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Monthly condensed analyses of crucial real estate and economic issues offered by the UCLA Anderson Forecast and UCLA Ziman Center for Real Estate. Here, UCLA Anderson Forecast Economist William Wei-Choun Yu, Ph.D, looks at predictors of home price increases in U.S. cities.

What Is Predicting Long-Term Home Price Increases Across Cities?
Income, Human Capital, City Size and Climate All Contribute to Demand

By William Wei-Choun Yu, Ph.D, Economist, UCLA Anderson Forecast, UCLA Anderson School of Management

As the housing market stabilizes after its extraordinary boom and bust in the 2000s, we can perhaps now reassess the fundamentals of pricing. In the long run, just like all other free-market products, regional home price growths are determined by local fundamentals, i.e., demand and supply.

Demand factors include economic factors, such as income growth, employment growth, and population growth of a city as well as non-economic factors, e.g. its amenities and climate. Supply is mainly determined by the growth of building permits, assuming (1) the cost of building a home does not vary significantly across the country, (2) a home's quality is constant over time and (3) there is no significant net accretion to supply from the existing home market due to outmigration. In theory, the gap between the growth of total income (demand) and the growth of residential units (supply) in a city could predict the long-term home price appreciation. The bigger the gap, the larger the home price appreciation.

> "Los Angeles' home supply falls far behind its demand. Even if it were to double its permit supply, it would contribute just 0.2 percentage points less per year to price appreciation."

Figure 1 presents a simple correlation between these two variables among 303 metropolitan areas in the nation. The home price growth rate is calculated by the nominal single-family home index (all transactions) from 1995Q1 to 2012Q3 according to the Federal Housing Finance Agency. In constructing the ratio of permit growth to personal income growth, the numerator is the total number of building permits issued from 1995 to 2012 over a metro's population in 2003 (middle point of the sample period), multiplied by 100. The denominator is the nominal total personal income growth from 1995 to 2011.

The empirical evidence seems to support the simple theory. If the ratio is lower (meaning that the home supply growth is much less than the demand growth), the home price appreciation is larger. Here we list the 12 largest metropolitan areas' home supply-to-demand ratio and the home price growth over an 18-year period: New York (4.4, 122%), Los Angeles (3.2, 122%), Chicago (7.1, 48%), Dallas (9.1, 62%), Houston (7.9, 87%), Washington DC (7.4, 117%), Miami (6.9, 87%), Atlanta (14.3, 35%), Boston (3.3, 125%), San Francisco (1.8, 142%) and Detroit (10.6, 16%). It is obvious that Northeast coastal and Californian cities have less accommodating home supply to its demand. As a result, they have higher home price

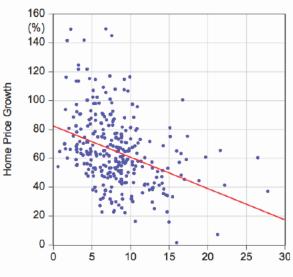growth and less affordable housing than other cities.

Let's take a broader view to see how all of the major factors predict home price appreciation across cities from 1995 to 2012. We consider the following factors: (1) *Home supply*: total building permits '95-'12 over the 2003 population; (2) *Economy*: nominal personal income growth '95-'11; (3) *Human capital*: First 5 LA/ UCLA City Human Capital Index in 2008. This index is computed based on the average education attainment of adult residents in an area (For details, see UCLA Anderson Forecast's City Human Capital Index). We suspect that a more educated city could create a home price premium for reasons such as safety and better school districts; (4) *Climate*: the average temperature in January; and (5) *City size*: the 2003 population. Note that the size of a city could partly represent the amenity, e.g. a more diversified lifestyle.

The home supply has a negative impact on home price growth and all other factors have a positive influence. These five variables will be able to explain 39% of the variation of home price growth for these 303 cities. Although the estimators could be biased and be far from illuminating causality, it might be of interest to the reader taking it with a grain of salt. Over an 18-year period, the interpretations are, controlling other factors: (1) A 10% nominal personal income growth would predict 4% home price growth, (2) An additional school year on average would predict an additional 17% home price growth, (3) A 10 degree warmer temperature in January would predict an additional 2% home price growth, and (4) A one million more population would predict an additional 2% home price growth.

For the home supply, let's use Los Angeles (including both L.A. and Orange Counties) as an example. From 1995 to 2012, L.A. issued 410,496 permits totally, which is about 22,800 per year. That results in a permit-to-population ratio of 3.23%, considering the population of 12.7 million in 2003 for the L.A. metro area. Over this period, L.A. home prices increased by 122%, which is about 4.5% compounded per year. Our regression estimator suggests that if L.A. were to increase its permits to 50,000 annually to reach a similar level of permit-to-population ratio like Chicago's (7.1%), the total period home price appreciation in L.A. would be 113% instead of 122%, which is 4.3% per year. That is, even if L.A. doubles its permit supply, it would only contribute 0.2 percentage points less to the home price appreciation per year.

Figure 1. The Correlation Between Home Price Growth and the Ratio of Permit Growth to Personal Income Growth

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