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Assessing the Housing Threat and the Appropriate Policy Response

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Executive Summary

The six-year-old housing crash continues to threaten the U.S. economic recovery. Home sales and housing construction are off bottom, but remain at exceptionally low levels, while house prices are still falling in many parts of the country. Millions of families have lost homes, and millions more are likely to follow them, given the unprecedented number of loans in or likely to soon enter the foreclosure pipeline.¹

It is hard to be enthusiastic about the U.S. economy's prospects as long as house prices are weak. A house is typically a family's most important asset. Many small-business owners also use their homes as collateral for business loans, and local governments rely on property tax revenues, which are tied to housing values, to fund schools and other important public services. Losses on mortgage loans and securities also pose a significant risk to the financial system, which is struggling to provide the credit necessary for a strong economy. Other serious longer-term effects of falling house prices include a reduction in labor mobility and the erosion of retirement savings for low- and middle-income homeowners.

Most worrisome is the risk that housing will fall back into the vicious cycle that occurred at the depths of the last recession. As prices fell, homeowners found they owed more than their homes could sell for; this led to more defaults, more distress sales, and still-lower prices. That cycle was broken only through unprecedented monetary and fiscal policy support.

The fragile housing and mortgage markets notwithstanding, there are reasons to be optimistic that housing's long slide is coming to an end. Although a mountain of distressed properties remains to be sold, investor demand for these properties appears strong. Prices have fallen enough to allow investors to purchase and profitably rent these homes until the market recovers. Rental vacancy rates have fallen meaningfully, suggesting that new construction is low enough to let builders work down the considerable inventory of vacant homes.

Nonetheless, risks remain uncomfortably high. Policymakers should thus consider taking additional, temporary, modest steps to ensure consistent house price growth. Once expectations for housing turn positive, the foreclosure crisis will quickly abate and the economic recovery will gain traction. Given that house prices in many parts of the country are already low relative to household incomes and effective rents, it wouldn't take much additional policy effort to accomplish this. The key is to reduce the number of loans in delinquency or in foreclosure, before these properties reach the market as distress sales. House prices will rise significantly once the share of home sales that are distressed declines definitively. Under reasonable assumptions, this requires reducing the number of impaired mortgage loans by 500,000 to 1 million over the next 24 months, below the level that would exist otherwise.

The most effective policy steps to this end include facilitating more mortgage refinancing to take advantage of record-low mortgage rates; supporting mortgage loan modifications, including targeted principal reductions, and aggressively pursuing efforts to convert distressed properties to rental use before they are put up for sale and further depress house prices.

These steps are consistent with the Obama administration's recent housing initiative and various policy steps proposed by the Federal Reserve. Many of the proposals carry no cost to taxpayers; others have costs that are already accounted for in the federal government's budget. Although these policy steps may not be politically popular, the outcome could be much worse if policymakers stand by while a weak housing market continues to undermine the economy.

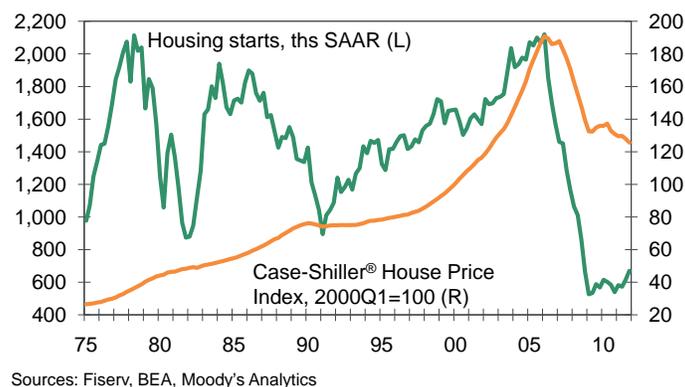
¹ More than 5 million U.S. homeowners are believed to have lost homes through foreclosures, short sales, or deeds-in-lieu since the housing crash began in 2006. Nearly 5 million more homeowners are expected to lose homes before foreclosures return to levels consistent with a well-functioning housing market, which we expect to happen in 2015.

I. Current housing market conditions

The housing crash is more than six years old. Sales of existing homes—a gauge of demand—languish near an annual rate of 4.5 million, of which about 40% are foreclosures and short sales. Sales of new homes are also depressed, at a nearly record low rate of just over 300,000 units per year. In a well-functioning housing market, more than 1 million more new and existing homes would change hands per year, and less than a tenth would involve distress sales.²

Housing construction—the marker for supply—is also depressed. Single- and multifamily housing starts run close to 700,000 units annualized, and manufactured home placements barely reach 50,000 per year (see Chart). This is above the recent bottom, but is still near the weakest pace of residential construction since World War II. A well-functioning housing market would produce closer to 1.75 million units annually.³

An Epic Housing Crash



Nationwide, house prices remain fragile. The Fiserv Case-Shiller national home price index has dropped by more than a third since peaking in the first quarter of 2006, and prices are still falling in many parts of the country because of the pressure created by the large number of distressed-property sales. In a well-functioning market, prices should rise around 3% per year.⁴

² A well-functioning housing market is defined as one consistent with an economy operating at full employment and growing at its potential rate.

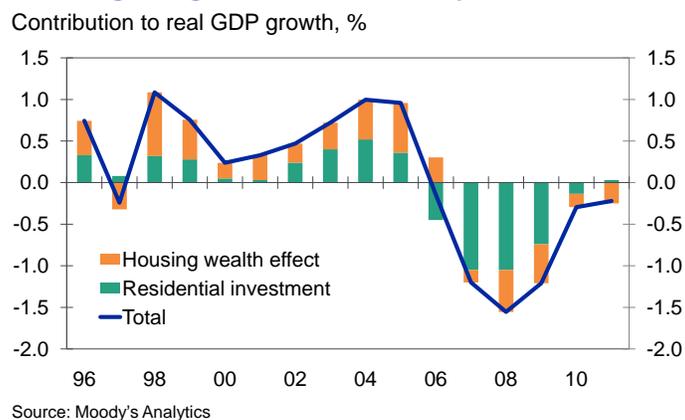
³ The pace of new construction is supported by the annual formation of 1.25 million households, the obsolescence of 300,000 housing units, and the purchase of 200,000 vacation homes.

⁴ House prices should increase at a pace between the annual rate of growth in household income (4%) and overall annual price inflation (2%). House prices are ultimately determined by replacement costs, which equal the cost of land plus the cost of construction. The cost of land is determined by its opportunity cost, or GDP per developable acre. The growth in GDP per acre is equal to the growth in household income (assuming that the profit share of GDP remains constant). Construction costs will grow at the rate of overall inflation in the long run, although material and labor costs can fluctuate substantially in the short run. Since the share of land costs in overall house prices varies considerably from place to place (very high in San Francisco, for example, much lower in Des Moines), growth in house prices will vary considerably among regions. For the past quarter century or so (the recent boom and bust aside), house prices have grown at a rate closer to household income. As financial and other incentives for homeownership increased, households spent as much on housing as their incomes would allow. These incentives have likely peaked and may well decline; therefore, households will devote less of their income to housing, and prices are likely to increase at rates closer to inflation.

II. Housing's economic contribution

Although housing is no longer the drag that it was during the worst of the Great Recession, it remains a weight on economic growth (see Chart). This is especially disappointing since housing is often a major source of growth during economic recoveries. In U.S. business cycles since the 1950s, housing accounted for an average of 1.4 percentage points of real GDP growth during the first year of recovery, and almost 1 percentage point of growth per year during the first 11 quarters. During the current recovery, housing subtracted 0.6 percentage point from real GDP growth in the first year and 0.4 percentage point per year through the first quarter of 2012. If housing had performed in this cycle as it did in the average post-World War II recovery, unemployment would be almost 2 percentage points lower today, and close to most estimates of full employment.⁵

Housing Weighs on the Economy



Falling house prices and the resulting hit to household wealth remain serious problems. Some \$7.4 trillion in homeowners' equity has been lost in the housing crash, with close to \$500 billion of that occurring in 2011. The wealth effects of the decline in house prices on consumer spending have been substantial.⁶ Middle-income households have been hit especially hard, as they have benefited less from rising stock prices than have their higher-income neighbors.

Shaky house prices also make it difficult for small-business owners to use their homes for seed money or as loan collateral. Bank lending to small businesses has picked up over the past year or so, but it is hard to see how credit will flow freely until house prices rise again. Since small businesses are a key part of job creation, this is a significant impediment to a stronger job market.

Strapped local governments are also struggling with the impact of falling house prices on property tax revenues. Despite rising millage rates in many parts of the country, tax revenue is growing at nearly its slowest pace on record. Considering the lag between market price changes and tax assessments, revenues are likely to slow even more in the coming year. Local governments will thus have little choice but to continue cutting budgets and laying off workers. Local government payrolls have declined by more than 500,000 from their peak and are shrinking by about 10,000 jobs per month.

⁵ Early in recoveries, stronger homebuilding provides the most significant boost to GDP growth. Later in the cycle, house price growth matters more. The effects of housing activity on real GDP and unemployment during economic recoveries are derived based on simulations of the Moody's Analytics U.S. macroeconomic model. Unemployment is 8.1% and the full-employment unemployment rate is estimated to be 5.7%.

⁶ There is ample literature with regard to the wealth effect. For a description of our estimates and how they are incorporated into the Moody's Analytics model of the U.S. economy, see Mustafa Akcay, "The Wealth Effect," *Regional Financial Review*, November 26, 2008.

The massive losses suffered by lenders and investors on residential mortgage loans and securities also remain a significant impediment to the financial system, which is struggling to provide the credit needed for a strong economy. Since the housing crash began, losses of more than \$900 billion have been recorded on mortgage loans (see Table 1). While private label mortgage securities and loans held by depository institutions accounted for a third of mortgage credit outstanding at the peak of the housing bubble, they account for more than one half of the subsequent losses. The other third involve mortgages owned or insured by government institutions, including Fannie Mae, Freddie Mac and the Federal Housing Administration. Losses continue to mount, and who ultimately will bear them is still being sorted out in lawsuits and legal negotiations. Until these disputes are settled, mortgage and other kinds of credit will not flow freely.

Table 1: Residential Mortgage Loan Realized Losses

\$ bil

	2006	2007	2008	2009	2010	2011	2006-2011	Share of Losses
Total	17.3	45.4	181.8	305.0	198.8	167.4	915.7	100.0
Government Backed	7.4	13.9	55.0	113.8	57.9	53.1	301.2	32.9
Fannie Mae & Freddie Mac	1.1	8.1	47.3	103.4	43.8	38.2	241.9	26.4
<i>Fannie Mae</i>	0.8	5.0	29.8	73.5	26.6	27.5	163.3	17.8
<i>Freddie Mac</i>	0.3	3.1	17.5	29.8	17.2	10.7	78.6	8.6
Federal Housing Administration	6.3	5.9	7.6	10.5	14.1	14.9	59.3	6.5
Privately Backed	9.9	31.5	126.8	191.1	140.9	114.3	614.5	67.1
Depository Institutions	2.7	7.3	35.0	54.9	48.2	35.3	183.4	20.0
Private Label Mortgage Securities	7.2	24.2	91.8	136.2	92.7	79.0	431.1	47.1
<i>Subprime</i>	5.6	15.4	55.9	71.5	38.9	34.7	222.1	24.3
<i>Alt-A</i>	0.2	0.9	10.8	27.5	23.8	20.3	83.4	9.1
<i>Option ARMs</i>	0.0	0.2	5.1	17.8	17.4	14.5	55.0	6.0
<i>HELOC</i>	0.2	1.5	5.1	5.1	3.4	2.1	17.4	1.9
<i>Jumbo</i>	0.0	0.0	0.3	1.9	3.1	3.7	9.1	1.0

Note: Total of private label mortgage securities includes securities not in components shown in the table.

Sources: Fannie Mae, Freddie Mac, HUD, FDIC, Federal Reserve Board, Moody's Analytics

Falling house prices have also had a potentially serious impact on labor mobility. The ability and willingness of U.S. households to move in search of jobs has enabled the U.S. economy to adjust after past recessions. Regions with high unemployment experience outmigration to regions where the job market is stronger. This allows the nation's unemployment rate to fall more quickly in recoveries and for the economy to return to full employment. Labor mobility has historically been higher in the U.S. than in Europe, where households are less inclined to move. This is one reason the U.S. has been able to adjust more quickly during downturns. Negative home equity currently impedes this mobility, making it more difficult for households to sell their homes. Econometric evidence suggests that between 2006 and 2011, nearly 1 million fewer households have moved than would have done so in normal times (see Appendix, Table 1). The problem isn't overwhelming—some 17 million U.S. households did move during this period—but it bears close watching (see Table 2).⁷

⁷ This is based on gross migration flow data available from the Internal Revenue Service and derived from address changes on taxpayers' returns.

Table 2: Homeowners Locked in Their Homes Because of Negative Equity

	2007	2008	2009	2010	Total	Share of Labor Force 2010
United States	120,032	200,384	349,963	316,297	986,675	0.64%
Alabama	1,620	1,958	2,696	2,408	8,682	0.40%
Alaska	379	533	842	634	2,389	0.66%
Arizona	1,772	6,720	18,283	18,600	45,375	1.46%
Arkansas	1,286	1,615	1,863	1,546	6,311	0.47%
California	8,444	28,547	56,599	45,659	139,249	0.76%
Colorado	4,877	7,339	10,192	8,822	31,230	1.15%
Florida	8,952	24,467	55,545	47,013	135,977	1.49%
Georgia	4,854	8,882	17,133	17,933	48,802	1.04%
Hawaii	1,221	1,545	1,825	2,047	6,638	1.02%
Idaho	579	963	2,027	2,408	5,977	0.78%
Illinois	4,986	8,279	15,364	15,015	43,645	0.66%
Indiana	3,877	4,817	6,404	5,338	20,435	0.64%
Iowa	1,265	1,360	1,378	1,289	5,293	0.32%
Kentucky	1,638	1,815	2,500	2,274	8,227	0.40%
Louisiana	5,572	2,249	2,279	2,453	12,552	0.61%
Maryland	3,523	6,643	8,855	6,552	25,573	0.84%
Michigan	4,732	9,424	18,211	13,947	46,313	0.98%
Minnesota	1,682	2,689	4,921	3,840	13,131	0.44%
Mississippi	997	1,124	1,283	1,298	4,700	0.36%
Nebraska	1,044	1,089	1,156	984	4,273	0.43%
Nevada	1,970	6,002	20,718	20,654	49,344	3.56%
New York	6,772	8,804	12,610	10,506	38,693	0.40%
North Carolina	5,815	7,324	8,604	8,495	30,238	0.66%
Ohio	5,676	7,928	14,134	13,405	41,143	0.70%
Oregon	1,543	2,395	3,990	4,015	11,943	0.60%
Pennsylvania	4,560	5,068	6,414	5,119	21,161	0.33%
South Carolina	3,038	3,527	4,889	4,697	16,151	0.75%
Tennessee	4,156	5,157	6,658	6,034	22,005	0.71%
Texas	13,114	14,154	15,700	14,831	57,799	0.47%
Utah	1,386	2,043	3,114	3,210	9,753	0.72%
Virginia	3,937	9,023	13,022	14,163	40,145	0.94%
Washington	3,097	4,826	7,511	7,713	23,146	0.66%
Wisconsin	1,667	2,076	3,244	3,394	10,382	0.34%

Sources: Internal Revenue Service, Moody's Analytics

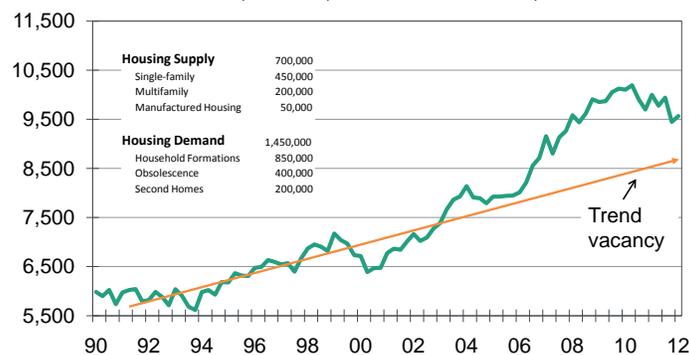
Even as the worst of the crash appears to be over, housing continues to grapple with big problems, including a glut of vacant homes and a mountain of properties in or approaching foreclosure. Some housing markets across the country also remain overvalued—house prices remain high relative to incomes and effective rents. With so many home loans deeply under water, risks remain uncomfortably high that the vicious cycle of foreclosures and price declines that ravaged the economy during the Great Recession will begin again. Aside from the European sovereign debt crisis, there is arguably no more serious immediate threat to the U.S. recovery than the troubled housing market. Moreover, until house prices are consistently rising in most of the country, the recovery will not evolve into a self-sustaining economic expansion.

Overbuilding

The rampant overbuilding of the bubble years remains a significant impediment to a housing rebound. While builders have slashed construction and have made progress working down inventory, the market still struggles with excess vacant homes; we estimate just about 1 million are either for sale, for rent, or being held off the market (see Chart). This is the difference between the 9.6 million vacant homes measured by the Census Bureau's Housing Vacancy Survey and the estimated number of vacancies—around 8.6 million—that would be consistent with a well-functioning housing market.⁸ At current levels of supply and demand for new houses, it would take until the 2013 spring selling season to work off this excess inventory.

Glut of Vacant Homes

Vacant homes for sale, for rent, and held off market, ths



Sources: Census Bureau, Moody's Analytics

There is some evidence that the situation may not be quite as bad as these numbers suggest. It is unclear how well many vacant properties are being maintained, especially in heavily overbuilt markets such as Florida and California's Central Valley. Such houses may be uninhabitable without significant renovation. Moreover, the excess inventory problem is regionally concentrated. Atlanta, Florida, Nevada, Arizona, and the Central Valley are awash in vacancies; elsewhere the inventory problem is much less pronounced and will thus be resolved sooner.⁹

Demand and supply will not improve simultaneously, moreover. It is likely that demand for vacant homes will pick up more quickly than will new construction. The principal driver of demand is household formation, which has been depressed recently because of the weak job market. With fewer job opportunities, young people have been staying in school; labor force participation has fallen

⁸ The trend amount of vacant housing units is determined based on the average rental and homeowner vacancy rate between 1990 and 2003, prior to the housing boom.

⁹ The Census Bureau's Housing Vacancy Survey may also overstate the problem. Recent data from the 2010 census suggest there are fewer rental vacancies than the survey implies. The survey is based on a sample that, given the Census 2010 data, appears to be biased.

among those 16 to 29 years old. While the data here are sketchy, it appears that household formation slowed to an annualized pace close to 300,000 at its low point in early 2010. It has picked up over the past year to closer to 850,000 per year; this has fueled a surge in rental absorption but is still well below the 1.25 million households expected to be formed each year in a well-functioning economy.

As the job market comes back to life and young people go to work, household formation should accelerate. Many have remained in their parents' homes longer than in normal times; this should be reversed in the next year or two. Formations later in this decade could rise well above the 1.25 million expected in a typical year.

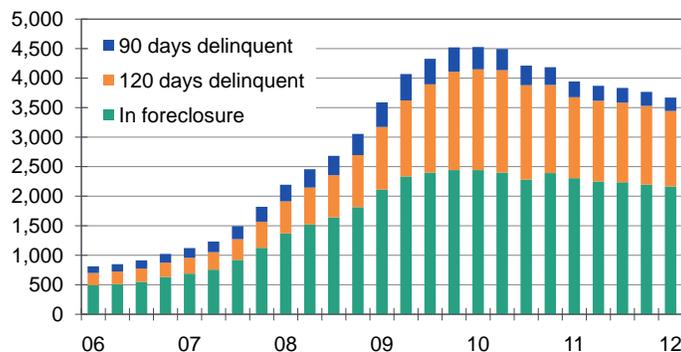
Still, housing construction is unlikely to ramp up quickly. Even as demand revives and the inventory of vacant homes is worked down, it will take time for builders to obtain construction and land-development loans from banks, many of which are still absorbing the poor loans they made during the bubble. It also will take time for builders to ramp up new-home construction, a process that includes acquiring land, obtaining permits, and moving equipment on site. Multifamily construction is already reviving thanks to stronger absorption, falling vacancy rates, rising rents, and more ample credit, but even under the best of circumstances, single-family home construction won't be back to full strength until the middle of the decade.

Shadow inventory¹⁰

A more serious threat is the huge number of first-mortgage loans stuck in foreclosure or more than 90 days delinquent. As of the first quarter of 2012, 3.6 million loans (out of 49.5 million outstanding) were in this predicament (see Chart). Most will end up in foreclosure or in a short sale over the next 12 to 24 months, pushing house prices lower.

A Mountain of Distressed Properties

First mortgage loans, this



Sources: Equifax, Moody's Analytics

The key to house price changes in the current environment is the change in the share of home sales that involve distressed properties. Prices will fall when the share rises, stabilize when it peaks, and rise when it declines. It is important to note that house prices will rise if the share of distress sales declines, even if the share remains elevated—as it will for a number of years, given the large number of very troubled properties.

The share of distress sales is likely to rise and house prices to fall further now that the nation's largest mortgage servicers and state attorneys general have resolved their legal issues arising from the robo-signing scandal and other process issues. These issues

¹⁰ Shadow inventory is defined here to include properties in the foreclosure process or in late-stage delinquency and likely to end up in foreclosure in the near future. It does not include properties whose owners have only delayed selling because of the tough market. These properties, when they eventually do come on the market, are unlikely cause prices to fall further, but they could keep prices from rising rapidly even as the share of distressed properties falls.

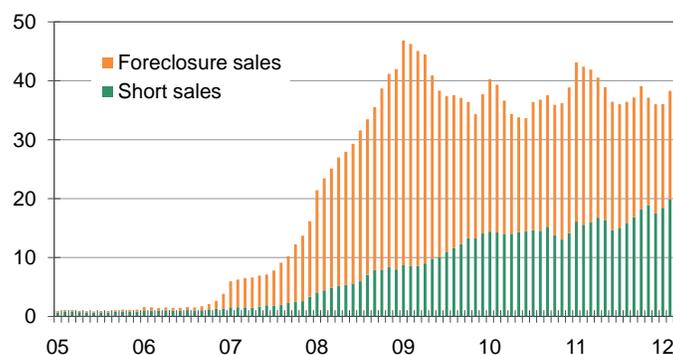
significantly slowed the pace of foreclosures and distress sales since late 2010. Little progress has thus been made reducing the number of troubled loans. With the lawsuit now settled, the foreclosure process is likely to gear up again, resulting in more distress sales and more house price weakness later this year and early next.

However, any house price declines should be limited. Sturdy investor demand for distressed properties will limit the declines, particularly in the hardest-hit markets. Prices have already fallen so sharply in Atlanta, much of Florida, Nevada, and Arizona that investors can purchase distressed properties and profitably rent them out. Many of these markets actually appear undervalued when current prices are compared with household incomes and effective rents. Unlike the house flippers who sought quick profits during the bubble, today's investors in distressed property seem willing to hold on. They include both individuals and institutions with investment horizons of more than a few years.

It is also encouraging that there are more short sales than foreclosure sales for the first time since the housing crash began. Short sales generally involve a discount of no more than 15% of the price in similar nondistress sales. This compares with a discount of more than 20% for foreclosure sales. According to LPS Analytics, short sales accounted for nearly one-fourth of total home sales in early 2012, while less than one-fifth of home sales were foreclosure sales (see Chart). Mortgage owners are increasingly comfortable doing short sales given the relative stability in house prices; they have a better sense of value and thus feel more sure they will not be defrauded. They are also increasingly experienced at conducting short sales, which involve as much art as science.

Short Sales Surpass Foreclosure Sales

Share of total home sales, %



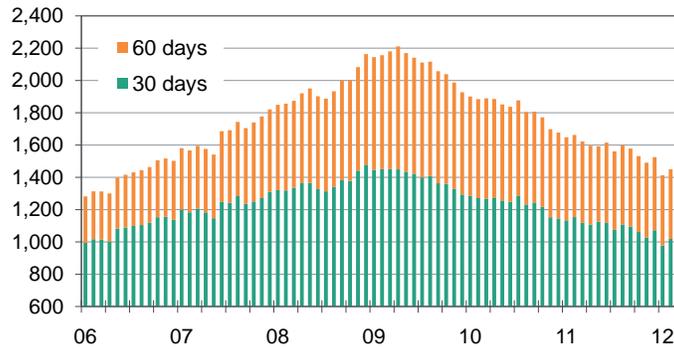
Sources: LPS Analytics, Moody's Analytics

Prices for nondistressed homes are also holding up better than they did earlier in the foreclosure crisis, according to CoreLogic and FNC. Many distressed properties may be in less desirable areas and no longer in direct competition with nondistressed properties. This suggests that damage to homeowners' wealth will be less severe, with less economic fallout.

The flow of mortgage loans entering foreclosure should also begin to slow soon, since fewer troubled loans are in early stages of delinquency. The number of first mortgage loans between 30 and 90 days delinquent is falling quickly (see Chart). The number of 30-day delinquent loans hasn't been this low in almost two decades. This reflects a better job market and tighter underwriting standards since the recession. Mortgage loans originated during the past several years are of excellent quality.

Early-Stage Delinquencies Falling Fast

First mortgage loans 30 to 60 days delinquent, ths, SA



Sources: Equifax, Moody's Analytics

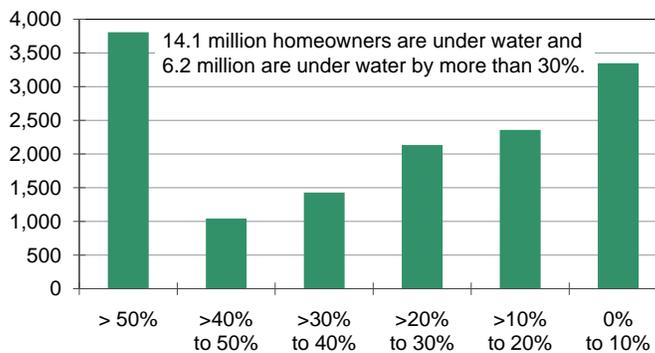
Vicious cycle

Notwithstanding the optimism that any future house price declines will be modest, risks that they will be more severe than anticipated are too high. With so many underwater homeowners, it wouldn't take much to revive the vicious cycle that roiled the housing market and economy during the Great Recession: Falling prices pushed more homeowners under water, prompting more mortgage defaults and more distress sales and thus more price declines.

With an estimated 14.1 million homeowners under water, almost half by more than 30%, this is a real possibility (see Chart).¹¹ Negative equity is especially concentrated in Nevada, Arizona, California, Florida, Ohio and Michigan (see Chart). Adding to the concern, the average underwater mortgage exceeds the market value of the underlying property by nearly \$50,000. It would not take much to induce many homeowners in this situation to walk away; a leaky roof or broken air conditioner might be sufficient, particularly if rental housing is available nearby for less than the cost of the mortgage.

Millions Are Deeply Under Water...

Number of underwater homeowners, ths, 2011Q4

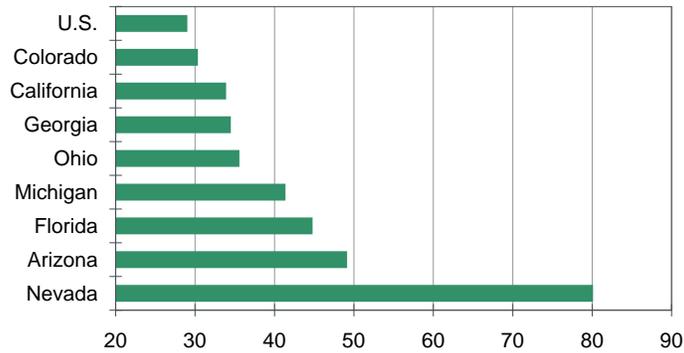


Sources: Equifax, Moody's Analytics

¹¹ CoreLogic estimates there are closer to 11 million underwater homeowners. The Moody's Analytics data are based on actual mortgage debt outstanding from Equifax credit files, while CoreLogic's estimate is based on debt outstanding at origination. The Moody's Analytics estimate of negative equity is nearly the same as CoreLogic's in California, much lower in Florida, and higher most everywhere else. CoreLogic may have some difficulty measuring debt outstanding in rural or exurban areas where homeowners generally have little equity even in good times (since house prices there do not rise much) and go into small negative-equity positions in difficult times. The Moody's Analytics estimate is much higher in Texas, for example. CoreLogic data are also unavailable for a half-dozen states.

...Particularly in These States

Underwater homeowners, % of first mortgages, 2011Q4



Sources: Equifax, Moody's Analytics

With so many homeowners deeply under water, the specter of strategic default remains high. That is, homeowners may abandon their mortgage obligations even if they are financially capable of making the payments. Despite the adverse effect of default on one's credit history and the social stigma associated with failing to honor a debt obligation, some choose to default anyway, believing the benefits outweigh the costs.

There are various ways to identify the volume of strategic defaults in the data. One is to define a strategic defaulter as a borrower who is delinquent on a mortgage but has no other credit obligation.¹² Close to a fifth of defaults in recent years have been strategic according to this definition. Another approach is to use survey data to gauge the propensity to default.¹³ This method identifies one-fourth of defaults as strategic. Not surprisingly, the more deeply under water the borrower, the greater the propensity to strategically default. Homeowners under water by more than 50% are more than three times more likely to default than homeowners that are under water by less than 10%.

Decisions to default depend critically on expectations about future house prices. If homeowners think prices will rise, they are more likely to hold on; if they believe prices will decline further, they are more likely to give up. This can quickly become a vicious cycle, as occurred during the depths of the recession.

Only a massive policy effort broke that cycle. The federal government put Fannie Mae and Freddie Mac into conservatorship, and the FHA aggressively expanded its lending. Today, the federal government originates more than 90% of all new mortgages. In addition, conforming loan limits were increased, and three rounds of housing tax credits were enacted as part of the federal fiscal stimulus. The Federal Reserve purchased \$1.25 trillion in mortgage securities as part of its quantitative easing initiative, which brought mortgage rates down. The government also took part in the mortgage-loan modification effort via the Home Affordable Mortgage Program and encouraged mortgage refinancing via the Home Affordable Refinancing Program.

Although various elements of this policy response may warrant criticism, it is important to remember that the effort was devised and implemented quickly, under extreme circumstances. Moreover, in its totality, the policy response worked: The housing market stabilized beginning in 2009. Yet, if housing were to begin another dark cycle, the policy response would not be nearly as aggressive. There is little political appetite for another big-government intervention in the economy, particularly given Washington's precarious fiscal situation.

¹² See Experian-Oliver Wyman Market Intelligence Report: Understanding Strategic Default in Mortgages, Part I.

¹³ See Luigi Guiso, Paola Sapienza and Luigi Zingales, "The Determinants of Attitudes Towards Strategic Default on Mortgages," forthcoming Journal of Finance. http://www.kellogg.northwestern.edu/faculty/sapienza/htm/Guiso_Sapienza_Zingales_StrategicDefault.pdf

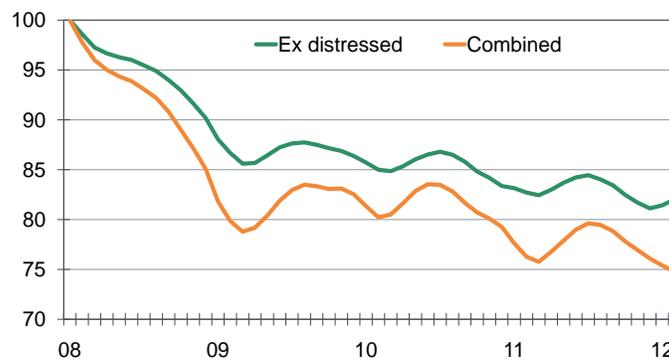
III. Foreclosure threat to the economy

Since World War II, house prices have tended to significantly affect foreclosures, but not the reverse; foreclosures have historically made little difference for house prices. This changed in the recent downturn because of the sheer volume of foreclosures. Indeed, foreclosures and short sales are among the most important near-term influences on the direction of house prices. The combination of rising distress sales, falling house prices, and weak job growth has severely hampered the economic recovery. The large overhang of distressed properties thus clouds the outlook for housing and the broader economy.

Several factors govern the relationship between house prices and distress sales. A distressed home, particularly a foreclosure, is discounted when sold because it is often in poor condition and thus less valuable than a comparable nondistressed home (see Chart). Empty, foreclosed homes are subject to vandalism or may have been damaged or poorly maintained by the former homeowner. The average discount on foreclosure sales peaked in mid-2008 at more than 25% (see Chart). Typically, discounts on short sales are smaller than discounts on REO sales. There is usually a buyer ready to purchase the home in a short sale. Additionally, the seller often still lives in the home and thus the home is better maintained than an REO.

House Prices Are Depressed by Distress Sales

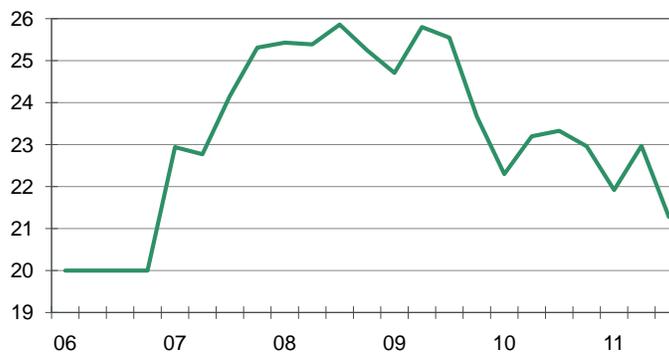
House price index, single-family homes, Jan 2008=100



Sources: CoreLogic, Moody's Analytics

REO Discount Big, but Shrinking

Discount for a REO sale, %



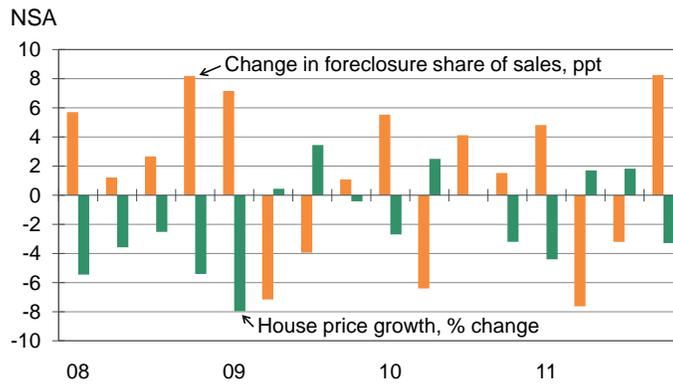
Sources: LPS Applied Analytics, Moody's Analytics

When distress sales dominate the market, prices of nondistressed houses are also depressed. Buyers are wary of purchasing in areas with a large number of foreclosures. The blighted neighborhood thus becomes a characteristic of a nondistressed house that reduces its value. A large number of foreclosures also means there is a large stock of vacant homes that weighs on prices of all types of houses.

Historically, distress sales have had little impact on measured house prices. Sale prices on individual distressed properties are discounted and might even have weighed on sale prices of a few nearby nondistressed homes, but aggregate measures of home prices were unaffected. The volume of distress sales was simply too small relative to normal home sales to have much impact on prices.

However, this changed dramatically in the past few years as the share of foreclosures and short sales surged to more than one-third of total home sales. As the share of distress sales increased, they came to dominate changes in house prices. A rising share of distress sales now results in a decline in house prices and a falling share results in price appreciation (see Chart).¹⁴ This relationship is also evident when examining house price changes across metropolitan areas (see Chart).

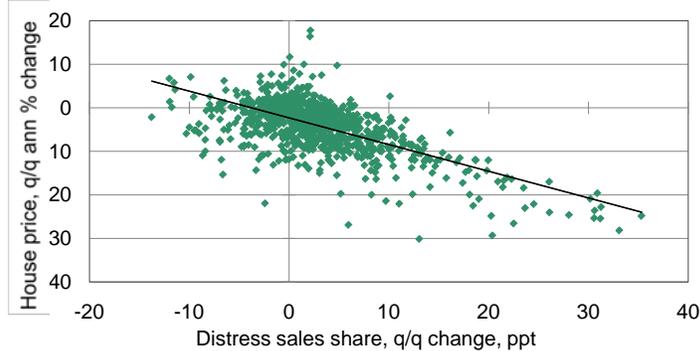
More Foreclosures...Weaker House Prices



Sources: CoreLogic, Moody's Analytics

House Prices Inversely Correlated With Distress

Metropolitan areas, 2007Q1 to 2011Q4, NSA



Sources: CoreLogic, Moody's Analytics

¹⁴ The strength of this relationship varies depending on the house price measure. It is particularly strong in repeat-purchase house price indexes such as those reported by Case-Shiller, LPS Analytics, and CoreLogic that include distress sales in their calculations.

Model of house prices

The importance of the distress share of home sales is captured in Moody's Analytics model of house prices.¹⁵ Metropolitan area house prices are determined in two stages. In the first stage, the so-called equilibrium house price is estimated. The equilibrium price is closely tied to household incomes and effective rents, and abstracted from the business and credit cycles. The second stage determines the adjustment process by which actual house prices return to their long-run equilibrium given changing business and credit conditions.

In the long term, house prices are most closely tied to household incomes and effective rents. Other factors that affect this relationship are nonhousing household wealth; population growth; the age and ethnic composition of the population; regulatory conditions and permitting requirements; structural changes in lenders' underwriting standards; consumer preferences; and the long-run, risk-adjusted return to housing and other household assets (see Appendix, Table 2).

The most important explanatory variable in the equilibrium house price equation is real per capita income. On average, a 100-basis point increase in real (after-inflation) per capita income leads to an equivalent increase in real house prices. Income changes have a slightly larger impact on house prices in coastal markets than in noncoastal markets. Because of geographical constraints in the coastal markets, stronger income growth may drive up demand more quickly than supply, hence driving up house prices more rapidly.

Equilibrium house prices are also affected by shifting mortgage lending standards. The housing bubble saw rapid growth in subprime and alternative-A mortgages, interest-only and option ARMs, along with second liens and home-equity lines of credit. This lending significantly expanded the availability of mortgage credit to households that did not previously have access to any type of credit. As the bubble burst, the lending landscape shifted abruptly and a credit crunch took hold, undermining demand for housing. Lending standards are proxied in the equilibrium equation by an average of the loan-to-value ratio of mortgage originations and the adjustable mortgage share. The higher the share, the looser the lending standards. On average, a 100-basis point increase in this measure generates a 60-basis point increase in equilibrium house prices.

The collapse in stock prices and the plunge in short-term interest rates in the early 2000s made housing an attractive alternative investment. Households were rationally attracted by higher risk-adjusted returns to housing compared with the risk-adjusted returns on stocks and cash. Since the bust, falling house prices have created the reverse effect. The returns to housing are measured in the equilibrium house price equation by the difference between the risk-adjusted returns on stocks and cash, weighted according to their share of assets in the average household portfolio and the risk-adjusted return on housing. The risk-adjusted return is measured by a Sharpe ratio, proxied by the ratio of a five-year moving average of returns to the standard deviation of those returns.¹⁶ On average a 100-basis point increase in the risk-adjusted return to stocks and cash results in a 75-basis point decline in equilibrium house prices.

The age composition of the population also affects equilibrium house prices, as people age 50 to 64 tend to have stronger demand for second and vacation homes. As the large baby-boom generation has moved into this age bracket, demand for second and vacation homes has risen significantly, lifting prices. This effect is captured in the equilibrium house price equation by the share of housing stock in second and vacation homes interacted with the share of the population age 50 to 64. A 100-basis point increase in the share of the population 50 to 64 lifts equilibrium house prices by an average of 60 basis points.

¹⁵ Moody's Analytics has modeled and provides forecasts for metro area and national house prices based on the Fiserv Case-Shiller, FHFA and Realtors' gauges of median house prices. Of the three, the Fiserv Case-Shiller is the most accurate and comprehensive measure.

¹⁶ Alternative moving averages were tested. A five-year moving average provides the best statistical results.

A population-growth variable is included in the equilibrium equation to capture the strength of migration flows, both domestic and international, into the various regions. Migration and population are likely to increase in coming years, with continued foreign immigration and more importantly, increased retiree migration among aging baby boomers.

Finally, the user cost of housing is included in the equilibrium equation. The user cost measures the after-tax cost of homeownership and is computed using the mortgage interest rate, the marginal income tax rate, the property tax rate, and house price expectations. The higher the user cost, the lower house price growth. House price expectations are proxied by consumer price inflation. The coefficient on this term has the correct sign, although its statistical significance is low. This weakness likely results from the fact that in recent years exceptionally low mortgage rates have driven down the user cost, yet house prices have fallen. Additionally, using consumer price inflation as the measure of house price expectation overstates expectations since the housing correction began.

The equilibrium equation is estimated using pooled cross-sectional estimation with metro-specific fixed effects in order to capture any systematic differences in the average quality of housing across areas. The fixed effects also capture the impact of those land supply constraints that do not vary over time.¹⁷ In order to capture broad regional differences in the response of house prices to the explanatory variables, the metro areas included in the estimation were grouped into metro areas situated along the coast and Great Lakes and noncoastal areas.¹⁸ The coastal and noncoastal dummy variables were interacted with each of the explanatory variables to pull out the different responses of areas that face tighter building constraints as a result of geographical location, and are thus more susceptible to housing cycles.

The residuals from the equilibrium equation provide an estimate of the overvaluation or undervaluation of metro area house prices relative to their long-run equilibrium. Overvaluation and undervaluation can be due to temporary business cycle forces, speculation or both.

The house-price model also accounts for short-term business cycle dynamics that explain departures from the estimated long-run equilibrium house price. Business cycle drivers of housing demand include the unemployment rate and the distress share of home sales. The adjustment process from the short to the long run is captured by time series terms that capture the tendency for house prices that have been rising or falling to continue rising or falling, as well as the tendency for prices to revert to their long-run equilibrium if they have departed from this trend for long. The larger the difference between the equilibrium house price and the actual price, the greater the reversion back to equilibrium.

The adjustment house price equation determines how house prices that deviate from their long-run equilibrium ultimately return to that equilibrium. The fitted values from the long-run equilibrium house price equation are thus an important explanatory variable in the adjustment house price equation (see Appendix, Table 3). A 100-basis point increase in the contemporaneous change of the long-run equilibrium price will result in an 8-basis point increase in house prices. This response is measurably smaller than that found in other studies and may reflect the unique housing market conditions of recent years, when factors other than long-term drivers, such as mortgage foreclosures and government housing policy, have been at play.

House prices lagged one quarter are also included in the adjustment equation, reflecting the persistence of house price changes. House price persistence is marginally stronger in the coastal areas, reflecting the greater potential for speculative pressures to develop in these markets. A 100-basis point increase in the house price one quarter ago will result in a 40-basis point increase in the current house price.

¹⁷ F-tests of the metro area effects reject that these effects are zero at the 0.001 confidence level. Similar tests for time effects were not found to be significant.

¹⁸ Glaeser, Edward L., Gyourko, Joseph, and Saiz, Albert, 2008 "Housing Supply and Housing Bubbles," NBER Working Papers 14193, National Bureau of Economic Research, show that metro areas in the U.S. located within 80 kilometers of the coast or the Great Lakes tend to feature supply-side constraints that produce larger and more frequent housing bubbles. The coastal dummy is an attempt to capture the inherent similarities of coastal and Great Lakes housing markets.

The mean reversion term captures the tendency of house prices to revert to their long-run fundamental values and is calculated as the difference between the equilibrium house price and the actual house price. Thus, for example, if this term is positive—that is, actual house prices are below equilibrium—then price growth will be faster.

The principal business cycle variable included in the adjustment equation is the unemployment rate. The higher the unemployment rate, the slower real price growth. The direct impact of the joblessness rate on the adjustment to equilibrium, however, is small relative to that of serial correlation and mean reversion.

The inclusion of a measure of distress sales in the house price model also helps to explain and predict prices. An increase in the distress share will lead to a more pronounced decline in house prices, and the impact will persist for nearly one year. Over this period, a 100-basis point increase in the percent of distress sales will result in a 32-basis point decline in house prices, with the coastal metro areas feeling the impact slightly more. Thus, nearly 10 percentage points of the 34% decline in the Case-Shiller house price index from its peak in early 2006 can be attributed to the 30-percentage point increase in the distress share of home sales.

It is notable that house prices are currently about 10% undervalued relative to equilibrium. Thus, the surge in distress home sales has been instrumental in causing prices to overshoot their long-run equilibrium. Even this calculation likely understates the case, as it does not account for the feedback mechanism between falling house prices, the job market, underwriting standards, and distress sales.

IV. Policies to reduce foreclosures

With housing and the economy still facing significant threats, and with policymakers unlikely to respond aggressively if another crisis breaks out, it would be sensible for policymakers to consider a number of modest additional steps now to make sure housing does not backtrack. The most effective policies to address the foreclosure problem vary according to the stage of the process. For the sake of brevity, we discuss one major policy action for each stage of the foreclosure process in this section.¹⁹

For loans that are current or in the early stage of delinquency (from 30 to 90 days behind), the government could help facilitate more mortgage refinancing. Mortgage loans in the late stage of delinquency (more than 90 days) would benefit from policies that support modifications. These loan adjustments can take many forms, ranging from interest-rate reductions to principal forbearance and forgiveness. For loans that either do not qualify for modification or fail to cure after receiving assistance, policy interventions could lower the chance that the loan will end up in REO inventory. And for properties already in REO, policies could promote conversion to rental use before they are sold and further depress house prices.²⁰



Mortgage refinancing

For mortgage loans that are current or in the early stage of delinquency, policymakers should act to substantially increase mortgage refinancing.²¹ This is a particularly propitious time for homeowners to refinance, as mortgage rates have fallen to record lows. The 30-year fixed mortgage rate for prime borrowers is below 4%, and likely to remain low for some time in light of the Federal Reserve's stated resolve to keep interest rates modest for several years. The central bank is also keeping open the possibility of additional quantitative easing, which would likely include purchases of more mortgage-backed securities by the Fed.

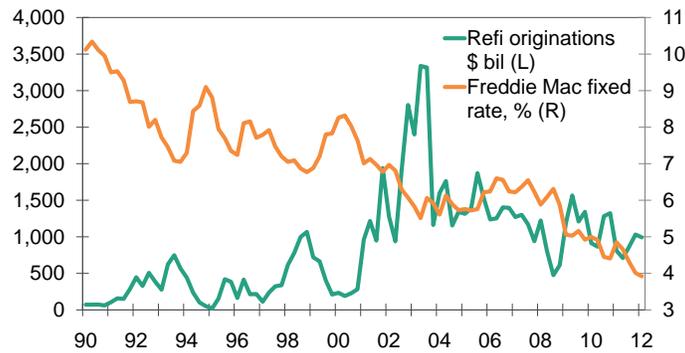
Despite record low borrowing costs, refinancing has been disappointingly slow. In 2003, when fixed mortgage rates were between 5.5% and 6%, home loans were being refinanced at an annualized rate above \$4 trillion. The current level is about one-fourth of that (see Chart). The 2003 boom was fueled by the large number of mortgages that had been originated when rates were much higher, making a sub-6% rate very attractive. Yet even today, about two-thirds of all outstanding mortgages carry coupons above 5%. Millions more U.S. homeowners should be refinancing, significantly cutting their monthly payments. This would be a boost both for individual household finances and for the economic recovery.

¹⁹ There are other proposals that are worth consideration, although they will likely take more time to develop and implement.

²⁰ The Federal Reserve's recent white paper on housing advocates similar steps. See "The U.S. Housing Market: Current Conditions and Policy Considerations," January 4, 2012. <http://federalreserve.gov/publications/other-reports/files/housing-white-paper-20120104.pdf>

²¹ Calls for policymakers to enable mortgage refinancing have steadily increased since late 2010. See Mark Zandi and Cristian DeRitis, "Restraining HARP: The Case for More Refinancing Now," Moody's Analytics Special Report, October 7, 2010. http://www.economy.com/mark-zandi/documents/HARP_100710.pdf

Rates Plunge, Refis Putter



Sources: MBA, Freddie Mac, Moody's Analytics

The Obama administration has worked since the introduction of the Home Affordable Refinance Program in mid-2009 to encourage refinancing among homeowners with little or negative equity, whose loans are insured or owned by Fannie Mae and Freddie Mac. Originally, the administration said HARP would allow 4 million to 5 million homeowners to reduce their interest rates to market levels. But so far, only about 1 million homeowners have refinanced using HARP, and fewer than 100,000 underwater homeowners have refinanced.

The disappointing results prompted the administration to unveil a number of important changes to HARP in late 2011. These included relaxed eligibility requirements, allowing borrowers with loan-to-value ratios higher than 80% to participate, streamlining the appraisal and underwriting process, getting most mortgage insurers to drop their recession rights, and requiring Fannie and Freddie to relax their reps and warranties. It has taken a few months for mortgage servicers and insurers to implement the new HARP rules, but the benefits have become more evident.²² Servicers appear to be particularly enthusiastic about the possibility of reducing their put-back risk.²³

In February 2012, the administration proposed even more aggressive steps to support refinancing, affecting all mortgage loans including those insured by Fannie, Freddie, the FHA and nongovernment lenders.²⁴ If implemented quickly, this proposal should boost refinancing, speeding the recovery in housing.

For Fannie and Freddie loans, the Obama administration proposes that the new HARP rules apply to all loans, not just those with LTV ratios higher than 80%, as is now the case. For FHA/VA loans, the administration is proposing that the FHA drop refinanced loans from the "compare ratio" process by which the performance of lenders is assessed (analogous to Fannie and Freddie's reps and warranties). For nongovernment loans, the administration is proposing that the FHA refinance the mortgage. The administration is also proposing that taxpayers pay closing costs when homeowners agree to loans of 20 years or less with monthly payments equal to those on their current loan. This would allow homeowners to build equity more quickly.

The administration's proposal would substantially increase the pool of homeowners eligible to refinance and remove impediments to more refinancing. Significantly reducing the put-back risk faced by lenders on refinanced loans would encourage lenders to

²² See Mark Zandi and Cristian DeRitis, "Improved HARP Will Expand Refinancing and Boost Recovery," Moody's Analytics Special Report, October 31, 2011. <http://www.economy.com/mark-zandi/documents/2011-10-26-Zandi-Improved-HARP-Will-Expand-Refinancing-Boost-Recovery.pdf>

²³ Put-back risk is the chance that Fannie and Freddie will require the servicer to take back a loan that was improperly originated. There is also a risk that mortgage insurers will rescind insurance on a poorly underwritten loan. The cost to servicers of having loans put back has been considerable.

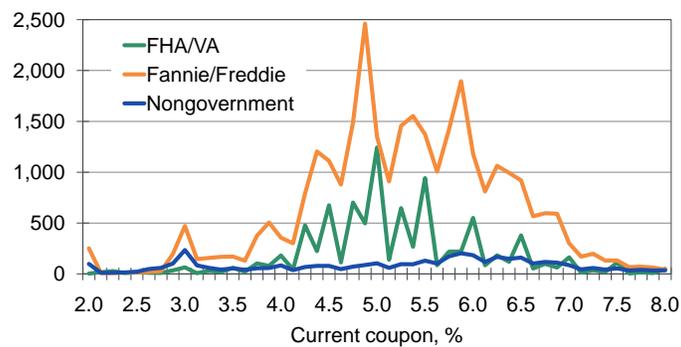
²⁴ A fact sheet describing the president's housing plan can be found at <http://www.whitehouse.gov/the-press-office/2012/02/01/fact-sheet-president-obama-s-plan-help-responsible-homeowners-and-heal-h>

aggressively compete for refinancing business. Lowering borrowers' closing costs would increase the incentive for them to participate as well.

Fully implemented, the administration's proposals would increase the number of homeowners eligible to refinance to nearly 27 million, covering about half of all loans outstanding (see Chart).²⁵ Of these loans, 7 million are FHA/VA loans, 18 million are Fannie/Freddie loans, and the remaining 2 million are nongovernment loans. The plan would affect all mortgage loans on owner-occupied single-family homes that have a current mortgage rate above 5% and have been current over the past six months. To qualify, borrowers would have to have been no more than one month past due in the prior 12 months, be within the conforming loan limits, and have a credit score above 580. There would be no restriction on when the loans were originated, unlike HARP's current limitation to loans originated before mid-2009.

Mortgage Loans Eligible for Refinancing

First mortgage loans, ths



Sources: McDash, LPS, Moody's Analytics

For all this, many homeowners would still not refinance. Yet under reasonable assumptions—including that mortgage rates remain near their current 4%—we estimate that the administration's proposal would result in 6.8 million more refinancings by the end of 2013.²⁶ That includes 3 million Fannie/Freddie borrowers, 2.5 million FHA/VA borrowers, and 1.3 million nongovernment borrowers.

There should be limited additional cost to taxpayers for the additional Fannie, Freddie and FHA/VA refinancing. As the FHA refinances loans of nongovernment borrowers, it will take on added credit risk, the cost of which would be borne by the financial industry under the administration's plan. Since the industry will likely oppose this, jeopardizing the overall effort, Congress could instead use some of the remaining \$20 billion in Troubled Asset Relief Program money set aside to address the housing crisis.

For the administration's efforts to be effective, the Federal Housing Finance Agency—Fannie and Freddie's regulator—will need to support the plan, and the FHA refinance plan for nongovernment borrowers will require legislation. The FHFA has reacted cautiously to this proposal and has demanded more time to study it, out of concern that it could require more taxpayer support for the agencies.²⁷ This argument is not without merit, although a cursory view of the data suggests the positive aspects significantly outweigh the negatives. While the agencies would lose some interest income on their \$1.2 trillion in mortgage securities and whole mortgage loans, under reasonable assumptions that would be offset by lower default rates on refinanced

²⁵ This is based on an analysis conducted by LPS using the McDash servicing database and the LPS-AA HPI.

²⁶ This is a very conservative estimate of the number of homeowners who will refinance, excluding all eligible Fannie/Freddie/FHA/VA borrowers with LTVs of less than 100% and nongovernment borrowers with LTVs less than 80%. The working assumption is that these borrowers have already had the opportunity to refinance and are thus unlikely to use the new programs.

²⁷ Taxpayers have already put almost \$200 billion into Fannie Mae and Freddie Mac since the agencies were put into conservatorship in September 2008.

loans. Borrowers are more likely to stay current if their monthly payments drop by \$100 or \$200. Indeed, under reasonable assumptions, Fannie and Freddie would break even if the probability of default on the loans and securities they own and insure falls by about 25 basis points.²⁸

The benefit to borrowers is meaningful. Assuming the average homeowner can refinance into a 4% fixed-rate loan, the gross saving from lower mortgage payments would come close to \$18 billion a year (6.8 million borrowers x \$140,000 average mortgage balance x 1.8% average rate reduction). This would provide a quick cash boost for mostly middle-income homeowners. Some would be used to repay other debt, but the bulk would likely be spent on home improvements or other needs. Assuming about three-fourths of the extra cash is spent during the year, real GDP will get a small but meaningful boost, adding 0.1 percentage point to growth this year.²⁹ The fragile U.S. recovery can clearly use all the help it can get.

More refinancing would also further the Federal Reserve's short-term goals. Monetary policymakers are considering a new round of quantitative easing—a process in which the Fed purchases long-term securities in an effort to bring down interest rates, including fixed mortgage rates. Indeed, the recent decline in mortgage rates is due in part to expectations that the Fed will resume quantitative easing. If it does, arguably the most significant benefit would involve increasing the pace of home-loan refinancing. Anything fiscal policymakers can do to support the Fed's efforts would be a plus.

While homeowners would clearly benefit from more refinancing and taxpayers would be largely unaffected, global investors in agency mortgage-backed securities would be hurt financially. As more loans are refinanced, higher-yielding MBS would be retired and replaced with lower-yielding MBS. To be precise, if a more effective HARP resulted in 6.8 million more refinancings, private investors would receive approximately \$11 billion less in annual interest income.³⁰

MBS investments are held by a wide array of institutions. Through its credit easing efforts last year, the Fed quickly became the largest owner of agency MBS, amassing \$1.25 trillion, or about a fourth of the total outstanding. The nation's central bank can easily absorb the lost interest income from increased prepayments, but this may put pressure on the Fed to be more aggressive in its quantitative easing efforts to forestall a counterproductive rise in mortgage rates. The interest rate spread between MBS and Treasury yields will increase regardless, but MBS yields need not rise if the Fed buys a sufficient amount of Treasury bonds.

Although other private MBS investors won't be happy to get their money back when interest rates are low, they were aware of this prepayment risk when they purchased their securities. Indeed, investors are likely surprised that their securities have not been retired already, as they would have been in a more normally functioning mortgage market. The updated HARP can thus be seen as a way to correct a serious market failure. It is also important to note that MBS investors have been significant beneficiaries of the monetary and fiscal policy response to the financial panic and Great Recession. The Fed's massive purchases of agency MBS during a previous round of quantitative easing was a windfall. Myriad federal policies aiming to stem foreclosures have also significantly benefited investors through reduced prepayments.

Policymakers may be nervous that overseas investors, who constitute a sizable and growing source of capital for the U.S. Treasury, will be annoyed by faster prepayments. Policymakers may also worry about implications for the financial health of the nation's depository institutions and pension funds, who also are big investors in agency MBS. While not unreasonable, these seem marginal concerns given the magnitude of the losses that will be widely distributed among investors.

28 The break-even change in the default rate equals the lost interest income divided by the product of the mortgage debt owned and insured and the loss from default, which is assumed to be 50% of the mortgage balance.

29 This assumes the proposed changes to HARP are implemented by early next year. The assumed spendout rate is consistent with that of the 2001 and 2008 tax rebates and the refinancing wave early in the last decade. See Jonathan Parker, et al "Consumer Spending and Economic Stimulus Payments of 2008," December 2009. http://finance.wharton.upenn.edu/~souleles/research/papers/ESP2008_v7b_results.pdf The spendout would likely be greater, given that homeowners will view lower mortgage payments as a more permanent increase in real incomes.

30 This excludes the interest income that would be lost by Fannie, Freddie, and the Federal Reserve.

Another potentially unwelcome side effect from more refinancing today could be less labor mobility in the future. Borrowers who lock in record low mortgage rates now will be less willing to move when rates start to climb. Considering that homeowners tend to be more skilled than renters, this impediment to labor mobility could aggravate the U.S. economy's current skills mismatch. However, it is difficult to know the scale of this consideration; it seems small against the sizable near-term benefit of a refinancing program. It is also worth noting that homeowners who switch from adjustable-rate to fixed-rate mortgages will be protected when interest rates ultimately rise.



90+ days
Delinquent

Mortgage loans in a later stage of delinquency may benefit most from a modification of their terms. At this stage, borrowers have indicated either an inability or an unwillingness to pay their mortgages. The objective of a modification is to reduce the number of loans going to foreclosure. Barring this, loan modification may still be beneficial to the lender and the broader market by reducing the rate at which foreclosures enter REO inventories to a more digestible pace.

Rate and term modifications

Payment plans are the most common type of assistance that servicers offer. They are most appropriate for borrowers who have fallen behind but who have the income and desire to become current over time. In these arrangements, servicers will allow borrowers to make larger than required monthly payments, so that a borrower can catch up over six to 12 months. For example, a borrower who has missed three payments may pay 1.25 times the monthly payment over the course of a year. In return, the servicer will agree not to require any additional interest or penalty charges.

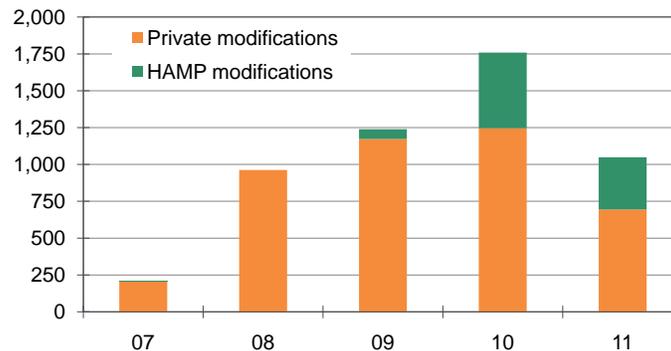
Borrowers who have experienced a permanent reduction in income may require a more significant modification to bring monthly payments down to an affordable level. Servicers may look to extend the remaining term on a borrower's loan to 30 or 40 years or reduce the contractual interest rate.

The Home Affordable Modification Program offers incentives to encourage servicers and holders of mortgage debt to modify these loans. The plan allows for interest rates as low as 2% and extensions of loan terms as long as 40 years in order to bring debt-to-income ratios down to levels that significantly reduce the probability of default. Operational difficulties and confusion regarding documentation requirements delayed the plan, which was introduced along with HARP in spring 2009. HAMP was to result in 2 million to 3 million loan modifications, but has so far produced closer to 1 million permanent adjustments.³¹ The number of new HAMP modifications has been declining, as at this point virtually all distressed loans have been considered for the plan and have received offers for modification if they are eligible (see Chart).

³¹ There have been nearly 5 million total modifications, including those done under HAMP, by the FHA and in the private sector since the modification effort began in earnest in 2007. HAMP has arguably facilitated more private modifications by requiring private servicers to invest in their own modification efforts. Hope Now provides the most comprehensive accounting of the modification effort. See: [http://www.hopenow.com/industry-data/2012-01-13-HOPENOW%20Data%20Report-\(November\)%20DraftV3.pdf](http://www.hopenow.com/industry-data/2012-01-13-HOPENOW%20Data%20Report-(November)%20DraftV3.pdf)

Modification Efforts Flag

Permanent modifications, ths, annualized



Sources: Hope Now, Moody's Analytics

The Obama administration has increased incentives for loan servicers to participate in the program, but ultimately participation is up to the borrower. Some borrowers may sensibly forgo participation if the lower payments reduce the likelihood of default only marginally, as any payments they make will be forfeited if they in fact end up in foreclosure.

Loan forbearance

Rate-term loan modifications have provided relief to some homeowners but may not provide enough incentive for borrowers with significant negative equity in their homes. Foreclosures may be avoided for these borrowers only if their outstanding principal payments are reduced.

With nearly three-fourths of all underwater homeowners still current on their mortgages, holders of mortgage debt are reluctant to shrink the balances owed for obvious reasons. However, creditors also recognize that failure to do so could result in larger losses. The major hurdle they face is moral hazard. That is, how can they identify those borrowers who will be able to pay whether or not their loans are reduced, and those who will be unable to pay without a principal reduction?

Loan forbearance offers a possible solution to this issue, although it may still not provide enough incentive to risk-averse borrowers. Under forbearance, the loan servicer will effectively delay payment on a portion of the outstanding principal for some specified time period or until the property is refinanced or sold. Forbearance buys time for the borrower to make payments at an affordable level by essentially gambling that home-price appreciation will restore equity over time.

Forbearance addresses the moral hazard problem, as the homeowner remains responsible for the entire outstanding balance. Nondistressed borrowers thus have little incentive to become delinquent in order to qualify. Only borrowers who are deeply committed to fulfilling their loan obligations and plan to stay in their homes a long time would accept the arrangement. As a result, complaints about providing distressed borrowers with undeserved benefits would be kept to a minimum.

Both lenders and servicers may find this process more tolerable than an immediate write-down of loan principal. For servicers, forbearance is easier to manage, as the owed balance on the mortgage note is unchanged. Lenders see a smaller capital impact with forbearance, as a probability that the total loan amount will eventually be repaid remains. As a result, lenders can provide forbearance, rather than write down principal, for more borrowers at equal cost.

However, loan forbearance may not provide enough incentive for deeply underwater borrowers. Homeowners who are pessimistic about future house price growth may decide it is not in their interest to continue paying on a loan with little chance of recovering

their paid-in equity. For borrowers who have experienced a large reduction in income, lenders may not be willing to forbear or forgive enough principal to make the loan affordable.

A hybrid approach mixing loan forbearance and forgiveness may provide the best opportunity to reduce foreclosures among distressed borrowers. Servicers could offer forbearance plans initially and forgive principal over time for those borrowers who make payments, but whose income and/or house prices do not improve.³² Under this plan, a portion of borrowers' principal would be forgiven over the course of several years in return for making timely payments on the remaining balances.

Such an approach is not without precedent. The FHA's partial claims program as well as Fannie Mae's Homesaver Advance provided second liens to underwater and delinquent borrowers to cover negative equity and/or balances in arrears. These loans may be structured as long-term, interest-only loans with a 0% interest rate, so that the borrower is still responsible for the outstanding balance, but would not have to make payments until the home is sold or fully amortized.

Given the time and complexity of any new initiative at the FHA or government-sponsored entities, this approach should allow for relatively quick implementation. Once the second lien is in place, a portion could be forgiven every few years in return for timely payment on the borrower's remaining first mortgage. Such a program would require congressional approval for the FHA as well as sign-off from the FHFA for the GSEs while they remain under conservatorship.

Loan forgiveness

A more dramatic and costly step, but one with better odds of ending the housing crash quickly and definitively, would be to encourage substantial principal reductions. Principal write-downs have economic positives and negatives, but are a net positive if well designed. The main concerns are moral hazard and fairness. To deal with these, modifications must be well targeted, with clearly articulated eligibility requirements. A long vesting period and some type of clawback provision for future capital gains to guard against potential fraud would also be helpful.

HAMP was reworked in late 2010 to promote principal reduction modifications, but the change has accomplished little so far. Responding to this shortfall, the Obama administration proposes more changes to HAMP to increase eligibility and extend the program through 2013. More important, the new program would significantly increase incentives for servicers who modify mortgages by reducing principal. For every dollar that a servicer writes down, the Treasury will pay the servicer up to 63 cents. The president proposes paying for this out of the remaining \$20 billion in TARP money slated for housing.

This expansion of HAMP could be particularly effective given the settlement between state attorneys general and mortgage servicers concerning foreclosure process issues. This deal included a monetary settlement of \$25 billion, with as much as \$17 billion allocated to modifications, including principal reduction, of loans on the servicers' balance sheets.

For scale, suppose \$30 billion is allocated to principal reduction modifications, including those done via the new HAMP and the mortgage settlement. If the average amount of principal reduction per homeowner is \$30,000, then 1 million homeowners would benefit. This is approximately equal to the number of those who currently satisfy the following eligibility requirements:

- » Homes are owner-occupied.
- » Homes were bought before December 31, 2008.
- » The homeowner took no cash out in past refinancings.

³² This proposal shares some similarity to the Homeownership Vesting Plan proposed by Zandi (2010). http://www.economy.com/mark-zandi/documents/Homeownership_Vesting_Plan.pdf

- >> First mortgages are below conforming loan limits.
- >> Loan principal is reduced by no more than \$50,000.

Moreover, the modification would have to result in the following conditions:

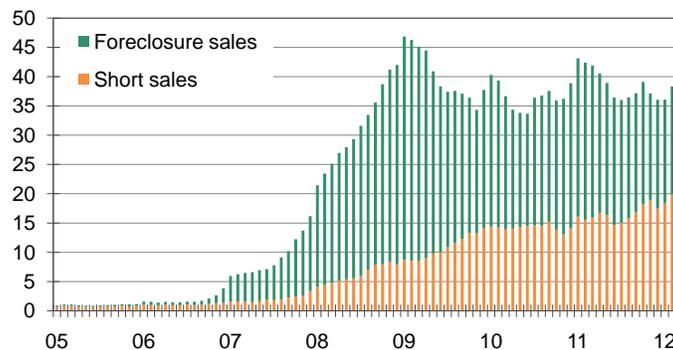
- >> The loan could be no more than 10% above the home's market value (to limit the probability of redefault).
- >> The "front-end" debt-to-income ratio (counting only housing costs) could not exceed 31%, and the "back-end" DTI ratio (counting all obligations) could not exceed 50%.

Assuming a redefault rate of 25%, this would result in almost 750,000 sustainable modifications.³³ Along with those that would take place in any event, this is about the number needed to forestall any further house price declines.

Without a successful modification plan in place, the share of distressed-property sales is expected to rise to almost half of home sales by late 2012 (see Chart). House prices will decline as the share of distress sales rises. But if a modification program is implemented soon, the share of distress sales will level off and house prices will stabilize.

Distress Share of Sales Threatens to Rise

Share of home sales, %



Sources: LPS Analytics, Moody's Analytics

In Foreclosure

Short sales and deeds-in-lieu

For loans that either do not qualify for a loan modification or fail to cure after receiving assistance, policy interventions may reduce the likelihood that the loan will complete the foreclosure process and end up in REO inventory.

A pre-foreclosure or short sale is typically a lower-cost alternative to an REO sale. Under a short sale, the current borrower markets the property and identifies a potential buyer. The potential buyer makes an offer that is typically less than the outstanding balance on the loan.

The lender weighs this offer against the attorneys' fees involved with foreclosing on the property, maintenance costs while the property is in REO inventory, marketing fees and broker's commission, and the potential future sales price at the end of the

³³ The redefault rate could be even lower since this is comparable to the redefault rate on HAMP modifications.

process. Given these costs, the uncertainty surrounding the time needed to sell the property, and the desire to minimize the number of properties in REO inventory, lenders will typically accept offers within 10% of the outstanding balance without hesitation. The larger the discount, the more time lenders will take to evaluate the offer.

The short sale is less damaging to the borrower's credit status than is a foreclosure. Lenders will typically allow borrowers who go through a short sale to take a mortgage in the future, while those who go through foreclosure can be barred from new mortgages for up to seven years. The social stigma attached to a short sale may also be less than with a foreclosure.

Lenders are reluctant to embrace short sales in light of the potential for fraud in non-arm's-length transactions. For example, an underwater borrower could arrange a short sale to a close relative who agrees to purchase the home at a reduced price and then return ownership to the original party after some time.

This potential for fraud, along with the sheer number of distressed properties, has led lenders to extend the time to consider and respond to short sale offers. Slow responses are hindering the market recovery in some instances.

If a short sale is not a possibility, borrowers may be encouraged to turn over any claims to their property in return for extinguishing any future obligation to repay their defaulted loan. So-called deed-in-lieu arrangements allow lenders to repossess properties without incurring the costs of foreclosure. Properties acquired through a deed-in-lieu transaction tend to have less physical damage than foreclosed properties, as borrowers are leaving willingly.

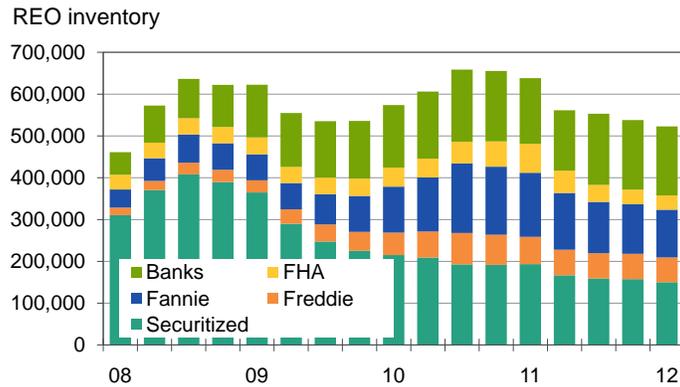
Short sales and deed-in-lieu arrangements can be encouraged as alternatives to foreclosure. Technology solutions to detect fraud could increase the speed with which lenders respond to short-sale offers. Mediation programs could be used to facilitate more deed-in-lieu arrangements and avoid foreclosure.



REO-to-rental and rent-to-own

Policymakers are also rightly focused on converting more distressed properties to rentals. Reducing the number of distressed properties for sale will support house prices. The number of properties classified by banks as "other real estate owned"—the last stage of the foreclosure process before a distress sale—has declined over the past year, but only because the robo-signing scandals that hit in late 2010 significantly slowed foreclosures (see Chart). Now that a settlement has been reached, foreclosures are expected to pick up again, and thus REO properties and the distress share of home sales will rise in coming months. Converting more REO properties to rentals will mitigate this increase and slow further house price declines.

REO Inventory Remains High



A key to doing this is getting private investors and property managers involved. Investors show healthy interest in buying distressed properties for rental, fueled by falling house prices alongside a sharp increase in rents. Given strong rental absorption and very weak construction of rental space, rents are rising at a sturdy mid-single-digit pace, and are at levels that can cover investors' costs while they wait for properties to appreciate. Most investors are not flippers looking for quick profits—considering the state of the housing market, this wouldn't be a winning strategy—but have investment horizons of three to seven years. Such investors would likely be willing to rent properties purchased from Fannie, Freddie and the FHA for at least several years, selling them after house prices begin to rise again.

It is important to note that many investors live in the neighborhoods where they are buying. Many have also bought with cash, because of the scarcity of mortgage financing. Institutional investors are also participating, but so far have been cautious and selective in their purchases.

The Obama administration recognizes that converting REO properties to rentals is a potentially productive way to help the housing market. During the summer, administration officials asked various housing market participants to help design an REO-to-rental program. As part of the president's recent housing initiative, the FHFA announced it would prequalify investors to bid on Fannie and Freddie REO-to-rental transactions. The hope is that more initiatives will soon come to fruition.

It is also important for the FHFA to fully embrace this process. Fannie and Freddie have historically not engaged in bulk foreclosure sales to investors or entered into agreements with property managers. For them to successfully do so requires the blessing of the FHFA and significant investment. Even then, Fannie's and Freddie's lack of experience in this area is among the most notable impediments to success.

One way to significantly increase investor interest in purchasing REO properties is to allow buyers to expense their investments up front for tax purposes. This is the same benefit granted last year to businesses for investments in equipment and software. Giving investors a small tax break should boost demand, supporting prices for distressed homes and the housing market in general. It would cost taxpayers little, since the tax liabilities of investors will be greater once they have exhausted their depreciation benefits.

Another avenue for reducing REO inventories while promoting homeownership would be the introduction of a rent-to-own program. Under this plan, the FHA along with the GSEs would rent properties to individuals directly but count a portion of each payment toward the renter's down payment on the property. If the renter made regular payments over some predetermined period (e.g. five years), he or she could obtain a mortgage for the remaining balance and take ownership of the property.

This approach would allow the renter an opportunity to see how the housing market recovers while still living in the home. If house prices continue to decline, he can choose to continue renting or move without losing significant equity. If the housing market recovers, he can take advantage of the appreciation. The FHA and GSEs would benefit from additional rental income while reducing the size of their REO portfolios. However, they would continue to be exposed to house-price risk, given the put option provided to the renter.

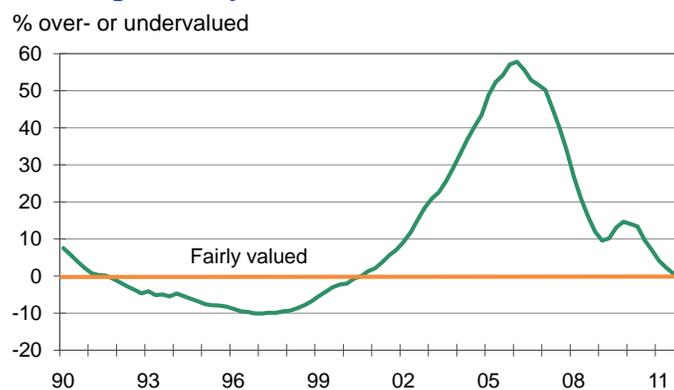
V. Housing policy distortions

There are reasonable concerns that government policies targeted at stemming the housing crash have not allowed the market to find a true bottom. That is, house prices haven't declined sufficiently to support a sustainable increase in demand, so that millions of households still can't afford the homes they live in. If so, any further efforts to support the housing market only delay the inevitable and will doom housing and the economy to subpar conditions for a long time.

There is no evidence that house prices remain overvalued. If anything they appear to have overshot and are now low compared with where they would be in a normal, well-functioning economy. One approach to gauging this is using the Moody's Analytics house price model. The difference between actual house prices and equilibrium prices as determined by the model is a measure of valuation. Recall that equilibrium prices reflect household incomes and other factors, discounting the effects of the business and mortgage credit cycle. Across 20 metro areas examined in the model, housing is more than 10% undervalued, and much more in some metro areas where house prices fell most.³⁴ This helps to explain why investor demand for homes is currently so strong in many of these areas.

Another heuristic approach is to use tried-and-true measures of housing valuation such as the price-to-income and price-to-rent ratios. The price-to-income ratio measures whether a household can afford to purchase a home; the price-to-rent ratio indicates which makes more economic sense for the household. This admittedly simplistic approach has historically signaled effectively whether housing markets are properly valued. At the peak of the bubble, these measures indicated that housing was overvalued by more than 50%. Currently, by contrast, housing appears appropriately valued (see Chart).³⁵ With only a few exceptions, most metro area housing markets appear to be either properly valued or undervalued (see Chart).

Housing Is Fairly Valued...



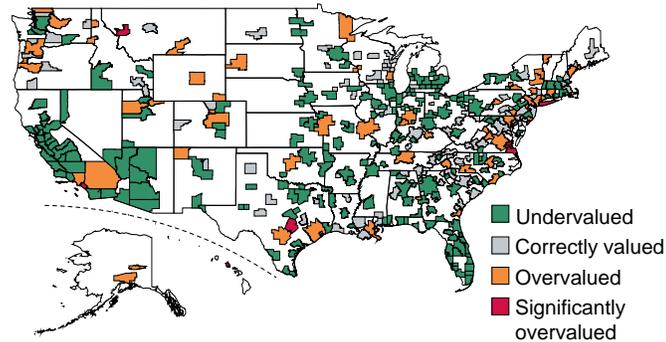
Sources: PPR, BEA, Census Bureau, Fiserv, Moody's Analytics

³⁴ This is based on an average of the 20 metro areas.

³⁵ The above chart shows an equally weighted average of the house price-to-income ratio relative to its long-run average and the price-to-effective rent ratio relative to its long-run average. The long-run averages are a proxy of what these ratios should be if the housing market were properly valued. The long run is defined to be the period between 1983 and 2003, which encompasses two full business cycles and ends prior to the start of the recent housing bubble.

...In Much of the Country

Metro area house price valuation, 2011Q4



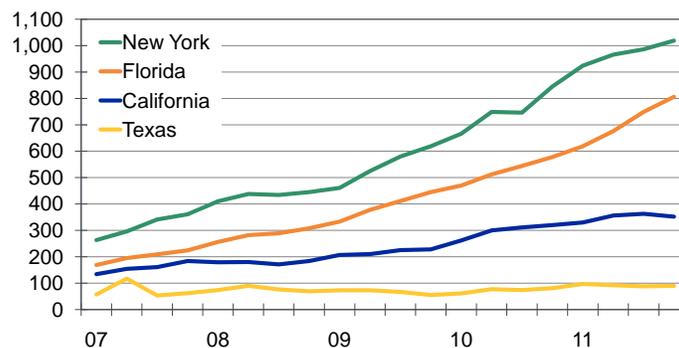
Sources: Property Portfolio Research, Fiserv Inc., Moody's Analytics

This suggests that the aggressive policy response to the housing crash during the Great Recession was well timed. The free fall in house prices ended by summer 2009, just about when prices were near equilibrium levels. Criticism that the policy effort artificially inflated house prices is thus not well supported. Even the homebuyer tax credits, which were much maligned for temporarily pulling forward home sales, served a useful purpose in breaking the negative deflationary psychology that pervaded the market at the time.³⁶ The credits would not have been as successful if house prices had been too high.

Until recently, criticism that policymaking had inappropriately slowed the foreclosure process was also largely misplaced. The process indeed slowed substantially. On average, it takes a year to push a bad loan through the system, from the first notice of default to the final repossession—about twice as long as it took before the crisis hit. In Florida, where the housing crisis has been especially severe and the courts are actively involved in foreclosures, the process has been stretched out from six months before the crisis to 2½ years today (see Chart). In New York, another judicial state, foreclosure takes nearly three years. But the extra time was needed to make sure struggling homeowners were treated properly, let the financial system digest its losses, and allow the market to absorb the flood of repossessions and short sales.

Lengthening Foreclosure Timelines

Days in foreclosure



Sources: RealtyTrac, Moody's Analytics

36 There were three rounds of temporary housing tax credits between 2008 and 2010. They gave prospective homebuyers compelling reasons to buy before the credit expired, even amid fears that prices might fall further. The tax credits were instrumental in breaking the deflationary psychology then weighing on the market, but became counterproductive as potential homebuyers delayed buying while they waited for the next credit deal.

Now that these objectives have been more or less met, it is time for the courts to accelerate efforts to work through the backlog of cases, for regulators to pressure mortgage servicers to quickly implement the process changes they agreed to, and for states and municipalities to re-evaluate the complex mediation efforts many have put in place. House prices won't rise and the economy won't fully engage until more distressed properties are resolved and put back into use.

VI. Alternative Scenarios

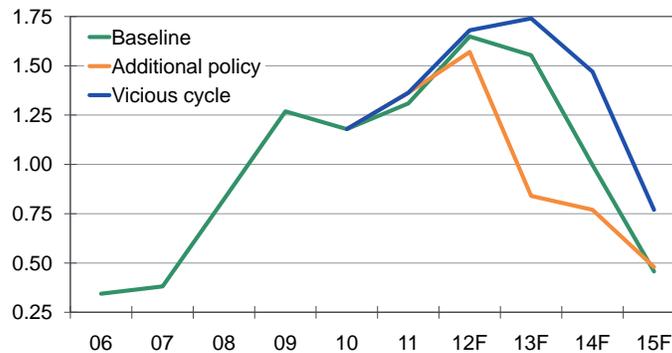
To assess the impact that future policy decisions could have on the housing market and economy, the Moody's Analytics model was simulated under several scenarios.³⁷ In the baseline scenario, an additional 4.7 million distress sales are expected between 2012 and 2015. The bulk of these are expected over the next 24 months. This scenario assumes that there are no additional policy steps to support more mortgage refinancings and loan modifications. As such, 600,000 loan modifications are expected on average each year through 2015. It is also assumed that there is a 35% five-year redefault rate on completed modifications since 2007, when they began in earnest, and on all future modifications.

In the baseline, the U.S. economy continues to recover and gains traction by mid-decade. Real GDP growth accelerates from 2.5% this year to nearly 3% in 2013 and closer to 4% in 2014 and 2015. The unemployment rate is thus expected to fall below 8% by the end of 2012 and to just above 7% by the end of 2013. The U.S. achieves something close to full employment—an unemployment rate of 5.7%—by early 2016. In this scenario, the Fiserv Case-Shiller national house price index declines 2.6% in calendar year 2012 and rises 1.6% in 2013. The share of home sales that are distress is expected to decline quickly in 2014 and 2015, resulting in solid mid-single-digit annualized house price growth in those years.

The "additional policy" scenario is intended to consider the impact of a more aggressive policy response to the foreclosure crisis. In this scenario, it is assumed that future policy efforts reduce the number of distress sales by 1 million compared with the baseline through the end of 2014 (see Chart). Of these 500,000 are principal-reduction modifications with an assumed redefault rate of 25%, and the remaining 500,000 are due to increased mortgage refinancing and a larger number of short sales.

Distressed Home Sales...

Foreclosure and short sales, mil



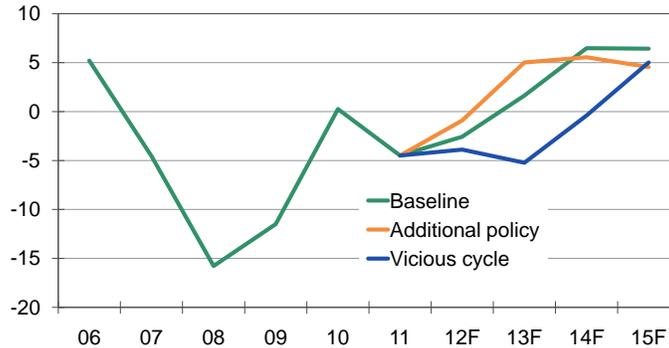
Sources: LPS Analytics, Moody's Analytics

House prices in the additional-policy scenario decline by 1% this year and increase by an annual average of 5% between 2013 and 2015 (see Chart). Stronger house prices have a substantial salutary impact on the economy, lifting real GDP growth in 2013 by approximately half a percentage point over the baseline to 3.3% (see Chart). Unemployment falls below 7% by the end of 2013 and the economy reaches full employment by mid-2015, a half year faster than in the baseline scenario.

³⁷ The Moody's Analytics model of the U.S. economy is a large-scale structural econometric model with a large and fully integrated housing and mortgage market sector.

...Drive House Prices...

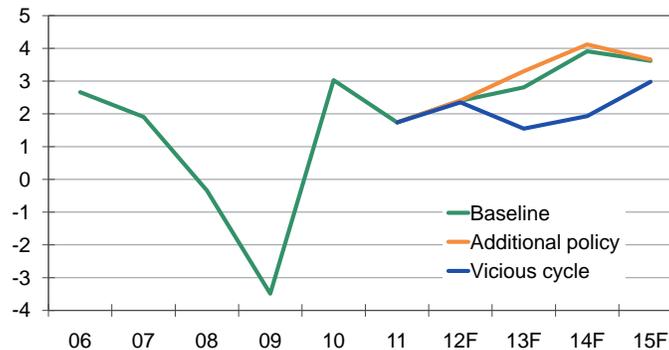
Case-Shiller® Home Price Index, % change



Sources: Fiserv, Moody's Analytics

...Which Impact Real GDP Growth

% change



Sources: BEA, Moody's Analytics

The "vicious cycle" scenario is intended to consider what would happen if underwater homeowners respond negatively to an anticipated weakening in house prices later this year and early next. That is, homeowners become more likely to default than they are in the baseline, all else being equal. In the vicious-cycle scenario, it is assumed as in the baseline that government takes no further policy steps to support housing, but that mortgage delinquencies and defaults are more sensitive to changes in house prices.³⁸ It is also assumed that the five-year redefault rate on previous and future loan modifications is 45%.

House prices in this darker scenario decline 4% in 2012, fall an additional 5% in 2013, and don't begin to rise in earnest until the second half of 2014. The economy is able to avoid another recession, but only barely, and only because the Federal Reserve responds to the weaker economy by further easing monetary policy.³⁹ Real GDP growth weakens to 1.6% in 2013 and growth remains below the economy's potential until 2015. The economy doesn't return to full employment until late 2017.

The lesson in these scenarios is that even if policymakers do nothing more to address the foreclosure crisis, the housing market and economy will probably navigate through without backtracking significantly. But policymakers would be taking a significant risk. The outlook is on a razor's edge, and if things don't stick very closely to script, housing and the economy could take a significant turn for the worse. Policymakers don't need to do a lot more, but good risk management suggests they should do some more.

³⁸ This is implemented by increasing the elasticity of mortgage delinquencies and default with respect to homeowners' equity in the Moody's Analytics model by 50%.

³⁹ Monetary policy, including quantitative easing, is determined endogenously in these scenarios.

VII. Conclusions

The three-year old recovery is still struggling to take root. The U.S. economy is growing, but at a disappointing pace, particularly with the unemployment rate over 8%. A significant impediment to stronger growth is persistent weakness in the housing market. Home sales and construction are off bottom but still extraordinarily low, and house prices continue to founder. With millions of foreclosures and short sales about to hit the market over the next several years, prices could fall further.

The economy will not be in full swing until house prices are rising consistently. For most Americans, the home is still the most important asset, and consumers will be reluctant to spend while their wealth erodes. Many small-business owners use their homes as collateral to grow, and local governments rely on property taxes.

There are some reasons to be optimistic that the housing slump is ending. Prices have fallen enough to make single-family housing affordable and attractive compared with renting. Investors are putting up cash to purchase distressed properties. Overbuilding remains a problem, but a decreasing one given a record low pace of construction and increased household formation.

But this optimism will be easily overwhelmed if house prices fall further, risking a vicious cycle that puts more homeowners under water, accelerating foreclosures and distress sales and driving prices lower still. During the recession, only an unprecedented monetary and fiscal policy response short-circuited that cycle.

In light of the risks, policymakers should thus consider additional temporary help for housing. Reinvigorating mortgage refinancing would provide a substantial boost with no meaningful cost to taxpayers. More refinancing will mean fewer borrower defaults and more money in the pockets of homeowners, supporting the recovery through a quick and sizable cash infusion.

Facilitating more well-targeted loan modifications, including those involving principal reduction, would be a much larger and costlier step but would bring the housing downturn to a quicker and more definite end. The number of modifications and the amount of principal reduction necessary to stabilize house prices can be reasonably financed with funds from the recent settlement between state attorneys general and mortgage servicers and the president's proposals to expand HAMP.

Moving more properties out of the foreclosure pipeline before they go to distress sales would also be a big plus, lowering the negative pressure on home values. Given the sharp decline in prices and the recent increase in effective rents, the returns to private investors participating in such efforts are increasingly attractive.

Each of these policy steps has its problems, but they are each worth careful consideration, because the weak housing market remains among the most serious threats to the still-fragile economic recovery.

Appendices

Appendix Table 1: Mobility Equation

Dependant Variable: Log Migration from State_i to State_j

Sample: 2006-2010

Cross-Sections: 1,056

Total Observations: 5,280

R-squared: 0.133

Fixed Efforts

Variable	Coefficient	t-statistic
Unemployment Rate _i - Unemployment Rate _j	0.000206	10.93
(Wage Income/Employee) _i / (Wage Income/Employee) _j	-1.2639	-14.87
((Underwater Homeowners + Homes in Foreclosure) / Single-Family Housing Stock) _i	-0.004	-15.45

Appendix Table 2: Equilibrium House Price Equation

Dependent variable: Log of real house price (Case-Shiller index)†

Sample (adjusted): 1985Q4 to 2011Q4

Included observations: 105 after adjustments

Cross-sections included: 20

Total pool (balanced) observations: 2,100

R-squared 0.908

Adjusted R-squared 0.906

S.E. of regression 0.138

F-statistic 701.7

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.4105	0.1108	3.7	0.0002
Log real per capita income, Coastal	1.3796	0.0357	38.7	0.0000
Log real per capita income, Noncoastal	1.2093	0.0412	29.3	0.0000
Market portfolio vs. housing returns, Coastal	-0.0089	0.0006	-15.2	0.0000
Market portfolio vs. housing returns, Noncoastal	-0.0061	0.0006	-10.4	0.0000
Vacation home share of stock interacted with pop. share 50-64, Coastal	0.0028	0.0012	2.4	0.0145
Vacation home share of stock interacted with pop. share 50-64, Noncoastal	0.0092	0.0026	3.5	0.0005
Log 5-yr population growth, Coastal	0.4150	0.1448	2.9	0.0042
Log 5-yr population growth, Noncoastal	1.5309	0.1397	11.0	0.0000
Weighted average of ARM share and LTV of new loans, 4-qtr MA	0.0068	0.0004	19.4	0.0000
User cost of housing	-0.3787	0.5324	-0.7	0.4770

Metro Area Fixed Effects

Atlanta GA	-0.0399
Boston MA	0.0906
Chicago IL	-0.1323
Dallas TX	-0.0225
Denver CO	0.1442
Detroit MI	-0.3873
Houston TX	-0.4780
Las Vegas NV	-0.0481
Los Angeles CA	0.3665
Miami FL	-0.3111
Minneapolis MN	0.0492
New York NY	0.0796
Philadelphia PA	0.1654
Phoenix AZ	-0.2633
Riverside CA	0.1458
San Diego CA	0.4177
San Francisco CA	0.3539
Seattle WA	-0.0662
Tampa FL	-0.3794
Washington DC	0.3150

† Case-Shiller index is benchmarked to the 2000Q1 median home price and then deflated by core PCE deflator.

Appendix Table 3: Adjustment House Price Equation

Dependent variable: Change in the log of real house price, Case-Shiller index †

Method: Pooled EGLS (Cross-section weights)

Sample: 2007Q1 2011Q4

Included observations: 20

Cross-sections included: 20

Total pool (balanced) observations: 400

The mean reversion variable represents the difference between equilibrium and actual house prices.

R-squared	0.736
Adjusted R-squared	0.714
S.E. of regression	0.018
F-statistic	33.15
Durbin-Watson stat	1.95

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-0.0089	0.0012	-7.548	0.0000
DLOG equilibrium house price	0.0782	0.0515	1.519	0.1295
DLOG house price lagged 1 qtr, Coastal	0.3632	0.0598	6.077	0.0000
DLOG house price lagged 1 qtr, Noncoastal	0.3267	0.0772	4.230	0.0000
Mean reversion, Coastal	0.0337	0.0102	3.288	0.0011
Mean reversion, Noncoastal	0.0521	0.0160	3.255	0.0012
2-qtr change in jobless rate	-0.0111	0.0022	-5.016	0.0000
1-qtr change in distress sales share, Coastal	-0.0025	0.0004	-6.830	0.0000
1-qtr change in distress sales share, Noncoastal	-0.0019	0.0005	-4.207	0.0000
1-qtr change in distress sales share, lagged 1 qtr, Coastal	-0.0002	0.0004	-0.554	0.5803
1-qtr change in distress sales share, lagged 1 qtr, Noncoastal	-0.0004	0.0005	-0.717	0.4738
1-qtr change in distress sales share, lagged 2 qtrs, Coastal	-0.0007	0.0004	-1.640	0.1019
1-qtr change in distress sales share, lagged 2 qtrs, Noncoastal	-0.0007	0.0005	-1.285	0.1994

Metro Area Fixed Effects

Atlanta GA	0.0042
Boston MA	-0.0006
Chicago IL	0.0031
Dallas TX	0.0069
Denver CO	-0.0095
Detroit MI	0.0054
Houston TX	-0.0064
Las Vegas NV	-0.0062
Los Angeles CA	0.0051
Miami FL	-0.0052
Minneapolis MN	-0.0042
New York NY	0.0037
Philadelphia PA	0.0046
Phoenix AZ	-0.0068
Riverside CA	-0.0036
San Diego CA	0.0033
San Francisco CA	0.0007
Seattle WA	0.0029
Tampa FL	-0.0053
Washington DC	0.0077

† Case-Shiller index is benchmarked to the 2000Q1 median home price and then deflated by core PCE deflator.

About Moody's Analytics

Economic & Consumer Credit Analytics

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Moody's Analytics tracks and analyzes trends in consumer credit and spending, output and income, mortgage activity, population, central bank behavior, and prices. Our customized models, concise and timely reports, and one of the largest assembled financial, economic and demographic databases support firms and policymakers in strategic planning, product and sales forecasting, credit risk and sensitivity management, and investment research. Our customers include multinational corporations, governments at all levels, central banks and financial regulators, retailers, mutual funds, financial institutions, utilities, residential and commercial real estate firms, insurance companies, and professional investors.

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