

# **Real Estate Economics**

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## **Theory of Real Estate Markets**

### **Flow of Services, Rent, and Price**

In many respects, real estate markets are similar to markets for other goods and services. There exist buyers who demand real estate by demonstrating a willingness and ability to pay for property. There are also sellers who supply real estate. One unique feature of real estate is that the good in question, namely land and structures, is long-lived. Consuming real estate does not result in the disappearance of the good as with, say, consuming a slice of pizza. Real estate can be purchased and enjoyed today, and then sold again tomorrow. In fact, the vast majority of real estate sold in any year was previously owned. Because of this durability, the decision to buy or sell real estate must take a long time horizon into account.

Durable goods deliver a flow of services over time to the owner or user of that good. For example, a car lasts many years, and a car will deliver a flow of transportation services each year. Real estate delivers a flow of shelter services, in the case of residential housing, and a flow of retail store space, in the case of commercial real estate. The person who purchases a durable good takes current and all future flows of services into account when making the decision to purchase the good. This is true whether or not the buyer intends to use the services that flow

from the durable good. For example, in the case of a car, while it is often the case that the buyer intends to drive the car for a number of years after the purchase, car rental companies purchase large amounts of cars in order to charge rent to their customers. The same is true in real estate, where a large amount is owner-occupied while in other cases some people intend to primarily offer for rent the shelter or retail space to others. If the buyer intends to rent the real estate to others, then the buyer's willingness to pay will be based on the rent that can be earned, which is determined by renters and landlords in the rental market for real estate. Renters will be willing to pay rent that is at or below the value that the renter puts on the flow of services. In fact, the dollar value of rent is an easy-to-obtain measure of the dollar value of the flow of services from a property.

Purchasing a piece of real estate today gives the buyer the use of services this year and every year in the future. See James Hamilton for a good discussion about how the buyer may approach the decision of whether to buy a house or not. The willingness to pay for that "stream" of service flows is equal to its present discounted value. The present discounted value is the sum of the discounted values, where the appropriate discount rate reflects the buyer's opportunity cost of purchasing today. Typically it is the mortgage interest rate, which may be adjusted for risk and taxes. Numerically, the present discounted value in year  $t$ ,  $PDV_t$ , is:

$$PDV_t = S_t + \frac{S_{t+1}}{(1 + i)} + \frac{S_{t+2}}{(1 + i)^2} + \dots$$

where  $S_t$  is the flow of real estate services,  $i$  is the interest rate, and  $t$  is the year index. If the value of services grows at a constant rate  $g$ , and if  $g < i$ , then the above reduces to:

$$PDV_t = \frac{S_t(1 + i)}{(i - g)}$$

The present discounted value will rise with the value of the flow of services provided by the property and the growth rate of services, and will fall when the interest rate rises. This last result is because while an increase in the interest rate will raise the numerator, it will raise the denominator more, thus lowering the ratio. The present discounted value of the flow of current and future services is referred to as the “fundamental value” of real estate. The fundamental value simply says that the most that people will pay for a piece of real estate is the present discounted value of the flow of services. This is a very intuitive way to think about real estate pricing and shows the link between the market for real estate rentals and the market for real estate purchases—the main driver of real estate prices is the value that the end user puts on the property and the discount rate. The fundamental value of real estate is essentially an arbitrage condition which says that if the market price of real estate is equal to the present discounted value of future rents, then there is no sure profits to be made through buying or selling real estate, and thus the market price of real estate will not rise or fall unless there is a change to the fundamental value.

## **The Macroeconomy and Real Estate**

The real estate market is both a determinant of the regional macroeconomic climate as well as a product of that climate. Land and buildings are inputs into the production process, whether those markets are for industrial, commercial, or residential purposes, and real estate prices affect costs of production. Exogenous increases in the supply of real estate, perhaps from the opening of new lands for development, reduces rents and reduces costs to firms in the region, which gives those firms a cost advantage over other regions of the state or country. Employment and wages in the region will increase. A very inelastic supply of real estate can inhibit demand driven economic growth if increases in housing prices raises the cost of living sufficiently to keep real wages from rising to attract new workers into a region. Economy-wide factors, such as an exogenous increase in labor supply due to immigration, will affect the real estate market. Immigration will increase employment and production since wages and costs to firms fall, and will increase the demand for real estate which raises real estate rents. An increase in the demand for goods produced in the region will lead to an increase in the demand and price of all factors of production, including real estate. If the supply of real estate is price elastic, real estate prices will increase less and real estate development will be more than if real estate supply is inelastic. Local real estate markets depend on the national economy, with recessions typically reducing the demand for most types of real estate. But regional differences matter too, and a local real estate market may suffer relatively less during a recession if the relative demand for the particular mix of goods and services produced in the region does not fall. Finally, real estate wealth is a large fraction of total household wealth, and Case et al. find large impacts of housing wealth on consumption.

## **Demographics and Housing**

The demand for residential real estate depends in the long run on characteristics of the population that move slowly over time. Mankiw and Weil present a look at the implications of the Baby Boomers and the aging of the population on housing supply and demand. One factor is net household formation, which is the difference between newly created households in a year and newly dissolved households. A household is a common unit of measurement by the Census and is a group of related or unrelated individuals living at the same parcel of real estate. New households may be created when children leave their parents' residence and through divorce, for example, while the number of households may fall during marriage and death, for example. The average size of households, as well as the age, composition, and income of households, will influence the typical features found in newly constructed housing, since developers quickly respond to current market conditions.

Age, income, demographic mobility, and marital status also greatly influence whether the household rents or buys housing. According to the 2007 U.S. Census American Housing Survey, 31 percent of households rent the house that they live in, 24 percent own the house outright, and 44 percent are making mortgage payments. Renters are on average younger and have lower income than non-renters. Permanent, or long-run average income appears to influence the decision on whether to buy more so than current income. Transaction costs of buying and selling a house are large, and renters move much more frequently than owners. Getting married and having children appear to be big factors which explain the switch from renting to owning.

Housing vacancies are a closely watched measure in the housing market. For a given level of sales, as vacancies rise the average time on the market increases. Increased time on the market will tend to lower market prices, since sellers face increased opportunity cost of funds if they cannot sell their house. New house builders will also be more motivated to lower prices, and they will also respond to greater average time on the market by reducing new construction. While vacancy rates are typically studied at the local market level, consider the recent drop in U.S. new housing demand. The Census reports that the U.S. Homeowner Vacancy Rate increased very quickly over 2006, averaging 2.375 in 2006 compared to 1.875 in 2005. New house sales fell from 1,283,000 in 2005 to 1,051,000 in 2006. In December of 2005 there were 515,000 new houses for sale, and the median months for sale was 4.0 months, while in December of 2006 there were 568,000 new house for sale, and the median months for sale was 4.3 months. The median price of new houses continued to rise for two more years, until falling from \$247,900 in 2007 to \$230,600 in 2008. Builders responded to these market changes and from 2005 to 2006, housing starts fell from 2,068,000 to 1,801,000 units.

### **Mortgage Financing**

Residential real estate typically sells for hundreds of thousands or even millions of dollars. This is greater than most household annual income. Households typically do not save over many years in order to purchase housing, but rather obtaining financing in order to purchase residential real estate. Financing terms have changed considerably over the last ten years, and they will likely change in the future. Until about ten years ago, down payments of twenty percent were common on loans, but today houses can be bought with little or no down payment. The down payment is subtracted from the sum of the purchase price and all fees and expenses in order to determine how much the buyer must finance. A mortgage is a residential real estate loan with

the real estate itself as collateral. Most mortgages are fully amortizing, which means that the principal balance is repaid over the life of the loan, which is usually thirty years, but sometimes more or less, such as forty or fifteen years. A common question asked is why does the principal balance decline very slowly in the first years of the loan? To answer this, it is helpful to think of a mortgage as a loan that is to be repaid every month. After the first month of the loan, the interest due is extremely large, since the outstanding principal is large. As the number of months goes by, the interest due becomes less because the principal is being paid down. In the final months, the interest due is small since the principal is small.

Many residential mortgages do not have a fixed mortgage interest rate over the life of the loan, but rather have a rate that rises and falls, within limits, along with the prevailing interest rate. These adjustable rate mortgages (ARMs) became more popular with lenders after the high inflation of the 1970s, when lenders were paying high interest rates on short run liabilities (deposits) while receiving much lower interest rates on long term assets (loans). Another recent change to mortgages has been the use of mortgages that do not fully amortize. These “interest-only” and even “negative-amortizing” loans allow the monthly mortgage payment to vary, within limits, such that the loan principal balance does not fall as it would fall with a fully amortized loan. These “pick-a-payment” mortgages usually require full amortization to begin a few years after the loan begins.

Funding for mortgages is typically provided by commercial banks and thrifts, and these institutions as well as mortgage brokers typically issue mortgage loans to households. However,

it is very common for these loans to be quickly sold on the secondary mortgage market to pension funds, insurance companies, and other investors. Mortgage Backed Securities (MBSs) or mortgage bonds are sold to investors. Investment banks and the government sponsored enterprises Fannie Mae and Freddie Mac package individual mortgages into these securities which are sold on huge markets. Fannie Mae and Freddie Mac also guarantee the payments on the securities that they process. Mortgages that “conform” to Fannie Mae and Freddie Mac standards, such as maximum loan to value, make up most of the secondary market and the standardization of loans has allowed the market for these securities to grow. Conforming mortgage loan amounts must be below a threshold limit, adjusted to take average market price in to account, or else the loans may be classified as jumbo loans, which have higher interest rates.

## **Government Policy**

### **Tax Treatment of Housing**

The federal government provides incentives to purchase housing in order to encourage home ownership. Government intervention is often justified on the grounds of positive externalities that result from home ownership, such as the idea that home owners will better maintain the exterior appearance of their house than home renters or landlords. Glaeser and Shapiro lead an excellent discussion about the positive and negative externalities associated with home ownership. The mortgage interest deduction, whereby interest payments (not principal payments) are tax deductible, cost the federal government \$67 billion in 2008 according to The Joint Committee on Taxation. Additionally, local property taxes are deductible for federal



income taxes. The marginal benefit to the owner of these tax deductions is equal to the deduction multiplied by the marginal tax rate. Since federal taxes allow a standard deduction, the housing tax incentives only are relevant if the household itemizes but low- to moderate-income households often do not itemize. The evidence shows that federal tax treatment of housing has a more powerful effect in encouraging larger houses to be purchased, rather than encouraging people to purchase housing for the first time. Other tax incentives include a large exemption on housing capital gains and the mortgage interest deduction for state income taxes in many states. According to the California Legislative Analysts Office, the largest California income tax deduction is the mortgage interest deduction, which cost \$5 billion in reduced revenue in 2007-08. Various distortions are created by state tax treatment of housing, such as Proposition 13 in California, which discourages sales of existing houses because property taxes tend to be lower the longer one resides at an address.

## **Real Estate after 2000 and Future Directions**

### **Housing Boom and Bust**

Residential real estate prices began to climb very quickly in the early 2000s in many countries across the globe and starting around 2006, prices began to decline. In the United States, nominal prices climbed 90 percent as measured by the Case-Shiller Index. The Case-Shiller Index is a “repeat sales” price index, which calculates overall changes in market prices by looking at houses that sold more than once over the entire sample period, in order to control for differences in quality of house sold. In some regions, the median selling price of a house doubled in about

three years from 2002-2005. While regional real estate markets had previously experienced quick price increases such as the Florida Land Boom of the 1920s, by all accounts this was the fastest increase in housing prices at the aggregate national level ever. As Robert Shiller showed, inflation adjusted U.S. housing prices were remarkably consistent since 1890, with the 1920s and 1930s being the exception of years of low prices. But since the late 1990s, housing prices in the U.S. on average grew to levels not seen in any year in which data are available. This fast rise in house prices encouraged a great deal of investment into both residential and commercial real estate. Construction employment soared, as did the number of people working as real estate agents and mortgage brokers. By 2008, housing prices had fallen 21 percent from their peak levels, which was a greater fall in inflation-adjusted terms than during the Great Depression. Accompanying this massive drop in prices was a fall in new and existing house sales, an increase in foreclosures to record levels, a drop in construction spending, a drop in commercial real estate investment, massive drops in government tax collections, and a huge drop in jobs in construction, real estate, and the mortgage industry. Mortgage companies, banks, and financial firms that held real estate assets shut their doors and there was massive contraction and consolidation in these industries. The U.S. recession that began in 2007 accompanied the collapse of the housing market.

It is important to explain both the boom and the bust of this historic housing cycle. Haines and Rosen compare regional U.S. housing prices and find evidence that actual prices rose above fundamental values in some markets. The boom can be partly explained by the fact that mortgage interest rates were very low at the onset, which according to the fundamental value approach should raise house prices since lower interest rates will raise the present discounted

value of future rents. But it seems that changes in mortgage financing may have been an even more important part of the explanation and many economists characterize the housing boom as a manifestation of a credit bubble that saw simple measures such as the price to rent and price to income ratios rise to levels above historic averages. Housing affordability fell sharply in most of the country. The use of MBSs increased, which was supposed to spread risk more efficiently among those supplying credit for house purchases. At the same time, mortgage lenders greatly reduced holding of their mortgages in the so-called originate-to-distribute model. Mortgage lending standards fell as more and more people fell into the subprime (poor credit history) or Alt-A (high loan to income value) borrowing categories and down payment and income documentation requirements were greatly reduced.

Both this increase in supply and the increase in demand for mortgage credit increased the demand for houses, which pushed prices to record highs. Starting in 2006, and particularly in 2007, the appetite for MBSs fell greatly, as concerns over their riskiness increased. The drop in available mortgage credit was a blow to new buyers, those refinancing, and those seeking to trade up or a purchase second house. The result was a huge drop in demand for housing. In the fourth quarter of 2008, the Census Bureau reports that the home ownership rate was 67.5 percent, the same level as the fourth quarter of 2000. The Federal Reserve Flow of Funds reports that household percent equity was lower than any time in over fifty years of data. Government reaction to the housing bust has been unprecedented. In 2008, the U.S. Treasury Department and the U.S. Federal Reserve Bank tried to encourage consumer confidence in financial markets, brokered mergers between insolvent institutions and other companies, and committed hundreds of billions of dollars in order to help financial industry and the U.S. economy at large. In

September of 2008 Fannie Mae and Freddie Mac were placed into government conservatorship when their stock prices plummeted and they were unable to raise capital. A flurry of legislation passed that reduced income taxes for home buyers. At the federal level, first time homebuyers in 2008 who are below the income limit received a credit on their taxes up to \$7,500 which must be repaid over fifteen years, while in 2009 there was a refundable tax credit equal to ten percent of the purchase price of the house or up to \$8,000. In California, a non-means tested tax credit of five percent or up to \$10,000 was available to all purchasers of a newly constructed house. Other states had their own home buyer income tax credits.

### **Areas for Future Research**

One of the challenges of future research will be to better understand how financial product innovation contributed to the housing boom and what types of regulation would best fend off a similar future boom and bust cycle. Mayer et al. point to zero down payment financing and lax lending standards as being important contributors to the dramatic increase in foreclosures. Additionally, the difficulty of modifying mortgages and approving sales for a price less than the outstanding principal balance (short sales) became evident with the diffuse ownership of mortgages through MBSs. In 2006 the Chicago Mercantile Exchange started issuing home price futures contracts with values based on the Case-Shiller Index for select cities. Like any futures contract, these are an agreement between a seller and a buyer to exchange housing contracts in the future at a predetermined price. If at the future date the actual contract price is above the agreed upon price, then the buyer of the futures contract profits, while if at the future date the actual contract price is below the agreed upon price, then the seller of the futures contract profits. An owner of residential real estate can use futures contracts to protect or “hedge” against price risk. For example, if the market price of a house falls, then the owner has a drop in net wealth.

However, if she had sold a home price futures contract, then she may have earned a profit that cancelled her loss as an owner of housing. The ability for individuals, investors, and developers to protect themselves against price risk had been very limited before the introduction of these S&P/Case-Shiller Home Price Futures, and it remains to be seen how well used these futures contracts will be. Bertus et al. show that the ability to hedge against price risk in Las Vegas is mixed.

Note: This paper is taken from a draft of “Real Estate Economics,” forthcoming in 21st Century Economics: A Reference Handbook, Rhona Free, ed., Sage.