

# Methodology Statement: 2013/2018 Esri US Demographic Updates

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## Introduction

The 2013 economy has opened to mixed reviews. There are signs of growth and recovery:

- Gross domestic product (GDP) increased in the first quarter—1.8 percent from the previous quarter.
- The ranks of the jobless decreased by almost 1.5 million in the past year.
- Employment increased by more than 800,000.
- Inflation is modest, currently at 1.4 percent.
- Growth in the financial markets has been robust: the Dow Jones Industrial Average hit an all-time high, over 15,000.
- Consumer confidence has strengthened to a high of 81.4 in June, the highest index in more than five years.
- Home value is increasing.

But the signs of unresolved problems remain:

- GDP growth remains anemic at 2 percent—comparable to 2010–2012.
- New jobs account for half of the drop in unemployment. Dropouts from the labor force account for the remainder of the drop in unemployment.
- The gain of more than 800,000 jobs in the past year still does not offset the loss of 7.4 million jobs during 2007–2009. The net change in jobs since June 2009 is still negative.
- Financial markets can still be volatile: the Dow Jones Industrial Average dropped 353 points when the Federal Reserve hinted that economic recovery may soon be sufficient to taper support from the central bank.
- The Consumer Confidence Index averaged 93.7 from 1967 to 2013.<sup>1</sup>
- The rate of homeownership is still decreasing.

The pace of recovery remains disappointing—two steps forward, one step backward. Growth continues at a weaker pace than the last decade, which closed with the worst recession since WWII. The population is growing more slowly than the increase of 9.3 percent, 2000–2010. The housing inventory gained almost 800,000 new units in the

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<sup>1</sup> Historical data on Consumer Confidence is from <http://www.tradingeconomics.com/united-states/consumer-confidence>.

past year, still below the two million units added annually at the height of the housing boom. The Federal Reserve is cautiously optimistic, but the automatic cuts in the federal budget known as the sequester just took effect in March.<sup>2</sup> The sequester is reducing federal spending—and federal jobs. The ripple effects will also impact recovery. Even referring to economic change as "recovery" is frustrating after four years.

**Change** Macrotrends set the expectations for local change. Table 1 provides a bit of perspective on population change by metropolitan status:

**Table 1**  
**Population Change by Metropolitan Status, 1990–2013**

Metropolitan Status	Annual Population Change		
	1990–2000	2000–2010	2010–2013
Metropolitan	1.3%	1.0%	0.6%
Micro-politan	0.9%	0.5%	0.4%
Nonmetropolitan	0.7%	0.1%	0.3%
US	1.2%	0.9%	0.6%

Much of the change in population growth since 1990 is a natural consequent of a maturing population and lower fertility rates. Slower rates of population growth are to be expected. The Great Recession simply exacerbated this trend by pushing fertility rates lower and by discouraging immigration from abroad and migration within the United States. However, the rates of change are hardly universal across the country.

Most of the metropolitan areas that were growing rapidly (more than 3 percent annually) in the past decade have experienced sharp drops in their growth rates since 2010. Metros like Las Vegas-Henderson-Paradise, NV or Cape Coral-Fort Myers, FL were impacted more severely by the housing market collapse and the ensuing recession. Metros like Austin-Round Rock, TX and Raleigh, NC are still experiencing growth but at a more moderate pace. Population growth in the top 10 metropolitan areas has averaged more than two percent annually since 2010—moderate, but not exceptional, change. Curiously, the fastest-growing metros over the past few years do not have the highest incomes, the most expensive homes, or the lowest unemployment. What the local economies have in common is the benefit of exogenous revenue sources from seasonal populations (including college students), military bases, or retirees. Their spending contributes to local economies without competing with the local, civilian labor force.

The moderation that is typical of the growth due to a maturing population—and the current pace of economic recovery—is not evident in the boom among energy-producing counties. The production of oil and natural gas is growing. The prospect, and profit, of energy self-sufficiency are promoting the use of hydraulic fracturing, also known as fracking, to extract vast reserves of oil and natural gas from shale. This is creating boom growth in areas accustomed to a more moderate growth rate or decline—North Dakota,

<sup>2</sup> In 2011, Congress passed a law that implements automatic, across-the-board budget cuts of \$1 trillion when they cannot agree to a budget that cuts the deficit by \$4 trillion.

Montana, Kansas, Wyoming, and Texas. The fastest-growing areas are the energy producers that offer high-paying jobs. Workers flock to areas like the Bakken oil shale in North Dakota or the Permian Basin in west Texas but quickly deplete the available housing stock. North Dakota added housing units faster than any state since 2010, while Texas added the highest number of housing units. Infrastructure and housing are among the real challenges for the boom towns.

Countering this trend are areas impacted by sudden, disastrous change. Unpredictable events like Superstorm Sandy in October 2012 and the Waldo Canyon Fire in June 2012 effected significant housing losses in the past year. Over 500 housing units were destroyed in the Waldo Canyon wildfire in Colorado in June 2012. Superstorm Sandy wreaked havoc from the Caribbean up the Eastern Seaboard. New Jersey and New York were the hardest hit areas in the United States, with severe damage or destruction to more than 100,000 homes.

The downside of population change includes the areas still struggling to recover from the effects of the recession. More than half of the counties are still experiencing lower rates of change since 2010. However, the number of counties experiencing loss of population has dropped by 32 percent. From 2010 to 2013, less than 25 percent of the counties lost population. The Great Recession decreased population loss through outmigration, too.

The signs of recovery are equally mixed in the housing market. Many markets are seeing a steady recovery in housing, both in home value and in the construction of new units. Vacancy rates have declined in more than 44 percent of counties. And the pace of home value appreciation continues to accelerate. Esri's 2013 estimate of home value confirms the first full year of appreciation after the Great Recession. The recession officially ended in late 2009, but the housing market hit rock bottom in October 2011, according to Zillow, or the second quarter of 2012, according to the Federal Housing Finance Agency's (FHFA) widely tracked Home Price Index. Esri estimates an appreciation of 5.7 percent in the median value of owner-occupied homes, to \$177,300 in 2013.

However, the level of recovery is not equally distributed nationwide. The West's Pacific and Mountain divisions experienced the sharpest downturns in home value between 2007 and 2011: declines of 9 percent and 8.3 percent, respectively. These divisions rank highly in their recovery in the past year, with growth of about 6 percent. Only the South Atlantic Division fared better, with an estimated 7.1 percent appreciation in home value, according to Esri estimates.

Recovery has overwhelmingly favored metropolitan areas, showing growth in 2013 of 5.8 percent. On the contrary, home prices in the nation's nonmetropolitan areas (including micropolitan areas) fell slightly by 0.4 percent. Recovery in the Midwest has been weak, with recent growth below 4 percent, but the housing recession had a smaller impact there. Areas where home values plummeted the farthest from prerecession peaks are currently seeing the largest increases in value. Recovery in these markets is bolstering the overall increases in value across the nation. Median home value increased in 92 percent of all metropolitan statistical areas (MSAs) from 2012 to 2013. Outside metro areas, only 47 percent of counties experienced a gain in median home value over last year. The disparity highlights the piecemeal nature of the recovery.

May marked 23 consecutive monthly year-over-year increases in the number of existing home sales (seasonally adjusted), and the 15th consecutive month of year-over-year median home price increases.<sup>3</sup> Prices are rising at the quickest rate since 2006.<sup>4</sup> This is good news for homeowners that have been underwater on their mortgages; however, in many of the fastest-growing markets, these rates are not sustainable.

In most markets, this is simply a rebound to preboom levels, but the speed of these gains has sparked legitimate fears of another housing bubble. While the speed of the recovery can be unsettling, most home values are staying in check with the fundamentals of local construction costs, wages, and rents. As prices rise, homeowners will be motivated to sell, providing an increase in available homes for sale. The rate of increase in home value is likely to slow as inventories increase and mortgage rates elevate.

Although demand and sales are increasing, the rate of homeownership is still decreasing. In 2000, owner-occupied units represented 66.2 percent of all households. That rate dropped to 65 percent in 2010—and 63.6 percent in 2013. If sales are up and homeownership is down, who's buying the houses? If you peak behind the curtain of the housing recovery, you will find that institutional investors are playing a major role, buying up homes in the hardest-hit markets, which drives prices up and inventories down. Most investors are buying single-family houses to rent back to the people that cannot obtain a mortgage due to their credit or tight lending practices. There are some beneficial aspects to this practice. Neglected homes are being bought and repaired, reducing neighborhood blight and increasing neighboring home values.<sup>5</sup> On the other hand, the investors are buying up the best valued homes, leaving traditional home buyers unable to compete with cash offers.

The nation added over 750,000 new housing units as of August 2013, a far cry from the peak of two million new housing units added every year during the height of the housing boom. Housing starts are climbing, but multifamily construction is leading the way.<sup>6</sup> The demand for multifamily housing is a direct corollary of reduced homeownership. Renters in the metro areas have increased from 33.5 to 35.1 percent of all households since 2010. New home sales are showing improvement, up 29 percent year-on-year in April.<sup>7</sup> Although demand remains high, single-family construction is running into issues with increased building supply costs and a lack of available properties and qualified construction workers.<sup>8</sup> Regionally, the South is leading the charge to recovery. Since Census 2010, the South has added more housing units than the West, Northeast, and Midwest combined. Almost 95 percent of the housing growth in the South has occurred in metropolitan counties.

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<sup>3</sup> National Association of Realtors, June Release, June 20, 2013, <http://www.realtor.org/news-releases/2013/06/existing-home-sales-rise-in-may-with-strong-price-increases>.

<sup>4</sup> *Wall Street Journal*, "Housing Market Accelerates," April 30, 2013, <http://online.wsj.com/article/SB10001424127887323528404578454612657511232.html>.

<sup>5</sup> *Wall Street Journal*, "Investors Pile in Housing, This Time as Landlords," March 25, 2013, <http://online.wsj.com/article/SB10001424127887324034804578346800317118568.html#articleTabs%3Darticle>.

<sup>6</sup> <http://www.census.gov/construction/nrc/pdf/newresconst.pdf>.

<sup>7</sup> US Census Bureau, New Residential Sales in April 2013, <http://www.census.gov/construction/nrs/pdf/newresales.pdf>.

<sup>8</sup> *USA TODAY*, "Housing starts take big jump in March," April 16, 2013, <http://www.usatoday.com/story/money/business/2013/04/16/housing-starts-march/2087107/>.

The demand for housing is there. The potential to increase the inventory of existing homes on the market has been improved by rising home value. But credit remains tight for most home buyers. A stellar credit rating and financial resources are required to purchase a home at current market rates.<sup>9</sup> The disparity between renters and homeowners has increased. Do potential buyers have the financial resources to buy into the current market?

Home value has improved. How is household income faring? Income declined from 2009 through 2012 (reported as income from the previous year). This year, Esri estimates an increase of 2.3 percent in median household income, to \$51,300. Household income remains lower than in 2010, and the increase has been uneven. By quintile, the shares of aggregate household income in 2000 and 2013 are shown in table 2:

**Table 2**  
**Shares of Aggregate Household Income by Quintile**

Quintiles: Household Income	Percent of Aggregate Household Income	
	2000	2013
Quintile 1: Bottom 20% of HHs	3.5%	3.3%
Quintile 2: Lower middle	8.9%	8.7%
Quintile 3: Middle	15.1%	15.0%
Quintile 4: Upper middle	22.7%	22.6%
Quintile 5: Top 20% of HHs	49.8%	50.4%

Looking at the change in the shares of total household income by quintile, only the top 20 percent of households has an increasing share. Among the lowest income households, the share of aggregate household income has dropped from 3.5 percent to 3.3 percent. A difference of 0.2 percentage points appears nominal, but it translates to a loss of more than \$20 billion dollars in the share of aggregate household among the bottom 20 percent of households. The middle class, quintiles 2–4, lost \$28 billion in their share of household income. The most affluent households, the top 20 percent, gained the majority share of household income, 50.4 percent.

The distribution of household income was not exactly a paragon of parity in 2000. In 2013, only the most affluent households realized a relative gain in their share of aggregate household income. However, in constant dollars, household income has not kept pace with inflation since 2000—for any quintile. The Census 2000 median household income was \$42,200. If the distribution of household income had kept pace with inflation, the median income today would be \$58,100, not \$51,300.

To stay even with inflation, workers need a steady job with regular pay raises. The Great Recession effectively derailed job growth and placed millions on unemployment. Since

<sup>9</sup> On June 24, 2013: 4.51 percent for a 30-year mortgage, up from 3.98 percent last week.  
<http://money.cnn.com/?hpt=sitenav>.

2010, the US civilian labor force has added back nearly 3.7 million jobs, bringing the total to 142.2 million persons employed, both full- and part-time. Eleven of 20 industrial sectors posted gains over this three-year period, with the fastest growth in Mining (6.5 percent, annually), followed by Other Services (3.9 percent) and Administrative and Support and Waste Management Services (2.9 percent).<sup>10</sup> These gains were partially offset by work force reductions in sectors such as Information (-4.9 percent), Utilities (-3.0 percent), and Wholesale Trade (-2.7 percent).

Subsequently, the US rate of unemployment dropped another 0.9 percentage points to 8.6 percent over the same period. While this is good news, there are still over 13 million people looking for work, which is roughly three million people more than typical levels of unemployment. Accordingly, the four-week moving averages of initial and continuing unemployment insurance claims continue to slide toward prerecession levels. The pool of unemployed has been shrinking, but job growth only accounts for part of the drop in unemployment. The rest of the drop is comprised of dropouts: retirees that have had enough fun or the unemployed that have quit looking for work. The labor force participation rate has steadily contracted since the recession due to the retiring baby boomers and job seekers who simply ceased looking for work. The participation rate dropped another 0.8 percent to 62.6 percent.

The Bureau of Labor Statistics produces multiple measures of the unemployment rate. The broadest and most comprehensive measure is referred to as the U-6 rate. This covers people who are marginally attached to the labor force (i.e., those who wish to work but cannot find a job as well as those who must settle for part-time work—the underemployed). Introduced in 1994 to provide a more comprehensive measure of unemployment, the U-6 rate began at 11.8 percent and decreased to its lowest levels in 2000, about 7 percent. Just before the recession began, the U-6 rate was 8.4 percent. Once the real estate bubble burst and the financial panic set in, businesses shed millions of workers and hunkered down to operate with a leaner work force. The U-6 rate spiked to over 17 percent near the end of 2009. In 2010, the rate began a gradual decline, to about 14 percent today. The rate is trending in the right direction.

Price inflation (minus the more volatile food and energy components) continues to weaken and hover near one percent, year-over-year. This is well below the Federal Reserve's target rate of two percent—a pace it believes maintains a stable financial environment. Because of weak demand, the reserve intends to maintain its activist policy approach. Labor productivity and costs have also helped to keep inflation low since 2009. Productivity, as measured by real output per hour, has risen by 1.4 percent, and nonfarm business labor costs have slowly grown by 0.4 percent since the recession.

Meanwhile, the Dow Jones Industrial Average has not only recovered from its lows during the 2008 crash but has also reached record-setting levels. The real question is how much of this performance is due to underlying fundamentals versus intervention by policy makers that may be laying the groundwork for another bubble. The central bank has been pumping \$85 billion into the economy every month. When Federal Reserve Board chairman Ben Bernanke observed that the economy may soon be strong enough to begin "tapering off" the support, the reaction was a swift sell-off and an immediate drop

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<sup>10</sup> The catchall "Other Services" sector covers varied industry subsectors such as Repair and Maintenance, Personal and Laundry Services, and employment in private households.

in the financial markets.<sup>11</sup> As of five minutes ago, the markets had stabilized again, but the problematic reliance on intervention is a valid question.

## The Outlook

After four years, we are still debating the strength of recovery since the Great Recession.

### ■ Will housing prices continue to increase?

That depends on supply. Building permits indicate that we may be close to adding one million units in calendar year 2013. Foreclosure rates are on the decline, although the process has been decelerated in part by the intervention of state legislatures to protect the homeowner and slow the foreclosure process. It is the fluctuation in supply that will determine home prices in the short term.

### ■ Will employment increase?

The only real stimulus to job growth right now is the energy boom. American oil and natural gas production is surging, and the beneficiaries are legion. Energy independence is appealing, but the environmental impact statements have not caught up with the process of fracking yet. In states impacted by drought, this process of oil and gas extraction adds a competitor to the demand for water.

### ■ Will the pace of economic growth pick up?

That depends on the response to the national debt and consumer spending. Higher wages, increased taxes, and more people at work have cut the 2013 deficit by 32 percent.<sup>12</sup> Growth also depends on consumer spending—which accounts for roughly two-thirds of the GDP. Income growth remains unequal, primarily benefiting the top 20 percent of households. Jobs, better wages, and access to the housing market encourage consumers to spend.

Growth is uneven. Changes in employment and income are unequal. The unpredictable events that defy forecast trends—catastrophic storms, flooding, drought, and wildfires—are increasing. Uneven + Unequal + Unpredictable = Uncertainty.

## 2013/2018 Demographic Updates

Esri's 2013/2018 demographic updates continue the new era in data development: retaining the best from our past while adapting to changes in source data. We have incorporated Census 2010 counts and geography and evaluated and revised our models. The demographic updates are still point estimates, representing July 1 of the current and forecast years. Esri presents the 2013/2018 demographic forecasts, including population, age by sex, race by Hispanic origin, age by sex by race and by Hispanic origin, households and families, housing by occupancy, tenure and home value, labor force and employment by industry and occupation, marital status, education, and income (including household income distributions, household income by age of householder, and per capita income). Updates of household income are also extended to provide after-tax (disposable) income and a measure of household wealth, net worth.

<sup>11</sup> On June 19, Federal Reserve Board chairman Ben Bernanke observed that improvement in the economy might be sufficient to begin tapering off the stimulus program by the end of the year. The Dow Jones Industrial Average dropped by 1.3 percent on June 19 and by 2.3 percent on June 20. The S&P 500 and NASDAQ sustained comparable losses.

<sup>12</sup> [http://money.cnn.com/2013/05/07/news/economy/deficit-falling/index.html?iid=SF\\_BN\\_River](http://money.cnn.com/2013/05/07/news/economy/deficit-falling/index.html?iid=SF_BN_River).

Forecasts are prepared initially for counties and block groups (BGs). From the county database, forecasts are aggregated to Core Based Statistical Areas (CBSAs), states, or higher levels. From the block group database, forecasts can be retrieved for census tracts; places; county subdivisions; ZIP codes; congressional districts (the 113th Congress); designated market areas (DMAs); or any user-defined site, circle, or polygon.

### ***Summary Totals***

The change in total population is a function of changes in household population and the population in group quarters, which are subject to different trends. The addition of a prison, for example, produces a sudden increase in the group quarters' population that is unlikely to yield an attendant change in the household population or the projected population growth of a county. The group quarters' population is the Census 2010 count of group quarters, with updates culled from a variety of federal, state, and local sources.

Forecasting change in the size and distribution of the household population begins at the county level with several sources of data. Esri begins with county estimates from the US Census Bureau. Because testing has revealed improvement in accuracy by using a variety of different sources to track county population trends, Esri also employs a time series of county-to-county migration data from the Internal Revenue Service, building permits and housing starts, plus residential postal delivery counts. Finally, local data sources that tested well against Census 2010 are reviewed. The end result balances the measures of growth from a variety of data series.

Measuring the change in population or households at the county level is facilitated by the array of data reported for counties. Unfortunately, there is no current data reported specifically for block groups. Past trends can be calculated from previous census counts but nothing that is current. To measure current population change by block group, Esri models the change in households from three primary sources: Experian; the US Postal Service (USPS); and Metrostudy, a Hanley Wood company, in addition to several ancillary sources.

USPS publishes monthly counts of residential deliveries for every US postal carrier route. This represents the most comprehensive and current information available for small, subcounty geographic areas. USPS establishes carrier routes to enable efficient mail delivery. Carrier routes are a fluid geographic construct that is redefined continuously to incorporate real changes in the housing inventory and occupancy plus administrative changes in staffing and budgets of local post offices. These frequent changes in the carrier routes are not the only difficulty.

Converting delivery statistics from postal carrier routes to census block groups is a complex challenge. Carrier routes are defined to deliver the mail, while block groups are constructed to collect and report census data. Comparing two different areas that are defined for wholly different purposes provides one significant conversion issue. Carrier routes commonly overlap multiple block groups. In many cases, a carrier route encompasses disjointed areas that can be distant from each other, but block groups are rarely divided into multiple polygons. These overlaps require an effective method of allocating the postal delivery counts across multiple block groups.

Esri has developed a technique to link a carrier route to the correct block group(s)—using the actual locations of mail deliveries. Its proprietary Address-Based Allocation (ABA) was developed in 2005 to solve the complex challenge of converting delivery counts

from carrier routes to block groups. This allocation method uses household addresses that are geocoded with carrier route and block group codes to serve as the foundation for the conversion. The approach is unbounded by geographic borders or arbitrary assumptions about the distribution of households or postal deliveries. ABA results have been tested extensively against Census 2010 counts, as well as an independent evaluation that included data from four other vendors. This test confirmed the accuracy of Esri's ABA allocation method.<sup>13</sup>

To track new housing developments, especially in previously unpopulated areas, Esri licensed a new data source in 2006 from Metrostudy—new and planned residential construction in the top US housing markets. This database identifies individual construction projects by location. The construction information includes the following:

- Total number of units planned
- Inventory of units under construction, sold, and/or closed
- Type of housing—Detached homes, townhomes, condominiums, etc.
- Target markets—Families, seniors, empty nesters, etc.

The 2013/2018 updates are the first to include an additional database from Metrostudy that more than doubles geographic coverage and the number of units planned and completed. The addition of this database gives the housing unit update a finer level of granularity and insight into smaller housing markets across the nation. Tracking residential development since 2010 with Esri's enhanced demographic and spatial analysis tools also provides better information for the five-year forecasts than past trends.

A revised housing unit methodology applies the change in households estimated from address counts, delivery counts, and new housing construction to update household population by block group. The best techniques are derived from a combination of models and data sources. Discrepant trends are checked extensively against independent sources and Esri's imagery data. Finally, totals for block groups are controlled to the county totals. Despite the appeal of microforecasting, there is simply more information available to track population change by county than by household. Ignoring the advantage of county-level data is throwing away information.

The integration of demographic and spatial analysis has not only enabled the development of more accurate block group totals, it has also provided the opportunity to update block totals. Blocks are the lowest common denominator in the geographic hierarchy that progresses to block groups, tracts, counties, and states. Blocks are most useful in the estimation of data for polygons, which can be any area outside the geographic hierarchy, from places to ZIP codes to user-defined polygons (including circles and drive-time polygons). For most areas, the application provides a good estimate for the polygon. If the relationship between the blocks and the block group has changed significantly since 2010, then the estimate cannot incorporate that change unless both blocks and block groups are updated.

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<sup>13</sup> For test results, see [http://www.esri.com/data/esri\\_data/demographic-overview/~media/Files/Pdfs/library/brochures/pdfs/vendor-accuracy-study.pdf](http://www.esri.com/data/esri_data/demographic-overview/~media/Files/Pdfs/library/brochures/pdfs/vendor-accuracy-study.pdf).

Esri's capability to assess change at the block level has also proved effective in assessing large-scale damages from natural disasters. The 2013 updates incorporate Esri's damage assessments from the Waldo Canyon Fire in Colorado and Superstorm Sandy along the Eastern Seaboard. For the Waldo Canyon Fire (6/28/2012), data on the fire damage was obtained from the City of Colorado Springs. This data contained addresses and damage assessments from a windshield survey after the fire. Addresses were geocoded, and homes that were deemed a total loss were removed from the housing inventory. Households and population were adjusted to be consistent with the housing loss. To quantify the impact of Superstorm Sandy (10/31/2012), poststorm imagery was used to evaluate the areas hardest hit by the storm. The Federal Emergency Management Agency's (FEMA) Imagery Based Preliminary Damage Assessments (IPDA) were processed and geocoded to the block level. Business data was used to filter out the businesses that were damaged. Rooftop points and damage codes were used to model residential housing, household, and population loss across 8 states, 28 counties, and 584 block groups.

### ***Population and Household Characteristics***

Esri's population and household characteristics include the population by sex and age, race and Hispanic origin, sex by age by race and by Hispanic origin and household type. Population by sex and age includes estimates by five-year age groups and by single years from less than 1 year to 84 years.

The population by age and sex is projected via a cohort survival model that calculates the components of population change separately, by age and sex. Applying survival rates specific to the cohort carries the 2010 population forward. Changes in the population by age and sex diverge at the household level. For example, an area that is losing population can age more rapidly with the loss of population in prime migrant ages, 20–34 years—unless there is a college nearby. Neighborhoods near colleges sustain high turnover from student populations but retain their youthful age distributions.

To capture these variations, Esri's model first separates the group quarters' population from the household population and, second, keys the calculations to the size and characteristics of the population. This stratification identifies several different patterns of change by age and sex that can be applied in a cohort survival model.

The changing profile of the US population requires measuring population change by race and Hispanic origin. The American identity is shaped by diversity. Tracking the changing patterns of race and ethnicity provides a current portrait of our society. Historical trends in race and ethnicity, combined with the most current data sources by race and Hispanic origin, including population estimates by county and state from the Census Bureau and survey data from the ACS, are analyzed to establish county population by race and Hispanic origin. Forecasts by block group combine local changes in the distributions by race and projected change for counties. The last step controls block group distributions to county totals by race and Hispanic origin.

The changing face of our nation is evident in Esri's Diversity Index, which summarizes racial and ethnic diversity in an area. This measure shows the likelihood that two persons, chosen at random from the same area, belong to different races or ethnic groups. The index ranges from 0 (no diversity) to 100 (complete diversity). Esri's Diversity Index has risen from 60.6 in 2010 to 62.1 in 2013, with a forecast to 64.8 in five years.

Diversity describes the composition of American households too. Husband-wife families remain the dominant household type, but their share of all households continues to slip—from 52 percent in 2000 to 48 percent in 2010. From 2000 to 2010, the real increase in family households was in single-parent families, up by 22 percent, and multigenerational households, up by 30 percent. Husband-wife families increased by less than 4 percent in 10 years, and husband-wife families with children declined.

All family households increased by 8 percent 2000–2010; nonfamily households, by 16 percent. The fastest-growing nonfamily households, however, are unmarried partners—opposite-sex partners by 40 percent and same-sex partners by 52 percent from 2000 to 2010. Single-person households retain the highest proportion of nonfamily households (80 percent), but the increase was less than 15 percent in the past decade. Nontraditional family types are the fastest-growing segments of households.

The attendant change in average household size was nominal from 2000 to 2010, 2.59 to 2.58, with no obvious change in 2013. The gradual change in household size has made it uniquely suitable to forecasting the change in household population from the change in households. Average household size is traditionally one of the most stable and predictable components of the forecasts. Household forecasts are predicated upon local patterns of change, which are controlled to the more constant trends for states and counties.

Few block groups represent a cross-section of US households. For example, in areas that gain population from immigration, the trend in average household size is increase. To distinguish local variation, Esri's model is keyed to the characteristics of households at the block group level. This stratification identifies several different patterns of change by household type that are applied to forecast trends in the characteristics of households—both family composition and tenure. Local change is emphasized in the 2013/2018 forecasts of households and families for counties and block groups. National and state trends are monitored with sources such as the Current Population Survey (CPS) and American Community Survey from the Census Bureau and then applied as controls.

In 2013, Esri added marital status and educational attainment to the current year updates. Distributions of marital status for the population aged 15 years and older from the 2007–2011 American Community Survey are applied to Esri's 2013 population 15 years and older. Similarly, educational attainment is updated for the population aged 25 years and older.

## ***Housing***

Esri's housing updates include total housing units, occupancy, tenure, and home value. Total housing unit updates are created from recorded changes in the housing inventory and estimated changes in occupancy rates since April 2010, applied to Census 2010 base data. Recorded change in the housing inventory is culled from several data sources, including multiple construction data inputs from Metrostudy, data for new manufactured homes placed by state from the Census Bureau, and building permits for permit-issuing places and counties. As of 2010, only half of the counties have complete coverage with building permits. Numerous independent sources are leveraged to obtain detailed information on housing development data where no building permits exist. Independent estimates of change in occupancy are calculated from USPS residential lists, the American Community Survey, and various state and local data. Additionally, data from

the Current Population Survey and the Housing Vacancy Survey from the Census Bureau are used to model trends in occupancy.

The data for tenure represents owner- and renter-occupied housing units. Together, the two components sum to total households, or total occupied housing units. A time series model based on data from the Housing Vacancy Survey, combined with changes in the Current Population Survey, the American Community Survey, and intercensal data guide tenure forecasts. With a blend of top-down and bottom-up techniques, the forecasts take advantage of the latest information from survey data at higher levels of geography while employing local characteristics at the lower levels. The data from the lower levels of geography is controlled to the higher levels to produce the tenure updates. Changes in owner-versus-renter occupancy are forecast independently and then controlled to the total households.

Esri tracks the change in home value using several different sources, including the House Price Index (HPI) from the Federal Housing Finance Agency and annual estimates from ACS. The HPI is designed to monitor changes in average home prices based on repeat sales or refinancing of the same properties. The index is derived from mortgage loans purchased or securitized by Fannie Mae or Freddie Mac. FHFA affirms the "significant advantages" of the HPI over Commerce Department surveys or other data collections based on snapshots of sales figures. Employing the repeat-sales methodology renders the index less susceptible to compositional effects, especially with data for smaller geographic areas. If a higher proportion of lower-end homes are sold in the current period than in an earlier period, survey data can underestimate home prices.

Local estimates of home value incorporate supply-demand characteristics, the socioeconomic traits of householders in the area, and trends assessed for larger markets. This approach to modeling small areas efficiently predicts home value for areas with small housing bases or missing base data. The 2013 update implements sophisticated techniques designed to accurately target change in home value and address the outliers that are expected in small area modeling.

### ***Labor Force***

Esri forecasts the civilian labor force (employment and unemployment) and employment by industry and occupation for 2013.<sup>14</sup> The US labor market is emerging from the most severe postwar contraction to date. Since 2010, the economy added nearly 3.7 million jobs, raising the total work force to 142.2 million.

Estimates of the civilian labor force integrate recent change in the supply and demand for labor from the Local Area Unemployment Statistics (LAUS), Occupational Employment Statistics (OES), and Current Employment Statistics (CES) programs of the Bureau of Labor Statistics (BLS), as well as the American Community Survey and Current Population Survey from the US Census Bureau. Federal statistical surveys are the principal sources for labor force trends. The LAUS program is the premier resource for current and local economic conditions.

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<sup>14</sup> It is important to remind data users that Esri's civilian labor force estimates represent seasonally unadjusted totals as of July 1 to stay consistent with the forecast base. While press releases of labor force statistics produced by the Bureau of Labor Statistics report seasonally adjusted change each month, removing such calendar influences, Esri's totals reflect actual estimated levels. As a result, Esri estimates and measures of change can yield differences when compared to these official government statistics.

Last decade, Esri leveraged the Census 2000 sample data on employment status as the forecast base for all areas, from block groups to states. The ACS is the replacement source for small area sample data. The 2013 employment and unemployment estimates are developed from a modified version of the 2007–2011 ACS block group base, using more current one-year totals from the 2011 ACS labor force profile and current sources.

Esri's updated employment by industry and occupation captures temporal change from the federal statistical sources: the ACS and CPS from the Census Bureau and the CES and OES programs from the BLS. National and state industry distributions are updated using trends from the CES. The latest industry-occupation matrix from the OES is applied to allocate 2010–2013 employment change by industry to the related occupations.

### ***Income***

Esri's forecast base is the income that was reported in the 2007–2011 ACS. To estimate income for households, Esri evaluates an extensive list of sources for household income trends that includes both federal and proprietary sources. The review of national surveys includes the Bureau of Economic Analysis's local personal income series, the Current Population Survey, and the Bureau of Labor Statistics's Consumer Price Index. Esri's updates emphasize the use of time series data from household surveys to establish a base trend line.

After forecasting the state income distributions, household income is estimated for counties and then block groups. Esri's income forecasts are uniquely designed to distinguish local variation, changes in income inequality, and urbanicity as differentiators of income growth. The model correlates the characteristics of households at the block group level with changes in income. This stratification identifies several different patterns of change by household type that are applied to forecast trends in income. Modeling links the current income change to all households with similar socioeconomic characteristics. Areas with small household bases or missing base data, where the model is unable to capture the local variation, are forecast with another level of modeling to capture change in income by strata (a group of areas classified by their sociodemographic characteristics). Separate forecasts of the change in income by strata are aggregated to compose the income distributions. Median income for 2013 and 2018 is calculated from the distributions using linear or Pareto interpolation. Average income is computed from aggregate household income.

Household income reported by age of householder is updated to be consistent with the 2013/2018 distributions of household income and age of householder. To update the age distribution of householders, the ratio of householders by age to the population by age in 2010 is updated to 2013/2018 and applied to the current age distributions. After the targets are set, the base distributions of household income by age of householder by block group are fitted to current distributions of households by income and by age of householder.

Esri uses the definition of money income used by the Census Bureau. For each person 15 years of age or older, money income received in the preceding calendar year is summed from earnings, unemployment compensation, Social Security, Supplemental Security Income, public assistance, veterans' payments, survivor benefits, disability benefits, pension or retirement income, interest, dividends, rent, royalties, estates and trusts, educational assistance, alimony, child support, financial assistance from outside the household, and other income.

Data for consumer income collected by the Census Bureau covers money income received (exclusive of certain money receipts such as capital gains) before payments for personal income taxes, Social Security, union dues, Medicare deductions, etc.

Disposable income represents money income *after* taxes—an estimate of a household's purchasing power. The proportion of household income left after taxes is estimated from special studies conducted by the Census Bureau to simulate household taxes. Esri's 2013 disposable income incorporates data from the 2012 Annual Social and Economic (ASEC) Supplement (Current Population Survey). Starting with the 2011 ASEC release, the Census Bureau has introduced a new technique to accommodate disclosure avoidance. Previously, high dollar values were capped or top coded; now, rank proximity swapping is employed.

Four types of taxes are deducted: federal individual income taxes, state individual income taxes, FICA (Social Security) and federal retirement payroll taxes, and property taxes for owner-occupied housing. Internal Revenue Service tax rates are used as guidelines for model testing. Esri then applies the proportions of after-tax earnings to income intervals that are cross tabulated by age of householder for each state. State-specific proportions account for the variation in taxes by state. The proportions, or multipliers, are then applied to the age by income forecasts for block groups and counties to calculate disposable income.

Current income is only one component of a household's financial security. A householder's net worth or accumulated wealth reflects ability to stay afloat during a financial shock as well as savings for future retirement. Net worth is estimated from data on household wealth that is collected from the Surveys of Consumer Finance (SCF) from the Federal Reserve Board from 1992 through 2010. These triennial surveys feature enhanced representation of wealthy households through the comprehensive measurement of net worth components. By definition, net worth equals total household assets less any debts, secured or unsecured. Assets include ownership of homes, rental properties, businesses, IRAs and Keogh accounts, pension plans, stocks, mutual funds, and motor vehicles. Examples of secured debt include home mortgages and vehicle loans; unsecured debt includes credit card and other bills or certain bank loans.

## **2013 Geography**

Changes in the areas for which data is tabulated and reported are critical to the analysis of trends. Esri reports data for political and statistical areas that include states, counties, census tracts, block groups, places, county subdivisions, Core Based Statistical Areas, and congressional districts, plus special use areas like ZIP codes and designated market areas. Of course, the provision of small area data in Esri software enables users to define their own areas of interest too.

Data is reported in 2010 geography for the standard political and statistical areas. Statistical areas, like block groups and census tracts, are defined by the Census Bureau (with help from local officials) to collect and report data for neighborhoods. Historically, these areas change every 10 years with each new census. Political areas like counties, cities, or townships are subject to change by local governments. Larger political areas like counties change less often than places, but boundary revisions were common with Census 2010.

Revised metropolitan and micropolitan areas were released by the Office of Management and Budget in February 2013. The 2013/2018 updates reflect the latest definitions. Core Based Statistical Areas include 381 metropolitan and 536 micropolitan areas. Congressional districts are updated to represent the 113th Congress.

ZIP codes, which are defined solely by the US Postal Service to expedite mail delivery, can change monthly or whenever the US Postal Service revises delivery routes. ZIP codes do not represent standard census geographic areas for data reporting. ZIP code boundaries are not contiguous with census geographic areas or stable over time. Data estimated for ZIP codes is also subject to change. Residential ZIP code data is estimated from block group data using a correspondence created by assigning Census 2010 block points to ZIP code boundaries from NAVTEQ. The vintage of the ZIP code boundaries is fourth quarter 2012; the total residential ZIP codes in this release is 31,173.

## Use of Projections

Projections are necessarily derived from current events and past trends. The past and the present are known; the future must be extrapolated from this knowledge base. Even though projections represent the unknown, they are not uninformed. Guidelines for the development of projections also inform the use of those projections:

- The recent past provides a reasonable clue to the course of future events, especially if that information is tempered with a historical perspective.
- A stable rate of growth is easier to anticipate than rapid growth or decline.
- The damaging effects of natural disasters cannot be anticipated. Esri makes every effort to assess the impact of sudden, catastrophic events like strong storms, flooding, or wildfires.
- The risk inherent in forecasting is inversely related to the size of an area: the smaller the area, the greater the risk.
- The risk increases with the length of the projection interval. Any deviation of the projected trends from actual events is amplified over time.

Esri revises its forecasts annually to draw on the latest data. However, this data can be enhanced with personal knowledge of an area to provide the qualitative, anecdotal detail that is not captured in a national database. It is incumbent on the data user and the producers to incorporate as much information as possible when assessing local trends, especially for areas that are subject to "boom-bust" cycles or natural disasters.

## Esri's Data Development Team

Led by chief demographer Lynn Wombold, Esri's data development team has a 35-year history of excellence in market intelligence. The combined expertise of the team's economists, statisticians, demographers, geographers, and analysts totals nearly a century of data and segmentation development experience. The team develops datasets, including the demographic update, Tapestry™ Segmentation, Consumer Spending, Market Potential, and Retail MarketPlace, that are now industry benchmarks.

For more information about the Updated Demographic data, call 1-800-447-9778.



Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and nongovernmental organizations trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.



## Contact Esri

380 New York Street  
Redlands, California 92373-8100 USA

1 800 447 9778  
T 909 793 2853  
F 909 793 5953  
info@esri.com  
[esri.com](http://esri.com)

Offices worldwide  
[esri.com/locations](http://esri.com/locations)