The Accumulation of Foreclosed Properties:
Trajectories of Metropolitan REO Inventories During the 2007–2008 Mortgage Crisis[1]

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In addition to causing financial and social hardship to families and individuals, high foreclosure rates can have negative effects on neighborhoods, cities, and metropolitan regions. One key concern among policymakers and community developers is the extent to which lender-owned homes, often called real estate owned or REO properties, accumulate in different local housing markets. The neighborhood and community impacts of foreclosure are expected to be worse if foreclosed properties sit vacant for significant periods of time and are not absorbed back into the market in some productive way. The inventory of REO properties in a local housing market or submarket may become not just a symptom of housing market decline but an impediment to recovery. An increasing amount of REO inventory in a local or regional housing market may discourage price stabilization and the return of even moderate levels of home purchase activity and financing.

A related reason for concern over the accumulation and aging of REO in a local market involves the negative effects of spatially concentrated vacant homes, especially if their physical condition deteriorates.[3] If REOs are disproportionately concentrated in some neighborhoods, and if some of these properties fall into disrepair or become blighted or vandalized, they may have particularly strong negative impacts on these neighborhoods.[4] One particular sign of potential problem REO properties are those properties that have been held by banks for more than a few months. Thus it is important to examine the aging of REO inventory–the length of time that properties have been owned by the lender.

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3 Not all REO properties are vacant, or vacant during the entire REO period. Non-owner-occupied rental properties that go into foreclosure, particularly in states with tenant protection laws, may be particularly likely to be occupied during some or all of the REO period. On the other hand, in most states, lenders are able to evict tenants fairly quickly after taking possession of a foreclosed property.

4 It is important to point out that just because a property "exits" from REO inventory does not necessarily mean that the property has been returned to some productive use that is beneficial to a community. Properties may continue to sit vacant or may be purchased by "bottom feeders" who may not rehabilitate dilapidated properties, etc. In the longer term, properties may even become tax-delinquent and abandoned. The analysis in this paper does not address the nature or disposition of the property after it exits REO status. See Coulton, Schramm and Hirsh (2008) for an excellent analysis of post-REO properties in the Cleveland area.

Although they pose many challenges, REO properties can also present opportunities for community developers and policymakers to turn the homes into a source of long-term affordable housing or provide opportunities for other forms of redevelopment by providing relatively low-cost land and building stock. The growth and concentration of REO properties in various neighborhoods and cities has prompted a variety of policy and programmatic responses, first by many local governments and nonprofits and more recently at the federal level with the advent of the Neighborhood Stabilization Program (NSP). The NSP, which was authorized in the 2008 Housing and Economic Recovery Act, provides $3.92 billion in funding over 18 months to state and local governments for neighborhood recovery from foreclosures.[5] NSP funds can be used for a variety of purposes related to neighborhood stabilization, including the purchase and redevelopment of foreclosed properties by governmental or quasi-governmental entities such as land banks, the demolition of such properties, or the financing of home-purchase activity.

Despite the attention and policy response aimed at the problems of vacant, foreclosed homes, data on REO properties in the United States are generally quite scarce, especially in a form that is highly comparable across different localities or regions. In this article I seek to describe the spatial distribution of REO properties across U.S. metropolitan areas. I examine the growth of REO inventory, with particular attention to REO trajectories, in a set of thirteen large metro areas with relatively high levels of REO activity. I also look at the aging of recent REO inventory. That is, I examine the extent to which REO properties have been in REO for more than a few months, as well as those held for over one year. The purpose of this aging analysis is to determine whether some metro areas with large numbers of REO may be experiencing only high levels of "frictional" or short-term REO, in which properties are sold within a few months, but not numerous properties that stay in REO for longer periods. Conceivably, some metro areas experiencing very high foreclosure rates may also see properties go into and out of REO very quickly. Such properties might be expected to have less deleterious impacts on neighborhoods than those remaining in REO–and likely vacant–for longer periods of time. Finally, I use cluster analysis to identify similar groups of MSAs using initial levels of REO inventory and changes in house-price appreciation.

This article is intended to be a first look at REO inventory trajectories during the most recent mortgage crisis cycle of 2007 and 2008. To do this, I examine data from August 2006 to August 2008. The analysis is not exhaustive. Given the fast-moving nature of foreclosure problems in recent years, following up this work with additional research will be important.

One limitation of this article is that its analysis is at the level of metropolitan statistical areas (MSAs). The MSA is a common, but quite large, geographical level of housing market hierarchy. Some smaller MSAs may approach a notion of a fairly unified, unsegmented housing market. In most large MSAs, however, there can be many geographic submarkets that are somewhat distinct from one another. In such metro areas, there may be both areas

5 For more detail on the Neighborhood Stabilization Program see Mallach (2008).

with little REO activity and other areas with substantial REO activity. Notwithstanding these submarket variations, MSAs represent a common notion of regional housing markets, and their use captures the very substantial regional differences in REO trajectories and composition. My intent in the future is to scope down in several high-REO metropolitan areas to examine submetropolitan patterns of REO to understand which parts of these metro areas have experienced the greatest buildup of REO and to explore the aging of REO in such places. But that will need to wait for a subsequent article.

Data on REO Properties—from Local to National

Although researchers have increasingly focused their attention on foreclosure-related issues in recent years, the paucity of comprehensive, cross-market data on REO properties has made it difficult to gain a strong understanding of the REO problem since the advent of the 2007–2008 mortgage crisis. Data on foreclosures and post-foreclosure properties, such as REO, are not compiled on a regular, uniform basis by any public agency at a multistate level. Public real estate records can be used in many places to identify lender-owned properties, although the process can be quite labor intensive, and the quality and accessibility of such data vary across local jurisdictions (often counties). Some firms purchase or assemble local property records data and/or foreclosure notices or filings and compile them for resale. Again, however, due to variation in state law, state data systems, and local property records, the uniformity of these data can be quite limited.

In any one locality or region, the best data on REO properties may well be local or state property records or private real estate listing data. Assuming these data are accessible, they can provide valuable information on REO properties. However, they may also be limited in that they may provide relatively little information concerning the nature of the financing related to the property before it was foreclosed upon (or assumed in some alternative to foreclosure).

My objective is to compare trends in REO activity across metropolitan housing markets. Therefore, using local property records data is not practical. Instead, I use a private, large national database of mortgages, the Lender Processing Services Inc. (LPS) Applied Analytics data set (formerly referred to as the "McDash Analytics" data set), to describe REO buildup and aging across most metropolitan areas in the United States, with some special emphasis on a set of large metropolitan areas with relatively high levels of REO.

The LPS data are compiled from mortgage servicing firms that collect mortgage payments for investors and lenders and handle the associated REO for these loans. By August 2008, nine of the top ten servicers and a total of sixteen firms provided data to LPS. The data set includes monthly information, including REO status, on more than 100 million loans, including more than 30 million loans that are currently active. Loans stay in the LPS data set through the REO process, making it useful for the purposes here. However, the data set does

not capture all mortgages, and it significantly underrepresents the subprime market.[6] Therefore, I have prepared a number of measures using weights based on comparing the LPS data to other information on the size and composition of the mortgage market. This approach and more information on the LPS data are described in more detail in the appendix.

A Cross-Sectional Look at REO Density across Metropolitan Areas, August 2008

I begin by calculating the number of prime/near-prime and subprime REO properties in the LPS database in August 2008 across 358 MSAs in the United States.[7] This is done by identifying loans in REO status in the LPS database in that month. Subprime loans are identified in the data, allowing one to distinguish between prime/near-prime and subprime REO. These raw REO counts are then divided by the estimated number of "mortgageable properties" in the MSA in 2006. This denominator is estimated using the Census Bureau's 2006 American Community Survey. I will refer to the ratio of REO properties per 10,000 mortgageable properties as "REO density." The REO density measure has the advantage over a measure of REO as a share of outstanding loans because it indicates the prevalence of REO properties relative to single-family and condominium housing stock in the region. From a community development and neighborhood stabilization perspective, this is generally a preferred measure of REO inventory.

I present some analysis using the prime/near-prime and subprime REO densities calculated from the LPS data and American Community Survey data only. However, in order to obtain an estimate of total REO density for each MSA, and especially because the LPS data is estimated to cover a smaller portion of the subprime (versus prime/near-prime) market, I also provide and use estimates of "total REO." I do this by adjusting the subprime and prime/near-prime REO densities upward to reflect the estimated total markets (using industry estimates of outstanding prime/near-prime and subprime loans) for each loan type and then summing these adjusted figures. The subprime and prime/near-prime REO densities calculated directly from LPS, which I call "unadjusted" densities, are adjusted upward by national scaling factors for prime/near-prime and subprime loans separately. (See the appendix for more details.) Because the estimates of total density depend on the adjustment factors used, an alternative set of adjustments was calculated using a different estimate of the total prime/near-prime and subprime markets to test the sensitivity of my findings to adjustment factors. The results using the alternative adjustments (not shown here) do not differ substantially from the results provided below.

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6 The LPS data also do not include REO properties owned by the Federal Housing Administration or other federal agencies.

7 The LPS data do not break out what are often called "Alt-A" loans from prime loans. These are sometimes termed "near-prime" loans. Alt-A loans include many loans made to borrowers who have relatively high credit scores but that have other features (e.g., limited or no documentation) that increase default risk. They are included here with prime loans. Although they represent a relatively small share of all prime/near-prime loans, they account for a disproportionate share of foreclosures and REO in this category.

Table 1 lists the 50 MSAs with the largest estimated total REO density as of August 2008 among 358 MSAs. It indicates the unadjusted prime/near-prime and subprime REO densities as well as the estimated total REO density. The table also indicates in bold the relatively large MSAs (those with more than 400,000 mortgageable properties) among these 50 high-REO MSAs. The estimated REO densities in these 50 MSAs generally range from just under 100 to more than 500 REO properties per 10,000 mortgageable properties. It is important to keep in mind that the estimated total REO density is merely an estimate and may overestimate or underestimate the true level of REO properties. The key aim here is not to develop a highly accurate, definitive measure of REO activity but rather to develop strong relative measures of REO density across MSAs. The "estimated total REO" is used primarily to provide some general sense of the volume of total REO compared to mortgageable housing stock and to control roughly for the underrepresentation of subprime loans in the LPS data.

When examining measures of metropolitan REO density, it is important to keep in mind variations in MSA size. Smaller MSAs are often less heterogeneous in terms of housing stock and neighborhood types and so will tend to vary more in REO density. As a result, many of the MSAs with the highest REO densities are relatively modest in size, including the top three MSAs in Table 1—Merced, Stockton, and Modesto. Notwithstanding this limitation, it is apparent that some states and regions are disproportionately represented at the top of this list. Eight of the top ten MSAs are in California, and another is in Nevada. The remaining MSA in the top ten is the Detroit area.

Table 1. 50 MSAs with Highest Estimated REO Density, August 2008
(MSAs with >400,000 mortgageable properties are highlighted in bold)

Metropolitan Area	*Unadjusted Prime/ Near-Prime REO per 10,000 Mortgageable Properties*	*Unadjusted Subprime REO per 10,000 Mortgageable Properties*	*Total Estimated REO per 10,000 Mortgageable Properties*
Merced, CA	175.4	71.1	524.8
Stockton, CA	158.7	60.6	463.0
Modesto, CA	132.9	64.3	430.0
Riverside-San Bernardino-Ontario, CA	125.3	45.0	356.7
Las Vegas-Paradise, NV	141.8	33.8	349.9
Vallejo-Fairfield, CA	95.6	41.1	293.3
Detroit-Warren-Livonia, MI	93.6	38.9	283.1
Madera, CA	84.7	42.5	278.6
Bakersfield, CA	86.4	39.5	272.5
Yuba City, CA	90.0	33.3	259.2
Salinas, CA	100.1	26.1	254.2
Sacramento-Arden-Arcade-Roseville, CA	79.2	31.9	236.3

Flint, MI	91.6	24.4	234.1
El Centro, CA	77.5	31.4	231.7
Jackson, MI	79.3	23.3	209.5
Phoenix-Mesa-Scottsdale, AZ	72.2	26.8	208.1
Minneapolis-St. Paul-Bloomington, MN-WI	63.8	23.5	183.6
Cape Coral-Fort Myers, FL	57.1	25.1	177.1
Lansing-East Lansing, MI	58.9	24.0	176.7
Fresno, CA	52.3	26.9	174.3
Grand Rapids-Wyoming, MI	60.5	21.3	170.9
Greeley, CO	62.1	19.6	168.2
Battle Creek, MI	54.9	21.8	162.7
Muskegon-Norton Shores, MI	53.0	22.6	162.1
San Diego-Carlsbad-San Marcos, CA	63.4	14.7	155.3
Atlanta-Sandy Springs-Marietta, GA	53.9	18.7	151.5
Reno-Sparks, NV	55.9	15.0	143.2
San Francisco-Oakland-Fremont, CA	46.5	19.6	141.5
Visalia-Porterville, CA	40.7	22.6	140.7
Naples-Marco Island, FL	46.6	19.1	139.8
Washington-Arlington-Alexandria,DC-VA-WV	50.6	16.7	139.4
Denver-Aurora, CO	51.9	14.6	135.0
Miami-Fort Lauderdale-Pompano Beach, FL	39.0	20.3	130.8
Ann Arbor, MI	50.3	13.7	129.6
Oxnard-Thousand Oaks-Ventura, CA	50.7	13.1	128.5
Santa Rosa-Petaluma, CA	40.7	16.8	122.6
Los Angeles-Long Beach-Santa Ana, CA	44.7	14.4	122.0
Saginaw-Saginaw Township North, MI	47.8	12.5	121.5
Monroe, MI	44.3	14.3	121.2
Elkhart-Goshen, IN	40.5	15.2	117.2
Memphis, TN-AR-MS	36.4	16.6	114.8
Niles-Benton Harbor, MI	30.5	19.6	113.8
Santa Barbara-Santa Maria-Goleta, CA	43.4	12.2	113.2
Kalamazoo-Portage, MI	39.2	13.5	109.7
Winchester, VA-WV	38.1	13.6	108.4
Port St. Lucie-Fort Pierce, FL	34.3	14.2	103.4
Pueblo, CO	31.8	15.3	102.4
San Jose-Sunnyvale-Santa Clara, CA	36.1	12.2	100.3
Bay City, MI	36.4	11.1	97.5

Data Source: Lender Processing Services Inc. (LPS) Applied Analytics

** "Mortgageable properties" is the estimated number of 1–4 unit-residential properties plus condominiums in 2006, based on American Community Survey data on housing units by structure. Total estimated REO based on adjustments by national scale factors derived from estimates of the coverage of the LPS data of the total market. See appendix for more information.*

Besides the many smaller metro areas in California in Table 1, smaller MSAs in Michigan are well represented among the highest-REO metro areas, accounting for 12 of the top 50 MSAs. At the same time, many large metropolitan areas rank high among all metro areas in REO density. Among the large MSAs in Table 1 are Riverside, Las Vegas, Detroit, Sacramento, Phoenix, Minneapolis, San Diego, Washington, DC, Atlanta, Denver, Miami, Los Angeles, Memphis, San Francisco, and San Jose.

Changes in Metropolitan REO Density, August 2006 to August 2008

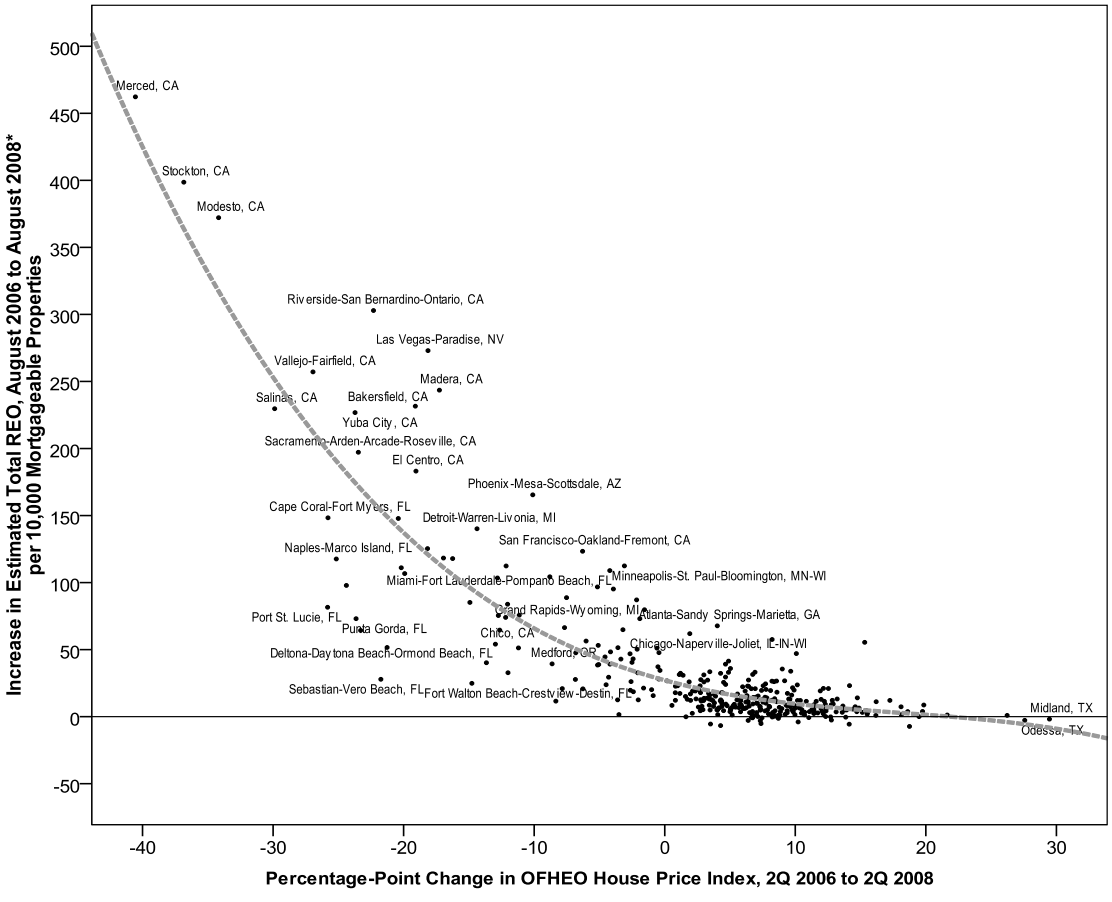
A good deal of attention has been paid to the large increases in foreclosures since late 2006 in many parts of the country. However, there have been fewer systematic examinations of changes in REO inventory–or the accumulation of REO properties–in different parts of the country. I now turn to examining the trajectories of REO accumulation (or, in a few cases, inventory decline) at the MSA level. I begin by looking at trends across all 358 MSAs and then scope down to a set of large MSAs with high REO densities.

In order to examine changes in REO density over time using the LPS data, it was necessary to take into account the dynamic nature of the data set, which grew as more servicers entered the data set over time. To address the expanding sample, all analyses of changes over time in REO activity were conducted after excluding "well-seasoned" loans that entered the data set after August 2006. ("Well-seasoned" is defined here as seasoned for more than four months.) The appendix describes this process in more detail and examines the extent and the size of the excluded activity compared to overall activity in the data set.

While many factors might affect REO density in an MSA, one variable that is expected to be closely related to REO, most likely as both cause and effect, is home price appreciation in the region. First, property values can be tightly linked to foreclosure activity. A variety of research has pointed to the negative impact of foreclosures on nearby home values (Immergluck and Smith 2006; Mikelbank 2008; Schuetz, Been, and Ellen 2008). Other research suggests that foreclosed properties will appreciate more slowly than other comparable properties (Pennington-Cross 2006). At the same time, declining home values, especially in the cases of highly leveraged borrowers, make it difficult for borrowers to refinance or sell their home to avoid foreclosure. Moreover, at least in the case of investor properties, declining values can make it more likely that a borrower will willingly default even if he or she can afford to continue making payments. Therefore, declining values are likely to spur increased foreclosures. A variety of research has found positive effects of declining home values on loan default and foreclosure (Danis and Pennington-Cross 2005; Gerardi, Shapiro, and Willen 2008).

In addition to the positive relationship between property values and foreclosures, declining values may also be linked to the accumulation and duration of REO properties by affecting the "exit" of properties from REO status. In declining-value markets, REO may not be easily absorbed into the broader market as buyers retreat. Moreover, accumulating REO can put downward pressure on price. Until prices are thought to have stabilized, buyers may remain scarce. Hence, increasing REO and declining values can reinforce each other in a vicious cycle.

Figure 1. Increase in Estimated Total REO Density* vs. Change in Housing Price Index, August 2006 to August 2008, by Metropolitan Statistical Area



Data sources: Federal Housing Finance Agency; Lender Processing Services Inc. (LPS) Applied Analytics

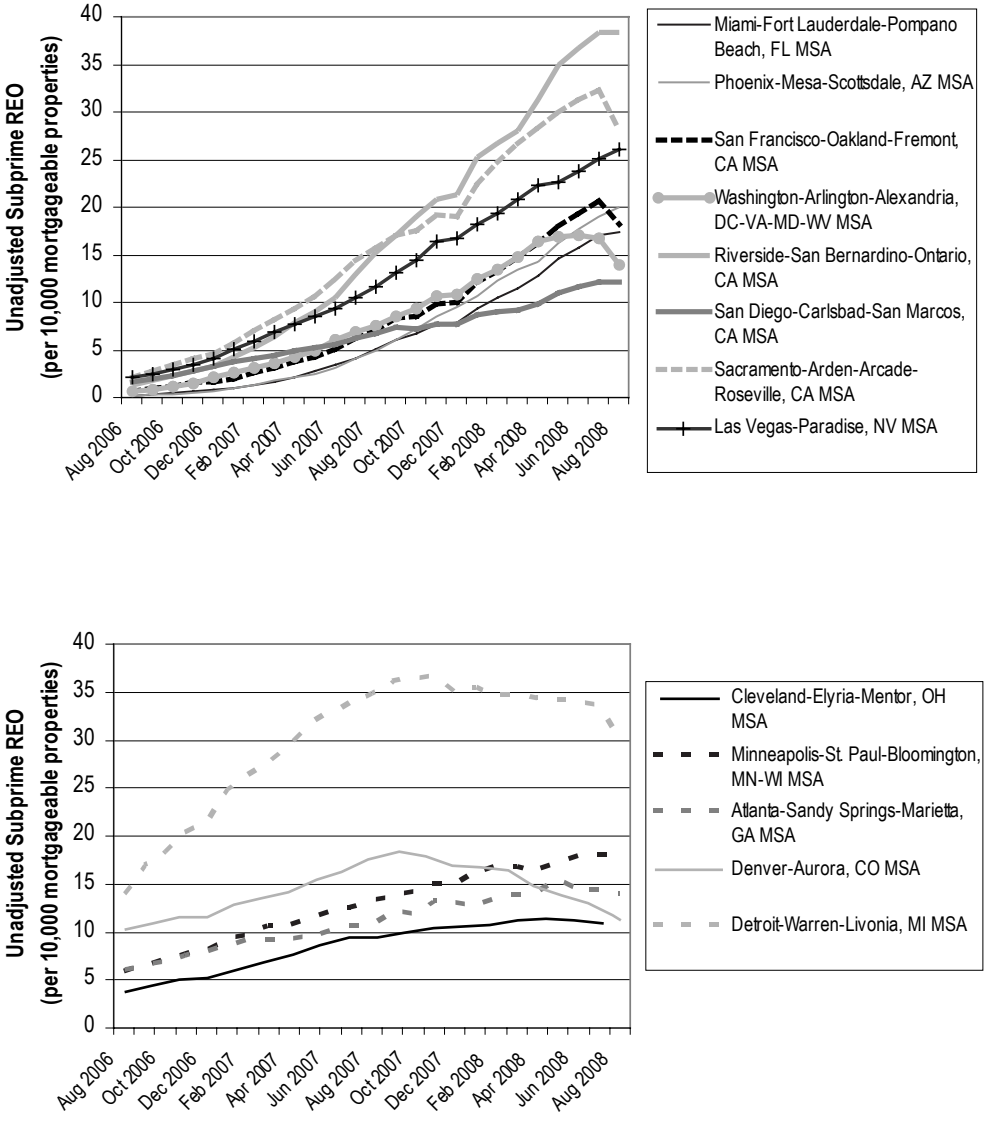
** Estimated total REO based on adjusting prime/near-prime and subprime REO upward based on differences in prime/near-prime and subprime volumes in LPS data set vs. Mortgage Bankers Association National Delinquency Survey. Excludes loans entering LPS after August 2006 *and* more than 4 months after origination (aged loans entering after August 2006). See appendix for more information on methods.*

Figure 1 plots the percentage-point change in the Office of Federal Housing Enterprise Oversight (OFHEO) house price index from the second quarter of 2006 to the second quarter of 2008 versus the increase in estimated total REO density from August 2006 to August 2008. A cubic bivariate regression line is also shown to illustrate the nonlinear relationship between the two variables. For most MSAs where house price appreciation (HPA) was positive, there was some increase in REO density over the two-year period, and any relationship between HPA and increase in REO density was slight. As HPA approaches zero and goes slightly negative, increases in REO density tend to grow. As HPA approaches a drop of 10 percent or

more over the two-year period, REO density grows more quickly. However, the dispersion of changes in REO density grows as HPA grows more negative. That is, among metro areas with similarly high rates of price decline, large differences often exist in how much REO density increased over the two-year period.

Figures 2 through 5 more closely examine the trajectories of REO accumulation in thirteen large MSAs with high levels of REO. These include eight MSAs that could be described as "formerly hot" housing markets, including Miami, Phoenix, San Francisco, Washington, DC, Riverside, San Diego, Sacramento, and Las Vegas. The remaining five metro area could be considered weak (Cleveland, Detroit) or relatively stable (Atlanta, Denver, and Minneapolis) markets. As expected during hot housing market conditions, the initial unadjusted subprime REO densities in the formerly hot MSAs in August 2006 were generally very low, well under five per 10,000 mortgageable properties. The weak or stable market MSAs generally began the study period at substantially higher subprime REO densities, on the order of five to fifteen per 10,000 mortgageable properties.

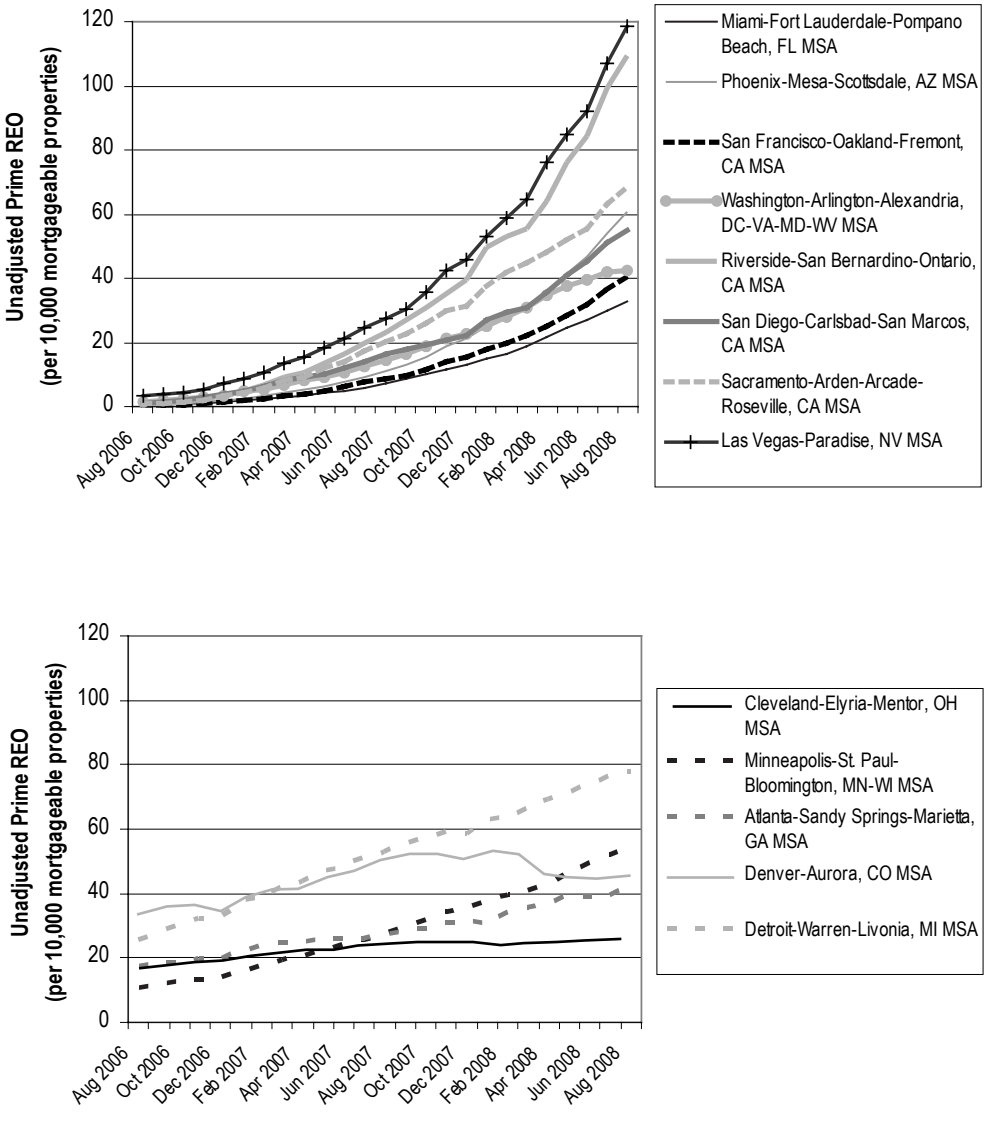
Figure 2. Increase in Unadjusted Subprime REO* Density, 13 Large, High-REO MSAs, August 2006 to August 2008



Data source: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

** Excludes loans entering LPS after August 2006 *and* more than 4 months after origination (aged loans entering after August 2006). See appendix for more information on method.*

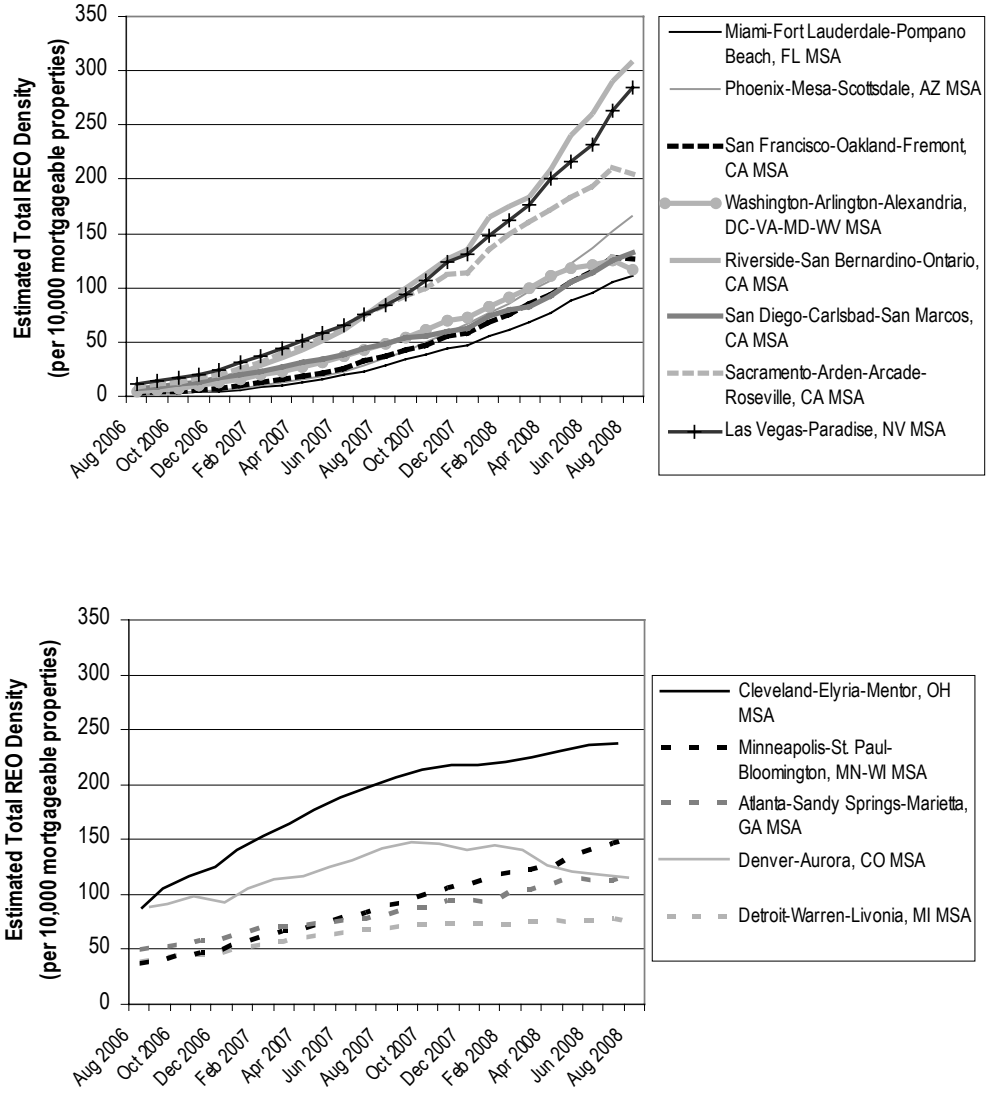
Figure 3. Increase in Unadjusted Prime/Near-Prime REO* Density, 13 Large, High-REO MSAs, August 2006 to August 2008



Data source: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

** Excludes loans entering LPS after August 2006 *and* more than 4 months after origination (aged loans entering after August 2006). See appendix for more information on method.*

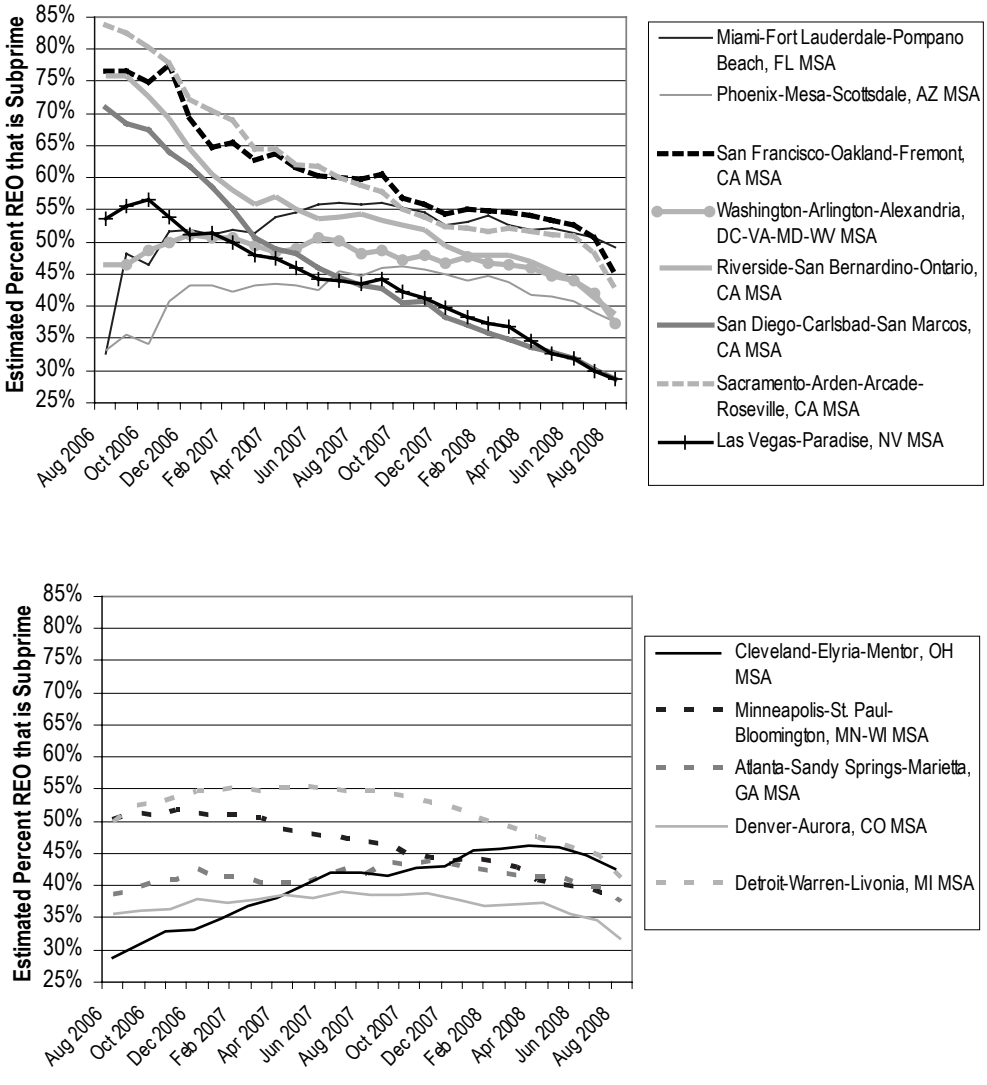
Figure 4. Increase in Estimated Total REO* Density, Based on Adjusted Prime/Near-Prime and Subprime Densities, 13 Large, High-REO MSAs, August 2006 to August 2008



Data source: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

** Estimated total REO based on adjusting prime/near-prime and subprime REO upward based on differences in prime/near-prime and subprime volumes in LPS data set vs. Mortgage Bankers Association National Delinquency Survey. Excludes loans entering LPS after August 2006 *and* more than 4 months after origination (aged loans entering after August 2006). See appendix for more information on methods.*

Figure 5. Change in Share of Estimated REO that is Subprime, 13 Large, High REO MSAs, August 2006 to August 2008



Data source: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

Figure 2 illustrates the change in unadjusted subprime REO density for the thirteen MSAs. The top chart shows that San Francisco, Miami, Phoenix, Washington, DC, and San Diego have had similar subprime REO density trajectories, with strong increases over the two-year period. Meanwhile, REO density in Riverside, Sacramento, and Las Vegas MSAs grew even faster.

The bottom chart in Figure 2 shows that the Detroit MSA experienced a very large increase in subprime REO until the end of 2007, but then subprime inventory slowed and declined somewhat. The Denver area saw a steady increase in subprime REO until October 2007, but since then it has seen a substantial decline. Although they did not experience the very steep increases in REO as the metro areas in the formerly hot markets in the top chart, the Minneapolis, Atlanta, and Cleveland MSAs also saw large increases in subprime REO over the study period. In some metro areas, the subprime REO density either slowed or even dipped slightly in August 2008, the last month of the analysis.

Figure 3 repeats the analysis in Figure 2, but for prime/near-prime loan REO density. Similar to the subprime findings, prime/near-prime REO density increased more in some metropolitan areas than others, with the greatest increases in the Las Vegas and Riverside MSAs, with somewhat smaller–but still very fast–growth in the other formerly hot-market MSAs in the top chart. Comparing the top chart in Figure 2 to the top chart in Figure 3 shows that prime/near-prime REO growth has generally lagged behind that of subprime REO, but by early 2008 prime/near-prime REO was, in some MSAs at least, accelerating and growing more quickly than subprime REO. Comparing the bottom chart in Figure 3 to the bottom chart in Figure 2 shows that prime/near-prime REO grew more steadily in the Detroit area.

Figure 4 plots the change in estimated total REO density from August 2006 to August 2008. Again, due to the somewhat similar trajectories of prime/near-prime and subprime REO in formerly hot-market MSAs, the top chart of Figure 4 resembles those in Figures 2 and 3. Riverside, Las Vegas, and Sacramento MSAs experienced the sharpest increases in estimated total REO, but increases were also quite large and steep in the other formerly hot-market MSAs. The bottom chart in Figure 4 shows that, in the stable-weak-market MSAs, the estimated total REO generally grew quite steadily, with the Denver MSA experiencing a significant decline since late 2007. However, the increase in REO density in these metropolitan areas was generally much less than in the formerly hot-market MSAs, so that by the end of the period the formerly hot-market MSAs tended to have similar or higher total REO densities than the stable-weak-market metro areas. The Detroit MSA remained among the large metropolitan areas with the highest estimated total REO density, but by the spring of 2008 Riverside and Las Vegas had surpassed it in terms of estimated REO density. Moreover, by August 2008, Sacramento and Phoenix exceeded the REO densities of the Denver, Minneapolis, Atlanta, and Cleveland MSAs.

Figure 5 shows that the source of REO, in terms of prime/near-prime versus subprime loans, shifted significantly across most MSAs toward prime/near-prime and away from subprime loans, especially after late 2007. Whether an REO property is associated with a

prime/near-prime or subprime loan may be important for various reasons. In particular, most subprime loans are held in complex securitized trusts, which can complicate the disposition and purchase of the properties. Prime/near-prime REO, compared to subprime REO, will more often be held by Fannie Mae or Freddie Mac (either in their portfolios or as backing for GSE securities) or on the balance sheet of a lender. Therefore, one might expect that the disposition of many prime/near-prime REO properties might involve less complicated negotiations and acquisitions. However, the Alt-A portion of the prime/near-prime REO is more likely to be held in a wide variety of disparate private-label securities, and so, like subprime REO, their disposition may be relatively more complex.

In some MSAs (Riverside, Sacramento, San Francisco, and Washington, DC), this shift began as early as August 2006, but in other MSAs, including most of the stable-weak-market metro areas, the decline in the subprime share of REO did not begin until late 2007. By August 2008, the share of REO that was associated with subprime loans had dropped below 50 percent for all 13 of the MSAs, with the share dipping below 40 percent in 7 of the 13 MSAs. Of course, within these and other MSAs, the distribution of prime/near-prime and subprime REO is likely to vary considerably. In particular, subprime REO are expected to be located more in lower-income and minority neighborhoods relative to prime/near-prime REO. Subprime REO might also be more clustered in various other types of locations within metropolitan regions. Further research is needed to examine these patterns.

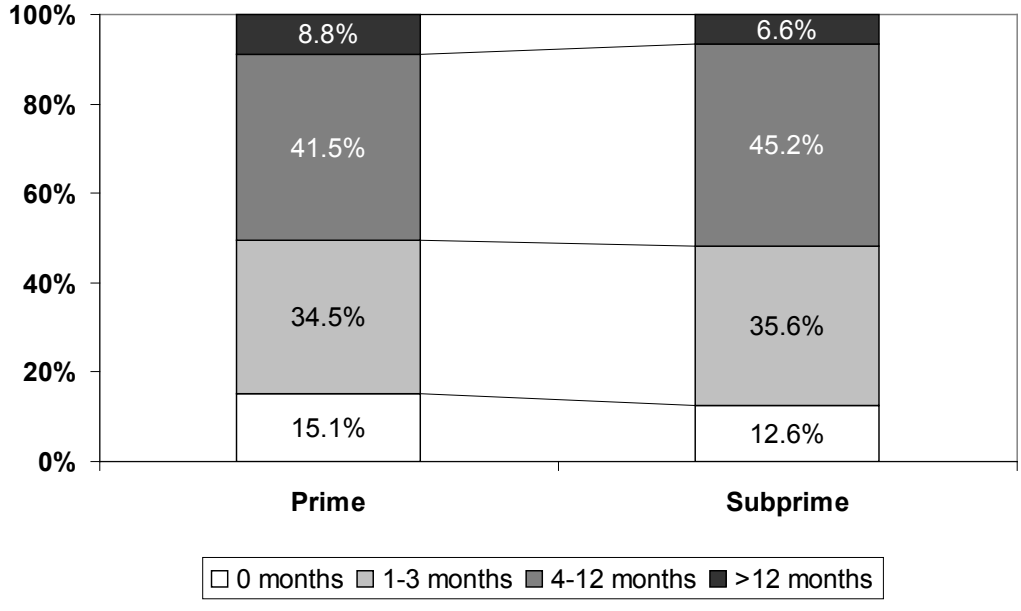
REO Aging Across MSAs

The simple volume of REO inventory is not all that is of concern. We might be particularly concerned with the volume of "old" REO, that is, the properties that entered REO status longer than a few months ago. In some markets, a high degree of "frictional" REO may be possible, that is, many properties entering and exiting REO status at any one time with relatively few properties staying in REO for more than a few months. Conversely, in some places many REO properties could be "stale," that is, have been in REO status for more than a few months, or in more extreme cases for a year or more.

Figure 6 shows that, in metropolitan areas overall, approximately 50 percent of the REO in August 2008 was more than three months old. The distribution of prime/near-prime REO aging is a bit broader than for subprime REO, with a higher percentage of prime/near-prime REO being over twelve months old and a slightly higher percentage being sold in less than a month (zero months).

Measuring the frictional aspect of REO stock across different metropolitan markets is made a bit complicated by the fact that in some areas the portion of REO stock that entered REO fairly recently is quite large due to the more recent surge in foreclosure activity. Therefore, rather than measuring the proportion of REO that is older (e.g., more than x months old), which will be heavily affected by the amount of recent REO flowing into the market, a better estimate is to measure the density of older REO in the region.

Figure 6. Aging of REO Inventory, U.S. Total, August 2008



Data source: Lender Processing Services Inc. (LPS) Applied Analytics

Figure 7 plots the combined density of "old" and "very old" REO, combined, by MSA. Old REO are defined here as those properties that have been in REO for four to twelve months. Very old REO are those that have been in REO for more than twelve months. Figure 8 plots the density of very old REO alone. The two maps are quite similar, suggesting that the MSA-level distributions of old and very old REO are at least roughly similar.

Figure 7. REO Aging: Old and Very Old REO per 10,000 Mortgageable Properties 358 MSAs, August 2008

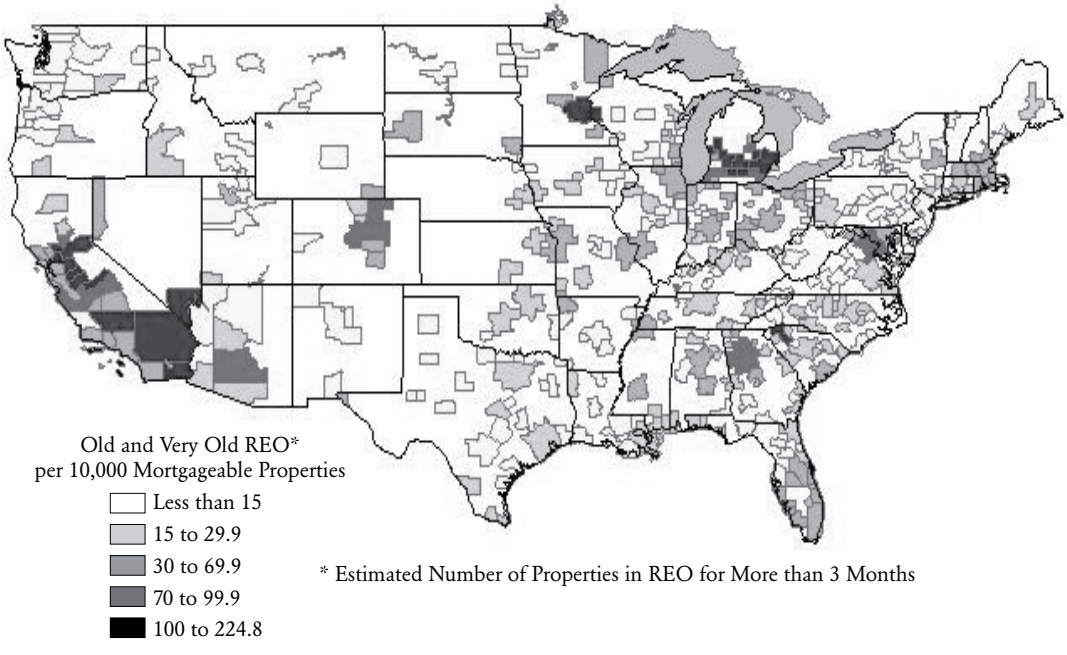


Figure 8. REO Aging: Very Old REO per 10,000 Mortgageable Properties

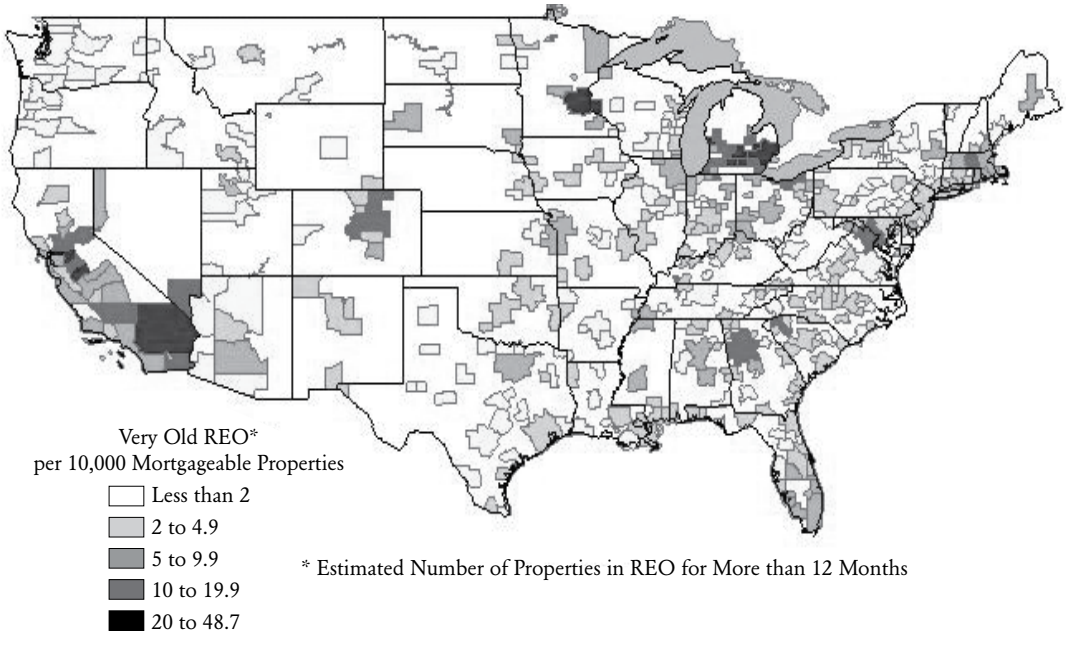
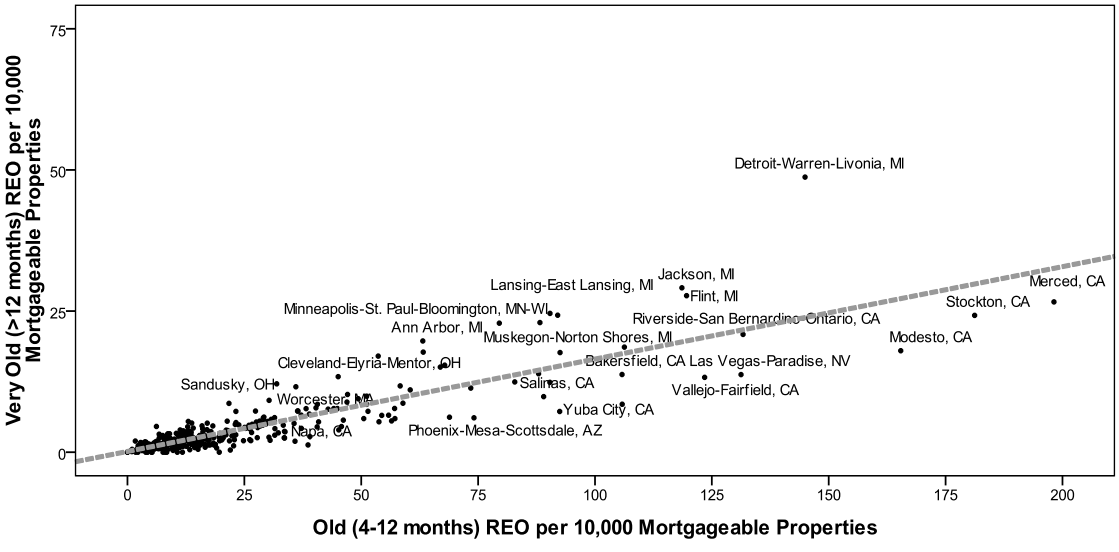


Figure 9. Very Old versus Old REO Densities by Metropolitan Area, August 2008



Data sources: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

Figure 9 extends a comparison of Figures 8 and 9 by plotting the density of very old REO against the density of old REO. In general, the plot shows a strong correlation between the two aging categories. Metropolitan areas with a high density of old REO also tend to have a high density of very old REO. However, many of the MSAs that have experienced very fast increases in REO since August 2006, including many in California, tend to lie on the lower/right of the dashed line. Although many of these MSAs have high rates of very old REO, their rates of old REO are particularly high. Conversely, in many of the MSAs where foreclosures and REO have been high for a longer period of time, the rate of very old REO is particularly large.

However, it should be noted that even in some metro areas where the density of REO was small in late 2006, the density of very old REO has become quite large. In fact, of the ten MSAs with very old REO densities of more than 20 per 10,000 properties, three were housing markets in California (Merced, Stockton, and Riverside). Of the remaining seven, six are MSAs in Michigan, and the last is the Minneapolis–St. Paul–Bloomington MSA. Therefore, although the stable-to-weak markets that have experienced high levels of foreclosure and REO for a longer period of time—well before 2007—tend to have the highest rates of very old REO, many formerly hot housing markets appear to be "catching up," amassing a large amount of both old REO and very old REO.

Cluster Analysis: A Typology of Metropolitan REO Markets

Given the relationship between home price appreciation and increases in REO density, I use cluster analysis to identify a typology of MSAs using the initial (August 2006) subprime REO density, the initial prime/near-prime REO density, and the change in the OFHEO home price index from the second quarter of 2006 to the second quarter of 2008. The cluster analysis results in three clusters described in Table 2 and illustrated in Figure 10. Metropolitan areas in the largest cluster, Cluster 1, are characterized by initial REO densities that are close to the median of all 358 MSAs. This cluster is also characterized as having a modest initial share of subprime REO (26.1 percent median) over the two-year period and a moderate level of home price appreciation (7.7 percent median versus the 358 MSA median of 5.8 percent).

Cluster 1 MSAs tend to be mostly modest in size (median number of mortgageable properties was 61,079). Finally, the median increase in estimated total REO density was relatively low at 8.31. This cluster, which I label "Low Initial REO Density and Stable Prices," accounts for almost 65 percent of MSAs but less than 47 percent of the mortgageable properties in all of the MSAs.

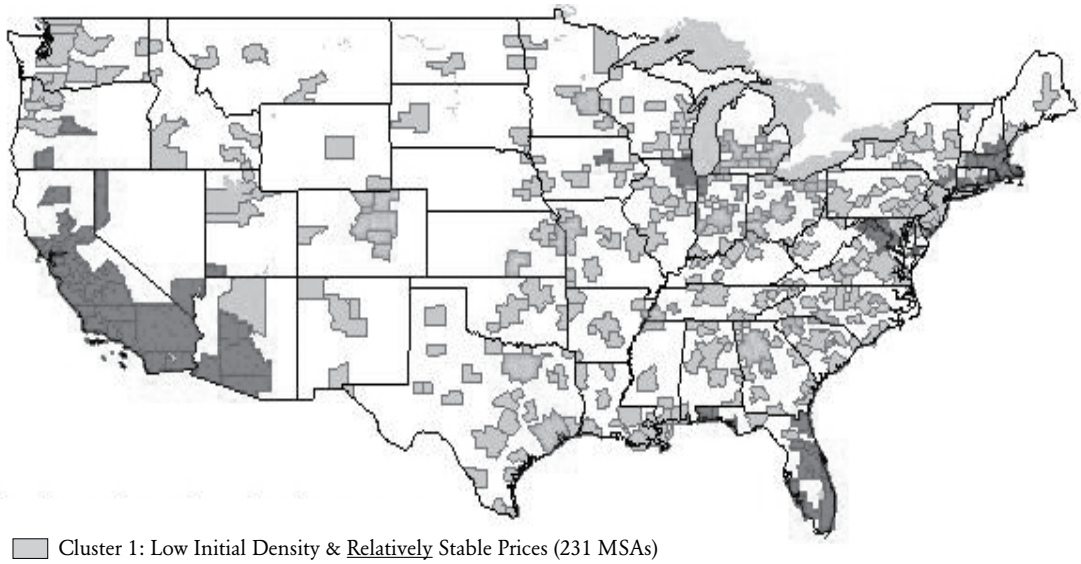
The second cluster includes metropolitan areas with relatively high initial estimated REO densities. This includes many metropolitan areas in Michigan and other weak-market cities as well as some stable-market cities with relatively high foreclosure and REO levels in 2006. Besides the Detroit MSA, this cluster includes the Minneapolis, Atlanta, Indianapolis, Memphis, and Denver MSAs. The MSAs in Cluster 2 are characterized by above-average initial subprime REO shares and modest home price appreciation or moderate declines in value. This cluster is labeled "High Initial REO Density." It accounts for 16 percent of the MSAs but 22 percent of total MSA mortgageable properties.

Table 2. Cluster Analysis: MSAs Clustered by REO Prime/Near-Prime and Subprime Density in August 2006 and Change in OFHEO Housing Price Index

	Cluster 1: Low Initial REO Density & Stable Prices, 8/06 – 8/08	*Cluster 2: High Initial REO Density 8/06*	*Cluster 3: Low Initial REO Density & Large Price Decline 8/06 – 8/08*	*All 358 MSAs*
Number of MSAs in Cluster	231	58	69	358
Number of MSAs in California in Cluster	0	0	26	26
Median Level of REO per 10,000 Mortgageable Properties, 8/2006	11.08	36.76	2.78	10.81
Median Level of Subprime REO per 10,000 Mortgageable Properties, 8/2006	2.92	11.98	1.44	3.21
Median Estimated Share of REO that is Subprime, 8/06	26.1%	35.0%	53.7%	29.8%
Median Increase in REO per 10,000 Mortgageable Properties, 8/06 - 8/08	8.31	23.01	64.83	12.70
Median Percentage Point Increase in OFHEO Housing Price Index, 2Q 2006 - 2Q 2008	7.7%	2.0%	-12.2%	5.8%
Median Number of Mortgageable Properties, 2006	61,079	88,691	137,758	75,319
Total Number of Mortgageable Properties in Cluster MSAs, 2006	32,401,199	15,802,851	22,250,703	70,454,754

Note: Clustering process used Ward's Method with squared Euclidean distance measure

Figure 10. Locations of MSAs by Cluster



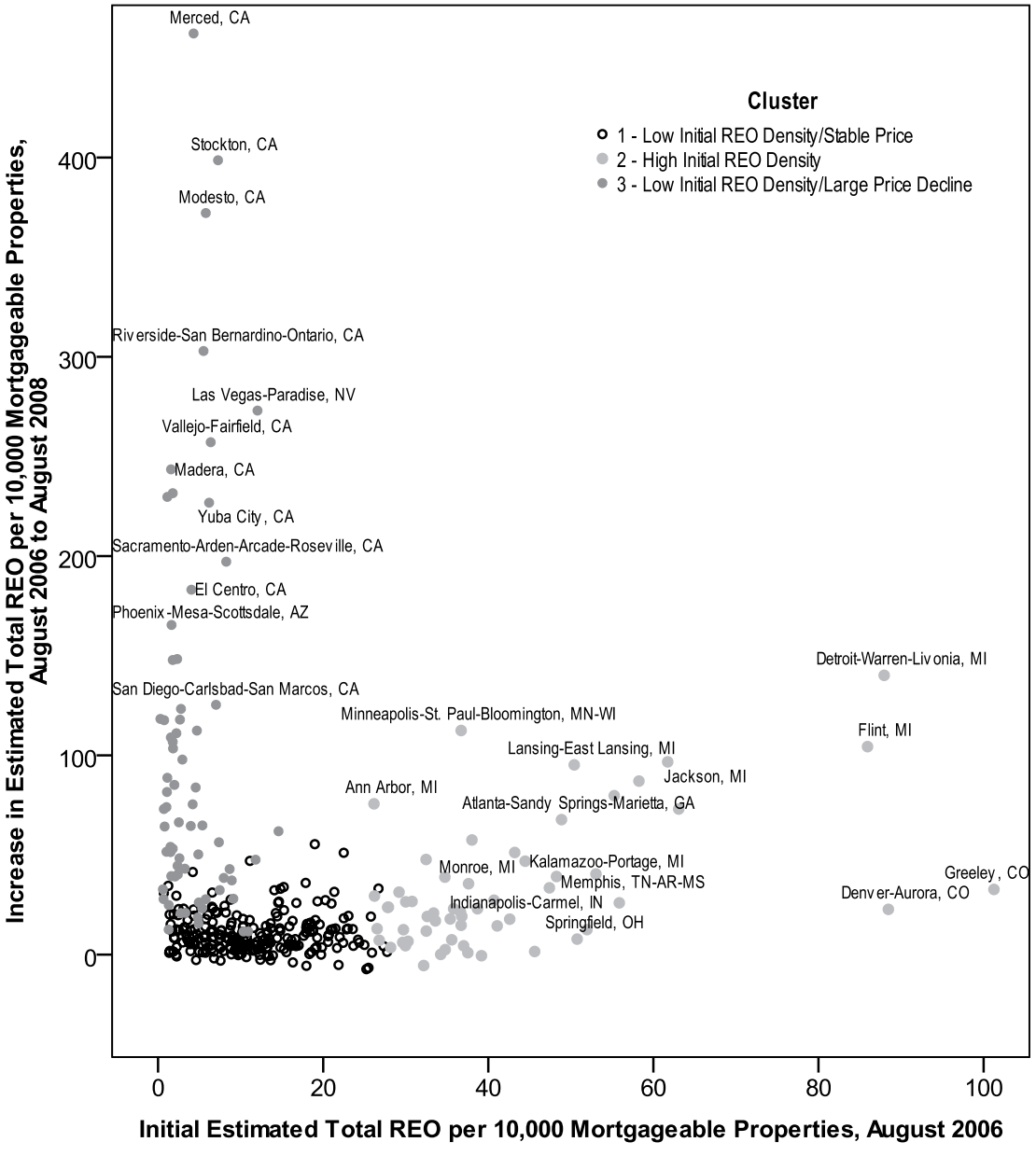
Cluster 1: Low Initial Density & Relatively Stable Prices (231 MSAs)
Cluster 2: High Initial REO Density (58 MSAs)
Cluster 3: Low Initial REO Density & Large Price Decline (69 MSAs)

Data sources: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006; Federal Housing Finance Agency

The third cluster includes mostly metropolitan areas that had very low REO densities initially (August 2006) and experienced significant loss in property values over the two-year period. It includes all of the California MSAs in the data set as well as most of the other formerly hot-market metropolitan areas, many of which have seen large increases in REO density. These metro areas began the period with very low REO densities (median 1.44 per 10,000 properties) and high subprime REO shares (median of 53.7 percent). They were relatively large with a median number of mortgageable properties of more than 130,000. This cluster accounted for 19 percent of MSAs but 31 percent of mortgageable properties in all 358 MSAs. This cluster is labeled "Low Initial REO Density and Large Price Decline."

Figure 11 plots the increase in estimated total REO density (August 2006–August 2008) against the initial estimated total REO density (August 2006), indicating cluster membership for each MSA. It shows that most of the MSAs in Cluster 2 (light solid) experienced sizeable increases in REO density and that, within this cluster, generally MSAs with higher initial REO densities tended to see larger increases in REO density. The outliers in this cluster are the Denver and Greeley MSAs, which had very high initial REO densities but saw relatively moderate increases in REO density over the two-year period.

Figure 11. Initial Estimated REO Density and Increase in REO Density among MSAs Clustered by Change in Value and Initial REO Density



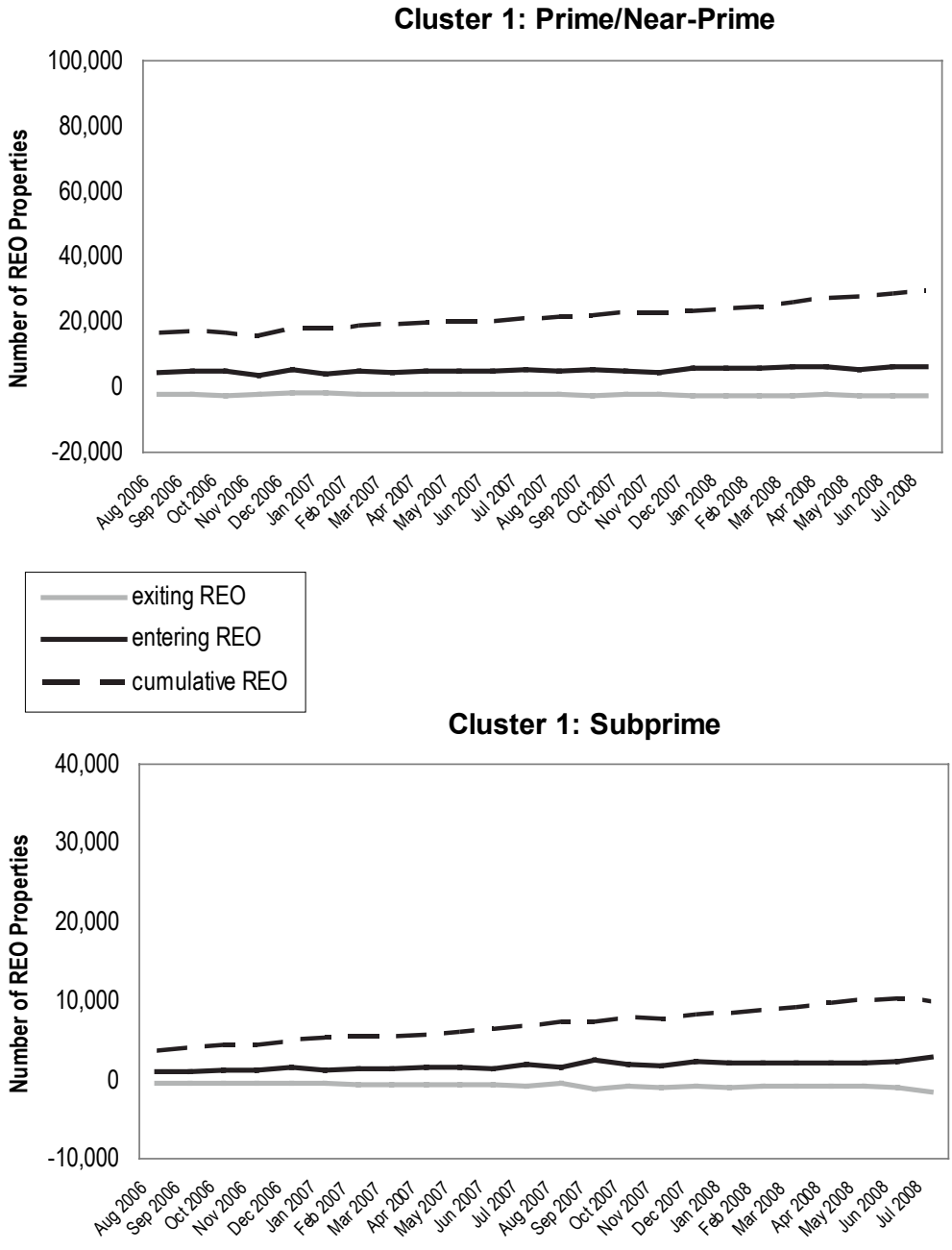
Many MSAs in Cluster 3 (dark solid) experienced extremely large increases in REO density. However, the variance in increased REO density within the cluster is quite large. That is, a good number of MSAs in this cluster show more moderate (but still substantial) increases in estimated total REO density despite large declines in their house price indices. This finding is consistent with Figure 1, which shows a large dispersion of REO increases among MSAs experiencing large property-value declines.

REO Exit by Cluster

The analysis of REO inventories thus far suggests that REO accumulation varies greatly across metropolitan areas. This is consistent with the fact that foreclosure rates (and therefore REO entrance) vary greatly across metros. However, what has been less clear is whether REO exit rates (primarily sales by servicers of REO properties) vary substantially across MSAs, and how these exit patterns may be contributing to differential rates of REO accumulation. In order to address this question, I examined REO exit and entrance data across the three clusters of MSAs described above. This was done separately for prime/near-prime vs. subprime mortgages. (Because there was no attempt to estimate total REO densities in this section, there was no need to adjust raw LPS REO numbers to arrive at estimated total REO figures.)

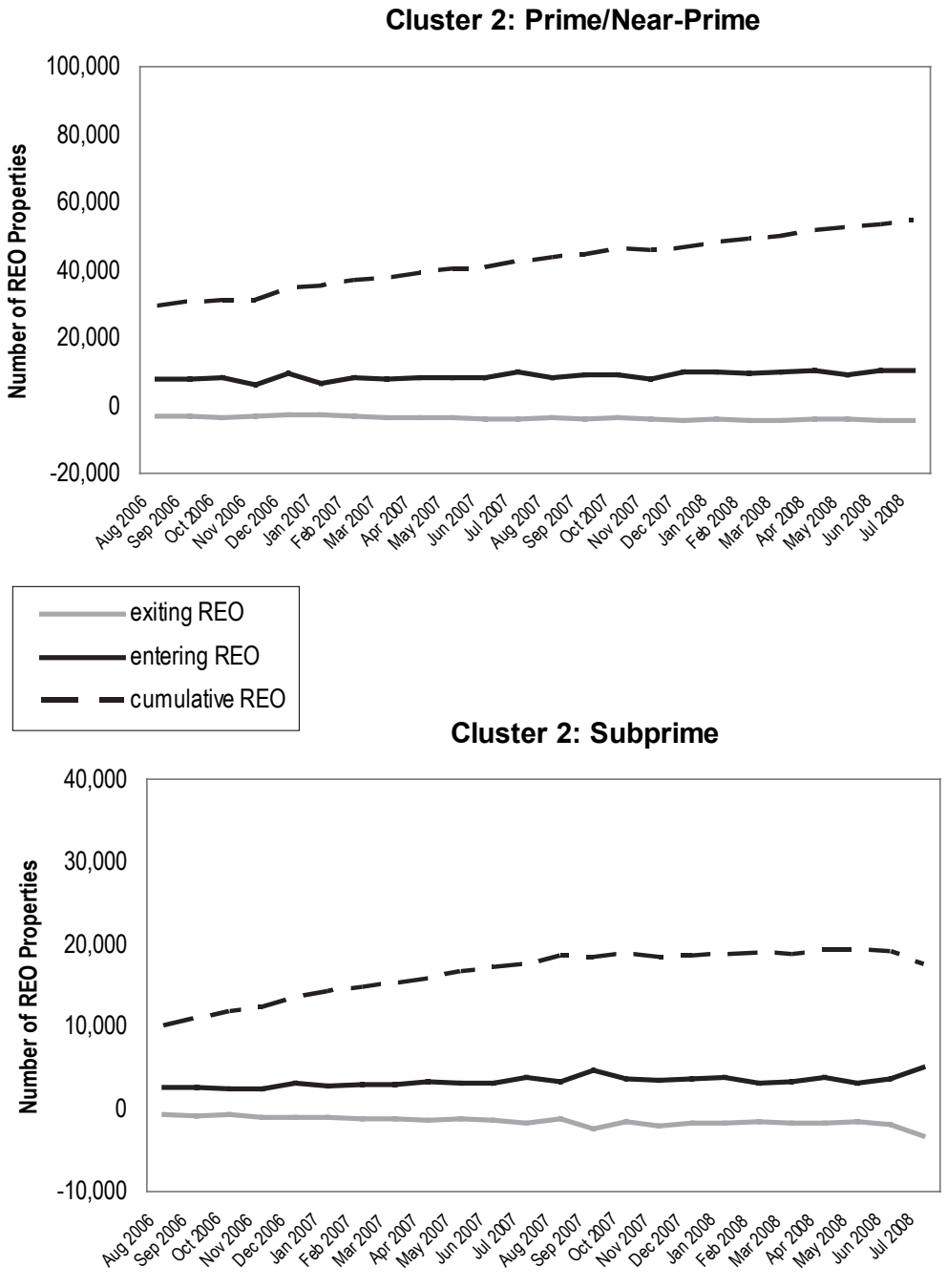
Figures 12 through 14 illustrate the prime/near-prime (top chart) and subprime (bottom chart) aggregate patterns of REO entrance and exit, together with the resulting REO accumulation, for each cluster of MSAs. Again, REOs have grown appreciably in all three types of MSAs.

Figure 12. Cluster 1 REO Entrance and Exit, by Prime and Subprime Mortgage Type



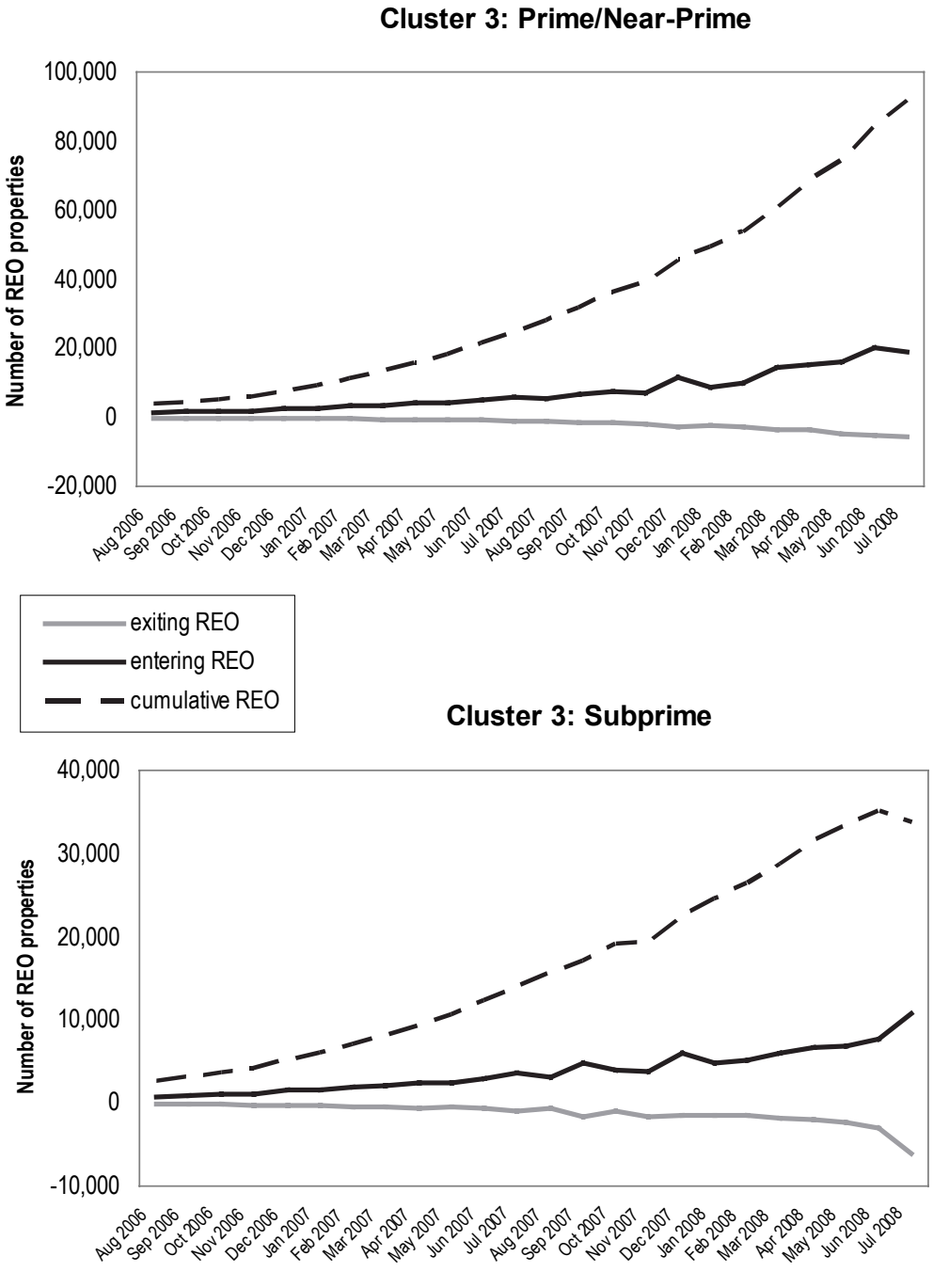
Data sources: Lender Processing Services Inc. (LPS) Applied Analytics; Federal Housing Finance Agency

Figure 13. Cluster 2 REO Entrance and Exit, by Prime and Subprime Mortgage Type



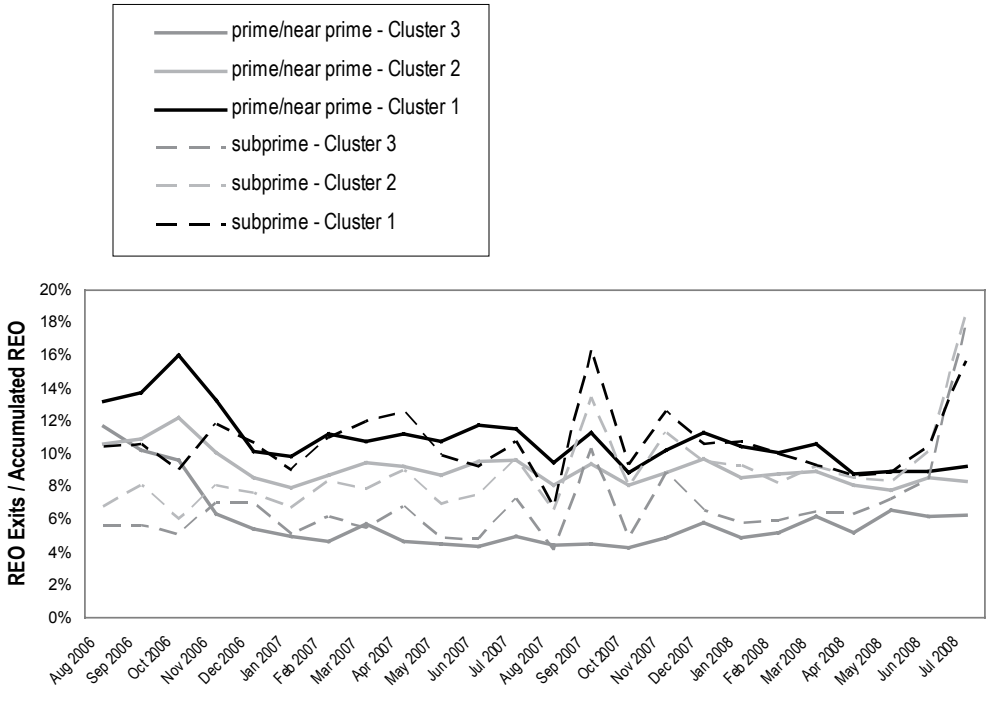
Data sources: Lender Processing Services Inc. (LPS) Applied Analytics; Federal Housing Finance Agency

Figure 14. Cluster 3 REO Entrance and Exit, by Prime and Subprime Mortgage Type



Data sources: Lender Processing Services Inc. (LPS) Applied Analytics; Federal Housing Finance Agency

Figure 15. REO Exit Rates for Prime/Near-Prime and Subprime, by Cluster



Data sources: Lender Processing Services Inc. (LPS) Applied Analytics; Federal Housing Finance Agency

The rate of increase is much faster in Cluster 3 MSAs generally, and the raw magnitude of the increase in Cluster 2 MSAs is generally greater than in Cluster 1 MSAs, which started at lower levels of REO density. These charts also show that the primary contributor to REO accumulation is REO entrance, that is, newly foreclosed properties reverting to bank ownership. In general, REO exit rates have not increased appreciably, especially in Cluster 1 and Cluster 2 MSAs. While REO exit rates grew slowly in Cluster 1 MSAs, these rates began from very low levels and have not at all kept pace with the increases in REO entrance.

REO entrance in Cluster 1 and 2 MSAs generally did not increase dramatically since late 2006. Cluster 2 MSAs generally saw large increases in foreclosure levels well before late 2006 and were typically at high foreclosure levels already. However, the net surplus of REO entrants over exits has remained consistently substantial in both Cluster 1 and Cluster 2 MSAs, at least in the aggregate, so that even while foreclosures did not increase dramatically over this period, REO accumulation continued to mount. In Cluster 3 MSAs, REO exits did increase some since late 2007, but this increase was slower than the increase in new REO.

The bottom charts in Figures 12 through 14 show that in the summer of 2008 there was a significant increase in subprime REO entrance and exit activity. The reason for this is unclear,

as is whether this trend continued into late 2008. The increase in exit rates was enough to cause a slight drop in subprime REO inventory in Cluster 2 and Cluster 3 MSAs overall.

Figure 15 illustrates the REO exit rates for prime and subprime REO, broken out by MSA cluster. The exit rate is the number of REO exits in a month divided by the total inventory of REO in that month. There are a few patterns worth noting here. First, the subprime exit rates are generally more volatile from month to month than the prime/near-prime exit rates. This may be due in part to a greater level of tumult in the subprime market relative to the prime market over this period.

Second, consistent with the patterns shown in Figures 12 through 14, the subprime exit rates across all three clusters showed a particular spike upward at the end of the period studied here. The explanation for this is unclear, but it is something worth paying close attention to going forward. Exit rates for prime/near-prime REO showed no such spike upward. Other than this late spike, subprime REO exit rates were not consistently higher or lower than corresponding prime/near-prime exit rates in Clusters 1 and 2, but subprime rates tended to be slightly higher in Cluster 3.

Third, the exit rates of Cluster 1 REO are generally substantially higher than those for Cluster 2 and, especially, Cluster 3 properties. The one exception is the spiking convergence of exit rates late in the period. Cluster 3 REO exit rates are generally substantially slower than is the case for the other two clusters. This may not be surprising given the very high levels of REO inventory that must be absorbed in many of these markets. However, it is worth noting that, at the beginning of the period, the prime/near-prime REO exit rate for Cluster 3 was higher than that for Cluster 2 and almost as high as that of Cluster 1. Cluster 3's prime/near-prime exit rate dropped from just under 12 percent to just over six percent over the study period.

Finally, in the aggregate, the prime/near-prime REO exit rate for each of the three clusters declined significantly over the study period. At the beginning of the period, these rates were in the ten percent to 14 percent range, but by the end of the period they had declined to a range of between six percent and 9.5 percent. This is consistent with a general pattern of REO entrance consistently outweighing REO exit over time.

Conclusion

This article provides a first look at REO accumulation across metropolitan areas since the advent of the 2007–2008 mortgage crisis. Overall, the buildup of REO properties has been quite steep, with the steepest REO accumulations in the formerly hot housing markets where foreclosures have increased most dramatically. Many of these are in the West, including metro areas in California, as well as Las Vegas and Phoenix. Some metro areas in Florida and the Washington, DC area have also seen very sharp increases in REO inventory. Metro areas that had relatively high levels of REO in late 2006 (at least compared to other metro areas at that time) have also generally seen quite substantial increases in REO densities, although these recent increases, while large, have not been as steep or generally as large as in the formerly hot-market metro areas. Moreover, four out of the five large metro areas with the

highest estimated REO densities as of August 2008 were formerly hot-market metro areas (Riverside, Las Vegas, Sacramento, and Phoenix). (The Detroit metropolitan area ranked third among large metro areas.)

The findings above also suggest that, although the growth of subprime REO began earlier during the crisis period, the estimated share of REO that is associated with subprime loans has generally declined in most MSAs, especially since late 2007 or early 2008. This finding is consistent with recent increases in prime/near-prime foreclosure rates, including among Alt-A and adjustable-rate loans. In many metro areas, these estimates suggest that the majority of REO are now associated with prime/near-prime loans. However, in particular parts of metropolitan areas, subprime REO densities likely still dominate prime/near-prime REO densities. More research is needed to understand small-area patterns of REO accumulation, including differences in the share of REO that is associated with subprime loans. Given the existing evidence on the spatial concentration of subprime lending within metropolitan areas, there is reason to expect significant variations across neighborhoods or other submarket geographies.

The analysis of REO aging suggests that, although the metro areas that had initially higher REO densities in August 2006 were likely to have the highest densities of very old (more than twelve months) REO, some of the formerly hot markets have substantial levels of old (four to twelve months) REO and some even have high levels of very old REO, despite having only had a major foreclosure problem for just a couple of years.

Metropolitan areas appear to cluster fairly well into three groups. First is a fairly large set of metro areas that had modest initial REO densities and have had relatively stable price trends over the two-year period. This largest group of metro areas—which includes many small MSAs—tended to see fairly moderate increases in REO density over the two-year period. A second cluster of metro areas includes those that had relatively high initial REO densities. In general within this group, a positive relationship exists between the initial level of REO density and the size of the increase in REO density over the two-year period. Denver and Greeley, Colorado, were clear exceptions here. They both began with very high REO densities but experienced relatively moderate increases over the study period. The third cluster includes those metro areas that began the period with very low REO densities but saw large declines in property values. Many—but by no means all—of these metro areas experienced very large increases in REO density. Some metro areas in this group saw more moderate increases in REO density.

Finally, the analysis of REO exit and entrance across the different MSA clusters shows that, overall, REO accumulation has been driven primarily by entering REO. In Cluster 1 and Cluster 2 metro areas, there has been a fairly consistent and substantial surplus of entrants over exits, resulting in a steady rise in REO inventory. In Cluster 3 metros, foreclosures have increased more, so that REO entrants have grown at higher rates over time. Although REO exits have grown some, the surplus of entrants over exits has increased, resulting in rapid accumulation of REO inventory. Generally, REO exit rates do not appear to differ substantially between prime/near-prime versus subprime REO. However, there was a

spike in subprime REO exits at the end of the study period, but it was too brief to enable any strong conclusions. Overall, exit rates have been considerably lower in Cluster 3 (primarily the formerly hot-market metros) than in Cluster 2 and, especially, Cluster 1.

Understanding the accumulation, aging, and nature of REO inventories across metropolitan areas is important to formulating policies and informing practice regarding how to help communities and neighborhoods recover from surging foreclosures. More research is needed to understand the corresponding intrametropolitan patterns of REO accumulation and aging to respond more effectively to the aftermath of the foreclosure crisis.

The findings in this article have several implications for community development policy and urban and regional planning. In considering such implications, it is important to keep in mind the fast-paced dynamics of changes in foreclosure and real estate markets in recent years. Cross-metro REO accumulation should be continuously monitored to inform policy and practice going forward.

First, at this stage of the mortgage crisis at least, it appears clear that REO accumulation has been quite severe not only in what had been considered weaker market metro areas but also in many formerly hot markets, some of which have experienced the heaviest and fastest increases in foreclosures over the last several years. Although this finding is most likely not surprising to many—especially those with local knowledge of these markets—there is little evidence at this point that the broader real estate market is readily absorbing REO properties in these formerly hot housing markets at sufficient speed to slow REO accumulation appreciably. Even in places where serious increases in foreclosures began fairly recently (late 2006 and early 2007), there are serious buildups in REO properties and, in most of these markets, substantial accumulations of old and very old REO. Given the earlier trends of population and economic growth in many of these regions, some may expect that these accumulations will be worn down rapidly via "regular" market forces and the settling out of credit market problems. This question remains unsettled. The evidence thus far suggests that many formerly hot-market metro areas have accumulated very severe REO inventories. Given that some of the factors that contributed to escalating valuations and rapid development in these markets—including easy access to construction and mortgage financing and low commuting costs (due in part to low gasoline prices)—are unlikely to return on a long-term basis, some may have reason to doubt that a quick clearing of the REO supply is likely, at least in some of these metro areas. The scale of the foreclosure and REO problem in many of these metro areas may herald a longer-term spatial restructuring of some regional housing markets. This has implications for policymakers and planners who may be considering longer-term development proposals, infrastructure planning, and neighborhood or local recovery efforts.

Second, because the growth in REO accumulation is driven primarily by growth in new, entering REO, it remains important to consider mixed strategies of slowing the inflow of new REO as well as encouraging the responsible and sustainable absorption of REO into productive use. As long as REO entrance rates remain very high, efforts aimed solely at REO recovery are likely to have limited impacts. In markets where the inventories have

reached very high levels, it is also important to consider possible land reuse, especially where population and economic forecasts do not suggest substantial increases in aggregate housing demand.

Third, notwithstanding the need to do more work at the submetropolitan level, the shift in REO accumulation from subprime to prime/near-prime mortgages suggests a likely spatial shift in REO accumulation over time. Thus, some suburban communities that had not previously experienced major REO problems may begin to see their REO inventories increase. While the problems in such places are unlikely to reach the levels in many central cities or smaller, formerly hot-market MSAs (Modesto, Merced, Stockton), they may become serious. Moreover, many suburban communities have little infrastructure or experience related to housing or community development and may be ill equipped to deal with such problems. Some older-, weaker-, or stable-market cities have faced episodic challenges of vacant property over several decades. Although these communities face serious problems with foreclosed properties as well, they often have somewhat of a head start in terms of an established community development infrastructure.

The spatial impacts of the shift toward prime/near-prime REO is not entirely clear. Subprime loans tend to be more spatially concentrated within metropolitan areas. The shift toward prime/near-prime loans suggests a potential spatial dispersion of REO, which may reduce the negative impacts associated with heavily concentrated foreclosed properties. Moreover, the neighborhoods in which the REO properties are located may be more economically resilient. At the same time, many of the Alt-A and prime loans that are going into foreclosure are likely to be adjustable-rate loans with teaser rates and, especially in the case of Alt-A loans, involve significant instances of fraud or inflated incomes and investor properties. Some of the properties associated with such loans are likely to be heavily underwater (where the loan balance far exceeds the property's value), making recovery of the property more challenging.

A fourth implication of this study concerns the desirability and utility of having broader access to reliable measures of foreclosure and REO activity that are comparable across neighborhoods, cities, counties, and states. The data used in this study are not generally available at reasonable costs for most researchers and policy analysts. Moreover, they are not entirely comprehensive and depend on the voluntary participation of loan servicers. Comprehensive, consistent, and accessible data on foreclosures and REO properties are critical to furthering solutions to problems of excessive foreclosures and to improving the prospects for returning REO to productive use. Data on loans entering foreclosure and through the REO process could be required from all mortgagees via federal regulations, similar to the way loan origination data are reported and disclosed via the Home Mortgage Disclosure Act. Moreover, linking of mortgage data from HMDA through to the foreclosure and REO process would be particularly helpful. This would allow researchers, policy analysts, and others to more clearly identify the characteristics of mortgages, lenders, and borrowers associated with foreclosures and REO properties.

Notwithstanding the desirability of having foreclosure and REO data on residential properties available at the federal level, many states could do more to ensure better and more accessible data at the state and federal level. Real estate recording is generally governed by state law, and more transparent and accessible data could be collected and disseminated by states through state-level property record keeping. Currently, lower-level jurisdictions–typically counties–collect and manage property records data, which leads to a great deal of variability in the quality and accessibility of the data, often making tracking REO in a large metropolitan area difficult.

Good data on real estate transactions can be an important tool in identifying problems related to foreclosures and vacant properties and in developing better policies to promote neighborhood and market recovery. For example, recent work by Coulton, Schramm, and Hirsh (2008) using an extensive data set on property transactions in Cuyahoga County, Ohio, show that the proportion of REO sales for under $10,000 (what they term "extremely distressed sales") increased from less than 10 percent in 2006 to more than 40 percent by the first half of 2008. The extremely distressed sales share in the City of Cleveland increased to 63 percent citywide, and to over 75 percent on the city's Eastside. Such analysis is impossible without good, robust, local data.

The findings of this study demonstrate the magnitude of the challenge that many communities face in dealing with the distress caused by the ongoing foreclosure crisis. While many metro areas have not experienced large inventories of REO properties at this point, a sizable portion of them, representing a majority of mortgageable properties in metropolitan America, have seen large increases in the density of REO properties over a relatively brief period of time. Moreover, many markets, including most formerly hot housing markets, show little sign that the growth of REO has slowed. The shift from subprime to prime/near-prime foreclosures may bring with it a different spatial distribution of REO. More research is needed to understand the neighborhood or submarket nature of REO accumulation within different types of metropolitan housing markets.

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Appendix

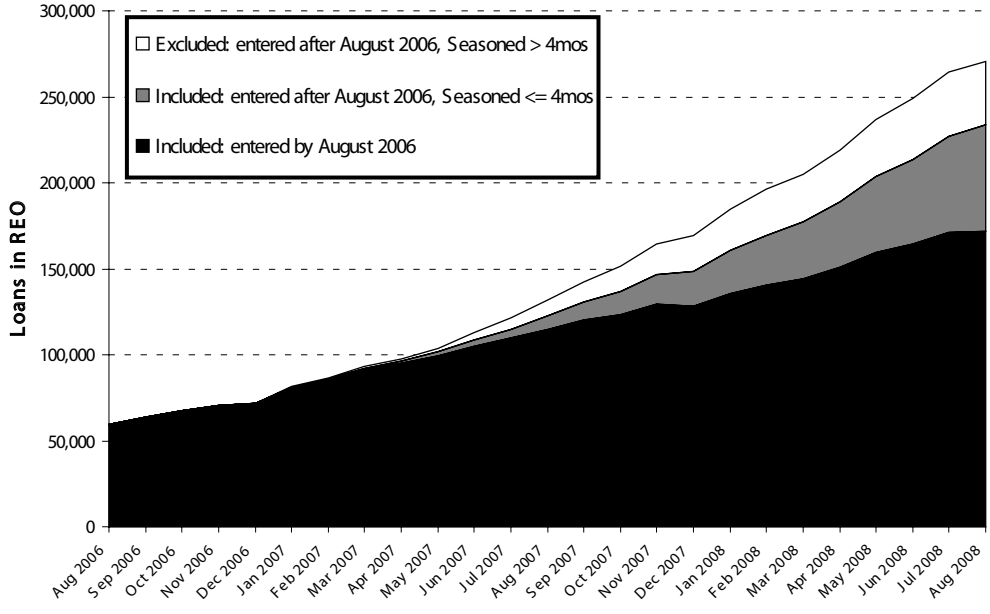
The primary data used in this article, the LPS data, are collected from loan servicers. The LPS data do not include all REOs. Therefore, in places where estimates of total REO properties are desired, I have derived them by multiplying the LPS unadjusted totals of prime/near-prime and subprime REOs by factors used to scale up the LPS figures. The figures used for this purpose are national-level estimates of outstanding prime/near-prime and subprime loans from the publication National Mortgage News (NMN). Alternative estimates from the Mortgage Bankers Association National Delinquency Survey (NDS) were also used to judge the sensitivity of the findings to the use of alternative adjustment factors. The sensitivity analysis results (not shown here) indicate that the findings in this article are not substantially affected when switching to the NDS adjustments. The NMN estimates of the total market were somewhat larger than the NDS numbers, so those figures were chosen as the best available estimates.

By comparing LPS data to the NMN estimates, the relative extent of the LPS coverage of the mortgage market is estimated and adjusted for. Using these figures, the LPS figures are estimated to cover 58 percent of the total prime/near-prime market and 32 percent of the subprime market. Therefore, unadjusted LPS prime/near-prime figures are adjusted by a factor of 1.72 (1/0.58), and subprime figures are adjusted by a factor of 3.13 (1/0.32).

The LPS data set grew significantly in recent years. While the expansion of the data set was the greatest in years before 2006, the sample size continued to expand during the study period. Therefore, the growth in the number of loans in the data set represents not only growth in mortgage loan activity (or REO activity) but also the additional new loans entering the survey due to expanded servicer participation. Over time, many well-seasoned loans (loans that were not recently originated) have entered the data set in "lumpy" spurts. If the entrance of large numbers of well-seasoned loans is not controlled for, increased REO activity may merely reflect the expansion of the sample over time. At the same time, many newly originated loans would normally enter the data set after August 2006 even if the aggregate sample (as a share of all loans) did not change. Therefore, merely restricting the REOs to those for loans originated by August 2006 would provide an overly conservative measure of REO activity and growth, especially given the poor loan performance of many loans originated after August 2006.

Figure A-1 shows the growth in REO in the LPS data set over time broken out into three categories: (1) those associated with loans that entered the data by August 2006; (2) those briefly seasoned (four months or less) loans that entered after August 2006; and (3) well-seasoned (more than four months) loans entering after August 2006. In all analyses involving tracking or measuring changes over time, only REO properties in groups (1) or (2) are included. In the cross-sectional analysis of REO as of August 2008, all three groups are included.

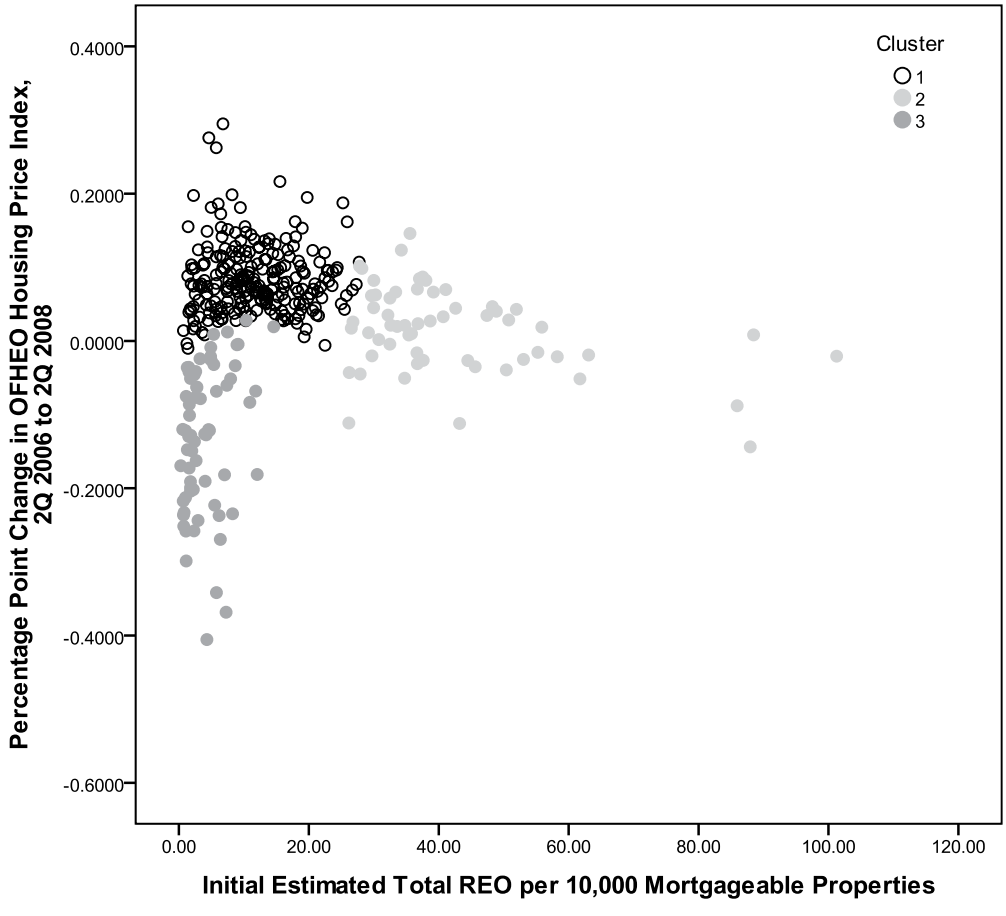
Figure A-1. REO Loans by Entrance Date and Seasoning, August 2006 to August 2008*



** Unadjusted counts, all loan types; all loans in MSAs*
Data source: Lender Processing Services Inc. (LPS) Applied Analytics

The cluster analysis in this article uses three variables: (1) the initial (August 2006) prime/near-prime REO density; (2) the initial (August 2006) subprime REO density; and (3) the percent change in OFHEO Home Price Index from the second quarter of 2006 to the second quarter of 2008. Squared Euclidean distance was used as the measure of proximity and Ward's method, which is aimed at minimizing variance within clusters of cases. Figure A-2 illustrates the cluster analysis result by simplifying the initial prime/subprime REO density dimensions by the estimated initial total REO density variable.

Figure A-2. Cluster Analysis Result



Data sources: Lender Processing Services Inc. (LPS) Applied Analytics, American Community Survey 2006

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