Joint Center for Housing Studies
Harvard University

Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future

Eric S. Belsky, Rachel Bogardus Drew, and Daniel McCue
November 2007
W07-7

Executive Summary

This paper examines the challenges of projecting the long-run sustainable demand for new residential construction and presents a range of estimates for the likely demand for new housing over the period from 2005 through 2014. Making long-run projections requires assumptions about the three elements of the demand for new homes: 1) the demand for additional units to accommodate household growth, 2) the demand for new units to replace existing units lost on net from the stock, and 3) the demand for additional second homes and vacant units for rent or sale that accommodate the normal turnover of a larger housing stock.

Assumptions about the future are usually based on examining past trends, as well as judgments about how the future is likely to deviate from these trends as a result of social and economic factors, the age and composition of the housing stock, expected immigration, and expected changes in the size and age distribution of the adult population. Thus, in evaluating any projection it is important that its users understand these assumptions and make their own judgments about the validity of the assumptions and how much faith to put in the projections. Doing so requires not only knowing the assumptions behind the projections, but also knowing and understanding the datasets upon which these assumptions and projections are based. Unless the appropriate datasets are selected and handled properly, interpretation of past trends and extrapolations to the future can be faulty.

The care and due diligence demanded of those that make projections and those that intend to use them for planning purposes is therefore great. This paper will help users understand the logic behind long-run housing demand projections and make them sensitive to the choice of datasets, interpretation of datasets, and assumptions behind these projections. The main conclusions about datasets and their use reached in this paper are that: 1) interpretations of the past are sensitive to the datasets used and the adjustments that are, or are not, made to deal with data revisions and errors; 2) the Annual Social and Economic (ASEC) Supplement to the Current Population Survey is the best dataset for choosing the headship rates to use in making household projections; 3) the Housing Vacancy Survey (HVS) is the best dataset for estimating historical changes in vacancies, households, and net removals, after adjusting for recent revisions to the series, but can only be used to examine second homes since 1987; 4) the American Housing Survey (AHS) is the best dataset for projecting losses from the stock; and 5) the selection of

endpoints when extrapolating from past trends can lead to very different conclusions about likely future demand.

An additional purpose of the paper is to make it clear that these projections are of sustainable long-run demand for newly built homes based on the fundamentals, not predictions of actual completions and manufactured home placements in a given year or even over the ten-year period. The underlying fundamental demand for new housing does not necessarily translate into nor equal the amount of new construction that actually occurs over a period because housing markets often enter or exit periods oversupplied or undersupplied. The actual level of production depends on the magnitudes of oversupply and undersupply at the start or the end of the period. As a case in point, the projections described below conclude that sustainable demand is conservatively estimated at 19.5 million for 2005 through 2014 – or an average of 1.95 million new units per year. But it also is becoming clear that entering the period, the market may well have been oversupplied by 500,000-750,000 units. By 2007, it further appears that above trend growth in 2005 and 2006 added around 250,000 additional excess units to the stock. Though the actual extent of the oversupply is unknown, even if it were as large as 1 million entering the period, the projection of sustainable demand for 2007 through 2014 would be reduced only to an annual average of 1.82 million housing completions plus manufactured home placements—and this is *only if the period ends exactly in balance* and the assumed levels of household growth, net replacements, and underlying demand for vacancies come in precisely as projected.

The 19.5 million projected long-run demand is on the conservative end of a range of estimates presented in this paper. There is enough uncertainty about the future and how to project each of the three components of new home demand that a range of projections is more appropriate than a single-point estimate. This range also allows those who intend to use these projections to draw their own conclusions about the proper set of assumptions and adjust their expectations for the future up or down from the different options presented.

Net household growth is the largest of the three components of new home demand. The Joint Center for Housing Studies, which has been making projections of household growth since the 1980s, is currently projecting net household growth of 14.6 million from 2005 to 2015. These projections are based on the assumption that headship rates by age will remain constant at 2005 levels over the period and net immigrants will increase by an average of 1.2 million per year. Historically, the Joint Center's projections have tracked closely to but slightly below recorded

household growth, especially since 1990, lending credence to the view of these projections as generally conservative. The biggest risk to the accuracy of these projections is the chance that immigration could slow from its annual pace of 1.2 million. Indeed, Census projects a much lower annual average immigration of only 840,000 over the period. If this projection proves to be accurate, total household growth over the ten years would instead total only about 13.3 million households. But the history of Census immigration projections dating back to the 1960s is that they are consistently too low.

The second component of new housing demand, vacant units, is the sum of three separate projections: the demand for for-sale vacancies, for-rent vacancies, and second and occasional use homes. The latter group, demand for additional second homes, is heavily influenced by the age distribution of the population as well as changes in household wealth and the preferences of each generation. Projecting second home demand therefore relies on household projections by age and requires assumptions about the likely future propensity of households of different ages to own second homes. These assumptions are typically rooted in recently observed propensities and changes in them over time. The conservative approach assumes that only changes in age distribution will affect new demand for second homes at the lower of the two rates observed in 1993 and 2003 for each age group. No gains in propensities since 1993 or that might occur as a result of a greater build up of wealth are factored in. Furthermore, the propensities are based on the Survey of Consumer Finances (SCF), which produces a lower estimate of the number of second homes than any other viable dataset. Using the Joint Center household projections, SCF propensities to own second homes by age translate into demand for 1.2 million additional second homes. The true demand could well be much higher if based on an extrapolation to the HVS, a source that likely provides a more accurate (though less conservative) estimate of the number and growth rate of second homes.

Projecting the demand for vacant units available for sale and for rent, on the other hand, is less dependent on the age composition of the projected household growth and more directly related to the absolute number of additional households. With household growth, some additional vacant units on the market are necessary to accommodate the mobility of the larger number of households and larger housing stock. Estimating this increase in vacant units involves settling on what economists call the natural vacancy rate. Like the concept of the natural unemployment rate, it is the rate that prevails when markets are thought to be in balance (when prices and rents

are not falling nor are they rising faster than income and construction costs). The natural vacancy rate, however, is difficult to identify and changes over time. Recent vacancy rates (since 2003) may well reflect markets that are oversupplied and thus are not good estimates of the natural vacancy rate. If this is indeed the case, then the most-recent period during which vacancy rates reflected markets in balance may go all the way back to the early 1990s, when rates were much lower than current estimates. Therefore, our conservative assumption is that the natural vacancy rate for the rental market occurs at the 1994 level of 7.4 percent and for the for-sale market at the 1995 level of 1.5 percent. Appling these rates to the projected growth in households produces a generally conservative projection of 340,000 additional on-market vacant units needed to satisfy the projected increase in households over the evaluation period. However, if more recent vacancy rates do in fact signal a new equilibrium in for-sale and rental markets, the number of vacant units demanded will be much higher.

The last component of new housing demand, replacement of existing units lost on net from the existing stock, is the most difficult to project accurately, in part because it depends on a combination of largely unpredictable events and trends, including natural disasters, relocation patterns of households to older built-out markets, and splits, mergers, and conversions of existing structures to and from their initial use. However, some amount of removals is related to the age and physical condition of the housing stock. Past removal rates by age of the housing stock can therefore be used to forecast how much of this stock is likely to wear out and be torn down instead of renovated. Using historical estimates of the share of units lost by age, applied to the current distribution of units by year built in the stock, generates our projection of around 3.3 million net removals over the period. Though it is difficult to say whether net removals will indeed follow this trend, this is nonetheless a conservative approach. The share of the housing stock that is in older structures is growing, which means more units will pass through ages when they are prone to higher loss rates in the future. It also does not take into account any unexpected losses that may occur from causes other than the aging of the stock. Hurricanes in 2005 alone destroyed over 200,000 units that were not picked up by the loss rates used in our projections. And as the land available for development continues to dwindle, more infill and replacement construction will likely be demanded to meet the needs of households interested in living close to employment centers.

An alternative approach to projecting total demand for new housing is to examine the ratio of household growth to completions historically and look for indications of a consistent and stable relationship. Once calculated, it can then be applied to the projection of household growth to project total completions. This approach has appeal since it involves the two most reliable estimates available in the housing demand equation and groups the less certain estimates of vacancies and net removals into a residual. Completions and placement data are based on tracking a carefully controlled sample from a near universe of housing permits and manufactured home shipments through to housing completions and manufactured home placements. Household growth is estimated by a variety of databases and benchmarked to a decennial Census count (or adjusted count) that is specifically designed to count the population. Vacancies are far smaller in number than households, more difficult to identify and classify, more difficult to weight, and generally prone to larger measurement error. Net removals are generally calculated as a residual after subtracting the growth in the total stock as estimated by the Census and the number completions and placements over period. Like vacancies, these estimates are subject to greater error.

The ratio of completions plus placements to household growth over ten-year periods since 1981 has ranged from 1.30 all the way to 1.45. Though a blunt instrument compared to building up projections from detailed assumptions about growth in the different types of vacancies and of net removals, the projections of new housing demand generated by this method are in line with those derived from more complicated piecemeal approaches. A conservative estimate of the completions to household growth ratio that represents an equilibrium period is the 1.36 ratio in each of the ten-year periods ending in 1994-1998. Importantly, each of these periods spanned the downturn of 1987-1991 that most closely resembles the current downturn. Applying this ratio corresponds to a plausible and perhaps conservative estimate of the growth in sustained long-run demand of 19.9 million from 2005 to 2014. This estimate is only slightly higher than the conservative 19.5 million estimate of the sum of household growth, net new vacant unit demand, and net removals from the housing stock described above.

Again, it is important to stress that these projections are of long-run, sustainable demand given the forecasted growth in households due to expected demographic changes in the population in the future. Actual construction of units will vary from these projections in a given year and even over the entire period if the beginning and end points of the period do not correspond with moments of market equilibrium. Entering this projection period in 2005 an

oversupply was building but had not yet been picked up in the HVS numbers because speculators were active in the market and demand was being pulled forward by rocketing home prices. Continued record-levels of completions and placements in 2005 and 2006 added further to this excess. While the amount of oversupply is impossible to know with precision, there is reason to believe that it was as high as 500,000 to 750,000 entering 2005 and may have reached 750,000 to 1 million by the beginning of 2007. However, drastic reductions in completions in 2007 so far have already cut into the excess somewhat. If completions remain at current levels through 2008, most of the oversupply may well be absorbed in an accounting sense. But if demand continues to remain suppressed, as it appears to be in 2007 as a result of tightening credit standards and sliding home prices, then the oversupply may not get worked off by the end of 2008. Even though production will have fallen enough to get back to near balance, the HVS for-sale vacancy rate may not fall back to closer to its natural level until demand rises back to its sustainable level. Long-run demand for new housing in 2008 through 2014, assuming the oversupply entering 2005 was about 500,000, will average 1.89 million per year. If entering 2005 the oversupply was a higher 1 million, the average will be a lower 1.82 million. However, in any given year completions and demand will run above or below the trend. In 2008, for example, completions and demand will likely run below trend.

I. Introduction

Projecting the demand for new residential construction over a ten-year period is no easy feat. Demand for new housing can be divided into three components: 1) the number of new households formed, 2) the net change in vacant units, and 3) the replacement of units lost on net from the existing stock to disaster, deterioration, demolition, and conversion to non-residential use. Projecting the levels of these components requires many assumptions about what will happen in the future, including (but not limited to):

- How future household growth will be influenced by changes in mortality rates, social trends (such as marriage, divorce and remarriage rates, immigration fertility patterns, and adult children living at home), economic trends (such as costs and availability of renter and owner housing), and the overall age structure of the adult population.

- How future demand for second homes and homes for occasional use will be influenced by changing age distributions, employment trends, wealth levels, and the preferences of the adult population.
- How future demand for vacant units for rent or sale will be influenced by changes in the number of units necessary to accommodate the normal turnover of the stock.
- How future demand to replace units lost on net from the stock will be influenced by factors like the changing age distribution of the stock, natural disasters, relocation of population away from older settled areas, and the demand to tear down older homes and replace them with newer homes, to split or merge existing units, or to convert structures to and from residential use.

In addition to making such assumptions, projecting housing demand also involves overcoming specific data challenges and making estimations and assumptions that are neither simple nor straightforward. While any prediction comes with a certain degree of uncertainty, the number and degree of challenges specific to projecting housing demand make the process worthy of closer scrutiny.

To make predictions about the future, many analysts look to past trends as indicators of the direction and magnitude of potential future demand, or to determine the base level from which projected demand will start. Yet different federal sources of housing data produce different estimates of the historic levels and changes in the components of new housing demand. Additionally, revisions to each of these surveys create breaks within the data series that make comparisons across some periods unreliable unless adjustments are made. Also, the choice of the historical period used to determine trends and inform projections matters because short-term market fluctuations can be mistaken as representing long-term trends.

It is important to stress that housing demand projections are of long-run, sustainable demand, and should not be viewed as a forecast of the actual number of units to be built, annually or over the entire projection period. Markets may be over or undersupplied going into a period, which adds or subtracts from the number of new units needed to fill the projected demand. While it is possible to assess whether markets are in balance or not at the beginning of a period, and adjust projections to account for it, it is not possible to know whether housing markets will be over or undersupplied at the end of the period, which also has an impact on how

much development takes place. Similarly, highly unpredictable events and factors play a role in total housing demand and the timing of market cycles. These include natural disasters that add to replacement demand, the course of interest rates and changes in the level and distribution of income and wealth, and federal tax and subsidy policies that encourage or discourage additional development. For these reasons, and others, it is therefore appropriate to offer projections of future housing demand as long-run ranges and averages, rather than individual annual estimates. Given that housing markets are often not in balance at the beginning of a projection period, and that this imbalance is reflected in either an excess or deficit in the number of vacant units, one can either adjust the projection of the sustainable level of demand for vacant units to reflect this, or else report the underlying sustainable level and then net out the market imbalances. We choose the latter approach because it allows for explicit and separate disclosure of both the presumed underlying demand for vacant units and the extent to which the period examined is presumed to be undersupplied or oversupplied entering it.

Our estimate of the total sustainable demand for new housing, which we believe to be a conservative estimate, is 19.5 million units from 2005 through 2014.[1] This projection does not account for oversupply in the housing stock as of the beginning of the period, or the high level of construction that already occurred in 2005 and 2006. Over the balance of the period remaining, completions and manufactured housing placements will therefore likely run below the 1.95 average annual pace implied by the long term projection. Indeed, construction in 2007 is already trending around 1.6 million for the year (including manufactured home placements). Assuming that the oversupply entering the projection period was around 500,000 units and swelled to 750,000 in 2007, and that the housing market will enter 2015 in equilibrium, trend growth from 2008 through 2014 will have to run closer to a 1.89 million annual average pace to match the projected demand. If the initial oversupply is larger, then production will be accordingly smaller. The largest unknowns in this forecast are the level of immigration and its impact on household growth, and the degree of oversupply entering 2005 – large changes in either of these factors may have a substantial impact on how accurate the forecasted demand proves to be.

[1] Throughout this paper we refer to the 2005-2014 period that begins on January 1, 2005 and ends on December 31, 2014. Any cumulative amounts (e.g. new construction) described therefore are based on the sum of the ten years from (and including) 2005 to 2014. Changes in elements that are counted (e.g. population and households) are presumed to be measured from July 1, 2005 to July 1, 2015. These conventions apply to all descriptions of time period, past and future.

The next section describes the components of the demand for new housing in greater detail. It is followed by a section that discusses the measurement and interpretation of past trends in these components. This section underscores the challenges of creating consistent time series with which the behavior of the components over time can be examined. It also drives home the importance of selecting the right dataset and making appropriate adjustments to it to take into account significant revisions. This is followed by a section that discusses a range of possible assumptions about the future course of each of the components of new home demand based on past trends and current demographic, social, economic, and housing conditions. The last section summarizes the projections for 2005-2014, gives reasons why the Joint Center projections are likely conservative if household growth comes in at about the projected level, and explains how to view the 2008-2014 period given the significant overhang of vacant units entering that period.

II. The Components of the Demand for New Residential Construction

As described above, construction demand is the sum of three components: net new households, net change in vacant units and second homes, and net removals from the existing stock. The Census Bureau's estimates of the completions of site-built units and manufactured home placements are considered fairly accurate and reliable because they are based on controlled samples of units followed through the construction process. The three components of demand, however, are measured inconsistently and with error. Thus, while the total amount of new construction over a period is known with some precision, the changes in households, vacancies, and net removals from the existing stock are not.

Household Growth

Net household growth is the largest single driver of demand for new housing units. As the number of households in the country increases additional units are needed to house them. Household growth is equal to the total number of new households formed minus the number of households dissolved over some period of time. Households form as young adults move out on their own, life changes spur divisions of existing households, and new immigrants arrive and set up residence. Households dissolve as family members are institutionalized or die, residents emigrate out of the country, or financial or family circumstances prompt households to merge. But rather than accounting for all these myriad formations and dissolutions net household change

is more simply measured by the difference between total households at two points in time. The number of new housing units needed to meet this additional demand is by definition equal to the number of net additional households.

Household growth is not the same thing as population growth, though the two are obviously correlated. As the population increases, so too do households but rarely at the same rate. It is the increase and changes in the composition of the *adult* population, not the increase in the overall population, which drives changes in the number of households. The ratio of households to population – called the headship rate – varies by generation, age, race, and nativity. Thus, as the make-up of the adult population changes so does the population's overall headship rate. Furthermore, headship rates within cohorts may change over time as a result of shifts in social trends, like age at first marriage and divorce rates.

Vacant Units and Second Homes

Vacant units are necessary to satisfy the demand for second homes (seasonal and other occasionally used homes) and to accommodate the turnover of the housing stock as people move for family, work-related, or financial reasons. When markets are in balance the number of vacant units for sale or for rent on the market divided by the number of households plus vacant units on the market is called the natural vacancy rate. The rate is not directly observable and can fluctuate over time as a result of changes in the demographic characteristics of households and the price and rent-setting strategies of property owners. The natural vacancy rate can fall over time if the process of moving and/or transferring property is made more efficient and fewer units are required to assist in turnover. It can also fall if the tenure mix of households shifts dramatically away from renting and towards owning because owners move less frequently than renters. Conversely, it can increase if more properties are in the hands of large property owners because they can tolerate a higher level of vacancies as they seek to maximize returns through aggressive price or rent setting strategies.

It is also difficult to estimate the sustainable level of second home demand because at any point in time the observed propensities of households to own second homes can be influenced by temporary economic factors like returns in other asset classes or the cost of capital as well as by other factors like changing preferences. Second homes include homes held for recreational or vacation homes, held for use by seasonal or migrant workers, used for employment-related

reasons, occupied temporarily by a household with a usual residence elsewhere (URE), and used for a number of other purposes. Recent changes in employment patterns, age structure of the population, living arrangements, and wealth appear to have lifted the demand for second homes. Recent analyses, for example, have shown that propensities to own second homes increase with wealth and age. As a result the aging of the baby boomers and increases in household wealth predictably lead to greater demand for second homes.

At any point in time the actual number of vacant units can fall above or below sustainable demand. When the number is greater this constitutes a situation of oversupply. When it is smaller it constitutes a situation of undersupply. In theory, an excess of vacant units should lead to price and production declines to bring the markets back towards balance. A deficit of vacant units should drive prices and production higher as tight markets lead buyers and renters to bid up values.

Replacement of Net Removals

The third component of construction demand is new units built to replace those removed from the stock. Even if the number of households and of vacant and second home units were to remain unchanged some new construction would still be required to maintain the existing demand for housing as units are lost from the existing stock to demolition, deterioration beyond habitability, conversion to non-residential use or mergers of existing units.

Some difficult-to-predict events can cause losses from the stock. A case in point is Hurricane Katrina, which rendered over 200,000 homes beyond repair in a single event. The year before only 30,000 units were lost to all disasters combined in the United States. Beyond natural disasters, simple aging and obsolescence of existing structures past the point of habitability results in a constant demand for new units to house displaced residents. Indeed, it is market forces that cause that greatest loss of stock. Physical depreciation of housing is a fact of life but it can be and is averted when investors decide to repair and replace systems to maintain habitability. Thus, decisions to allow properties to fall into disrepair are driven by market forces. Older housing is more apt to fall into disrepair because as modern tastes and standards change this housing is in less demand. It only receives the reinvestment required if its location makes it desirable to do so. Housing in areas with concentrations of poverty (often in older parts of cities and rural areas) is prone to abandonment because some homeowners cannot afford to maintain their properties and landlords may not be able to recoup costs and earn a competitive return on

their capital. On the other hand, investors in locations where demand has shifted from existing lower-end uses to newer, higher-end units may teardown perfectly habitable units to earn a competitive return on capital. Lastly, broader regional shifts, such as away from central cities or rural areas, can cause a drop in demand that leads to increased stock losses in particular places.

Some of the demand for new or different units to house existing households can be met without razing old or building entirely new structures. Conversion of non-residential structures for residential use may require substantial renovations but is not considered new construction. Likewise, splitting an existing structure into multiple units adds to the available stock without requiring new building.[2] In the same vein residential and multi-unit buildings can be converted to non-residential use or merged into fewer units in response to contracting demand. Thus, it is the net effect of all these changes that determines the level of new construction, if any, that is needed to meet changing location and amenity preferences.

Relative to household growth and net additional vacant units estimating the amount of replacement/reconfiguration demand is difficult. Disasters and structural failures cannot be predicted, nor can geographic preferences or technological advances that result in full replacement of units rather than just renovation. Only age of stock can be used as a proxy for structural obsolescence of units that are likely to need replacing, though even this is a weak indicator if rehabilitation of older units becomes more common and leads to fewer tear-downs of existing structures. In addition, no effort is made to formally count units that are lost on net from the stock. Indeed, there is not even a reliable national estimate of demolitions even though permits are usually required before a structure can be demolished. As a result, replacement demand is most often calculated historically by the difference between known construction and the net change in demand from household growth and new vacant units.[3]

[2] There is also a small stock of private rentals, sometimes illegal, that requires construction and re-configuration of accessory apartments in basements, attics and garages that can also accommodate newly formed households, and are difficult to monitor and estimate.

[3] With the exception of the decennial Census, federal estimates of total housing stock include assumptions about net removals, though they are not made publicly available. Inferring net removals as a residual is our attempt to reconstruct those assumptions.

III: Measuring and Interpreting Past Trends in New Housing Demand

The interpretation of past changes in the components of housing demand is complicated by several factors. First, data from different datasets produce different estimates of the levels and changes in the components of new housing demand. Second, datasets are occasionally revised and rebenchmarked to improve their accuracy, causing breaks in their time series. Third, and perhaps most important, historical trends are largely determined by the time frame used for evaluation, with sensitivity to the duration of the analysis and the state of the housing market at the beginning and end of the period. Inattention to these issues in measuring historical change in households and housing units can potentially result in misleading conclusions about the level and magnitude of sustainable housing demand. The following section details these complications.

Measuring Demand and Change across Datasets

A number of federal surveys estimate households and housing units across the country. The most commonly used are the American Housing Survey (AHS), the American Community Survey (ACS), the Housing Vacancy Survey (HVS), the Annual Social and Economic Supplement to the March Current Population Survey (ASEC; formerly the CPS March Supplement), and the Decennial Census of Population and Households. These datasets vary in their definitions of households and types of vacancies, weighting and control total schemes, surveying techniques and timing, and sample sizes. Appendix A describes these surveys in detail, comparing characteristics such as their size, coverage, frequency, definitions of key elements, changes to the surveys over time, and their appropriateness for measuring the components of housing demand. Readers unfamiliar with these surveys are encouraged to look at the descriptions of the surveys to better understand the sources of the differences.

Table 1 shows the estimates of households, vacant units and total housing stock reported by the four major household surveys conducted in 2005. The HVS, AHS and ACS were all benchmarked to the same independent Census Bureau count of the total housing stock, and have similar estimates of the number of units. Yet each has a very different estimate of the number of households. In part, these differences stem from different approaches used to define households. The HVS and AHS use a “usual residence” definition of occupancy, in which a unit that is temporarily occupied by a resident with a usual residence elsewhere (URE) is classified as a

vacant unit. The ACS household estimates, however, use a "current residence" definition of occupancy that classifies units occupied or intended to be occupied for at least 2 months as occupied units, even if that unit is not the primary (usual) residence of its occupants. As a result, some units that would fall under the URE category in the AHS and HVS are instead considered occupied in the ACS, especially among renters and in traditional resort destinations where households may stay for more than 2 months. This results in higher total household estimates and accordingly lower vacant unit estimates relative to the HVS and AHS. The ASEC, meanwhile, has by far the highest estimate of total households, even with a usual residence definition, due in large part to the different control totals to which it weights its responses. The ASEC bases its estimates of households on an estimate of the number of *householders* in the population, rather than deriving it from an estimate of total housing units like the other surveys. Accordingly, the ASEC does not estimate vacant or total housing units.

Table 1: Number of Households & Housing Units in 2005 (Thousands)

Survey	Households	Vacant Units	Total Housing Units
HVS	108,231	15,694	123,925
AHS	108,871	15,506	124,377
ACS	111,091	13,431	124,522
ASEC	113,146	n/a	n/a

The vacant unit estimates derived from the ACS, AHS and HVS differ not only in their totals, but also in estimates of the different types of vacancies. Table 2 shows that while much of the 2 million or so difference in the ACS relative to the AHS and HVS estimates of total vacant units can be attributed to the URE category; there are other notable differences in estimates of vacant units by type across the datasets.

Table 2: Estimates of Vacant Units by Type in 2005 (Thousands)

	HVS	AHS	ACS
Total Vacant Units	15,694	15,506	13,431
For Sale	1,451	1,401	1,309
For Rent	3,721	3,707	3,136
Rented or Sold, Not Occupied	1,060	994	1,344
URE/Occasional use	3,012	2,695	n/a
Other	2,672	2,864	3,758
Seasonal	3,778	3,845	3,884

Note: ACS does not have a mutually exclusive URE category, and instead has a separate tabulation of units classified as "Vacant- current residence elsewhere", which in 2005 included 805,898 units. ACS includes occasional use units (including those held for non-farm seasonal workers) in its estimates of seasonal vacant units. Units held for migrant farm workers only are grouped with the "other vacant" category. AHS vacant unit counts are estimated from independent control totals, though the distribution of vacant units by type is derived from the HVS estimates.

Some of the differences are the product of the different definitions each survey employs for some categories. The most significant such difference is in how each survey classifies 'occasional use' units. The ACS groups them with seasonal vacant units, while the AHS includes them with URE units, even though it too has a seasonal vacant category. The HVS, meanwhile, treats them as a stand-alone category.[4] Another difference is among units held for migrant farm workers that occupy them during crop season, which the AHS and HVS classify as seasonal but ACS includes with "other" vacancies. Units for non-farm seasonal workers, however, are grouped with seasonal units in the ACS. Time-shares and units with multiple owners are also treated differently. They are considered seasonal in the ACS, but as occasional use in the HVS, while in the AHS they could be included within either for-rent, seasonal, occasional-use, or other types of vacant unit.

In addition to different levels of households and housing units, the available datasets also display different trends in those estimates over time. For example, Table 3 shows how the surveys vary in their estimates of the change in households between 2003 and 2005. Though two years is not a long enough span to adequately measure trends in household growth, this comparison is convenient since it eliminates the need to consider the impact of survey revisions prior to 2003 on growth estimates.

[4] For comparative purposes, Table 2 combines the 1.9 million occasional use units and 1.1 million URE units in the HVS in 2005 into one category.

Table 3: Change in Households (Thousands)

Survey	2003	2005	Change
HVS	105,560	108,231	2,671
ACS	108,420	111,091	2,671
AHS	105,842	108,871	3,029
ASEC	111,278	113,146	1,868

Interestingly, the survey with the highest estimate of households (ASEC) also shows the smallest growth over the two year period. The other three surveys, with similar control totals, demonstrate less variation in their growth, despite other institutional and methodological differences. Indeed, the remarkable similarity in the change measured by the HVS and ACS is all the more surprising given the different residency definition employed in the ACS estimates. Again, the short time frame discussed here does not tell us anything about long-run trends that may better inform our projections, and is only shown here as an example of the differences across data sources. A longer time frame is preferred, but introduces more complexities and variations between estimates, as described in the next section.

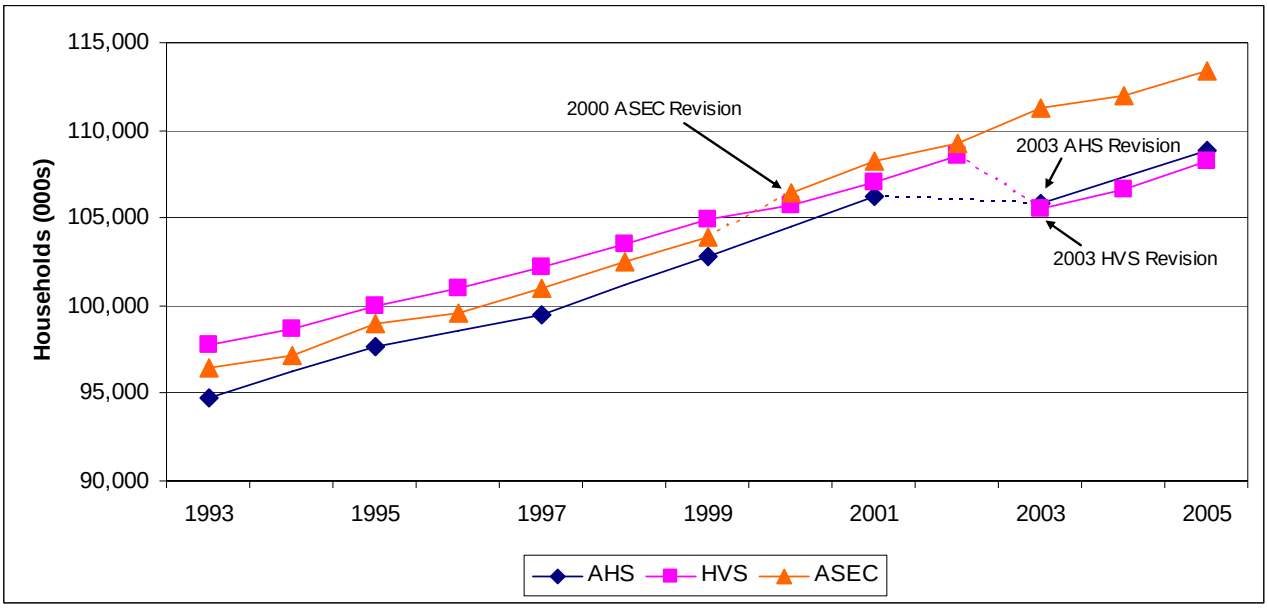
Measuring Long-Term Trends Across and Within Datasets

Surveys differ not just in the levels of households and vacancies they estimate, but also in the long-run trends observed. Revisions to the datasets over time lead to different estimates of the change in households and vacant units, and occasionally inconsistencies within datasets over revision years. Breaks in the time series reported are often the product of either re-benchmarking to new control totals, which may result in small or large revisions to the series but may allow for some reconciliation within the data, and/or outright changes to the dataset which break data compatibility completely. The result is that it is difficult to draw conclusions about long-run trends spanning these revision years without acknowledgement of these changes and possible adjustments for them.

In general, the HVS and ASEC are adequate for measuring household growth between 1980 and 2000. However, changes to definitions and corrections for the underreporting of some types of units in the HVS make vacant unit estimates in this survey before and after 1990 incomparable. But the most substantial revision to both household and vacant unit estimates for all surveys occurred following the 2000 decennial Census. The ASEC was rebenchmarked to higher Census population totals in 2000, causing an *upward* revision to household estimates. The

HVS and AHS, meanwhile, were revised *downward* starting with the 2003 surveys to new independent housing unit estimates based on the lower housing unit totals in the 2000 decennial Census, as well as a methodological change in how some units are categorized and tabulated. The magnitude of these revisions to the household estimates in each survey is visible in Figure 1.[5]

Figure 1: Rebenchmarking of Household Estimates can be Significant



The 2003 revisions to the HVS and AHS result in breaks in the long-term household growth trends that make direct comparison of estimates before and after the revisions impossible. The 2000 revision to the ASEC, though less dramatic and in keeping with the general upward trend of household estimates, also skews calculations of the total growth in households over the revision period.

Chained growth, or measurement of the change in household estimates using revised and unrevised data for one year, may allow users to adjust for breaks in the data series in revision years. For example, the HVS released a revised set of household estimates for 2002 based on the new control total weights to allow for comparisons with the 2003 estimates. Growth up to 2002 can therefore be measured with the unrevised 2002 estimates and from 2002 forward with the revised 2002 estimates. However, changes in the race and ethnicity questions and methodologies

[5] Long-run trends are evaluated here from 1993, due to revisions in that year in the HVS and other series from rebenchmarking to the 1990 decennial Census, which had a minor but still important impact on the estimates of households. The ACS, as a relatively new survey, does not yet have breaks in its long-term trend line from revisions, and is temporarily excluded from the discussion.

in the 2003 HVS done simultaneous to the rebenchmarking make drawing conclusions from this approach inappropriate. In other words, the revised 2002 number, in attempting to bridge the two different race definitions from the 2002 survey and the 2003 survey, is comparable to neither the 2002 unrevised number nor the 2003 number. Therefore, there is still no good way to determine household change from 2002 to 2003. As shown in Table 4, using revised 2002 estimates from the HVS implies net household growth 2002-2003 of just 595,000 units, well below the 1.4 million average annual increase 2000-2002 and 1.3 million annual average growth in 2003-2005. Furthermore, that estimated growth can be decomposed into growth of 1.26 million minority households and a *loss of over 660,000 white households in one year*. This stands in contrast to the growth in white households that averaged 584,000 annually over 2000-2002 and 564,000 annually over 2003-2005.

Table 4: Estimated Households and Household Change by Race in the HVS 2000-2005 (Thousands)

Households	Total	Whites	Minorities
2000	105,720	79,242	26,478
2001	107,010	79,811	27,199
2002u	108,539	80,411	28,129
2002r	104,965	77,179	27,786
2003	105,560	76,513	29,047
2004	106,588	76,930	29,659
2005	108,231	77,640	30,591
Average Annual Change			
2000-02u	1,410	584	825
2002r-03	*595*	*-666*	*1,261*
2003-05	1,336	564	772
2000-05 w/ 2002-03	1,217	326	891
2000-05 w/o 2002-03	1,373	574	799

Clearly a reasonable calculation of the estimated *change* in households over the revision is not possible. For this reason the Joint Center has chosen not to use the 2002-revised household estimates to measure household change with the HVS, but instead to assign to the 2002-2003 period the average annual growth measured 2000-2002 and 2003-2005, which is 1.37 million per year.[6]

[6] The ASEC estimate of household growth from 2002 to 2003 was 1.98 million, so the JCHS-adjusted HVS household growth estimate is a conservative one.

Choice of Time Frames and End Points

In addition to adjusting and accounting for data revisions historical trends must also be placed in the context of the prevailing market conditions. Any deviations in long-run demand that occur at the beginning and end of the evaluation period should be considered when extrapolating from the period. Ideally, change in housing units should be evaluated between two periods in which the market is believed to be in equilibrium—that is, when demand and supply are in balance and there is no over or under supply. But it is difficult to judge whether markets were or were not in equilibrium at the beginning and end of the selected periods and, if they were not, how to make adjustments for the forward period when making projections.

The usefulness of different datasets for examining long-run trends depends on the timeframes they span, how often they are released, and how serious revisions have been. The ACS, as a relatively new survey, only has estimates of units from 2001, so no ten-year prior period estimates are possible. The AHS is only released every other year and may obscure the actual peaks and troughs of a housing cycle should they fall in an even-numbered year. The decennial Census is reported even less frequently. The ASEC tracks households back to the 1960s but does not produce estimates of vacant units. Only the HVS has a long and continual series of household estimates since 1979 and vacant unit estimates since 1989 after making adjustments for the 2003 revision.[7] Hence the HVS, though flawed, is the best data source available to demonstrate the implications of measuring historical change over different time frames, though the same cautions hold true regardless of the dataset used.

Without assessing whether housing markets were or were not in equilibrium in any of these years, the change in housing units clearly varies depending on which 10-year period is considered. Table 5 shows the change in HVS housing unit estimates in 10 year periods from 1989 to 2006, with adjustments made to the 2002-2003 change to account for rebenchmarking as described above.

[7] While the HVS tracks vacant units back to the 1960s, revisions to the survey made in the mid-1980s make comparisons with earlier data inaccurate. These revisions include changing the definition of year-round vacant units to include manufactured homes in 1990 and an upward adjustment of 28 percent on the counts of seasonal vacant units in 1987 to correct for perceived underreporting of those units. See Appendix A for more details.

Table 5: HVS 10-Year Changes in Housing Units (Thousands)

	All Housing Units	Vacant	Occupied
1989-1999	13,315	1,876	11,439
1990-2000	13,345	1,849	11,496
1991-2001	14,204	2,447	11,757
1992-2002	15,002	2,853	12,148
1993-2003	15,402	3,208	12,195
1994-2004	15,414	3,170	12,245
1995-2005	15,449	2,853	12,598
1996-2006	16,053	3,110	12,943

Note: Unrevised 1993 estimates used to measure change in housing units up to 1993, and revised 1993 estimates used to measure change from 1993 on. Change in the 2002-2003 period is assumed to equal the annual average change 2000-2002 and 2003-2005, to correct for revisions to the survey that make direct comparisons of estimates before and after this period inaccurate.

Looking at the 10-year changes in vacant and occupied units separately shows that it is the volatility in vacant unit changes that drives most of the irregularity in the 10-year total housing unit trends. Vacant units rise steadily from 1.85 million for the period ending in 2000 to 3.2 million in the period ending in 2003 but level off for one year before declining back to 2.85 million in the period ending in 2005. We know from vacancy rates for all vacant units that the early and mid 1990s was a period of relative stability, while the late 1990s and early 2000s saw a dramatic jump up in the total vacancy rate that briefly stabilized from 2003 to 2005 before shooting up again in 2006. Thus, some of the observed variations in the 10-year changes in vacant units were likely due to market conditions rather than shifts in sustainable demand.

Measurement of Net Removals

Estimates of the level of net removals from the residential stock are much less straight forward than household growth and change in vacant units. Net removals are often calculated as the difference between the net change in total units (occupied and vacant) at two points in time and the cumulative construction over the same period. Any construction that occurs above and beyond the change in total units is presumed to be one-for-one replacement of units removed from the stock.

Table 6: Estimates of Net Removals (Thousands)

Time frame	Total Completions	Data source	Net change in stock	Total net removals	Average net removals per year	Implied average annual loss rate
1990-2000	16,121 (1990-1999)	Decennial Census	13,641	2,480	248	0.24%
		HVS	13,345	2,776	278	0.26%
1995-2005	18,139 (1995-2004)	AHS	14,920	3,219	322	0.29%
		HVS with JCHS adj.	15,449	2,690	269	0.24%

Note: Total completions are the sum of site-built completed units and manufactured home placements annually in each year *up to* the last year of the period. Change in housing stock is measured as the difference between estimates at the beginning and end of the period. Change in stock 1995-2005 with the HVS includes JCHS adjustment for the 2002-2003 period. Implied loss rate is the ratio of average annual net removals to the level of housing stock in the beginning year of the period.

Because of the considerable variation in year-to-year estimates of net removals due to natural disasters and short-term market conditions a long-term perspective on the amount of replacement housing demanded is appropriate. As Table 6 shows, over recent 10-year periods (since 1990), the implied annual loss rates vary from 2.4 to 2.9 units per thousand annually. Though this is a relatively narrow range, most housing analysts consider these loss rates to be too low. At 2.5 units per thousand replaced every year, the current stock would be expected to last for around 400 years. Given that the completions estimates are measured with considerable accuracy, the implication therefore is that estimates of the growth in the total housing stock (occupied and vacant units combined) are too high.

There are other, more complicated means of estimating net removals from the stock aside from the residual method. One of these is the CINCH (Components of INventory CHange) analysis using linked AHS data.[8] Instead of comparing straight estimates of total units in two years the CINCH method tracks individual units forward from an initial survey year by their status in a later survey year. Units from the first year can be present in the second year, switched to non-residential use, lost in a merger of multiple units, or removed from the stock by disaster or demolition. The sum of all these lost units is then tallied to derive a gross estimate of all units from the initial year that are no longer part of the residential stock as of the second year. CINCH

[8] See Econometrica, Inc. (Frederick Eggers and Fouad Moumen), "Components of Inventory Change: 2003-2005." prepared for the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, May 2007.

also uses a similar backward-looking analysis of units present in the second year by their characteristics in the first year.

The CINCH forward and backward-looking analyses can be combined to derive an estimate of the net removals from the stock over some period. However, some caution must be used in interpreting these results because the estimates are from two different survey years (with different weights). While the CINCH approach is useful for decomposing the change in units by their characteristics over some period of time and drawing comparisons about the relative propensity for removal by those characteristics, it cannot be used to accurately estimate levels of units at the start or end of the period.[9] Nonetheless, a combined CINCH analysis can be used to compare presumed loss rates across units of different types and vintages. This allows consideration of the greater or lesser propensities of some units to be removed from the stock.

[9] For example, in the 2003-2005 CINCH analysis, gross losses estimated with the 2003 survey weights equaled 1.64 million units, while new construction and other additions estimated with the 2005 survey weights equaled 4.81 million units. Taking the difference between these two estimates – additions net of losses – and applying it to the 2003 AHS estimate of the total housing stock of 120.78 million implies that the 2005 total stock should be 123.95 million. However, the actual estimate of the stock based on the 2005 AHS was 124.38 million, or 433 thousand more than the CINCH analysis would suggest.

Table 7: CINCH Analysis of Net Removals 2003-2005 (Thousands)

	2003 AHS housing units	Gross losses from stock	Total non-construction additions	2-year net losses	Average annual losses
Total Housing Stock	120,777	-1,640	1,010	-630	-0.26%
By Units in Structure					
1, detached	74,916	-678	333	-345	-0.23%
1, attached	7,227	-115	81	-34	-0.24%
2 to 4	9,965	-254	150	-104	-0.52%
5 to 9	6,012	-64	19	-45	-0.38%
10 to 19	5,433	-60	33	-27	-0.25%
20 to 49	3,964	-60	58	-2	-0.02%
50 or more	4,289	-81	226	145	1.60%
Mobile home/trailer	8,971	-328	110	-218	-1.22%
By Year Built (age of stock in 2005)					
2000-2004 (1-5 years)	6,237	-38	80	42	0.34%
1990s (6-15 years)	16,006	-188	93	-95	-0.27%
1980s (16-25 years)	16,449	-130	86	-44	-0.14%
1970s (26-35 years)	23,502	-345	204	-141	-0.30%
1960s (36-45 years)	15,482	-184	110	-74	-0.24%
1950s (46-55 years)	13,433	-172	109	-63	-0.24%
1940s (56-65 years)	8,152	-123	74	-49	-0.31%
1939 and earlier (66+ years)	21,513	-459	250	-209	-0.50%

Notes: Gross losses, based on 2003 AHS weighted estimates, include units lost in disasters, demolished, merged or converted to non-residential use, or badly damaged or condemned, but does not include moves of manufactured homes. Non-construction additions, based on 2005 AHS weighted estimates, include units converted from non-residential use, split from existing units, or temporarily unused units returned to the stock, but does not include placements of (new or existing) manufactured homes. The 2-year net loss is the difference between gross losses and non-construction additions. Average annual loss rates are the 2-year net divided by the 2003 total stock and halved.

The estimated annual net loss rate derived from the combined CINCH analysis in Table 7 at 2.6 units lost annually per thousand is in the range defined by the residual approach from the 10-year loss rates calculated in Table 6 above. However, loss rates for manufactured homes and units more than 65 years old are twice as high as for the total stock. In contrast, single-family units, units in 10-49 unit structures and units that are 6-55 years old (cumulatively) have lower loss rates. Meanwhile, units in 50+ unit structures or 1-5 years old have positive loss rates, indicating more splits of existing units and conversions of non-residential properties than gross removals from the stock. These individual rates can be applied to estimates of the current stock, to account for the higher propensities of some units to be removed from the stock faster than others. As the

housing stock continues to get older, the overall loss rate may be more heavily influenced by the higher loss rates of the older stock, implying higher rates of net removals going forward.

IV. Projecting Future Trends in the Components of New Housing Demand

Given the complexities of calculating historical changes in the components of housing demand applying past estimates to projections of future demand requires an understanding of the best datasets to use and how to adjust them to address revision years. Historical data can be used in two ways to evaluate future demand: first to understand trends and if they are likely to continue; and second as a benchmark from which to compare projections.

Forecasting Household Growth

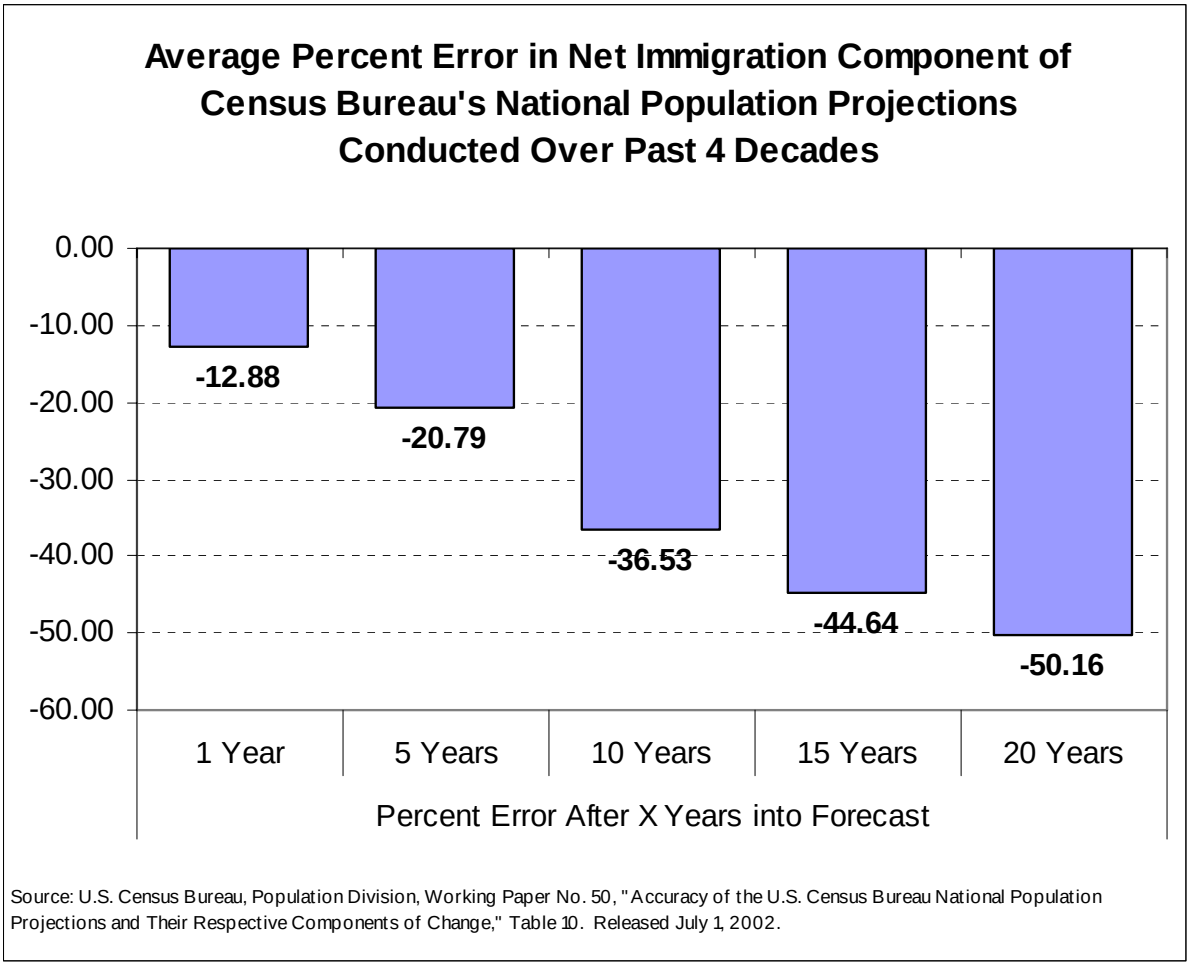
Of the three components of future housing demand, household growth is not only the largest contributor but is also the most reliably forecasted based on historical trends and known characteristics of the population. Projected household growth is derived from projections of the size and composition of the adult population, which in turn are based on current estimates of population by age, race and nativity, known birth and mortality trends, and assumptions about future immigration. Fertility and mortality trends are expected to remain relatively stable over the next 20 years, barring any unusual and unexpected circumstances (e.g. wars, health epidemics). Immigration, however, is much more difficult to project, since the level of net immigration is heavily influenced by policy and economic conditions, which change unpredictably over time.

The Census Bureau uses current and historic information in producing its population projections. These are the population projections most commonly used for projecting household growth.[10] If applied to the Joint Center's household projections net new household formations from 2005 to 2015 would be around 13.3 million. Some analysts, however, believe that the immigration assumption used in the Census projections, at around 840,000 per year between 2000 and 2020, is unreasonably low relative to recent estimates of net immigration between 2000 and 2005 that average 1.2 million per year. Indeed, the Census Bureau has a track record for under-projecting immigration. During the 1990s population projections produced by the Census Bureau averaged around 800,000 per year though post-2000 Census evaluations put that number

[10] See http://www.census.gov/population/www/projections/popproj.html for more information.

at around 1.1 million.[11] The consistent under prediction of immigration is illustrated by Figure 2. The methodology used to generate immigration projections has since come under greater scrutiny and criticism, and is now being revisited.[12]

Figure 2: Illustration of Consistent Under Prediction of Immigration Levels



Further complicating estimates of net immigration is the illegal component of immigration. Illegal immigrants are much less likely to respond to government surveys, making it difficult to count them accurately. In addition, the level of illegal immigration is sensitive to

[11] See Tammany Mulder, "Accuracy of the U.S. Census Bureau National Population Projection and Their Respective Components of Change," US Census Bureau, Population Division, Working Paper No. 50, 2002; and Kevin E. Deardorff and Lisa M. Blumerman "Evaluating Components of International Migration: Estimates of the Foreign-Born Population by Migrant Status in 2000," US Census Bureau, Population Division, Working Paper No. 58, 2001.

[12] Betsy Guzman, Kevin Deardorff and Melissa Therrin, "Discoveries and Challenges from Census 2000: Estimating International Migration at the U.S. Census Bureau," prepared for the International Union for the Scientific Study of Population, Tours, France, July 2005.

economic and political conditions, making forecasting this element of demand even more challenging. The impact of over or under-estimating illegal immigrants on forecasted housing demand, however, may not be as significant as that of legal immigrants. Many illegal immigrants, particularly those who enter illegally, often stay in this country for only a short time, and live with extended family or friends while in the US, creating fewer independent households that add to long-run housing demand. Long-term stayers and those who overstay their legal visas might have a greater propensity to form independent households particularly if they have children born in the U.S.

Different population projections based on varying levels of immigration are not the only cause of differing household growth projections. Projected population estimates are converted into household estimates by applying age-based headship rates, or the share of the population in each age group that heads households. Further division of the population by race/ethnicity and household type allows analysts to apply different headship rates for subsets of each age cohort, to factor in systematic differences among them and changes in the diversity of the population and living arrangements over time. But these headship rates themselves are estimates, often based on historical trends but sometimes adjusted to reflect assumed changes in the rate at which different ages, races and family types form households over time.

Headship rates change over time as the composition of the population changes and social and economic trends influence propensities of some groups to form households. Between 1970 and 2000, the headship rates for the under-30 population declined by as much as 0.04 points, but increased for the older population by almost as much. That change was not smoothed out over the 30 year time frame either, as all age groups had increases in their headship rates over the 1970s while most had declines over the 1990s.[13] Data so far this decade appear to show headship rates stabilizing though this could be an indication of another shift in the direction of rates, like in the 1980s, going from declining rates to once again increasing headship rates.[14] Whether one

[13] Donald Haurin and Stuart Rosenthal, "The Influence of Household Formation on Homeownership Rates Across Time and Race," prepared for the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, October 2004.

[14] Due to changes in the racial/ethnic categories in the ASEC in 2003, headship rates from before and after this change are incomparable. Headship rates from 1998-2002 and 2004-2005 however were stable by age, race and family type. See George S. Masnick, Eric S. Belsky and Zhu Xiao Di, "The Impact of New Census Bureau Interim National Population Projections on Projected Household Growth in the United States," Joint Center for Housing Studies, Research Note, N04-1, 2004.

believes the rates are indeed stabilizing or about to turn up again influences the choice of headship rates to apply to future household projections.

The Joint Center has a long track record of projecting household formations and household growth. Since 1980, the Joint Center has been following trends in headship rates by age and family type and using likely historical cohort trends in those rates to extrapolate a set of total household estimates. Despite the idiosyncrasies in household formations over any stretch of time, past Joint Center projections have for the most part been fairly accurate at estimating the expected growth in households. Indeed they have, if anything, recently underestimated household growth, though not by much (see Table 8).

Table 8: Average Annual Household Growth (Actual and Joint Center Projections)

Years	**1980-85**	**1985-90**	**1990-95**	**1995-00**	**2000-05**	**2005-10**
Actual (HVS)	1,295	1,267	1,154	1,147	1,373	---
Joint Center Household Projections						
Vintage						
1980	1,578	1,386	1,303	1,193	---	---
1986	1,421	1,427	1,175	1,066	---	---
1989	---	---	1,119	1,090	---	---
1994	---	---	---	1,242	---	---
1996	---	---	---	1,107	1,131	1,191
2000	---	---	---	1,260	1,145	1,201
2004	---	---	---	---	1,277	1,340
2006	---	---	---	---	1,320	1,456

Note: 1980 and 1986 vintage JCHS projections are represented by the midpoints of high/low estimates made in those projections. 2004 and 2006 JCHS projections use constant headship rates and Census 2000 race information, while the 1996 and 2000 projections were done using pre-2000 information. The differences between 2004 and 2006 vintage projections are attributable to use of Census' 'interim' immigration assumptions in the former projections, and the change to the Joint Center's own higher immigration assumptions in the latter.

In the Joint Center's most recent estimates of household growth, headship rates by age, race and household type for 2005 to 2015 are presumed steady at 2005 levels as measured with the ASEC.[15] Unlike the 1970s and 1990s, social trends impacting household formations are relatively stable at the moment. Any subsequent shifts in household formation patterns in the

[15] Headship rates use ASEC household counts in the numerator and resident population estimates in the denominator. See George S. Masnick and Eric S. Belsky, "Revised Interim Joint Center Household Projections Based Upon 1.2 Million Annual Net Immigrants," Joint Center for Housing Studies, Research Note N06-1, 2006.

near future are likely to be minimal and offset by changes in the other direction[16]. The Joint Center projected growth in households 2005 to 2015 is 14.6 million.

Forecasting Demand for Vacant Units

There are several different types of vacancies that display different trends, follow different drivers, and therefore need to be treated and projected differently. The sustainable demand for additional vacant units for sale and for rent largely reflects the growth in the number of renter or owner households. This is not to say that the actual for-sale or for-rent vacancy rates at a point in time reflect equilibrium conditions. Indeed, some of the increase in the supply of vacant units since 2000 appears to have resulted from supply overshooting demand. For other types of vacancies, such as second homes, the number of units demanded reflects complex changes in the age distribution, wealth, and buying preferences of adult households. Projections of these units also involve judgments as to the likelihood that the endpoints of the evaluation period represent markets in which supply and demand are in balance.

The likely change in demand for vacant units is based on expected changes in the 'natural' vacancy rate, which varies by market and type of vacancy. As described earlier, the natural vacancy rate is the sustainable level of vacancies. Similar to the way in which there remains a certain number of unemployed persons at full employment, natural vacancies occur due to the number of vacant units needed to accommodate turnover in the housing stock for a mobile population, and the complex behavior of owners and investors in setting and managing stock and rents.[17] The natural vacancy rate of for-sale and for-rent housing are different because those who own also tend to move less often than renters. It is therefore desirable and appropriate to disaggregate them when projecting future demand.

---

[16] In its recent five-year housing demand forecast, the National Association of Home Builders (NAHB) assumed headship rates for younger populations would increase as their numbers increased, while middle-age headship rates would decrease, relative to recent trends. The shift in headship rates resulted in a 360,000 higher estimate of the annual increase in households headed by under-50 year olds, and a 333,000 lower annual change in households headed by persons age 50 and older. So even though the total amount of construction needed would only be 27,000 more per year (less than 2 percent of projected annual construction), given the different demands and preferences these age groups have for housing, this shift has significant implications on the type and location of the housing that will be built over this period, relative to what would be built if headship rates remain constant. See NAHB, "Long-Term Forecast," Housing Economics, September 26, 2006. For more information, visit www.HousingEconomics.com.

[17] For more on natural vacancy rates, see Eric S. Belsky, "Rental Vacancy Rates: A Policy Primer," *Housing Policy Debate*, Vol. 3 Issue 3, 1993.

Our approach to identifying a natural vacancy rate is to simply use rates from a recent year or years when the markets appeared to be in equilibrium, though as noted earlier, there is no settled approach to identifying equilibrium in housing markets. Among for-rent and for-sale vacant units, published HVS vacancy rates provide the most accurate means for assessing a period of equilibrium.[18] The HVS is the only viable data source that provides annual estimates of both households and vacant units over a long-enough timeframe to allow for identification of equilibrium periods or long-run averages. Revisions to the HVS are also less problematic when evaluating rates instead of levels, so few adjustments and assumptions need to be made about the validity of the time series; indeed, the 1993 and 2002 revised counts produce ratios that are only a tenth of a percent different from the unrevised counts in those years.

Historically for-sale vacancies have been relatively stable. They remained at around 1.6 percent through the 1980s and 1990s, but began to drift upward slightly in the early 2000s and then shift dramatically upward to 2.4 percent in 2006. Therefore, in determining the equilibrium for-sale vacancy rate, a judgment must be made as to whether this recent shift reflects a change to a new higher natural vacancy rate caused by lasting changes in behavior (such as greater rates of turnover of owner-occupied homes), or if this higher rate in 2006 is simply a temporary aberration that will not carry forward.

The relatively stable for-sale vacancy rate over the years stands in contrast to the frequently changing for-rent vacancy rate. The rental vacancy rate follows a stair-step pattern of higher and higher sustained vacancy levels every few years. For instance, HVS rental vacancy rates appeared to be stable from 1991-1994, when they hovered around 7.4 percent. They then increased through the mid 1990s until stabilizing again from 1998-2000 at a level of about 8 percent. After 2000, rates begin to rise again, this time with a more substantial increase that peaks in 2004 before holding steady at about 9.8 percent in 2005 and 2006. Each time, rents stabilized and then headed higher. The cause of these periodic step-ups and subsequently higher sustainable levels of rental vacancies in the for-rent market is subject to debate and beyond the scope of this paper.[19]

[18] The HVS published total rental vacancy rate is equal to the ratio of vacant-for-rent units to the sum of renter-occupied, vacant for-rent and rented but not occupied units. The published total owner vacancy rate is the ratio of vacant for-sale units to the sum of owner-occupied, vacant for-sale and sold but not occupied units. Vacancy rates by units in structure exclude units awaiting occupancy.

[19] See Belsky 1993.

In Table 9 the rental vacancy rates from these three periods of apparent rate stability (early 1990s, late 1990s, mid 2000s) are applied to our projected growth in renter households 2005 to 2015 to get three estimates for the expected demand for vacant rental units during this period.[20] Given the past stair-step pattern of sustainable higher rental vacancy rates, we can consider the estimate using the rate from the early 1990s as most modest and that of the mid 2000s as the most aggressive. The difference between the ratios from the different equilibrium periods results in a range of vacant for-rent demand growth of 145,000 to 200,000.

Table 9: Projected Growth in Demand for Vacant For-Rent Units, 2005-2014

Vacancy rate base year(s)	HVS published rental vacancy rate	Ratio of vacant for-rent to renter occupied units	Projected renter household growth 2005-15 (000s)	Projected change in vacant for-rent demand 2005-14 (000s)
1991-1994	7.4%	8.0%	1,816	145
1998-2000	8.0%	8.9%	1,816	162
2005-2006	9.8%	11.0%	1,816	200

Note: The ratio of vacant for-rent to renter occupied properties is different from published rental vacancy rates because these published rates include vacant for-rent and rented but not-occupied units in the denominator. Here, a conversion is necessary because future demand is expressed as a ratio of rental vacancies to projected increases in rental household demand.

On the for-sale vacancy side the HVS published for-sale vacancy rate most recently was stable between 1998 and 2004 at around 1.7 percent. It subsequently rose to 1.9 percent in 2005 and 2.4 percent in 2006, signaling recent oversupply in this market. If, however, the oversupply was in existence as far back as the late 1990s, then the previous period of presumed equilibrium was from 1992 to 1995, when the HVS published for-sale vacancy rate was steady at 1.5 percent. A cautious forecast might apply the ratio of for-sale vacant units to owner occupied households from the early 1990s to the projected growth in owner households from 2005 to 2015. A forecast that is not based on a presumed equilibrium period, however, might take the ratio from the most recent period. The difference in the two projected changes in the demand for vacant for-sale units, shown in Table 10, would be 116,000 units.[21]

[20] This calculation applies the presumed natural rental vacancy rate to the incremental growth in renter households to estimate the expected change in demand for rental vacancies, and does not take into account any existing oversupply or undersupply of rental vacancies going into the period, nor does it assume any shift in the overall rental vacancy rate other that what would occur given the incremental growth at the natural rate.

[21] There is an additional category of on-market vacant units that are rented or sold but not yet occupied. This group included just over a million units, or 7 percent of the total vacant stock, in 2006 according to the HVS. Because of the size and idiosyncratic nature of these units we do not explicitly include them in our projection of vacant unit

Table 10: Projected Growth in Demand for Vacant For-Sale Units, 2005-2014

Vacancy rate base year(s)	HVS published owner vacancy rate	Ratio of vacant for-sale to owner occupied units	Projected owner household growth 2005-2015 (000s)	Projected change in vacant for-sale demand 2005-2014 (000s)
1992-1995	1.5%	1.5%	12,816	192
1998-2002	1.7%	1.7%	12,816	218
2006	2.4%	2.4%	12,816	308

Note: The published owner vacancy rate is almost the same as the ratio of for-sale vacant to owner occupied units because the inclusion of the vacant units in the denominator of the published rate produces only a minor deviation. Hence, the rounded figures reported here appear the same.

Second homes are not as sensitive to market conditions as other vacancies, so it is useful to focus on age-specific second homeownership rates instead. To project second homes, we can use a more complicated methodology than is used to project on-market vacancies, employing data from the Survey of Consumer Finances (SCF). The SCF is a household-level survey of assets and wealth, including real estate not owned as a primary residence, which unlike in the HVS, can be tabulated by the householder's age—perhaps the dominant factor in second home ownership.[22] The question asked by the survey, however, is limited and possibly misleading to respondents, and may underestimate the true size of the stock of homes owned by households.[23] Nonetheless, the reported second-home ownership rates from the SCF can be applied to projections of households by age and/or generational cohort to predict how many second homes each generation will own in the future and then summed to a total.

Due to small sample sizes in the SCF, the most accurate means of reporting categorical second-home ownership rates is to average the estimates over two consecutive surveys, and refer to the data by some interim year. We do that here with 1993 data based on the average of the 1992 and 1995 surveys (an equilibrium period), and with 2003 data based on the average of the 2001 and 2004 surveys (market fluctuations). In both periods, the SCF shows that older

---

demand. However, internal analysis suggests as many as 100,000 not-yet-occupied units may be added over the evaluation period.

[22] See Eric S. Belsky, Zhu Xiao Di and Daniel McCue. "Multiple-Home Ownership and the Income Elasticity of Housing Demand," Joint Center for Housing Studies, Working Paper W06-5, 2006.

[23] According to Belsky et al, (page 9) "When SCF respondents are asked what type of property they own, they must choose from "seasonal/vacation home," "time share ownership," and a host of structure types including single-family house, condominium, residential, trailer/mobile home, farm/ranch, etc. It is likely that some of those who own homes for occasional use on weekends or for work do not consider them for seasonal or vacation use. Indeed, many of those responding with a structure type do not derive any rental income from their second home, suggesting that in some cases they are at least in part for consumption uses."

householders are more likely to own a second or seasonal home, with second homeownership rates jumping once householders reach their 40s, peaking at over 10 percent for householders in their 50s, and remaining high for the oldest age groups. Since the next 10 years will bring more of the youngest baby boomers into the age groups with higher propensities for second homeownership, demand for second homes is expected to increase. As shown in Table 12, if one is to assume that the propensities to own a second home by age in effect in 2003 are to carry forward for each age group, we can expect demand for 1.22 million new second homes from 2005-2014 due to changes in the age distribution alone. If instead rates retreat to the lower 1993 second home ownership levels, the projected growth in second home demand would still be 1.173 million. Using the lower of the two rates for each age group produces the most conservative estimates, which when summed together project the demand for new second homes will be as low as 1.167 million units.

Table 12: Projected Growth in Seasonal & Other Second Homes, 2005-2014

Age of Householder	JCHS Projected Household Growth 2005-2015 (000s)	SCF Second Homes per Household 1993	SCF Second Homes per Household 2003	Projected Growth in 2nd Home Demand 2005-2014 at 1993 rates (000s)	Projected Growth in 2nd Home Demand 2005-2014 at 2003 rates (000s)	Projected Growth in 2nd Home Demand 2005-2014 at lowest of 1993 or 2003 rates (000s)
Under 30	1,638	1.6%	2.1%	26	35	26
30s	1,205	3.8%	3.5%	46	42	42
40s	-1,975	7.0%	6.2%	-138	-122	-138
50s	3,882	10.2%	10.4%	395	402	395
60s	6,910	8.7%	9.0%	602	624	602
70s and older	2,972	8.1%	8.1%	242	240	240
Total	14,632			1,173	1,221	1,167

A word of caution is needed when comparing estimates of changes in second homes between the SCF and the HVS. Since the SCF estimates far fewer second homes owned by households than the HVS, and the latter provides a much more reliable estimate of the total housing inventory, any assessment of likely changes of the total demand for vacant non-owner occupied housing derived from the SCF propensities is almost certainly low. Indeed, the HVS estimate of the growth in second homes from 1993 to 2003 was three times that of the SCF, at

1.5 million units. Second, the SCF is a household survey and therefore, unlike the unit-based HVS, it does not include institutionally-owned vacation units or those held off the market for other reasons. Additionally, from 1993 to 2003 the overall second home ownership rate in the HVS rose by 0.6 percent. This is a much more likely scenario than the steady rate in the SCF, especially given record levels of wealth accumulation over this period, along with growth in the number of older householders (e.g. baby boomers) in the age cohorts with the highest propensities to own second homes.[24]

Adding together the projections for each of the three types of vacant units produces a range of estimates of the cumulative change in demand for vacant units from 2005 to 2014 of 1.5 to 1.7 million units, as shown in Table 14. The most likely result will be somewhere in between, at around 1.6 million.

Table 14: Range of Estimates on Projected Change in Vacant Unit Demand 2005-2015 (000s)

	JCHS Projection	More Aggressive	Most Aggressive
Vacant for rent	145	162	200
Vacant for sale	192	218	308
Second homes*	1,167	1,173	1,221
Total	1,504	1,559	1,729

*Includes all seasonal, occasional use/URE, and "other" vacant units.

Forecasting Replacement of Net Removals

The last component of housing demand, replacement of net removals from the stock, is the most difficult to accurately estimate based on historical trends. Since past estimates of net removals are calculated as a residual, they are very sensitive to the measurements of both total construction and change in households and vacant units. A slight change in either of these could dramatically shift the estimate of net removals, and thus make future estimates based on this level subject to more error. Using these loss rates to project future demand could result in a

[24] Although the SCF is useful for exploring the role of the changing age distribution of the adult population on second home demand, its undercount of second homes makes it a problematic source for projecting future second home demand. While here we take a cautious approach and use it in our projections, another method for estimating second home demand would be take the increase in projected demand from 2005 to 2014 using the SCF and divide it by the actual increase 1993-2003 and then apply that ratio to HVS-reported growth 1993-2003. That approach would yield an estimate of additional second home demand of *3 million or more* 2005 to 2014. Instead, we stick with the SCF estimates of 1.2 million or slightly more in our projections.

significant underestimate of the housing construction needed to meet this need. Nonetheless, they can still be used as a baseline from which to make assumptions about possible future demand for net removals.

As shown in Table 6 above the loss rates implied by calculating net removals as a residual from different federal datasets suggests that over recent periods, an average of around 25 units per thousand were removed on net from the stock annually. With around 125 million units total in the stock as of 2005 this implies a net loss for the 2005-2014 period of 3.13 million units over 10 years. However, given the belief that these loss rates may be understated, and that demand for new construction in old places will accelerate with more infill development and aging of the housing stock, the actual net removals could be much higher. We already know of 200,000 additional units destroyed by hurricanes in 2005 that were not expected or predicted losses, which raises the projected demand to 3.33 million units. If infill demand and aging of the stock add another 20 percent increase in loss rates to 30 units per thousand over ten years, then the cumulative net removals 2005-2014 will be 3.95 million.

A more sophisticated approach to estimating net removals is possible, using information about loss rates for specific types and vintages of housing relative to their numbers in the stock. The CINCH analysis can be used to estimate change to the total housing stock net of new construction and moves of manufactured homes disaggregated by characteristics of the units. Applying these to 2005 estimates of the stock provides projections in Table 15 of the number of units that may be removed from the stock if these rates were to remain constant over 10 years.

Table 15: CINCH-Based Analysis of Net Removals and Estimates of Projected Removals 2005-2014 (Thousands)

	2003 Stock	Change 2003-05 net of new construction and manufactured homes moved	Annual net loss rate (net change divided by 2003 stock and halved)	2005 Stock	Implied 10-year losses 2005-2014
Units in Structure					
1, detached	74,916	-345	-0.23%	77,703	-1,791
1, attached	7,227	-34	-0.24%	7,046	-166
2 to 4	9,965	-104	-0.52%	10,071	-528
5 to 9	6,012	-45	-0.38%	6,073	-233
10 to 19	5,433	-27	-0.25%	5,696	-143
20 to 49	3,964	-2	-0.02%	4,402	-11
50 or more	4,289	145	1.60%	4,757	760
Mobile Home/trailer	8,971	-218	-1.22%	8,630	-1,049
				Total	**- 3,160**
Year Built (age of unit in 2005)					
2000-2004 (1-5 years)	6,237	42	0.34%	9,194	310
1990s (6-15 years)	16,006	-95	-0.27%	15,988	-439
1980s (16-25 years)	16,449	-44	-0.14%	16,376	-224
1970s (26-35 years)	23,502	-141	-0.30%	25,091	-757
1960s (36-45 years)	15,482	-74	-0.24%	15,192	-363
1950s (46-55 years)	13,433	-63	-0.24%	13,003	-311
1940s (56-65 years)	8,152	-49	-0.31%	7,904	-243
1939 and earlier (66+ years)	21,513	-209	-0.50%	20,686	-1,024
				Total	**-3,050**

Note: Change net of new construction and manufactured home placements includes units merged or split, converted to residential from commercial, or vice versa.

The forecasted estimates of total net removals to the stock when summed over the different structure types and housing vintages are near or slightly below the 3.13 million derived with the simple method described above. Disproportionate shares of these losses are likely to come from manufactured homes and units in structures built before 1940, given their much higher estimated loss rates. Indeed, these figures likely underestimate actual losses moving forward. As units continue to age, the higher loss rates of the older stock will apply to even more housing units. Likewise, the most recently built units will begin to experience net removals

instead of net additions. Lastly, these estimates assume maintenance of the status quo for the near future, and do not account for unexpected shocks to the housing stock or shifts in demand and construction trends that could dramatically alter the actual number of net removals from the stock. But, barring any catastrophic changes, replacement demand over the 10-year period has a strong chance of falling somewhere in the 3.3 to 4.0 million unit range.

Alternative Method to Forecasting Construction

The accuracy of our estimates of net removals and vacancies can be tested by looking at an alternative measure of the historical relationship between demand for housing and new construction. Calculating the ratio of total completions to household growth ignores the individual contributions of vacant unit and net removal demand by combining them into the residual. The historical trend on this ratio is best measured with the HVS, which has the longest available annually occurring estimates on households, once revisions to the data are accounted for. Table 16 shows the historical view on this ratio measured in 10-year periods and adjusted forward annually to show the stability of the calculation.

Table 16: Ratio of Completions to Household Growth (Thousands)

Ten year periods	Cumulative Completions	Household Growth	Ratio
1981-1991	17,132	12,460	1.37
1982-1992	16,902	12,660	1.34
1983-1993	17,032	13,152	1.30
1984-1994	16,799	12,349	1.36
1985-1995	16,497	12,098	1.36
1986-1996	16,142	11,839	1.36
1987-1997	15,881	11,685	1.36
1988-1998	15,710	11,514	1.36
1989-1999	15,804	11,439	1.38
1990-2000	16,121	11,496	1.40
1991-2001	16,473	11,757	1.40
1992-2002	16,975	12,148	1.40
1993-2003	17,428	12,195	1.43
1994-2004	17,811	12,245	1.45
1995-2005	18,139	12,598	1.44
1996-2006	18,561	12,943	1.43

If we apply the 1.44 average ratio from the periods ending in 2004-2006 to projected household growth of 14.6 million from 2005 to 2015 the implied level of new demand over that period would average 2.1 million a year—higher even than the most aggressive estimate of the cumulative projected growth in demand from the three components evaluated separately. Recent market imbalances, however, suggest the level of building at the end of this period was outpacing true demand. Thus, if the 1.40 ratio from periods ending in 2000 to 2002 is used instead, the estimated demand for new housing over 10 years would be closer to 2.04 million per year. Finally, applying the ratio from the 10 year periods that spanned the downturn of 1987-1991 that end in 1994 through 1998, at 1.36 the estimated demand over the 10 year period would be 1.99 million per year, which is still greater than the Joint Center's most conservative estimate of the long-run demand for new housing.

V. Sustainable Demand versus Market Fluctuations

The methodologies, data sources, assumptions and calculations described above are meant to provide the reader with an understanding of the complexities and uncertainties that are inherent in projections of housing demand. Each analyst has his or her own view on what historical trends are appropriate to use in this process, and small differences in the approach one takes to deriving such estimates can have a notable impact on the outcome. Furthermore, placing these projections of sustainable long-run demand in the context of current market conditions is necessary to translate the hypothetical into likely results.

That said the total projected demand for housing from 2005 through 2014 derived from the different approaches described above is summarized in Table 17. The estimates range from 19.5 under conservative assumptions and 20.4 million under more aggressive assumptions. Erring on the low side the Joint Center believes that 19.5 million is a reasonable estimate of the projected growth in *sustainable, long-run* demand for new housing from 2005 to 2014. If, however, the immigration assumption used in projecting 14.6 million net new household formations over the period proves to be too high, and immigration falls from its current pace to the Census Bureau's projected 840,000 annual level over ten years, total demand would be reduced from these estimates by 1.3-1.4 million over the decade.

Table 17: Range of Estimates of 2005-2014 Change in Housing Demand (Millions)

	Joint Center Projection	More Aggressive	Most Aggressive
Household Growth	14.6	14.6	14.6
Change in Vacant Unit Demand	1.5	1.6	1.7
Net Removals	3.3	3.5	4.0
Total	**19.5**	**19.7**	**20.4**
By Ratio of Completions to Household Growth	**19.9**	**20.5**	**21.0**

Modest expectations for vacancies and removals both contribute to the conservative nature of Joint Center projection. Though our projection assumes a reversion in demand back to the vacancy rates that prevailed in the early 1990s, it is possible that vacant rental demand had once again stair-stepped to a higher sustainable level by 2006, given a lack of additional evidence that rental markets were far out of balance. Our projection of for-sale vacancies also reverts to the early 1990s rate even though the vacancy rate appears to have stabilized at a higher level in the late 1990s and early 2000s. The even higher for-sale vacancy rates observed in 2006-2007 are presumed not to be sustainable. Our second home projections assume reversion back to the lower of age-specific propensities to buy homes at 1993 or 2003 rates do not take into account higher levels of wealth and project from the database with lowest estimate of the number of second homes. Lastly, net removals to the housing stock are also modestly projected because they do not include any shocks to the housing stock such as abnormal natural disasters, nor do they include expected increases in the demand for teardowns near city centers or the aging of the stock by another ten years. The most important assumption in the aggressive scenario is that there will be a 20 percent increase in net removals above and beyond the rate suggested by the vintage-specific housing loss rates from 2003-2005 that may result from increased pressure to redevelop areas close to employment centers as land on the periphery becomes less available. The aggressive case does *not* include possibly much stronger second home demand growth than is suggested by applying the SCF-derived aging of the baby boom effect to HVS second homes estimates rather than much lower SCF second home estimates (see footnote 24).

Entering this period, however, it is now apparent that the market was oversupplied and that production in the first two years of the period—2005 and 2006—was also well above trend. Entering 2005 the HVS did not yet register the significant oversupply of for-sale units because

investors and speculators had not yet exited the market. Through 2004 sales kept pace with construction, prices continued to rise, and vacancy rates remained stable. But in 2005 and 2006, even as completions continued to climb, sales dropped to below trend levels as a result of higher mortgage rates, still-rising home prices, and the exit of many speculators from the cooling market. The for-sale oversupply finally and swiftly revealed itself in the HVS estimates of vacant for-sale units which increased by around 750,000 units between the end of 2004 and the middle of 2007. Meanwhile, rental vacancies peaked in 2004 after rising in the wake of the 2001 recession and the surge in homeownership. But rental markets have since firmed, the rental vacancy rate has edged down, and rents have turned up. This suggests that a new and higher natural vacancy rate in rentals may have been established 2005 to 2007.

Unfortunately, the extent of the oversupply entering the period is not known with certainty. One way to estimate the degree of oversupply is to apply the HVS for-sale vacancy rate for an earlier period to the current period to estimate the excess supply of for-sale vacancies. Assuming that the for-sale market was in equilibrium from 1999-2001 (a time when markets were still relatively tight and prices were growing about in line with incomes), this method produces an estimate of the oversupply of for-sale vacant units of about 750,000.[25] Of this amount, perhaps 250,000 were added to the oversupply in 2005 and 2006 when completions and placements averaged 2.07 million while sustainable demand ran closer to 1.95 million. But the number of seasonal vacant units also increased by around 600,000 between 2004 and mid-2007 and other non-year round vacancies grew by 300,000, mostly in the "other vacant" category. Some fraction of these second homes may also reflect an oversupply, especially the 300,000 surge in units held off the market. It is also conceivable that there is also an oversupply of rentals. Under the most aggressive assumption of equilibrium conditions in rental markets not occurring since the 7.4 percent vacancy rate prevailed in 1991-1994, the oversupply of rental vacancies could have been as high as 1 million in mid-2007. But the interpretation of these crude stabs at estimating oversupply is clouded by the possibility that rental markets have been in equilibrium since 2005 and for-sale demand has been running below long-run demand as a result of softening home prices, tighter credit, and affordability pressures. If so, the apparent oversupply may be exaggerated. Still, it is unlikely the oversupply is less than 750,000.

[25] The HVS average for-sale vacancy rate 1999-2001 was 1.7 percent. Applying that rate to 2nd quarter 2007 housing estimates produces an estimate of sustainable, for-sale, vacancies of 1.28 million. Actual for-sale vacancies totaled 2.036 million – a difference of 756,000.

Table 18 demonstrates how a range of estimates of oversupply entering 2005 impacts the projected long-run sustainable demand for new housing from 2005 to 2014. Without any oversupply, new additions to the stock would have to average 1.95 million units for 10 years to meet even the conservative estimate of 19.5 million new units needed. However, if the oversupply entering 2005 was about 500,000 but is being offset by the decline in production in 2007 to 1.6 million (350,000 below long-run trend) then trend growth 2008 through 2014 would have to average 1.89 million. If the oversupply was 750,000 entering 2005, then trend growth 2008-2014 would have to average 1.86 million. If it was 1 million, then trend growth 2008-2014 would have to average 1.82 million.

Table 18: Annual Average Production 2008-2014 to Bring Markets to Equilibrium by the End of 2014 (Thousands)

Estimate of Oversupply Entering 2005	Average Annual Production Needed 2008-2014
500	1,892
750	1,856
1,000	1,820

Of course these simulations assume the market will end the period in balance, with no over or undersupply relative to the sustainable demand added. These projections are also cumulative counts expressed as annualized averages. Housing markets are cyclical so the level of production in any given year is likely to deviate substantially from these average values. Indeed, production appears to have run well above trend in 2005 and 2006 and below it 2007.

VI. Conclusion

In reviewing the above discussion on quantifying the elements and assumptions that go into estimating housing demand, it is important to keep in mind a few features of these housing projections. Firstly, they are just that – projections of possible outcomes based on past occurrences. They are not meant to be exact counts or firm statements on what the future will bring. Given the information available at the moment, analysts must still make assumptions about their applicability to forthcoming events.

Second, even the historical data itself may not be completely accurate, further adding bias to the projections. Different datasets, methodologies, time frames, and calculations can be used

to arrive at one seemingly straightforward count, with widely different results. The choice of these inputs for the historical basis upon which projections are made pays a significant role in determining what those projections may be.

Third, unpredictable events and factors play a role in total housing demand. Natural disasters, significant economic fluctuations, political climate, technological advances, and the timing of normal housing cycles all contribute to the supply and demand sides of housing. Though the effect of any one of these factors is likely to be small, and some may offset each other, they nonetheless add to the element of uncertainty around predictions of housing demand in the future.

Finally, these are *long-run* projections, covering a ten year period over which the housing market is certain to cycle though high and low periods. Even in mid-2007, one-quarter of the way through the period, we still do not know how the response to this projected demand will play out in actual construction. But do not mistake short-term reactions to the housing slowdown as a harbinger of things to come for the long-term. On the strength of demographically-driven demand for housing, the market will bounce back from its currently suppressed levels. If past cycles are any guide, the market will turnaround once most of the oversupply is worked off, remain below long-run sustainable demand for a time, and then rise back up above it for a period of time.

Appendix A: Summaries of the Data Sources Used in Estimating Historical Trends in the Components of New Housing Demand

The historical estimates of the components of housing demand are most often measured with one or more government-sponsored surveys. These include the Housing Vacancy Survey (HVS); the Annual Social and Economic Supplement (ASEC) to the March CPS; the decennial US Census; the American Community Survey (ACS); and the American Housing Survey (AHS). These surveys have several differences which lead to different estimates of the levels and growth of households and change in housing units in the US. To better understand the sources of these differences, this appendix describes the structure, benefits, limitations and applicability of each for evaluating the components of housing demand. Table A1 provides a quick glance at the characteristics of each survey.

Housing Vacancy Survey

The HVS is a subset of questions included in the monthly Current Population Survey on the status and characteristics of housing units, which is aggregated and reported on a quarterly basis. The HVS reports estimates of owner and renter households as well as vacant units by type (vacant for rent or sale, seasonal, URE/other second home, etc.). The coverage of housing categories, long time series, quarterly and annual (average of quarterly data to reduce seasonal factors and sampling variability) estimates, and the most up-to-date information make this survey a useful and popular option for estimating changes in households and vacant units over time.

The major limitation of the HVS for measuring households and housing units is that revisions to the dataset and its processing structure make accurate analysis of some categories of units over time impossible. The first such structural change occurred in 1980 when sampling and estimating procedures for the HVS were updated to be consistent with the AHS. Revised estimates from 1979 only were released, making estimates of all housing units from that point on not completely comparable to data from before 1979. In 1987, another revision was made after analyses of seasonal vacant data prior to the first quarter of that year were shown to have been underestimated by approximately 28 percent.[26] Consequently seasonal vacant unit estimates prior to 1987 are not compatible with later years. Also, total vacant unit estimates prior to the 1989

[26] For more detail on HVS revisions, see *http://www.census.gov/hhes/www/housing/hvs/annual95/ann95src.html.* Though both unrevised and revised data are included in historical tables for years 1979, 1989, 1993 and 2002 only revised data appear for 1987.

revised estimates are not comparable with later data, due to the inclusion of year-round vacant mobile homes in estimates of vacant units starting in 1990. Though with each survey adjustment, the HVS arguably becomes more accurate in estimating the actual size and composition of the housing stock, it also becomes less useful for measuring trends in housing units and households across time. As a result, the HVS is a problematic source for comparing total housing units before and after 1980, vacant units before and after 1990, and for seasonal vacant units from before 1987 to all later years.

However, the most significant recent revision occurred in 2003, when the HVS underwent a series of structural changes. First, the independent housing unit totals to which the HVS is weighted were changed due to new methodologies and counts from the 2000 decennial Census. This resulted in a sharply revised downward estimate of total housing units and a corresponding decrease in estimated households. At the same time, the HVS adopted new definitions and classifications of the race and Hispanic origin of householders. The combination causes a break in the series in 2003 that dramatically changed the estimated levels and change in households and units, and makes direct comparisons with pre-2003 estimates (even revised 2002 estimates) inappropriate.

Decennial Census

The decennial Census is a mandatory survey conducted every ten years as the official source for enumeration of all persons with usual residence in the United States. It consists of two questionnaires: a “short form” intended to enumerate 100 percent of the population and a “long form” administered to approximately 17 percent of households (addresses that are occupied) and containing detailed questions on demographic, socio-economic, and housing variables. As the largest and most comprehensive survey the decennial Census is widely recognized as providing the best available point in time accounting of the number of households in the US and the change in households across time, with very low sampling errors due to its large sample size but high non-sampling error. Though it is primarily a population survey information on vacant units is collected when possible and estimates of units by their type of vacancy reported.

The major drawback of using the decennial Census to measure change in housing demand is the length of time between surveys. Such a wide span of time makes it easy to miss trends that do not coincide with the survey years, and limit the options for smoothing out short-

term changes based on market conditions rather than true demand. Long lags between when the data are collected and when results are released also prevent up-to-date reporting of trends. Another concern with using the decennial Census is the apparent undercount in the 1990 survey, estimated at 1.65 percent overall but higher among low-income and minority neighborhoods, which affected household totals in many of the largest cities and most densely populated neighborhoods, and therefore national household and population levels as well as the 10-year growth levels leading up to and following the 1990 survey. Surveys benchmarked to the 1990 decennial Census, including the ASEC, used revised weighting to correct for this undercount, but stopped the practice with the release of the 2000 decennial Census. The 2000 decennial Census presumably corrected for the errors in the 1990 survey and was evaluated in two separate analyses to measure for any over or undercount. One analysis estimated the 2000 survey had a 0.5 percent over count for the population as a whole, while the other estimated a 0.12 percent undercount. In the end, the 2000 decennial Census estimates were made official in 2003 with no revisions, though acknowledging that some sub-populations were likely over and undercounted.

American Community Survey

The ACS was created as a replacement for the decennial Census long-form survey, providing annual estimates of households and people based on a sample of slightly less than 3 percent of households. After a test period from 2000-2004 the full ACS survey began in 2005 with data collected from 3 million households. The 2006 survey added persons living in group quarters, which were not included in the 2005 survey. The large sample size relative to the HVS/CPS reduces standard errors and allows for better geographic detail with reporting for jurisdictions as small as 65,000 people annually and even smaller locales with three and five year averages. However, being less than one fifth the size of the decennial Census long-form sample, the fine geographic detail that many local data users looked forward to every 10 years will no longer be available for long-form questions.

As a sampled survey the ACS does not produce its own estimates of housing units but rather has relied from its inception on the same 2000 decennial Census-based independent totals of units as the HVS but without the same break in its time series. As a relatively new addition to the datasets available for measuring housing demand and only reaching full implementation in

2005 the ACS today has limited historical data available for measuring change in households and housing units.

Like the decennial Census, the ACS collects some information on vacant and non-primary residences, but uses a different definition of residency than all other available surveys. Specifically, while the HVS and decennial Census require that the housing unit be the respondent's principal place of residence, the ACS allows for a unit to be classified as occupied (i.e. as a household) if the respondent has lived or plans to live in the unit for at least two months, even if it not the respondent's usual or permanent residence.[27] The reason for this approach by the ACS was to provide a better estimate of households in seasonal and resort areas that support larger populations during some parts of the year. However, this residency definition adds a certain number of households in the ACS that might appear as vacant units in the decennial Census or in other surveys using the "usual residence" occupancy rule and could potentially over-estimate renter households and households in vacation areas. So while the total housing units reported by the ACS may be similar to those of other surveys also based on the decennial Census, estimates of vacant units and households (and distribution of some categories within them) are not directly comparable. Presumably, the magnitude of this difference will be further understood after the 2010 Census short form tenure and vacancy rates are compared to the 2010 ACS results.

American Housing Survey

The AHS is a biennial survey conducted by the Census Bureau and the Department of Housing and Urban Development (HUD). Every odd numbered year the AHS collects information about the quality of housing and other information that HUD uses to evaluate and develop its housing programs. The survey goes back to the same housing units on a regular basis, recording changes in characteristics, adding and deleting units when applicable, and providing a current and ongoing series of data on the size, composition, and change in housing in the United States over time. This also allows the AHS to include vacant unit characteristics not usually reported by other surveys. With a "usual residence" definition applied to households and vacant units, the vacancy rates and distribution of the types of vacant and occupied households calculated with AHS data are also similar to those of the HVS. Responses to the AHS are also

[27] The ACS collects, but does not report information to determine whether the unit is usual/primary residence.

weighted to independent housing unit totals updated from the decennial Census, so that estimates of units reported by the AHS are nearly the same as those in the ACS and HVS.

One of the major drawbacks of using the AHS to estimate change in households and units over time is that data are only collected and released every two years, which is less frequent then the annual ACS or the quarterly HVS. Its sample size is also smaller than that of the decennial Census and ACS with responses to the 2005 AHS covering less than one in two thousand households. The survey responses are adjusted through a complicated 5 step weighting process that introduces higher standard errors in the estimates. Finally, since it bases its totals on the same independent housing unit totals as the HVS, the AHS has a similar break in its time series following the methodological change in those counts in 2003. The AHS reports that in general, this revision lowered estimates of total housing units by less than one percent when applied to data from the 2001 survey. Full implementation of the revised weights began with the 2003 survey and all surveys following it, so direct comparisons with pre-2003 surveys are limited.

March CPS Annual Social and Economic Supplement

The ASEC, formerly called the March Supplement, is a supplement to the CPS that collects additional demographic and socio-economic information such as income, family characteristics, household composition, and employment. Conducted around tax season the ASEC is intended to provide an accurate reporting of personal and household income for the previous year. As a result some populations are over-sampled in the ASEC including high-income households. In 2002 the ASEC was expanded to include not just all households in the March CPS sample but also select households in the February and April samples to reduce the volatility inherent in a one-month sample. However, relative to survey data collected year-round, the ASEC still has more variability and larger error terms than the annual averages of monthly surveys reported by the HVS.

The ASEC is also significantly different than other surveys in what it covers and how it estimates totals from its sample responses. Because its purpose is to measure income and demographic characteristics, the ASEC does not survey or report an estimate of vacant units. As such, ASEC cannot be weighted to the same totals of housing units, and instead uses population estimates collected by the Bureau of Labor Statistics (BLS). These weights were rebenchmarked in 2000 to reflect 2000 decennial Census counts resulting in an upward revision of the estimate

of occupied housing units of about 1.7 million.[28] However, the ASEC was not subject to the methodological change in the independent housing unit estimates that caused downward revisions in the HVS and AHS series. As a result, the ASEC estimate of households in 2005 was nearly 5 million higher than the HVS and AHS estimates.

[28] Unrevised 2000 ASEC household counts were 104.7 million, and revised counts were 106.4 million.

Table A1: Comparison of Available Data Sources for Estimating Historical Housing Demand

	Housing Vacancy Survey/Current Population Survey (HVS/CPS)	2000 Decennial Census	American Community Survey (ACS)	American Housing Survey (AHS)	March CPS Annual Social and Economic Supplement (ASEC)
Sample Size	72,000 / month	100% of households	3 million	57,000	99,000
Year of Origination	1965	1790	Tested: 2001-4, Full: 2005	1973	1947
Frequency	Quarterly and annual	Decennial	Annual	Biennial	Annual
Survey duration and aggregation	Monthly surveys averaged for quarterly and annual reports	Conducted March-July, collecting information as of April 1	Overlapping 3-month sample issued monthly, with results averaged for the calendar year	Conducted mid-year (April/June-Sept)	Conducted in March with supplemented data from February and April samples
Controls/ Weighting	Independent housing unit estimates	n/a	Independent population and housing unit estimates	Independent housing unit estimates	BLS population estimates
Housing data collected	Occupied and vacant units	Occupied and vacant units	Occupied and vacant units	Occupied and vacant units	Occupied units only
Residency Status Determination	Place of "usual residence"	Place of "usual residence"	Current residence at time of survey if occupied or intended to be occupied at least two months	Place of "usual residence"	Included if household is place of "usual residence"
Group Quarters	Excluded	All-Inclusive	Excluded	Excluded	Includes only residents in non-institutionalized group quarters
Major Revisions and Rebenchmarks Since 1980	• Revised in 1980 to adopt new sampling and estimating procedures • Revised in 1981 to reflect changes in processing procedures • Estimates prior to 1986 exclude vacant manufactured housing units in estimates of seasonal vacancies • Revised in 1987 to correct for underreporting of seasonal vacant units • Revised in 1989 to reflect new editing procedures to allocate non-responses • Year-round vacant mobile homes were classified as housing units beginning in the 1990 HVS • Rebenchmarked in 1994 to reflect 1990 decennial Census counts and new weighting procedures • Revised in 2003 to rebenchmark to 2000 decennial Census counts and new methodology for independent housing unit estimates, and changed race and ethnicity definitions	None	None	Revised in 2003 to rebenchmark to 2000 decennial Census counts and new methodology for independent housing unit estimates	• Revised in 1980 to adjust to population controls based on the 1980 decennial Census. • Incorporated Hispanic-origin population controls after 1983. • 1988 data adjusted for revised processing procedures. • Revised in 1993 to adjust to population controls based on the 1990 decennial Census. • From 1995, the data reflects full implementation of the 1990 sample redesign, changed metro definitions, and a reduction of 7,000 units from the sample • Revised in 2000 to reflect 2000 decennial Census population controls • Sample expanded in 2002 to add 34,000 households in March for better reporting of child health outcomes • Survey changed in 2003 to reflect revised race and ethnicity definitions • 2005 data revised to correct an error in the initial weights