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Income Migration and Home Price Trajectories in the United States

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This paper models one facet of the relationship between housing market price shifts and income migration among U.S. regions: how income migration relates to regional housing price clusters. The tremendous negative slide in national housing prices from 2006 to 2012 had an uneven spatial distribution. These differences are explored within the context of net income and net population migration (movement of money with people). Median housing prices for urban areas from 2005 to 2010 and IRS county-to-county migration data are used to compare income migration among urban clusters of similar housing price trends. Selective migrations of people and income in and out of these housing clusters have either exacerbated the housing bust or softened its decline. Income effectiveness, or the gain or loss of money caused by migration, is a helpful measure that can be used to help predict future housing price movements.

Keywords

Income migration, United States, Housing prices, Income effectiveness

1. Migration Impacts on Home Prices

When a house loses value, are its occupants more inclined to move or will they wait it out in hopes that prices rebound? Do people move to new areas because the housing stock is less expensive? Does migration to areas keep home values from dropping more precipitously? Does migration increase or decrease during housing downturns? To examine these questions, this paper analyzes the relationship between housing market price shifts and income migration transfers among U.S. regions.

The tremendous negative price trends in national housing prices over the past five to seven years have not been evenly distributed across space. This irregular price trend is examined here within the context of income migration or change in county or region total household income attributable to in- and out-migration. This exploration pinpoints areas that will likely experience positive housing price trends in the future and those that will be more apt to continue to struggle.

2. Factors that Affect Housing Prices

A multitude of factors impact changes in housing prices of a certain market of which migration is key. Supply of housing is important, and when geographical and urban structure constraints limit or encourage building (Glaeser et al. 2006, Saiz 2010) or government regulations (Phillips and Goodstein 2000) limit building, prices tend to be pushed higher. At the macro level, mortgage rates are important (Tsatsaronis and Zhu 2004), while at the local level, school quality (Kane et al. 2006), housing vacancies, and the speed in which new housing construction comes to market (Hwang and Quigley 2006) make a difference.

Migration affects demand. A large and growing body of literature has explored the relationship of housing prices to migration. These studies have considered this interrelationship at different scales. For example, at the neighborhood level, housing prices are supported by in-migration, but as prices rise, in-migration is discouraged (Jeanty et al. 2010). Additionally, local markets can be subdivided into submarkets, as illustrated in a case study of Glasgow, U.K., to have a large share of intra-submarket migration that should be used to help define the submarkets themselves so housing markets can be accurately analyzed (Jones et al. 2004). At the regional level, higher housing prices and a greater share of single family residences constrains in-migration, while out-migration is not greatly affected (Hämäläinen and Böckerman 2004). At the national level, housing prices in New Zealand have been pushed up ten percent for a positive net in-migration equal to one percent of the population (Coleman and Landon-Lane 2007). In the U.S., this relationship is only a one percent increase of price for each positive net-migration which is equal to one

percent of the total population. This house price effect is still larger than a similar increase in the labor market (Saiz 2007).

The modeling of the relationship between migration and housing prices reveals how these factors interact together and with other variables. Potepan (1994, 89) considers how migration impacts housing prices in major metropolitan areas in the U.S. He finds that both in- and out- migrations influence house prices by about the same amount. Conversely, migration is discouraged by higher housing prices. A theoretical model of a system of cities where migration is frictionless within the system, but closed otherwise, allows for household income to be taken into account (Frame 2004). The modeling of the complicated relationship among local economic activity, migration patterns and housing prices shows that higher wage jobs attract better qualified migrants from lower wage cities, and thus increases housing prices in the higher wage city while bringing in lower paid migrants into the lower wage city. This depresses housing prices there (Aharonovitz 2011). Other models have shown how house building regulations constrain housing supplies and employment while raising real estate prices (Saks 2008); that migration is affected by housing prices in varying degrees across the U.S. after employment shocks (Zabel 2009); and that there is an impact, although small, in the interstate migration rate when people have negative home equity which decreases their ability to sell their homes (Modestino and Dennett 2013).

Differential patterns in housing prices have developed due to the "sorting process" where those with higher incomes migrate to certain cities with high housing prices that offer attractive amenities, agglomeration economies and/or strong, specialized labor requirements and often limited housing supplies (Gyourko et al. 2006, 2010). On the other hand, selective migration experienced in the expensive housing areas of coastal California and parts of the northeast resulted in the loss of billions of dollars from 1995 to 2004, because of greater out-migration than in-migration. The implication of this is that not only do expensive housing areas attract migrants that can afford to live there, but that others leave those regions and move to less costly areas either by economic force or perceived affordable opportunities (Shumway and Otterstrom 2010). This paper seeks a middle ground in housing and migration research, a topic missing in current referenced studies, which is increasing the understanding of how large-scale migration flows impact local price shifts in single family housing. This is done by differentiating a number of urban region clusters and modeling how migration moves both people and income to affect the price of houses in various regions of the country.

3. Theoretical Framework: Selective Migration Impacts on Home Prices

Selective migration is the process by which migration flows among counties, and regions are fashioned by populations with distinct socio-demographic traits who choose to move from one region to another, in contrast with those who do not migrate (Shumway and Otterstrom 2010). These selective migrations actually change the constitution of both the origin and destination locations. This study shows how this selective migration in and out of housing clusters has either worsened the housing bust or slowed its decline across America. By using Internal Revenue Service (IRS) county-to-county migration data, the paper considers the relationship of income migration and housing price trends in the contiguous United States from before the macro-market price declines to the continuing weak housing conditions of 2010.

This paper combines the concept of selective migration with observations from Aharonovitz (2011) that migration flows trend toward lower-wage workers who move to less expensive housing areas and higher-wage workers who migrate to more expensive housing areas. The hypothesis is that home prices are positively affected by increases of income in a region brought on by selective migration and positive net migration, and negatively affected by losses of income. This is a straightforward assumption, which becomes more valuable by the use of an 'income effectiveness' statistical measure, which is found to give some sense of future price changes in housing. Income effectiveness measures the relative amount of income that enters or leaves a region because of migration (explained in more detail below).

3.1 *Urban Cluster Analysis and IRS County-to-County Migration*

Over 300 metropolitan and urban areas are measured by IHS Global Insight (IHS 2010) in terms of median housing prices. Those places form the basic units for the analysis. To match the period from the end of the housing boom through the period of the greatest crash, the most current data available are used which consist of the years 2005 through 2009. In this case, the actual percentage changes in single family house prices (bi-quarterly), rather than the prices themselves, are used for the clustering. This method allows urban areas that experienced similar trends in home price valuations to be grouped together, even if their median price ranges are very different.

Several different group sizes are formed by using k-means clustering in SPSS. K-means clustering is a non-hierarchical method that assigns members to a predetermined number of clusters according to their closest statistical distance from one of the cluster centers, which centers adjust so that they are at the statistical middle of those places assigned to them. Eight clusters are settled on because of their good statistical differentiation among themselves in terms of their price trends. These urban groups, along with the urban areas not

measured by the IHS, and the rural counties make a total of ten groups from which a comparative analysis of migration patterns is performed. Housing price trends are not readily available for these last two groups of rural and other urban areas so only their income migration is available here. Thus some of the tables and figures will not have information for them.
An analysis followed, which takes the counties specific to each of the ten clusters, and considers the relationship between population flows and housing prices by using county-to-county migration data compiled by the IRS from 2005 to 2010 (IRS 2010, Shumway and Otterstrom 2010). The IRS distinguishes migratory flows by comparing addresses of tax returns from one year to the next. The data must be extracted from two parallel sets of files; one displays in-migration and the other chronicles out-migration. Every file provides basic information that concerns the number of individuals (exemptions listed in the tax form) and households (tax returns) that have moved from one county to another, grouped by county of origin or destination. The files also include the aggregate income levels for in-, out-, and non-migrants in each county. If a migration between two specific counties had at least ten households or tax returns in it, then its size and income characteristics are listed in the IRS data. Otherwise, the flow is aggregated with other counties in the same region with small migrations from or to the certain origin or destination county.

In order to assess how migration among the different housing clusters has changed income in these areas, the basic IRS data were extracted and several cluster-specific measures and totals computed from 2005 to 2010. For every year, the aggregate income totals of in-, out-, and non-migrants for all counties in each cluster were extracted. From this, net migration among clusters, net income migration, income effectiveness, and per capita income change due to migration were calculated (these statistics, unfortunately, do not include the effect of illegal migrants and U.S. citizens who did not file a tax return).

Income effectiveness is related to net income migration and total income migration, and is calculated from these variables. Income effectiveness (E) is a percentage ratio of the net to total amount of aggregate income from the in- and out-migrants in each county of specific housing clusters (Plane 1999; see also Otterstrom et al. 2006). Income migration (YN) is simply the difference between the aggregate money income of in-migrants (YI) and out-migrants (YO). Total income migration (YT) is the sum of those two statistics:

$$YN = YI - YO$$
$$YT = YI + YO$$

Therefore, income effectiveness (E) = 100 (YN/YT). Income effectiveness for every cluster and year is included, which is weighted by the population size of each county in the specific cluster.

The use of both income effectiveness and net migration income is helpful. Net migration income shows the absolute dollar size of the flow of money due to migration. Income effectiveness is a standardized measure that accounts for differences in cluster populations so that the relative impact of migration on income can be compared among different sized clusters. Positive income effectiveness (E) and net income migration (YN) values signify that certain clusters had net gains in income from migration. On the other hand, negative values of the two measures mean a net loss in income to that cluster.

Per capita income changes (see Plane 1999) show how migration impacts the overall income of a cluster. The measure uses in- and out-migrant incomes similar to how the net income migration and income effectiveness statistics do. It also displays a comparison of the incomes of in- and out-migrants with those of the non-migrants. There are therefore three components, which together constitute the total per capita income change for all people of a cluster. The first component reveals how much income changes because of the difference in non- and out-migrant incomes. The second constitutes the per capita income change caused by uneven in-migrant incomes in comparison to that of non-migrants, and the third differentiates the incomes of in-migrants against out-migrants. As this per capita measure uses income comparisons with the non-migrants in every cluster, it is possible for a cluster to have positive net income migration, while at the same time, experience negative per capita income change (the converse is also true).

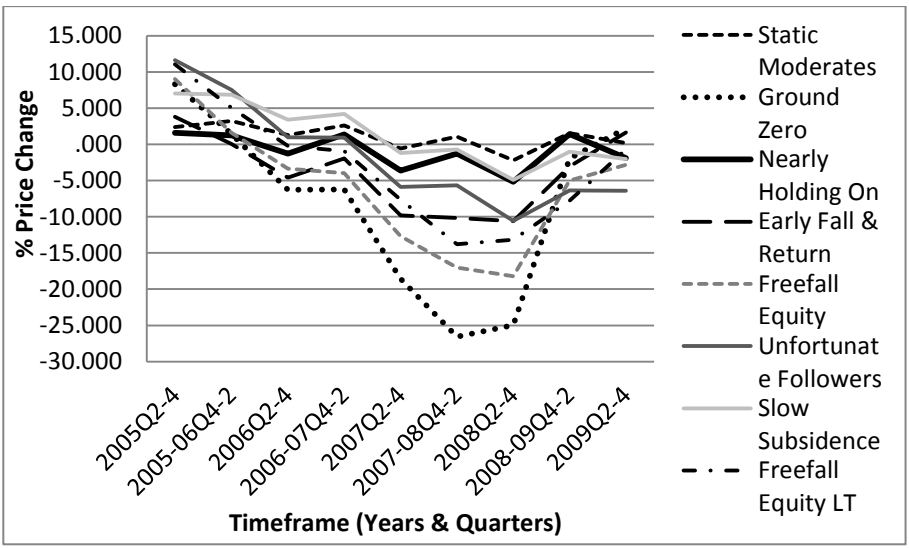
Finally, the combination of cluster analysis and IRS income migration comparisons identify the urban areas that are most likely to experience price declines or increases in housing as we move forward. The methodology used in this research highlights the importance of incorporating migration patterns and geographic characteristics into the analysis of changing housing markets across the nation.

4. Contrasting Clusters

Not only do the housing clusters have important differentiating characteristics in terms of house price trends, but by mapping these clusters of metropolitan areas, they demonstrate an interesting spatial distribution (Table 1 and Figures 1 and 2). The statistical centers for each bi-quarter period were of the percentage amount that median housing increased or decreased in price in that cluster. The shape and severity of decline or increase in the trend lines were the basis for the names assigned to every cluster. These clusters range from the “Ground Zero” serious crash cluster of portions of the San Joaquin Valley in California, to the “Static Moderates” urban areas that only declined a few times during the study period. That cluster dominates Texas, Oklahoma, North Carolina, Louisiana, and upstate New York, among other widely spaced places, being mostly the secondary urban areas. The “Static Moderates”

cluster did not experience large swings in home values, and was mostly made up of moderately priced housing regions. "Ground Zero", on the other hand, first raced ahead to high housing prices in the first half of the decade, fueled by speculation, only to drop quickly after its peak.

Figure 1 Statistical Centers of k-means Clusters for Percentage Change in Median Home Prices Bi-quarterly 2005-2009

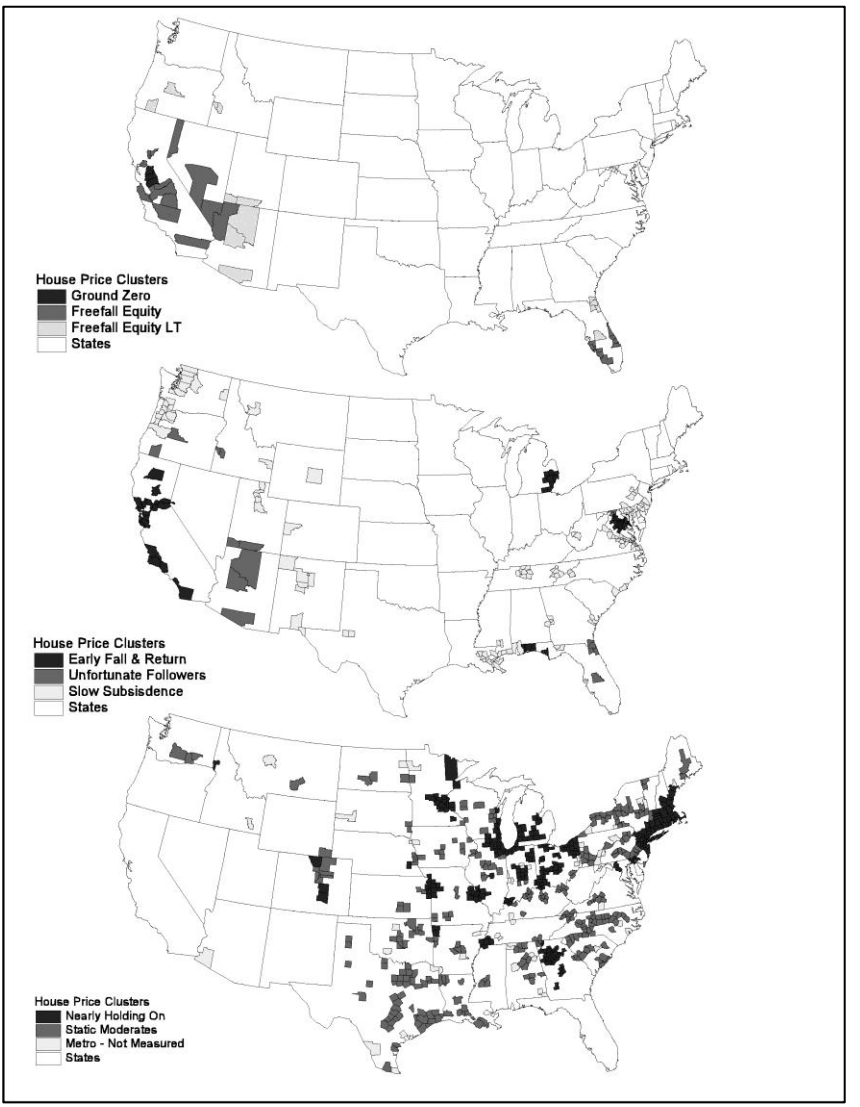


Other clusters include "Nearly Holding On", "Slow Subsidence", "Freefall Equity", "Freefall Equity LT", "Early Fall and Return", and "Unfortunate Followers". The "Freefall Equity" counties were exclusively located in California, Florida, Nevada, and Arizona– all states that were heavily impacted by the housing fall. Their declines after mid-decade were not as large as those in "Ground Zero", but were still significant without a positive trend by the end of 2009. These areas also had rapid increases in new housing stock during the boom that inflated supply past true demand (often being purchased by speculators). Rapid price appreciations were followed by crushing falls as the economy turned downward. "Freefall Equity LT or Lite" had a similar geography and price trend as "Freefall Equity", with its metropolitan areas in southern California (Los Angeles and San Bernardino), Arizona (Phoenix) and large parts of Florida (including Miami), but price declines were not as large as those of "Freefall Equity". The "Unfortunate Followers" in Florida, Arizona, Utah, and Idaho slid in prices after the others in their regions, and did not decline as precipitously as some of the others, but they still were in negative terrain while other areas were declining less or even increasing in value. The "Unfortunate Followers" were secondary metropolitan areas in the West as well as Jacksonville, and Lakeland, Florida.

Table 1 Statistical Centers of k-means Clusters for Percentage Change in Median Home Prices Bi-quarterly 2005-2009

Ground Zero	8.321	1.402	-6.275	-6.230	-18.583	-26.581	-24.974	-1.929	2.194
Freefall Equity	9.011	1.571	-3.364	-3.979	-12.680	-17.038	-18.196	-4.998	-2.838
Freefall Equity LT	11.049	5.032	-.211	-.918	-7.663	-13.783	-13.162	-7.792	-.692
Early Fall & Return	3.801	.050	-4.611	-1.947	-9.834	-10.175	-10.615	-3.041	1.652
Unfortunate Followers	11.609	7.500	.985	.916	-5.870	-5.652	-10.555	-6.369	-6.419
Slow Subsidence	7.037	6.862	3.416	4.193	-1.210	-.696	-4.918	-1.037	-2.048
Nearly Holding On	1.599	1.256	-1.288	1.383	-3.625	-1.295	-5.192	1.419	-1.906
Static Moderates	2.400	3.236	1.259	2.620	-.557	1.044	-2.201	1.531	.189
	Per05Q24	Per0506Q42	Per06Q24	Per0607Q42	Per07Q24	Per0708Q42	Per08Q24	Per0809Q42	Per09Q24

Figure 2 Home Price Clusters 2005-2009



The "Early Fall and Return", urban areas of California, Detroit, Washington D.C., and Florida Panhandle, dropped into negative territory at the end of 2005 and had a tough period from the middle of 2007 to the middle of 2008, but returned to nominal price increases at the end. This cluster includes economically diverse areas (e.g. Washington D.C. compared with Detroit), but their underlying trends point to similarities in their housing markets. Washington's "return" was possibly fueled by increased government

spending, while Detroit could have been aided in its revival by government support of the auto industry. "Nearly Holding On" contained the most populated metropolitan area in the U.S. –New York City, along with Boston, Chicago, Atlanta, Kansas City, St. Louis, Indianapolis, Minneapolis, etc. This cluster had some periods of negative home price changes along with increases too, so that the average net change in home prices was not as dramatic as in other parts of the country. This relatively steady price pattern can be potentially attributed to the important primary role that many of these cities play in the U.S. economy, which allowed them to continue to support housing prices at previous levels. Finally, the "Slow Subsidence" of many cities in the Northwest, Mountain West, South (coastal areas and Tennessee especially) were the last places to top out in prices in the former boom period and were still on a downward trajectory at the end of 2009. These were follower metropolitan areas, but not as extreme in their losses as most of the other clusters.

5. Analysis of Four Clusters

An examination of four of the clusters specifically in terms of their house price changes and income migration shows a cross-section of the main ways that housing has changed in value in urban areas throughout the study period (Tables 2 and 3). "Ground Zero" in California is small, but its extraordinary decline has a telling story behind it. "Freefall Equity" includes many of the metropolitan areas that have been highlighted time and time again in the news media because of their location in former boom areas in the Sunbelt that so abruptly lost their shine. The large population size of "Nearly Holding On" and the key place that it plays at the top end of the urban hierarchy prompted its inclusion. Finally, the curious case of the "Static Moderates", a wide swath of heartland America that really did not "crash" like most other areas, deserved focused attention.

"Ground Zero" had the fewest metropolitan areas assigned because of its extraordinary price declines (see Figures 3-4 and Tables 4-5). It includes the San Joaquin, Merced, and Stanislaus counties, the large cities of Stockton and Modesto, and the smaller city of Merced. Before the crash, these counties experienced tremendous run-ups in housing prices. Negative net migration began in 2005-2006 as residential appreciation came to a halt. It was small then (-236), but the outflow substantially increased over the next three years, and was especially pronounced in 2007-2008 when 8,661 more people left the cluster than moved in. Indeed, the greatest declines in housing prices were from the fourth quarter of 2007 to the last quarter of 2008, with more than 25% declines on average. Additionally, net income migration was negative throughout the period because the loss of income from the out-migrants was greater than the money brought to the cluster by the in-migrants. The per capita income changes due to migration show a positive effect on average income in the out-migrant to stayer component because the out-migrants were

poorer than the stayers. However, in the in-migrant to stayer comparison, there was a decrease of mean income because the in-migrants had lower incomes than the stayers as well, which dragged down the overall per capita income change. An exception was 2007 – 2009 when the very high numbers of poorer out-migrants actually resulted in higher incomes for those who were left, even with the relatively low in-migrants.

Figure 3 **Ground Zero – Net Migration (Left Axis) and k-means Cluster Centers for Median House Percentage Price Changes (Right Axis) - 2005-2009**

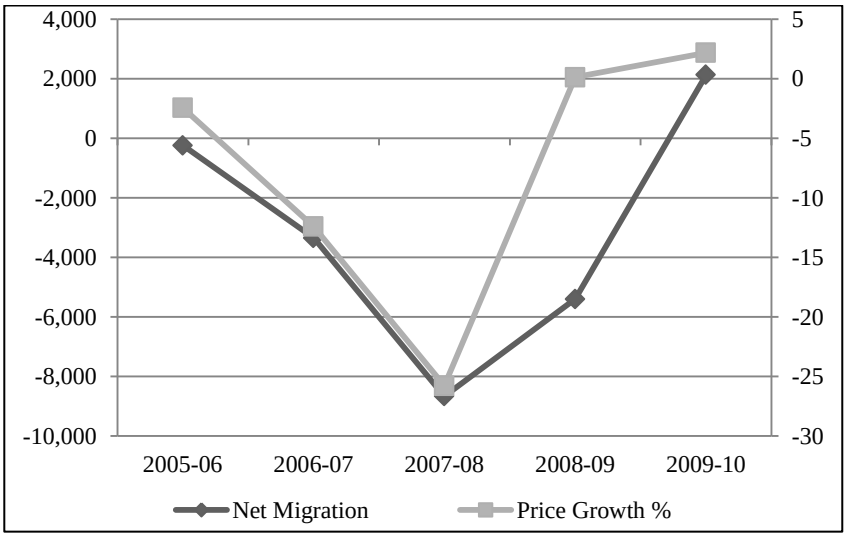


Figure 4 **Ground Zero - Total In- and Out-migration 2005-2010**

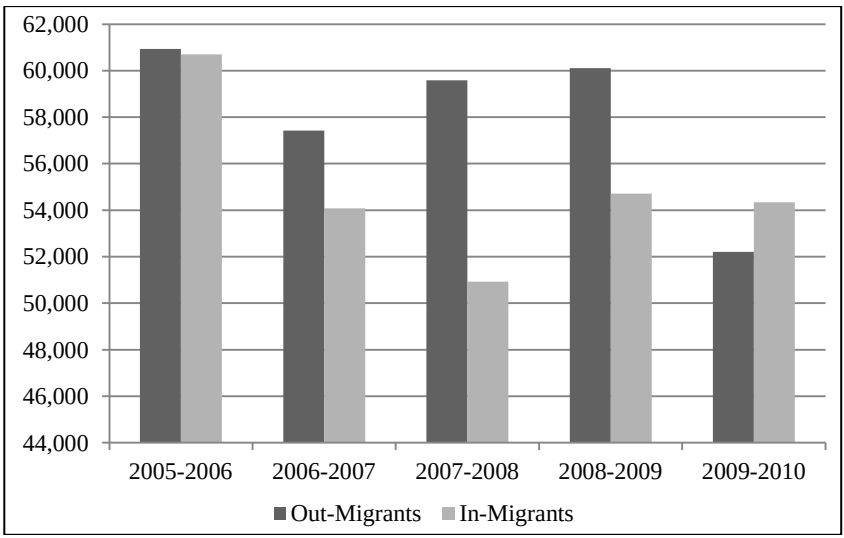


Table 2 Net Migration among Clusters 2005-2010

	Static Moderates	Ground Zero	Nearly Holding On	Early Fall & Return	Freefall Equity	Unfortunate Follower	Slow Subsidence	Freefall Equity LT	Rural	Metro-Not Measured
Static Moderates	0	6,123	294,511	114,808	40,544	2,794	99,289	161,646	202,130	40,227
Ground Zero	-6,123	0	-783	18,027	-3,275	-2,181	-5,011	-375	-4,568	-378
Nearly Holding On	-294,416	783	-87	-11,308	-100,983	-42,924	-124,265	-176,701	-63,013	5,089
Early Fall & Return	-114,808	-18,027	11,308	0	-118,415	-33,247	-93,746	24,411	-78,448	-3,651
Freefall Equity	-40,544	3,275	100,983	118,415	0	-14,404	-17,904	214,501	-21,035	-1,950
Unfortunate Follower	-2,794	2,181	42,924	33,247	14,404	0	7,470	41,466	4,467	1,892
Slow Subsidence	-99,289	5,011	124,411	93,746	17,904	-7,470	0	49,626	-24,699	7,756
Freefall Equity LT	-161,646	375	176,701	-24,411	-214,501	-41,466	-49,626	0	-54,473	-2,816
Rural	-200,775	4,568	64,094	78,508	20,950	-4,512	23,699	54,555	0	-20,509
Metro-Not Measured	-40,227	378	-5,089	3,636	1,950	-1,892	-7,727	2,816	20,595	0

Table 3 Net Income Migration among Clusters 2005-2010 (in 1000s of dollars).

	Static Moderates	Ground Zero	Nearly Holding On	Early Fall & Return	Freefall Equity	Unfortunate Follower	Slow Subsidence	Freefall Equity LT	Rural	Metro-Not Measured
Static Moderates	0	93,678	9,070,270	3,324,881	-493,780	-133,169	1,227,299	1,851,175	2,867,102	859,358
Ground Zero	-93,678	0	-8,740	260,781	-54,809	-43,948	-95,911	-42,259	-106,436	-4,106
Nearly Holding On	-9,062,615	8,740	0	-1,674,785	-7,726,579	-1,670,675	-4,540.987	-10,310,830	-3,693,586	166,889
Early Fall & Return	-3,324,881	-260,781	1,674,785	0	-3,534,418	-1,172,075	-3,460,349	1,437,582	-3,022,152	-48,083
Freefall Equity	493,780	54,809	7,726,579	3,534,418	0	-378,428	91,886	4,704,392	-370,840	10,332
Unfortunate Follower	133,169	43,948	1,670,675	1,172,075	378,428	0	431,464	1,014,901	64,366	42,995
Slow Subsidence	-1,227,299	95,911	4,545,520	3,460,349	-91,886	-431,464	0	655,841	-1,069,595	179,073
Freefall Equity LT	-1,851,175	42,259	10,310,830	-1,437,582	-4,704,392	-1,014,901	-655,841	0	-1,407,626	3,481
Rural	-2,841,746	106,436	3,731,549	3,024,377	369,458	-64,629	1,065,414	1,409,555	17,770	-193,667
Metro-Not Measured	-859,358	4,106	-166,889	47,813	-10,332	-42,995	-178,383	-3,481	195,016	0

Table 4 **Ground Zero Net Migration, In-migrant per Capita Income as a Percentage of Stayers, Out-migrant Income as a Percentage of Stayers, and Net Income Migration (in thousands of dollars) - 2005-2010.**

	Net Migration	In % of Stayers	Out % of Stayers	Net Inc Migr.
2005-2006	-236	85.37	91.18	-74,793
2006-2007	-3,344	84.47	88.88	-111,245
2007-2008	-8,661	90.28	89.35	-145,316
2008-2009	-5,396	87.19	86.37	-76,849
2009-2010	2,135	88.65	95.00	-22,951

Table 5 **Ground Zero Total per Capita Income Change for All Residents of the Cluster and Component Parts (in to stayers, out-stayers, in-out) - 2005-2010 (in dollars).**

	Total Inc Change	In Stay Component	Out Stay Component	In Out Component
2005-2006	-66.30	-162.20	99.67	-3.77
2006-2007	-37.14	-150.76	115.98	-2.36
2007-2008	29.86	-82.92	112.18	0.60
2008-2009	21.98	-116.96	138.37	0.57
2009-2010	-55.97	-95.43	41.90	-2.42

Over the total study period, “Ground Zero” lost migrants and money to all of the different clusters except one: “Early Fall and Return”. “Ground Zero” gained over 18,000 migrants from “Early Fall and Return” and nearly 261 million dollars in income. Most likely, a greater number of the people in that cluster came from the Bay Area of California and other parts of the state in that category rather than the distant metropolitan areas in this category of Washington D.C., Detroit, and the Florida Panhandle. It is also of note that “Ground Zero” lost more than 106 million dollars to rural counties, which constituted the second largest outflow of funds. It is hypothesized that as the housing prices dropped so severely, many people in this cluster decided that they could afford a new house and life in the less populated places. As house prices began to stabilize in 2009, net migration turned positive for the area. What is the leading indicator in this case? Actually, the movements were concomitant as the most people left when the prices bottomed, and then the pattern turned around to positive net migration and the end of double digit percentage price declines.

We now turn to the "Static Moderates" cluster (Figures 5-6 and Tables 6-7). They had a lot going for them during 2005-2010. Their home prices, by and large, continued to appreciate over much of the time even if it was at a slow rate. An important point here is that this cluster generally had not had excessively high prices or large increases in real estate prices before 2005. This is the area where the newspapers did not find many extreme stories to tell in terms of housing price crashing during the study period. Throughout the five years, this cluster of 122 metropolitan areas experienced significant positive net migration every year. For 2005-2008, there were about 10% more in-migrants to these urban areas than out-migrants. An attraction most likely was the $118,000 median house price for the urban areas of the cluster at the end of 2008, which was lower than many other areas (such as $296,000 for "Early Fall and Return" and $127,000 for "Nearly Holding On"). Net income gain during this period was also very high with this cluster gaining over 4.9 billion dollars per year from 2006 to 2009. That number did drop off from 2009 to 2010 as other parts of the country started to recover and migration slowed to this cluster. In this case, average per capita income was pulled down each year because of migration. This is because of the large number of in-migrants that averaged less than 90 percent of the income of the stayers.

Figure 5 **Static Moderates- Net Migration (Left Axis) and k-means Cluster Centers for Median House Percentage Price Changes (Right Axis) - 2005-2009**

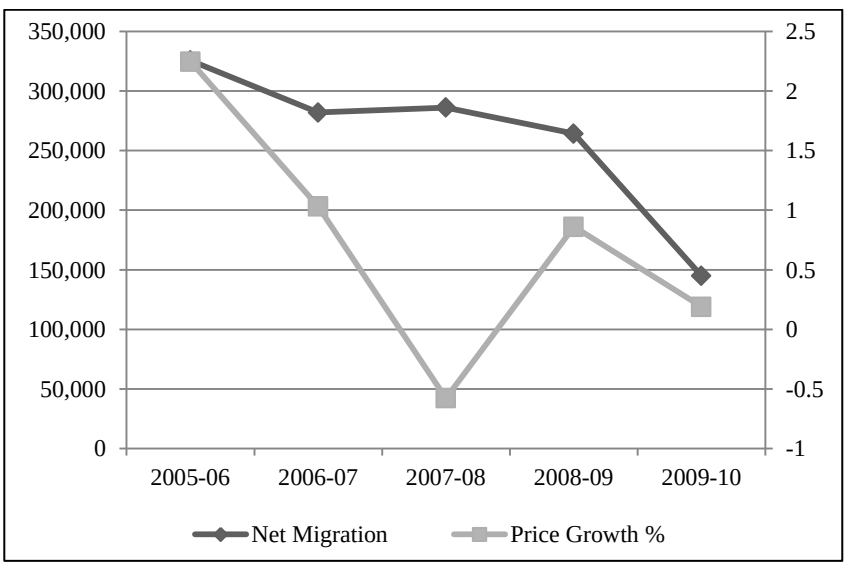


Figure 6 **Static Moderates - Total In- and Out-Migration 2005-2010**

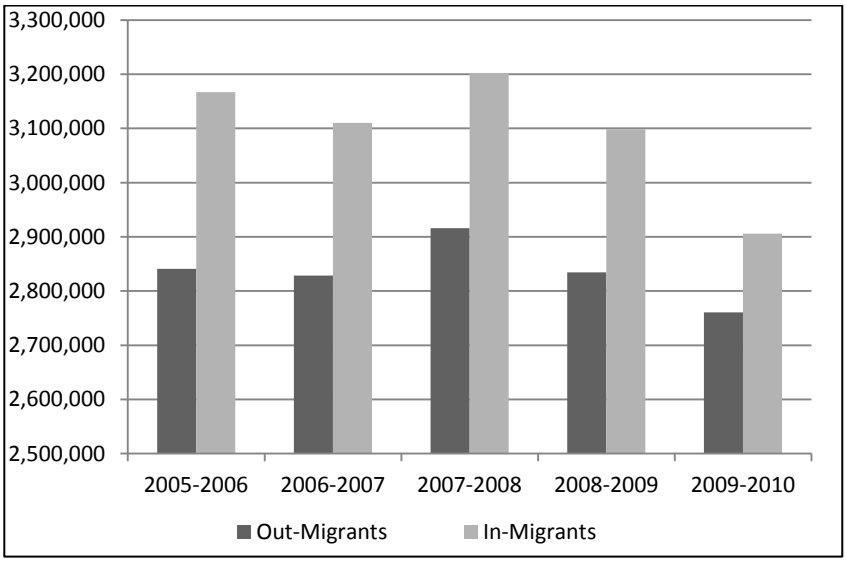


Table 6 **Static Moderates Net Migration, In-migrant per Capita Income as a Percentage of Stayers, Out-migrant Income as a Percentage of Stayers, and Net Income Migration (in thousands of dollars) - 2005-2010.**

	Net Migration	In % of Stayers	Out % of Stayers	Net Inc Migr.
2005-2006	325,678	88.55	93.42	4,667,615
2006-2007	282,057	88.37	91.63	4,911,646
2007-2008	286,158	87.10	90.51	5,185,765
2008-2009	264,258	85.90	88.79	4,992,182

Table 7 **Static Moderates Total per Capita Income Change for All Residents of the Cluster and Component Parts (in to stayers, out-stayers, in-out) - 2005-2010 (in dollars).**

	Total Inc Change	In Stay Component	Out Stay Component	In Out Component
2005-2006	-84.89	-201.05	119.71	-3.54
2006-2007	-64.09	-209.30	147.38	-2.17
2007-2008	-63.30	-234.16	172.75	-1.89
2008-2009	-50.56	-236.93	187.46	-1.08
2009-2010	-24.72	-204.74	180.35	-0.33

The "Static Moderates" attracted migrants from all over. Their biggest partner was the major cities of "Nearly Holding On". They contributed over 294,000 net migrants and 9 billion net dollars of income to the "Static Moderates". In contrast to "Ground Zero", the "Static Moderates" appealed to rural migrants with some 202,000 more moving in to this cluster than going the other way. For both these other clusters, the relatively lower prices of homes in the "Static Moderates" areas were probably an encouragement for them to move to this area, and by doing so, the house prices were supported throughout the period. The most peculiar migration relationships here are the facts that "Static Moderates" were net gainers in migrants from the "Freefall Equity" and "Unfortunate Followers" counties, but a net loser in income to both of these clusters. This means that the people who were moving out of "Static Moderates" to these places had much higher incomes than the ones that the "Static Moderates" were attracting from these same locales. Of note is that most of the "Freefall Equity" and "Unfortunate Followers" counties are in high amenity areas (attractive climate characteristics and/or natural features). Overall, in the "Static Moderates" cluster, it appears that highly positive net migration and net income migration helped to keep housing prices from slipping very much.

If your home happened to be located in Las Vegas, Nevada or Riverside, California, a much different dynamic was in play. From a price standpoint "Freefall Equity" had a very rough go of it over the study period (Figures 7 and 8 and Tables 8 and 9). It was only worsted by "Ground Zero". However, what is very interesting is that this cluster had positive net migration every year, even while housing prices plunged. Additionally, this cluster attracted higher income earners, so that there was a positive per capita income effect every year. In-migrants each year had average incomes of over 90% of the stayers within the cluster, while those of the out-migrants were below 90% of the stayers, which resulted in such high per capita income gains for all residents in "Freefall Equity". The likely reason why this cluster experienced such harsh price declines in housing even with positive net migration and income gain is that pre-2006 or 2007 homebuilders, together with speculators, had overbuilt and overbought in these areas while home prices were increasing.

In-migration outpaced out-migration in 2005-2006 by 135,744 people during this high-growth time in this cluster. When the market turned negative in 2006, the attractiveness of these places for new migrants came in contact with the reality of equity losses in single family housing. Net migration remained positive, but slipped to 95,651 and then 26,514 over the next two years. In-migrants who decided to buy were able to purchase homes at a steep discount from 2006 to the middle of 2008. Then the equity losses slowed and the positive net migration recovered from its nadir of only 3,476 in 2008-2009 to 37,759 in 2009-2010. Income effectiveness was not only positive, but the highest of all the clusters except for the "Unfortunate Followers" from 2005-2008, where house price gains were particularly high at the beginning of the

study period. Not only was per capita income positively affected by the arrival of higher income earners to the cluster than those who left, but the greater numbers of in-migrants than out-migrants helped bring in billions of dollars of income into the cluster each year. Breaking down this flow, we find that "Freefall Equity LT", "Nearly Holding On", and "Early Fall and Return" contributed the greatest positive flow to the cluster, while "Freefall Equity" lost people to all of the other clusters except "Ground Zero". However, it only lost income to the "Rural and Unfortunate Followers" clusters. It is probable that this extra net migration income helped to prevent the housing market from falling farther than it did.

Figure 7 **Freefall Equity Net Migration (Left Axis) and k-means Cluster Centers for Median House Percentage Price Changes (Right Axis) - 2005-2009**

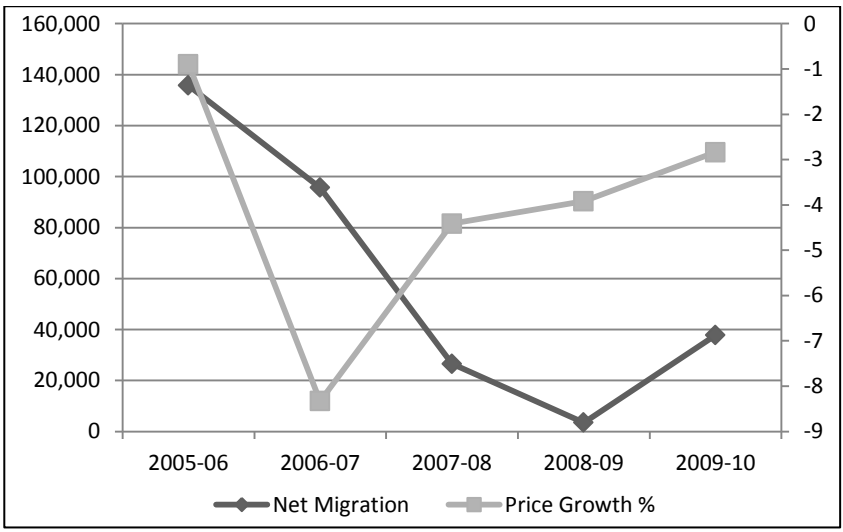


Table 8 **Freefall Equity Net Migration, In-migrant per Capita Income as a Percentage of Stayers, Out-migrant Income as a Percentage of Stayers, and Net Income Migration (in thousands of dollars) - 2005-2010.**

	Net Migration	In % of Stayers	Out % of Stayers	Net Inc Migr.
2005-2006	135,744	96.52	87.34	5,379,765
2006-2007	95,651	94.67	85.23	4,444,867
2007-2008	26,514	96.51	83.36	3,388,957
2008-2009	3,476	96.06	81.60	2,338,382
2009-2010	37,759	97.33	84.79	2,542,507

Figure 8 Freefall Equity - Total In- and Out-migration 2005-2010

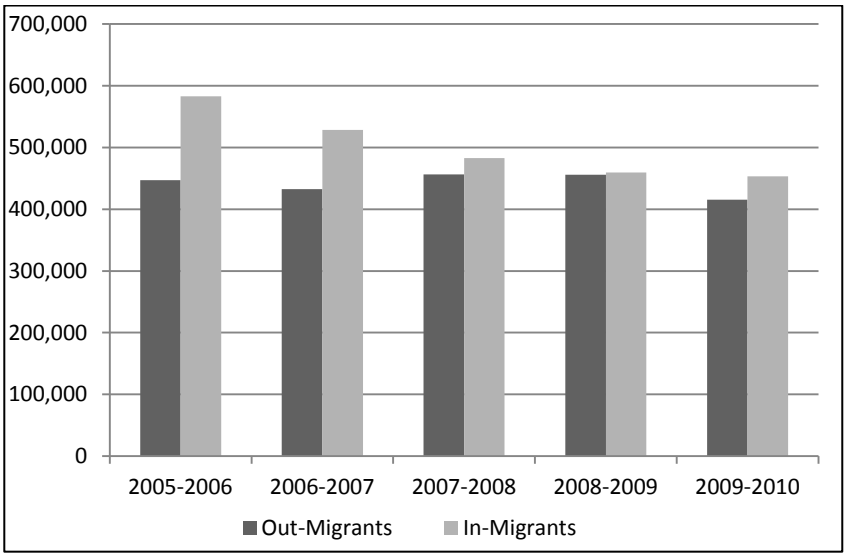


Table 9 Freefall Equity- Total per Capita Income Change for All Residents of the Cluster and Component Parts (in to stayers, out-stayers, in-out) - 2005-2010 (in dollars).

	Total Inc Change	In Stay Component	Out Stay Component	In Out Component
2005-2006	230.07	-7.95	216.28	21.75
2006-2007	235.96	-26.93	243.58	19.31
2007-2008	323.04	9.05	290.96	23.03
2008-2009	267.31	-17.22	267.96	16.57
2009-2010	197.33	0.68	184.48	12.16

For those in the "Nearly Holding On" cluster, we discover a story nearly opposite of "Freefall Equity" (Figures 9-10 and Tables 10-11). This cluster represents some of the most densely populated cities of the country and they certainly were not the ones to have spectacular population growth. This cluster actually lost people and money every year to migration. They left in greater numbers from 2005-2007 to areas of lower housing cost in parts of the "Static Moderates" cluster or sunnier weather of the south and southwest (like in "Freefall Equity" or "Freefall Equity LT"). These losses slowed through 2007-2009, but picked up the following year. Net income losses over 12.7 billion dollars in 2005-2006 explain how the housing market barely kept its prices level, while other parts of the country were enjoying their boom. These losses, although they shrunk to 8 billion dollar in 2007-2008, continued to be significant throughout the study period.

Figure 9 **Nearly Holding On - Net Migration (Left Axis) and k-means Cluster Centers for Median House Percentage Price Changes (Right Axis) - 2005-2009**

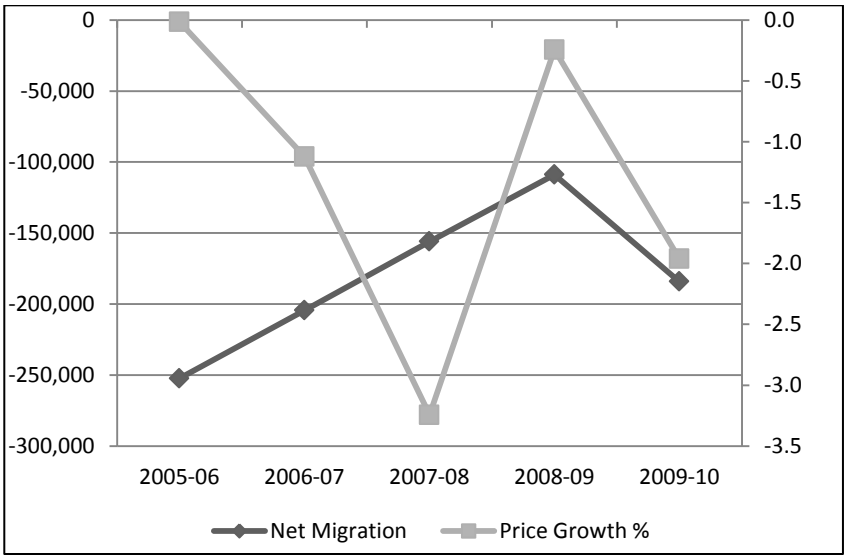


Figure 10 **Nearly Holding On - Total In- and Out-migration - 2005-2010**

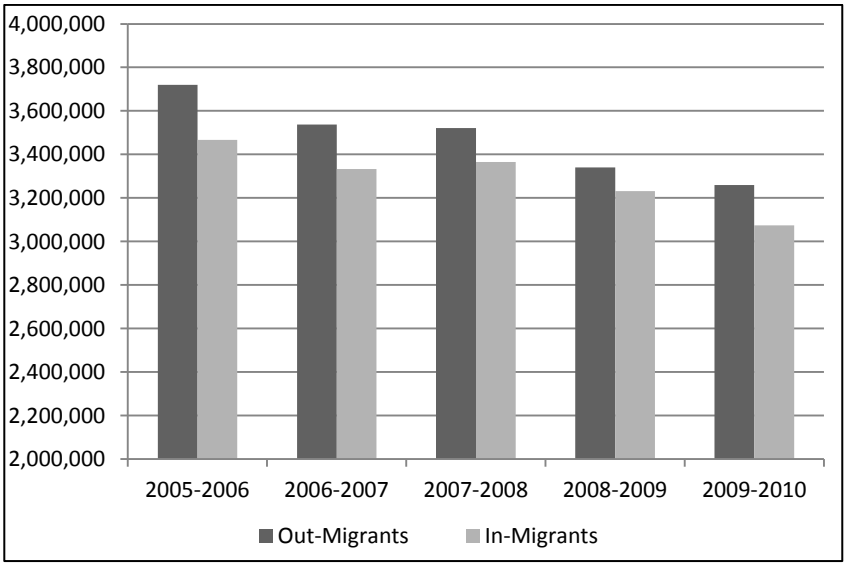


Table 10 Nearly Holding On Net Migration, In-migrant per Capita Income as a Percentage of Stayers, Out-migrant Income as a Percentage of Stayers, and Net Income Migration (in thousands of dollars) - 2005-2010.

	Net Migration	In % of Stayers	Out % of Stayers	Net Inc Migr.
2005-2006	-252,353	92.26	95.96	-12,732,678
2006-2007	-204,402	90.97	94.77	-11,426,499
2007-2008	-155,993	89.57	93.82	-10,387,586
2008-2009	-108,882	87.72	91.91	-8,083,601
2009-2010	-184,110	88.38	92.63	-8,454,866

Table 11 Nearly Holding On Total per Capita Income Change for all Residents of the Cluster and Component Parts (in to stayers, out-stayers, in-out) - 2005-2010 (in dollars).

	Total Inc Change	In Stay Component	Out Stay Component	In Out Component
2005-2006	-76.54	-168.67	97.17	-5.05
2006-2007	-72.69	-186.58	118.27	-4.39
2007-2008	-81.13	-217.23	141.06	-4.96
2008-2009	-75.11	-226.31	155.96	-4.76
2009-2010	-49.16	-181.03	134.39	-2.51

Not only did the losses mount every year, but the in-migrants to "Nearly Holding On" generally had lower incomes than those who left, which meant that migration had a negative effect on per capita income each year in the region. This is the inverse of "Freefall Equity" that gained per capita income every year because of its ability to attract higher wage earners. What is striking then is that "Nearly Holding On" did not experience price collapses as many other clusters, even while it was losing income and people every year. This may be explained by the important economic position and large population size of this cluster, which could have helped make up for the loss of migrants by its own internal growth. Thus, this cluster was not prone to wide price swings like other areas even though it lost migrants both when the housing markets in other regions were more positive, and after the housing collapse. This ongoing out-migration probably offset the economic growth in these urban areas insomuch that the net result was that prices did not drop too significantly.

Other characteristics emphasize the negative migration impacts on "Nearly Holding On". For instance, the migration income effectiveness values were negative each year, which ranged from -7.72 in 2005-2006 to -4.97 in its least negative year of 2008-2009. This indicates that not only did this cluster lose significant money to migration as a highly populous cluster, it was also relatively large in comparison with the total amount of income migration. Indeed, it had the dubious distinction as having the most negative income effectiveness of all the clusters from 2007 to 2010. Additionally, income losses to "Early Fall and Return" were small in people (11,308 net), but very large in income with a per net-migrant loss of over $148,000 over the study period. The parallel income loss to "Freefall Equity" was $76,500 per net out-migrant. These figures were affected by the differential incomes of all the in- and out-migrants between the respective clusters and not just the net migrants. This also reveals how migrations from or to certain clusters were either more lucrative or economically difficult depending on the destination or origin.

Finally, geographic characteristics of these flows indicate the greatest cluster specific loss (294,000 people) to the "Static Moderates" over the five years and an income loss of over 9 billion dollars to the "Static Moderates" and 10 billion dollars to "Freefall Equity LT". In all, over 38 billion more dollars left the "Nearly Holding On" cluster than arrived through migration. It is amazing that this cluster held up as well as it did.

6. Conclusion

Summarizing the migration and housing stories of these four clusters from 2005 to 2010 helps to contextualize the value of this approach. "Freefall Equity" continued to gain migrants and income even while housing prices dropped. "Static Moderates" housing prices probably benefitted from positive net migration as its prices held the best of any cluster. "Ground Zero" (San Joaquin, Stanislaus, and Merced counties) greatly lost out in migration and housing prices, but certain flows from nearby coastal counties helped to keep residences from tanking further in value. The "Nearly Holding On" counties of the Megalopolis, Midwest and parts of the south lost income and migrants to the "Static Moderates", which had greater housing price stability, and they also came up short to "Freefall Equity LT", which has attractive climates (parts of Florida, California, and Arizona). However, "Nearly Holding On" did not have housing value declines as steep as other parts of the country.

These patterns support, refine, and focus what is already known about the relation between housing price changes and migration. Although migration only accounts for part of the changes in house prices, as there are a number of other supply and demand variables at play, certain characteristics of selective migration in both income and people help to explain the pricing trends. Per capita income variations due to migration show how the income

demographics are changing because of migration, but they do not correlate well with home price changes. More helpful variables are net migration and net income migration because they give actual increases or decreases in money and people that directly affect housing prices. Income effectiveness, which considers the relative size of income gain or loss, seems to be an even better determinant of the relationships of migration to housing price changes.

Income effectiveness directly relates to price movement, most impressively when one follows the whole trend in effectiveness over time, and not just by looking at the absolute numbers of the variable. For example, the study period began when prices of homes were continuing to rise in most areas of the country. In 2005 to 2006, clusters with strongly positive income effectiveness (Table 12) were the "Freefall Equity" and "Unfortunate Follower" clusters. They also had large home price appreciations over that time. Over the ensuing years, "Freefall Equity" stayed positive in income effectiveness, but the number dropped sooner and recovered faster than that of "Unfortunate Follower", which mimicked the housing price trend.

Table 12 Net Income Effectiveness by Housing Cluster, 2005-2010 (Weighted Average by County Population).

CLUSTER	2005-06	2006-07	2007-08	2008-09	2009-10
Static Moderates	1.35	1.36	1.58	2.20	0.99
Ground Zero	-3.45	-5.59	-7.47	-4.22	-1.58
Nearly Holding On	-7.72	-7.01	-5.97	-4.97	-5.76
Early Fall & Return	-8.40	-8.15	-5.38	-3.34	-2.86
Freefall Equity	16.03	13.76	9.62	8.28	9.97
Unfortunate Follower	18.32	15.12	10.03	5.94	5.65
Slow Subsidence	4.27	3.13	2.13	2.00	1.38
Freefall Equity LT	-4.44	-6.17	-3.90	-3.95	-3.17
Rural	3.08	2.01	1.28	-0.08	0.91
Metro-Not Measured	-3.86	-3.14	-4.29	-3.30	-1.80

"Nearly Holding On" and "Early Fall & Return" were the most negative in income effectiveness and their residential price growth was weak, but "Early Fall & Return" became relatively less negative in income effectiveness compared with "Nearly Holding On", and was able to recover more quickly, while "Nearly Holding On" struggled on. The "Static Moderates" kept low but positive income effectiveness throughout the study period which parallels the small changes in home prices in that cluster. Finally, "Ground Zero" had negative income effectiveness throughout, but slid to the lowest depth in lock-step in both home price changes and income effectiveness in 2007-2008. "Ground Zero" fared worse than the "Freefall Equity LT" cluster, which

contained cities like Los Angeles and Miami. Even with negative income effectiveness and net migration, "Freefall Equity LT" was larger and more economically diverse, which resulted in smaller price declines.

Migration is just one component of the housing market picture, but positive net income migration and total migration gains can help to stabilize and encourage markets. Although house prices at the end of 2009 seemed to have leveled, differential migration patterns among the various regions of the U.S. continued to assist price recoveries in some cases, while checking price gains in other areas. As Aharonovitz (2011) theorizes, there is a reinforcing pattern where higher income migrants help to support the greater house prices in some metropolitan regions, while lower wage movers are attracted to regions with more affordable housing. This can be seen in the "Static Moderates" cluster where lower income in-migrants translated into positive net migration and income effectiveness, which meant minimal house price depreciation and even some growth. In contrast, the "Nearly Holding On" cluster had lower income migrants, but a large negative net migration flow, which help to explain a negative house price trend. On the other side, the "Freefall Equity" cluster was able to start to recover quickly from its price falls with both positive net migration, and relatively more affluent in-migrants than out-migrants, and thus very positive income effectiveness. Therefore, the use of net migration, net income migration, and income effectiveness together is quite beneficial for explanation of price trends. In sum, this paper has shown the potential for using selective migration flows as one method to help predict the future of home prices among the diverse economic and cultural regions of the United States.

References

Aharonovitz, G.D. (2011). Knowledge-Based Spatial Differences in Economic Activity, Job Related Migration and Housing Related Migration, *Annals of Regional Science*, 46, 1, 159-88.

Coleman, A. and Landon-Lane, J. (2007). Housing Markets and Migration in New Zealand, 1962-2006, *Reserve Bank of New Zealand Discussion Paper Series (DP2007/12)*, New Zealand: Wellington.

Frame, D.E. (2004). Equilibrium and Migration in Dynamic Models of Housing Markets, *Journal of Urban Economics*, 55, 1, 93-112**.**

Glaeser, E.L., Gyourko, J. and Saks, R.E. (2006). Urban growth and housing supply, *Journal of Economic Geography*, 6, 71-89.

Gyourko, J., Mayer, C. and Sinai, T. (2006). Superstar cities, *NBER Working Paper no. 12355*, Cambridge: National Bureau of Economic Research.

Gyourko, J., Mayer, C. and Sinai, T. (2010). Dispersion in house price and income growth across markets: Facts and theories in: *Agglomeration Economics*, Glaeser, E.L. (ed.), University of Chicago Press, Chicago, 67, 104.

Hämäläinen, K. and Böckerman, P. (2004). Regional Labor Market Dynamics, Housing, and Migration, *Journal of Regional Science*, 44, 543-68.

Hwang, M. and Quigley, J.M. (2006). Economic fundamentals in local housing markets: Evidence from U.S. metropolitan regions, *Journal of Regional Science*, 46, 425-53.

IHS (IHS Global Insight and PNC Financial Services Group), (2010). House Prices in America: 4th Quarter 2009 Update, on the Internet at http://www.ihsglobalinsight.com/gcpath/ValuationReport4Q10.pdf (Last accessed June 1, 2012).

IRS (2010). County-to-county migration flow data [digital data files available online at irs.gov], Washington, D.C.: Internal Revenue Service.

Jeanty, P. Wilner, M.P. and Irwin, E. (2010). Estimation of a spatial simultaneous equation model of population migration and housing price dynamics, *Regional Science and Urban Economics*, 40, 343-52.

Jones, C., Leishman, C. and Watkins, C. (2004). Intra-Urban migration and housing submarkets: theory and evidence, *Housing Studies*, 2004, 19:269-283.

Kane, T.J., Riegg, S.K. and Staiger, D.O. (2006). School Quality, Neighborhoods, and Housing Prices, *American Law and Economics Review*, 8, 183-212.

Modestino, A.S., and Dennett, J. (2013). Are American Homeowners Locked into Their Houses? The Impact of Housing Market Conditions on State-to-State Migration, *Regional Science and Urban Economics*, 43, 322-37.

Otterstrom, S.M., Dixon, S. and Cosby, K. (2006). Income Change Due to Migration in California, 1995-2001, *California Geographer*, 46, 32-56.

Phillips, J. and Goodstein, E. (2000). Growth management and housing prices: the case of Portland Oregon, *Contemporary Economic Policy*, 18, 334-44.

Plane, D.A. (1999). Geographical pattern analysis of income migration in the United States, *International Journal of Population Geography*, 5, 295-318.

Potepan, Michael J. (1994). Intermetropolitan Migration and Housing Prices: Simultaneously Determined? *Journal Of Housing Economics*, 3, 2, 77-91.

Saiz, A. (2007). Immigration and Housing Rents in American Cities, *Journal of Urban Economics*, 61, 345-71.

Saiz, A. (2010). The geographic determinants of housing supply, *The Quarterly Journal of Economics*, 125, 1253-96.

Saks, R. E. (2008). Job Creation and Housing Construction: Constraints on Metropolitan Area Employment Growth. *Journal of Urban Economics*, 64, 1, 178-195.

Shumway, J.M. and Otterstrom, S.M. (2010). US regional income change and migration: 1995–2004, *Population, Space and Place*, 16, 483-97.

Tsatsaronis, K. and Zhu, H. (2004). What Drives Housing Price Dynamics: Cross-Country Evidence, *BIS Quarterly Review*, available at SSRN: http://ssrn.com/abstract=1968425.

Zabel, J. (2009). The role of the housing market in the migration response to employment shocks. New England Public Policy Center at the Federal Reserve Bank of Boston. working paper