2</sup> we estimate that 25 million homeowners will have negative equity before home prices stabilize, or 48% of all mortgagors.<sup>3</sup>

In Figure 1 below, we include other's estimates of the negative equity problem. First American CoreLogic,<sup>4</sup> estimated that 20% (or approximately 11 million) of U.S. homeowners had negative equity as of December 31, 2008 (their most recent work). According to the latest update from Economy.com<sup>5</sup>, approximately 15 million homeowners had negative equity at the end of Q1 2009, and they project that number to climb to 17.5 million by Q1 2010. Economy.com's home price outlook calls for a further 9.8% decline from Q1 2009, on average nationwide, considerably less than our 14% HPD.<sup>6</sup>

**Figure 1: Homeowners with mortgage balances > property value**



Source: Economy.com, First American CoreLogic, Deutsche Bank

<sup>1</sup> 2007 American Community Survey, U.S. Census Bureau, DB U.S. Economics Research.

<sup>2</sup> Karen Weaver, Ying Shen and Katie Reeves, June 15, 2009, "Update: The Outlook for U.S. Home Prices."

<sup>3</sup> We assume home prices do not stabilize until the end of Q1 2011.

<sup>4</sup> An affiliate of title insurance and real estate services company First American Corp and a sister company of LoanPerformance.

<sup>5</sup> Zandi, M., June 1, 2009, "Rising Foreclosures Could Still Doom Recovery." Economy.com's total mortgage debt estimates are based on credit file data from Equifax. The house price estimates are based on Case-Shiller and Zillow data. For information on our data sources, see pages 11, 12 and 13 in this article.

<sup>6</sup> HPD refers to home price depreciation. Karen Weaver, Ying Shen and Katie Reeves, June 15, 2009, "Update: The Outlook for U.S. Home Prices."

**Sizing the problem by mortgage type, region, etc.**

Of course, the negative equity problem is more severe in some mortgage vintages and products and in some regions than in others. In the following pages we break out the aggregate data from a number of different perspectives. First, in Figure 2, we examine the negative equity problem by mortgage type. Not surprisingly, the worst cohorts are subprime<sup>7</sup> and Option ARMs.<sup>8</sup> A number of factors drive this result. First, because of the relative newness of these mortgage products and the tendency of these borrowers to refinance frequently (often to cash out equity), these loans are likely to be recent vintages. This means that many subprime and Option ARM loans were originated at the peak of home prices. A loan made in California in 2003 enjoyed three years of home price appreciation before prices began to fall, cushioning the impact. A loan made in September 2006 in Los Angeles has experienced nothing *but* depreciation.

Option ARM mortgages have negative amortization features, so that product cohort is obviously most likely to be underwater. Moreover, the starting LTV for these loans were particularly high, since they were higher credit loans (i.e. had higher FICO scores), which was believed to offset the higher loan amounts and other risk characteristics. Lastly, the popularity of this product was greatest in the bubble markets; like subprime, Alt-A and Option ARMs were also referred to as “affordability products” because they were designed to enable borrowers to buy homes in unaffordable areas. Hence, the geography of these products was adversely selected toward bubble markets.

The second-worst product type *vis-à-vis* negative equity is subprime. There are two drivers. Once, again, the make-up of subprime is disproportionately skewed toward more recent vintages and hence the peak of the housing market. Two, the weighted average LTVs in subprime were higher than in, say, conforming mortgages or prime.

**Figure 2: The next leg of the decline will have the biggest impact on conforming borrowers**

Estimated percent of borrowers with negative equity, by product		
	Q1 2009	Q1 2011 Projected
Conforming <sup>(1)</sup>	16%	41%
Prime jumbo <sup>(2)</sup>	29%	46%
Alt-A <sup>(3)</sup>	49%	66%
Subprime <sup>3</sup>	50%	69%
Option ARM	77%	89%
<b>Total mortgage market</b>	<b>26%</b>	<b>48%</b>

1. Conforming loans refer to mortgage loans that conform to GSE guidelines that include conforming loan limit, debt-to-income ratio limit and documentation requirements. Conforming limit is the maximum loan amount that is set based on the October-to-October changes in median home price.

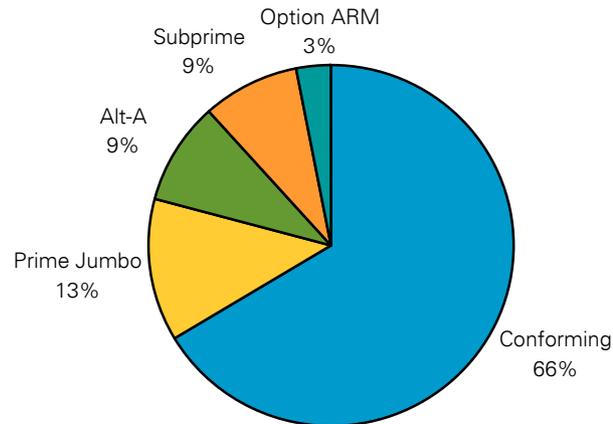
2. Prime jumbo loan generally refers to a mortgage loan that meets GSE guidelines with the exception that its loan size exceeds the conforming limit.

3. Alt-A loans were typically originated with reduced documentation to home borrowers with limited credit history (self-employed, no employer history, etc.). Alt-A borrowers have higher FICO scores (660–720) than subprime borrowers. Also, relatively high concentrations of investor properties are common in securitizations of Alt-A mortgage loans

Source: Deutsche Bank

<sup>7</sup> A mortgage loan is defined as subprime if the borrower of the underlying loan has an imperfect mortgage or rental history and/or a high debt-to-income ratio and/or a high loan-to-value ratio and/or has provided less than standard documentation of their financial situation. Subprime borrowers generally have a credit (FICO) score between 580 and 660.

<sup>8</sup> Option ARM loans are mortgage loans that offer borrowers the following options (1) pay minimum monthly payment, or (2) pay interest only, or (3) pay fully amortizing payment. The minimum payment may not reflect the fully indexed interest rate, leading to so-called negative amortization. A borrower is required to pay the fully amortizing payment if the outstanding balance increases to a specified negative amortization limit or when the loan is set to recast.

**Figure 3: Prime borrowers, both jumbo and conforming are by far the largest share****Distribution of outstandings by RMBS\* product**

\* RMBS refers to the universe of residential mortgage loans consisting of conforming loans, subprime loans, Alt-A loans, option ARM loans, and prime jumbo loans.

Source: Deutsche Bank

While subprime and Option ARMs are currently the worst cohorts with underwater borrowers, we project that the next phase of the housing decline will have a far greater impact on prime borrowers (conforming and jumbo) (see Figure 2). By Q1 2011, we estimate that 41% of prime conforming borrowers and 46% of prime jumbo borrowers will be underwater, a significant increase over the percentage of these borrowers in Q1 2009. The impact of this is significant given that these markets have the largest share of the total mortgage market outstanding (see Figure 3).

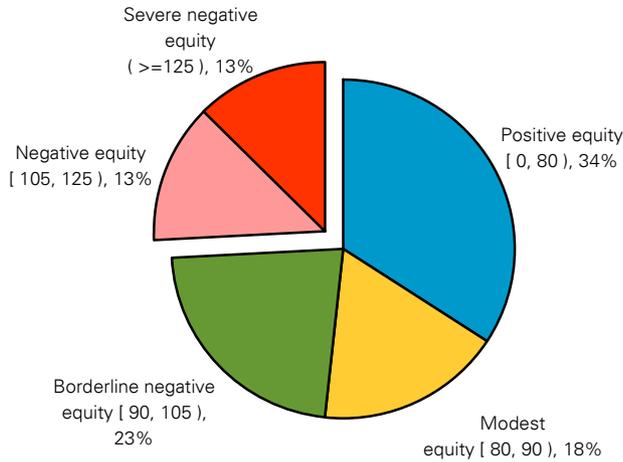
***“Underwater”; the kiddie pool vs. the deep end***

Next we look at our results in another way. The magnitude of the negative equity position is important. Clearly, a CLTV over 105% is negative equity, and less than 80% CLTV is a solid equity position. Some borrowers have borderline negative equity, e.g. CLTV  $\geq 90\%$ , and some have moderate equity, e.g. CLTV  $\geq 80\%$ . In the figures below we break out the degree of negative equity for the total mortgage market, and for conforming, prime jumbo, Alt-A, subprime and option ARMs.<sup>9</sup> Borrowers with severe negative equity are most likely to default because they are most likely to believe that they will not recover.

<sup>9</sup> The bracket [a,b) denotes borrowers with  $a \leq \text{CLTV} < b$ . For example, [80, 90) consists of borrowers with  $\text{CLTV} \geq 80$  and  $\text{CLTV} < 90$ .

**Figure 4: DB estimates that 26% of US homeowners are currently underwater**

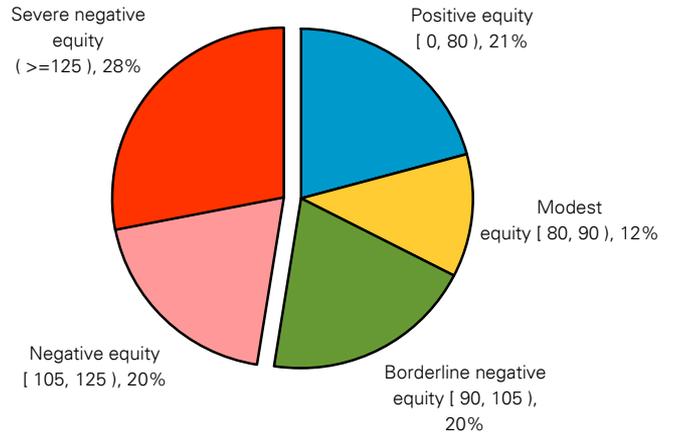
**Estimated current CLTV distribution of outstanding RMBS loans (share with negative equity: 26%)**



Source: Deutsche Bank

**Figure 5: DB forecasts that 48% of US homeowners will be underwater by Q1 2011**

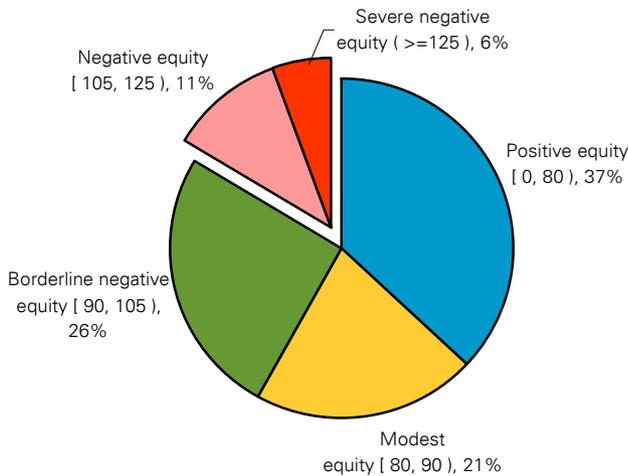
**Projected CLTV distribution of outstanding RMBS loans (share with negative equity: 48%)**



Source: Deutsche Bank

**Figure 6: DB estimates that 16% of conforming loan borrowers are currently underwater**

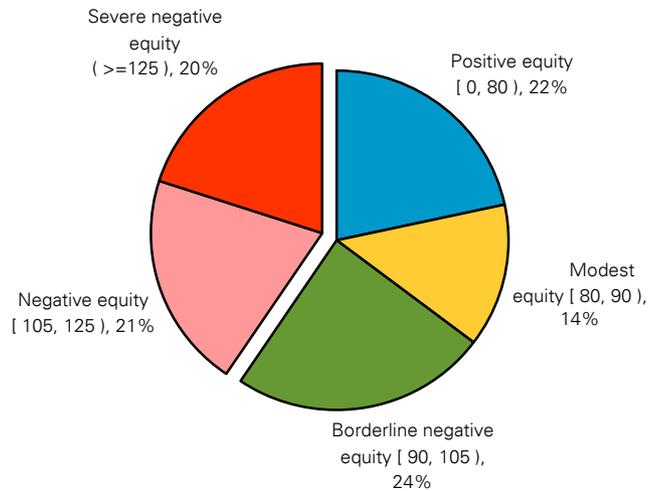
**Estimated current CLTV distribution of outstanding conforming loans (share with negative equity: 16%)**



Source: Deutsche Bank

**Figure 7: DB forecasts that 41% of conforming loan borrowers will be underwater by Q1 2011**

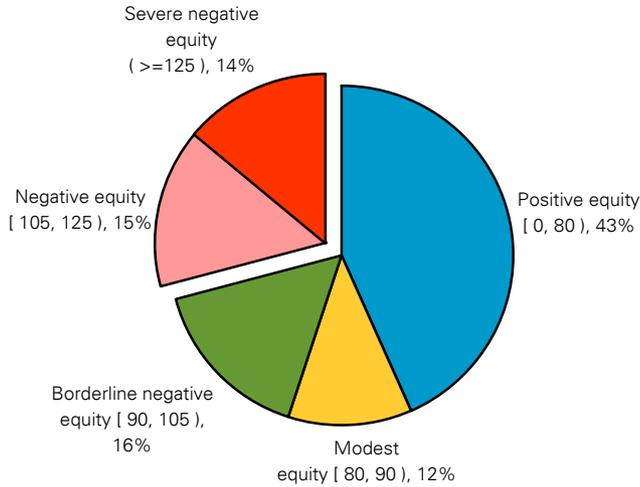
**Projected CLTV distribution of outstanding conforming loans (share with negative equity: 41%)**



Source: Deutsche Bank

**Figure 8: DB estimates that 29% of jumbo loan borrowers are currently underwater**

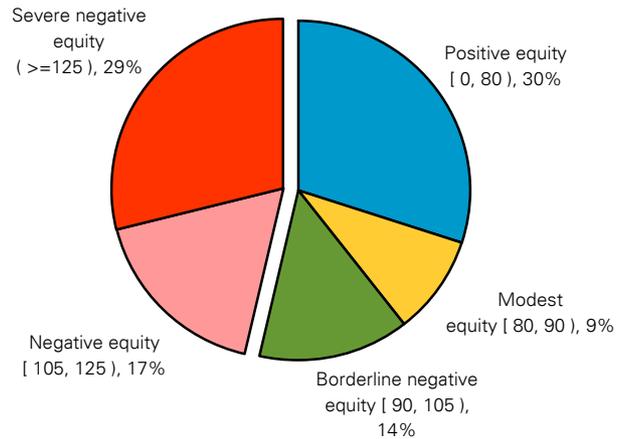
**Estimated current CLTV distribution of outstanding prime jumbo loans (share with negative equity: 29%)**



Source: Deutsche Bank

**Figure 9: DB forecasts that 47% of jumbo loan borrowers will be underwater by Q1 2011**

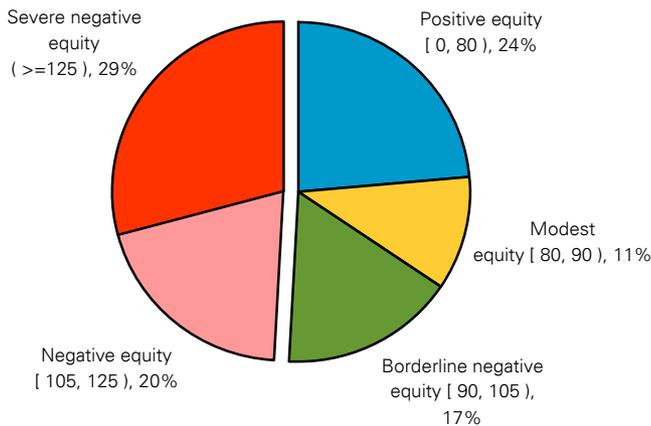
**Projected CLTV distribution of outstanding prime jumbo loans (share with negative equity: 47%)**



Source: Deutsche Bank

**Figure 10: DB estimates that 49% of Alt-A borrowers are currently underwater**

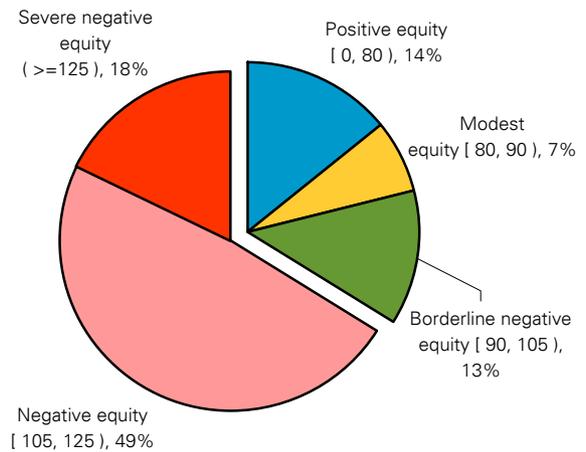
**Estimated current CLTV distribution of outstanding Alt-A loans (share with negative equity: 49%)**



Source: Deutsche Bank

**Figure 11: DB forecasts that 66% of Alt-A borrowers will be underwater by Q1 2011**

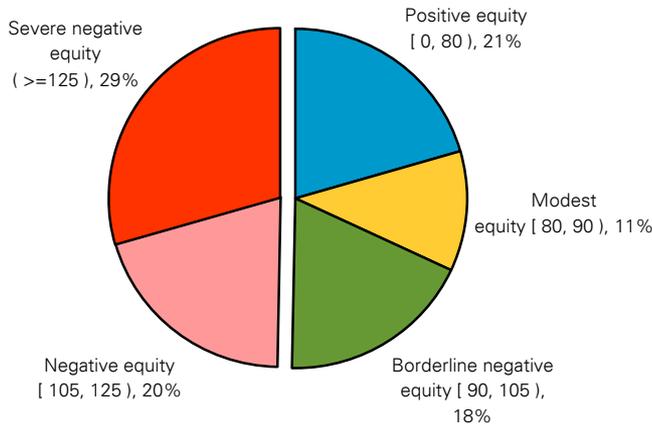
**Projected CLTV distribution of outstanding Alt-A loans (share with negative equity: 66%)**



Source: Deutsche Bank

**Figure 12: DB estimates that 50% of subprime borrowers are currently underwater**

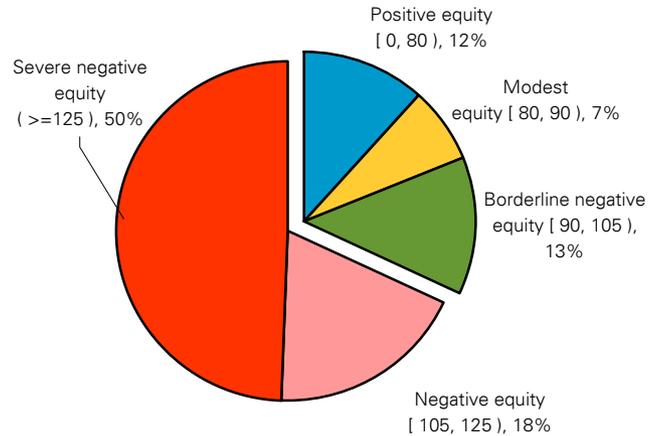
**Estimated current CLTV distribution of outstanding subprime loans (share with negative equity: 50%)**



Source: Deutsche Bank

**Figure 13: DB forecasts that 68% of subprime borrowers will be underwater by Q1 2011**

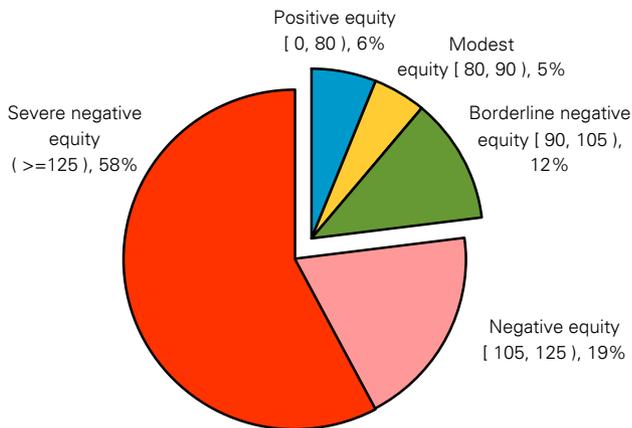
**Projected CLTV distribution of outstanding subprime loans (share with negative equity: 68%)**



Source: Deutsche Bank

**Figure 14: About 77% of Option ARM borrowers are already underwater as of Q1 2009**

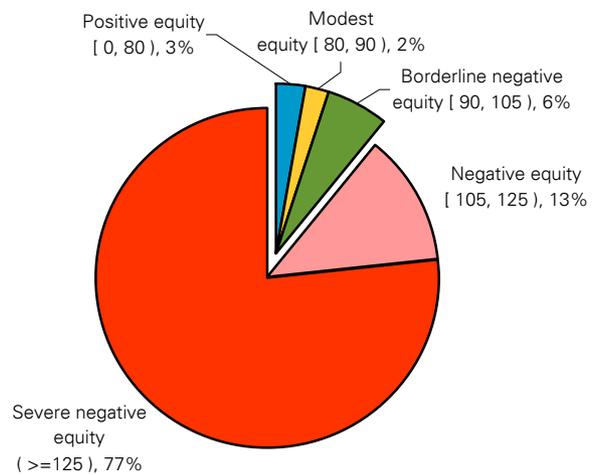
**Estimated current CLTV distribution of outstanding Option ARM loans (share with negative equity: 77%)**



Source: Deutsche Bank

**Figure 15: DB forecasts that 89% of Option ARM borrowers will be underwater by Q1 2011**

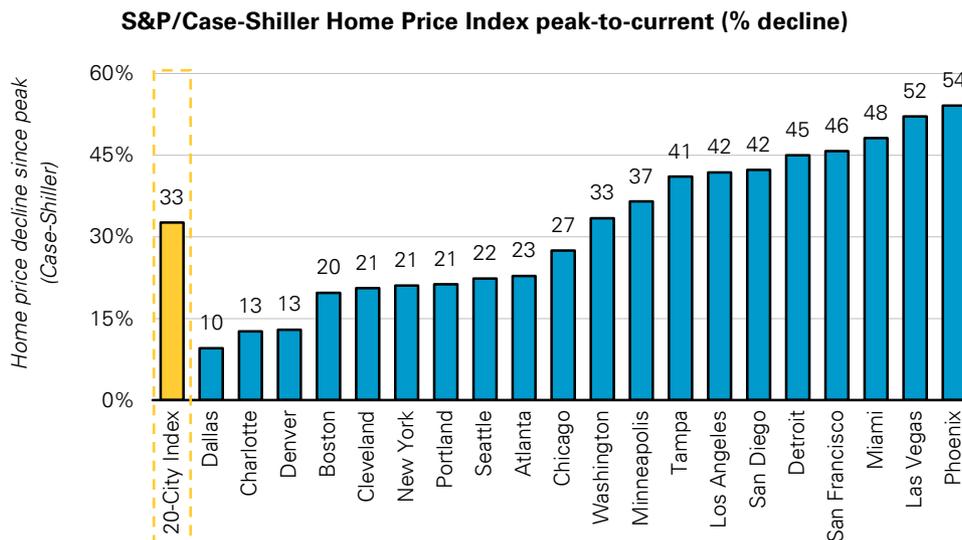
**Projected CLTV distribution of outstanding Option ARM loans (share with negative equity: 89%)**



Source: Deutsche Bank

**Sizing the problem by region**

**Figure 16: All 20 cities had double digit home price depreciations during the current financial crisis**



Case-Shiller data as of April 2009

Source: S&P, Deutsche Bank

Clearly, geography plays a key role in the incidence of negative equity. According to the Case-Shiller Index, even among the top 20 markets, home price depreciation has ranged from a low of 10% (Dallas) to a high of 54% (Phoenix). Some markets had huge run-ups prior to the correction, some more modest. Some started correcting nearly four years ago, some a little more than a year ago.

In a ‘map analysis’ below, we present our findings on the U.S. map, so that the MSAs with high concentrations of negative equity are visually evident. In our analysis, MSAs refer to Metropolitan Statistical Areas or Metropolitan Statistical Divisions.<sup>10</sup> Our map analysis covers a total of 371 MSAs. Recall that in our recently updated home price forecast,<sup>11</sup> we provided current-to-trough home price depreciation estimates for the largest 100 MSAs. To project the negative equity for each of the remaining 271 MSAs, we use the nationwide average, i.e., a 14% current-to-trough decline, following our assumptions from that forecast.

In Figure 17, the pink areas denote markets where we estimate that more than 17% of mortgagors have negative equity, and red denotes an estimate above 30%. Visually, one might take some comfort that relatively little of the map is shaded red or pink. However, due to population density, the red and pink areas summed together represent the lion’s share of outstanding U.S. mortgages—52%!

As readers might suspect and the map clearly shows, negative equity is a problem in many areas of California, Florida, Arizona and Nevada, but also in many areas of Ohio, Michigan, Illinois, Wisconsin, Massachusetts and West Virginia. The first four (the “sand states”) are bubble states characterized by speculation, easy credit, and, often, overbuilding. The other

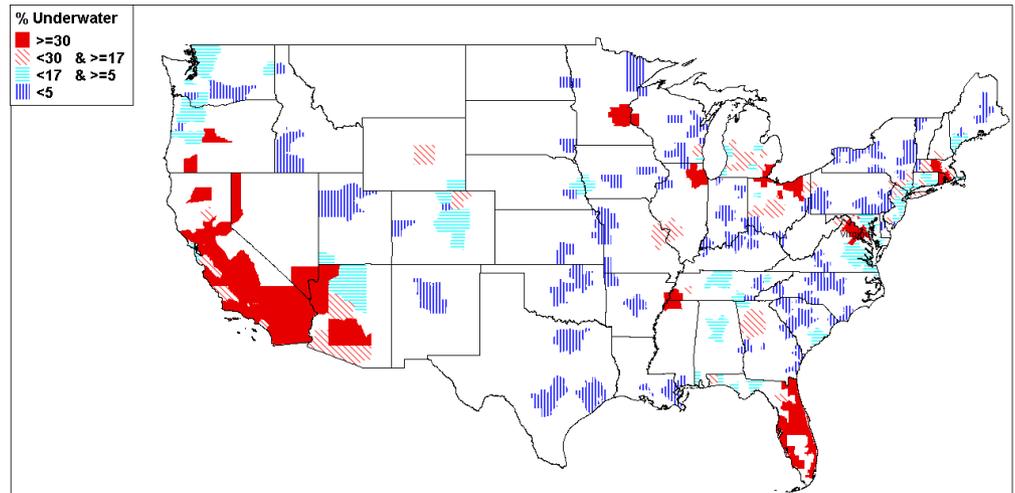
<sup>10</sup> The United States Census Bureau defines a Metropolitan Statistical Area as one or more adjacent counties or county equivalents that have at least one urban core area of at least 50,000 people, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. A metropolitan statistical area containing an urbanized area of at least 2.5 million people can be subdivided into two or more “metropolitan statistical divisions” (MSD) provided specified criteria are met. A metropolitan division is a subdivision of a larger metropolitan statistical area that functions as a distinct social, economic, and cultural area within the larger region. Our map analysis is based on 371 MSAs that consist of 342 MSAs without MSDs, and 29 MSDs.

<sup>11</sup> Karen Weaver, Ying Shen and Katie Reeves, June 15, 2009, “Update: The Outlook for U.S. Home Prices.

areas are victims of the restructuring of U.S. manufacturing. New Jersey and the New York metropolitan area have relatively few underwater borrowers, and yet we believe these markets are further from the bottom than, for example, much of California (see page 10-12 of our home price piece<sup>12</sup>). Consequently, as depicted on our map (Figure 17), the following areas in New York and New Jersey are projected to have over 50% of homeowners underwater by the end of the first quarter of 2011: New York-White Plains-Wayne, Nassau-Suffolk, and Edison-New Brunswick.

**Figure 17: Most of the MSAs with borrowers currently deeply underwater are in the "sand states" or the "rust belt states".**

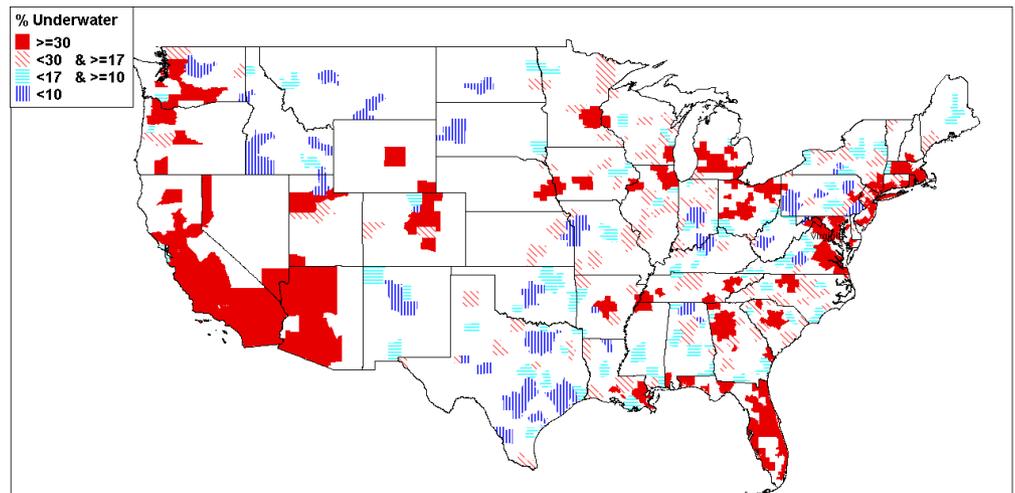
Estimated current MSA distribution of percentage of underwater borrowers (as of Q1 2009)



Source: Deutsche Bank

**Figure 18: Based on our forecast, by Q1 2011, many more markets will have significant concentrations of underwater borrowers, especially in the Northeast.**

Estimated projected MSA distribution of percentage of underwater borrowers (Q1 2011)



Source: Deutsche Bank

<sup>12</sup> Karen Weaver, Ying Shen and Katie Reeves, June 15, 2009, "Update: The Outlook for U.S. Home Prices."

**Figure 19: MSAs with the highest estimated percentage of underwater borrowers  
(as of Q1 2009)**

<b>MSA Name</b>	<b>Estimated % of mortgage borrowers currently underwater</b>
Merced, CA	85
El Centro, CA	85
Modesto, CA	84
Las Vegas-Paradise, NV	81
Stockton, CA	81
Bakersfield, CA	79
Port St. Lucie, FL	79
Riverside-San Bernardino-Ontario, CA	78
Cape Coral-Fort Myers, FL	76
Vallejo-Fairfield, CA	75
Yuba City, CA	73
Madera, CA	72
Fresno, CA	72
Orlando-Kissimmee, FL	71
Visalia-Porterville, CA	70
Miami-Miami Beach-Kendall, FL	70
Palm Bay-Melbourne-Titusville, FL	69
Lakeland-Winter Haven, FL	69
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	69
Phoenix-Mesa-Scottsdale, AZ	68
Tampa-St. Petersburg-Clearwater, FL	65
Sacramento-Arden-Arcade-Roseville, CA	65
West Palm Beach-Boca Raton-Boynton Beach, FL	64
Palm Coast, FL	63
Deltona-Daytona Beach-Ormond Beach, FL	62
Bradenton-Sarasota-Venice, FL	60
Reno-Sparks, NV	59
Punta Gorda, FL	58
Hanford-Corcoran, CA	56
Mansfield, OH	54
Cleveland-Elyria-Mentor, OH	54
Salinas, CA	51
Los Angeles-Long Beach-Glendale, CA	51

Source: Deutsche Bank

**Figure 20: MSAs with the highest projected percentage of underwater borrowers (Q1 2011E)**

<b>MSA Name</b>	<b>Projected % of mortgage borrowers underwater</b>
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	93
El Centro, CA	92
Merced, CA	91
Miami-Miami Beach-Kendall, FL	90
West Palm Beach-Boca Raton-Boynton Beach, FL	90
Modesto, CA	90
Las Vegas-Paradise, NV	90
Stockton, CA	88
Bakersfield, CA	87
Riverside-San Bernardino-Ontario, CA	87
Port St. Lucie, FL	87
Cape Coral-Fort Myers, FL	85
Vallejo-Fairfield, CA	84
Lakeland-Winter Haven, FL	84
Yuba City, CA	84
Orlando-Kissimmee, FL	84
Madera, CA	83
Palm Bay-Melbourne-Titusville, FL	81
Fresno, CA	81
Tampa-St. Petersburg-Clearwater, FL	80
Visalia-Porterville, CA	79
Mansfield, OH	79
Phoenix-Mesa-Scottsdale, AZ	78
Deltona-Daytona Beach-Ormond Beach, FL	77
Toledo, OH	77
New York-White Plains-Wayne, NY-NJ	77
Palm Coast, FL	77
Hanford-Corcoran, CA	76
Bradenton-Sarasota-Venice, FL	75
Sacramento--Arden-Arcade--Roseville, CA	75
Punta Gorda, FL	74
Canton-Massillon, OH	72
Portland-Vancouver-Beaverton, OR-WA	71
Baltimore-Towson, MD	71
Reno-Sparks, NV	70
Akron, OH	70
Ocala, FL	69
Cleveland-Elyria-Mentor, OH	69
Sandusky, OH	66
Chicago-Naperville-Joliet, IL	65
Naples-Marco Island, FL	65

Source: Deutsche Bank

**Figure 20: MSAs with the highest projected percentage of underwater borrowers (Q1 2011E) (Cont'd)**

<b>MSA Name</b>	<b>Projected % of mortgage borrowers underwater</b>
Springfield, OH	65
Monroe, MI	64
Nassau-Suffolk, NY	64
Sebastian-Vero Beach, FL	64
Youngstown-Warren-Boardman, OH-PA	64
Oakland-Fremont-Hayward, CA	64
Richmond, VA	64
Virginia Beach-Norfolk-Newport News, VA-NC	63
Lansing-East Lansing, MI	63
Salinas, CA	63
Los Angeles-Long Beach-Glendale, CA	62
Edison-New Brunswick, NJ	62
Jacksonville, FL	62
Detroit-Livonia-Dearborn, MI	62
Lake Havasu City-Kingman, AZ	61
Dayton, OH	61
Ann Arbor, MI	61
Washington-Arlington-Alexandria, DC-VA-MD-WV	60
Worcester, MA	60
Bend, OR	60
Allentown-Bethlehem-Easton, PA-NJ	60
Medford, OR	59
Salt Lake City, UT	59
Providence-New Bedford-Fall River, RI-MA	58
Seattle-Bellevue-Everett, WA	58
Hagerstown-Martinsburg, MD-WV	57
Pensacola-Ferry Pass-Brent, FL	57
Redding, CA	57
Chico, CA	57
San Diego-Carlsbad-San Marcos, CA	57
Grand Rapids-Wyoming, MI	56
Flint, MI	56
Manchester-Nashua, NH	55
Winchester, VA-WV	55
New Orleans-Metairie-Kenner, LA	55
Yuma, AZ	52
Minneapolis-St. Paul-Bloomington, MN-WI	52
Casper, WY	52
Santa Rosa-Petaluma, CA	51
Santa Ana-Anaheim-Irvine, CA	51
Prescott, AZ	51
Gainesville, FL	51

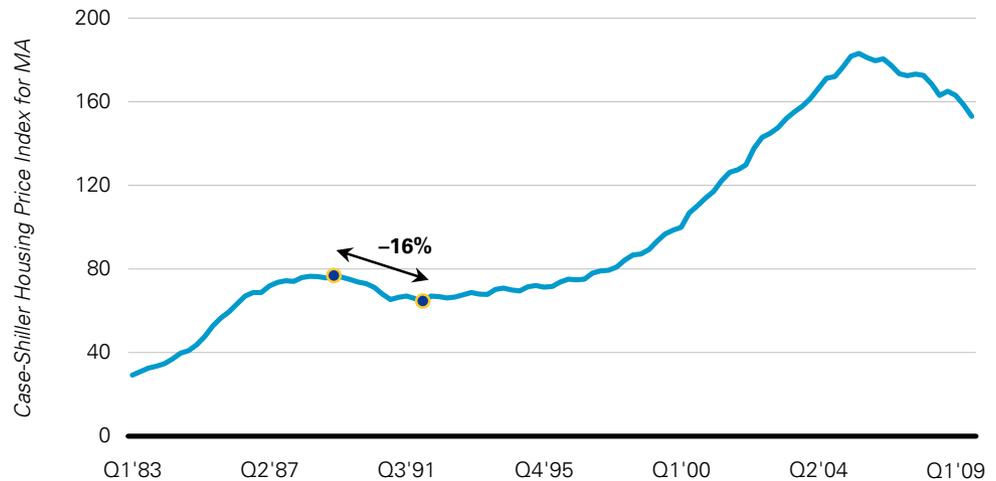
Source: Deutsche Bank

In Figure 19, we list those MSAs where more than half of all mortgages have negative equity, based on our estimates as of Q1 2009. In Figure 20, we show our estimate of how many MSAs will have more than 50% of their borrowers underwater at our projected current-to-trough home prices (Q12011). As is evident from both the maps and these tables, we expect underwater areas to become even more so, but note, too, that 50 more markets are in the "50% underwater category" at the end of our forecast horizon versus today.

**Negative equity and default**

The Federal Reserve Bank of Boston published a loan-level analysis of Massachusetts mortgagors with negative equity.<sup>13</sup> Massachusetts experienced a housing downturn in the late 1980s and early 1990s (see Figure 21 below). The authors were able to identify 100,300 borrowers with negative equity in Q4 1991. They subsequently found that 6,450, or less than 7%, of those borrowers actually defaulted on their homes over the next three years. We refer to this number as the “marginal propensity to default,” or “MPD,” to represent the likelihood that a mortgagor will default assuming they have negative equity. (Borrowers rarely default if they have equity in their homes.)

**Figure 21: The past housing downturn in Massachusetts: Home price decline from peak (Q2 1989) to trough (Q1 1992) was 16%**



Source: S&P, Deutsche Bank

However, the default rate experience from Massachusetts is likely to be significantly better than what we experience in this cycle, for several reasons:

**Superior borrower quality in the Massachusetts data.** Prime, conforming mortgage loans were the norm of the time period, so one can assume that the borrower’s credit quality, debt service capacity and documentation were all relatively sound at the time of origination. Non-prime loans of all types, and limited documentation, were very rare.

**Superior product mix in the Massachusetts data.** Fixed-rate loans were the prevailing product: only 11% of conforming mortgage originated between 1988 and 1993 were ARM mortgages. At the peak of the latest housing boom, 45% of originations were ARMS. All else equal, ARM loans have a higher default propensity than fixed rate loans.

**Home price depreciation was more benign in the Massachusetts study.** The Boston Fed’s study focused on Massachusetts from Q2 1989 to the home price trough in Q1 1992. Note that the peak (Q2 1989) to trough (Q1 1992) decline was about 16%, according to the Case-Shiller Index. By contrast, several MSAs have seen prices nearly halved, and the Case-Shiller Top-20 Index shows a decline of 33% from the peak. DB’s projection is for a nationwide *average* peak to trough of 42%—with 85 of the top 100 MSAs falling more than 16%.

<sup>13</sup> Foote, C., Gerardi, K., and P. Willen. 2008, “Negative Equity and Foreclosure: Theory and Evidence,” Federal Reserve Bank of Boston Public Policy Discussion Paper No. 08-3.

**The unemployment rate is higher today than in the study.** In Massachusetts, during the study period, unemployment peaked at 9.1%. We are already at 9.5% nationwide, and in a market like California, unemployment is at a record high of 11.5%

In summation, while the historical experience suggests a marginal propensity to default of about 7%, today's mortgage portfolios represent a far riskier universe of borrowers, and today's environment a far worse stress test. We view the 7% as an absolute floor. The eventual MPD will depend upon how much further prices fall (the more severe the negative equity, the more likely default), and unemployment or under employment. Policy and social factors will also play a role in whether or not borrowers strategically or ruthlessly exercise their default option.

### **Dataset**

Our data sources for the purposes of this estimate are as follows:

**LoanPerformance.** As of March 2009, LP has about 6.7 million non-conforming mortgage loans, consisting of subprime, Alt-A, option ARM, prime (jumbo and hybrid) loans. LoanPerformance estimates that their database covers approximately 65% of the total non-agency residential mortgage market. We extrapolate this data to the broad universe of nonconforming mortgage loans.

**LoanPerformance Home Price Index ("HPI"<sup>14</sup>) data.** First American CoreLogic's LoanPerformance HPI measures home prices based on repeat sales of single-family homes. This "paired series" approach is designed to capture the true appreciated value of constant-quality properties, and avoid distortions caused by changes in the mix of properties being sold. The downside to such indices is that there are far fewer data points to analyze, since a pair is necessary. The HPI index is built from the top down; indices for lower level geographies are imputed from upper levels if there are not enough repeat sales pairs.

The maximum value of the houses in the LP HPI database is \$1 million. The database covers 7,618 ZIP codes, 958 Core Based Statistical Areas (CBSA) and 677 counties located in all 50 states and the District of Columbia.

**Freddie Mac loan-level agency data.** There are 5.5 million loans available in this database versus 33 million total agency loans outstanding as of March 2009. The Freddie Mac database covers loans originated after 2005 and the total outstanding balance is \$1.06 trillion, versus \$1.76 trillion of total Freddie Mac conforming loans outstanding. The average outstanding balances are 247K for ARMs and 181K for fixed-rate loans. 11.6% of the loans in our Freddie Mac database are ARMs. Our negative equity analysis on conforming loans is based on the implicit assumption that the Freddie Mac data is representative of the entire Agency conforming loan universe. Obviously, our analysis generates conservative estimates for FHA/VA borrowers—i.e. our analysis will underestimate the severity of negative equity among FHA/VA loans, given the low down payment requirements for those borrowers. Freddie Mac and Fannie Mae loans, however, do share similar credit profiles. Both follow the underwriting guidelines from OFHEO.

### **Methodology**

To estimate the current and projected combined LTV of the loans, we did the following: The value of the home at origination can be derived by dividing the total original amount of the loans (first lien and junior liens) by original combined LTV. For loans in LoanPerformance or the Freddie Mac database, we use the "regional home price index" to estimate the home price changes between the loan origination date and March 31, 2009. For each loan, the regional home price index is the zip-code-level LP HPI if it's available. Otherwise, the regional home price index is defined as the MSA-level HPI. If neither zip-code-level nor MSA-level HPI

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<sup>14</sup> HPI refers to home price index.

is available, then we let the regional home price index be the state-level HPI. Consequently, we obtain an estimate of the borrower's current mark-to-market home price.

Based on the current home value and the total current outstanding mortgage balances, including junior liens if available, we can obtain the current combined LTV, i.e. the total mortgage principal amounts divided by the current mark-to-market home price.

To estimate the *future* CLTV of a loan we use the current CLTV and apply DB's MSA-level HPI projections. Consequently, we can obtain the future CLTV at the end of Q1, 2011. For simplicity, and because the effects are likely to be small, we ignore amortization and inflation in our calculations.

### **Second liens and HELOCs**

Figure 22 shows the percentage of silent junior liens at the time of origination among various first lien mortgage products. We note that our estimation of silent junior liens in Figure 22 is likely smaller than the actual occurrence, due to incomplete information available to our data sources, LoanPerformance and Freddie Mac. There are \$1.1 trillion of outstanding home equity loans<sup>15</sup> (closed-end second lien loans and HELOCs) as of Q1 2009. At the time of deal origination, second lien information associated with some first lien loans may be unavailable. In fact, in securitizations, reporting of a second lien associated with a given first lien was not required by the rating agencies before 2005. There was an increased voluntary reporting started in 2004. Moreover, borrowers who subsequently take out home equity lines of credit (HELOCs) are also not properly accounted for. As of July 2009, the outstanding of HELOCs on U.S. commercial banks' portfolios was \$607 billion<sup>16</sup>. We estimate that represents approximately 13 million lines with average balances between \$45K-50K. Those factors resulted in our underestimation of current and future CLTV in this report. Therefore, readers should view our estimations of negative equity as conservative. Moreover, borrowers who subsequently take out home equity lines of credit (HELOCs) are also not properly accounted for.

**Figure 22: Alt-A and option ARM loans have the highest percentage of silent junior positions**

Conforming	16%
Prime jumbo	14%
Option ARM	25%
Subprime	18%
Alt-A	33%

Source: Deutsche Bank

### **Conclusion**

The continued decline of U.S. home price will contribute to rapidly rising rates of negative equity. We project that over the next two years, an additional 11 million households will be underwater, bringing the total to as many as 25 million households. The most obvious implication is for mortgage defaults; borrowers with negative equity may be forced to default after a life event (e.g. unemployment, underemployment, divorce, disability, etc.). Borrowers may also "ruthlessly" or strategically default even without such life events. Apart from default, this reversal of fortune for the middle class will surely suppress consumption. In the meantime, we don't expect a quick turnaround of the housing market due to the weakness in labor markets, excess supply and continued un-affordability in some regions.

<sup>15</sup> Federal Reserve Statistical Release, Z.1 Report, Flow of funds accounts of the United States, June 11, 2009.

<sup>16</sup> Federal Reserve Statistical Release H.8 Report, Board of Governors of the Federal Reserve System, July 31, 2009.

# Appendix 1

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