The Home as a Risky Asset

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Abstract

Despite being one of the most valuable assets in the world and one of the largest assets on many household balance sheets, real estate—in the form of homeownership—presents considerable risks that are generally poorly understood. Through an analysis, we find significant homeownership risks that are primarily idiosyncratic (i.e., not market-related), driven largely by the illiquid nature of owning a single home. We find the risk of homes is approximately double that of city-specific home price indexes (e.g., the S&P Case-Shiller Home Price Indices), with an annual standard deviation of 12%, which is approximately equivalent to the historical volatility of a portfolio invested in 60% stocks and 40% Treasury bills. While the return on house price indexes has exceeded inflation historically (with a real return of approximately ~1%), the actual real return realized by homeowners, after considering the various costs associated with owning and selling a home, has likely been negative in real terms. Renting is often a better option for many households, especially those households with lower marginal tax rates (i.e., households that do not itemize deductions) and have shorter expected housing durations. We note significant differences in the returns, volatility, and market risk of homes and REITs; these differences suggest REITs are a relatively poor proxy for residential real estate from an investment perspective. We also identify the factors, such as home price, county unemployment rate, housing turnover, home size, and even average annual temperature, that can differ by region and are strongly related to the returns, volatility and market risk of homeownership. Many households may use this factor information to better approximate the risk of their homes. Overall, the impact of owning a home on the optimal total wealth financial portfolio is likely to vary significantly by household, based on the unique risks associated with the home, household wealth, and other non-financial household assets.
Introduction

The total value of global real estate is approximately $217 trillion, according to London-based real estate services provider Savills.¹ This is more than the value of other common financial assets, such as equities (~$62 trillion²) or bonds (~$122 trillion³), combined. Similarly, home value typically dominates the household balance sheet,⁴ represents the greatest household liability (the mortgage), and accounts for the largest household expenditure (e.g., 33% of expenditures for U.S. households⁵). Listings website Zillow ⁶ estimates the total value of residential real estate in the United States to be $28.4 trillion, which is consistent with data from the Federal Reserve,⁷ which places the value at $25.3 trillion.

Given the key role real estate plays for investors, especially households, it is important to understand the attributes of homes from an investment perspective and how they fit onto a comprehensive balance sheet in conjunction with other household assets, primarily financial assets (i.e., owning a home should affect how a household invests its financial portfolio).

Residential real estate (or a home) is a unique asset for households since it is both an investment and consumption good. A home is an investment good such that it allows the household to accumulate equity over the duration of homeownership, and it is a consumption good since it provides shelter. When assessing the value of homeownership, it is important to understand both aspects. That is, we should consider both the risks associated with owning a home and the best financial option to provide shelter (i.e., buying versus renting). Both of these perspectives will be explored at some length in this piece.

Unlike stock portfolios, which can easily be diversified through the purchase of other stocks or some type of collective investment vehicle (e.g., a mutual fund or ETF), a homeowner is subject to significant idiosyncratic risk that cannot be easily (and is rarely) diversified away. While a homeowner can insure against types of risk, such as fire or theft, most location-specific risk is virtually impossible to hedge away given the relatively illiquid market of homes today. Therefore, common proxies used to gauge the risk (and return) of residential real estate, such as the S&P/Case-Shiller Home Price Indexes, significantly understate the risks associated with owning a home since they represent a geographically diverse portfolio of thousands of homes (similar to how the risk of a single stock is much greater than that of a broad-market index, such as the S&P 500). Through our analysis, we find that the volatility of individual homes is likely more than double that of Case-Shiller Indexes, with an annual standard deviation of at least 12%, which is equivalent to the historical volatility of a portfolio invested in 60% stocks and 40% Treasury bills (or 50% stocks and 50% bonds). Note, the 12% estimate is for a non-leveraged home. Leverage creates a significant potential risk for new (or first-time) homebuyers, and home equity is likely the riskiest asset in most homeowners’ portfolio, significantly exceeding the risk associated with financial assets.

In addition to idiosyncratic risk, homeownership comes with a lot of costs: at purchase, during ownership, and at sale. While the historical returns for many residential real estate indexes have exceeded inflation (generally by ~1%), the true return of owning a home is likely lower than inflation, and potentially negative (in nominal terms), after all the costs associated with homeownership are factored in (i.e., the cost of carry), such as insurance, taxes, maintenance, transaction costs, etc. Although many of the costs associated with homeownership are explicitly paid by owners (such as real estate taxes, sales commissions, etc.), these same costs are implicitly paid by renters (i.e., the costs are factored into the total rent), and therefore the relative attractiveness of home ownership (versus renting) is driven by a variety of factors, such as the prevailing rent-to-buy price ratio, expected duration of homeownership, the tax deductibility of the various taxes and costs (e.g., mortgage interest) associated with home ownership, etc.

Because of the idiosyncratic nature of homeownership, it's difficult to model its expected risk and reward. Real

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¹ $162 trillion is residential, $29 trillion is commercial, and $26 trillion is land.
³ http://www.bis.org/statistics/c1.pdf
⁴ That is, excluding intangible assets such as human capital and pensions.
⁵ http://www.bls.gov/news.release/cesan.nr0.htm
⁷ https://www.federalreserve.gov/releases/z1/current/z1.pdf
Real estate investment trusts would seemingly have similar risk and return characteristics as homes, since they are real estate-focused investments. However, REIT returns differ significantly from single-home investment returns, both domestically and abroad, suggesting that REITs are a poor proxy for homes.

When building a total wealth portfolio, our optimization routine suggests significant allocations to home ownership when related costs are ignored. However, the optimizer gives low homeownership allocations when costs are included, suggesting that homes are not an efficient asset when viewed entirely from an investment perspective or even when jointly considering them as a consumption good (i.e., owning versus renting).

However, again, much depends on the specific characteristics of the home and its owners. To provide some perspective on which region-specific qualities have been associated with historical returns, volatility, and the market risk of homes, we run a series of multivariate ordinary least squares regressions and find that certain zip code attributes, such as average home price, unemployment rate, population, education level, percent born in the U.S., percentage of English-language-only households, zip code size, housing turnover, average regional temperature, and home size all tend to have statistically significant coefficients that vary by dependent variable. Overall, though, there does appear to be some factors that at least historically have been positively and negatively associated with the return, volatility, and market risks of homeownership across regions that could be useful to homeowners when assessing the risk of their home.

Finally, we provide guidance on the impact this research could have on an investor's portfolio. While the impact of other assets, such as pension benefits, which are relatively bond-like, is much more straightforward, the unique nature and risks associated with homes make them a unique asset for households. Households that have a significant amount of leverage in the home (e.g., a mortgage over 80% of the value of the home) should likely be more conservative in other financial assets to balance the overall home equity risk; however, the impact of owning a home on the optimal total wealth financial portfolio is likely to vary significantly by household, based on the unique risks associated with the home, the household's wealth, and their other non-financial assets.

**Homeownership**

Real estate is a unique asset in that it can be both an investment good and a consumption good. The income stream that owners could save from buying a home instead of renting is commonly termed “imputed rent.” Despite the potential benefits of renting (more on this later), homeownership is generally encouraged versus renting by national governments. The main economic argument for subsidizing homeownership is that ownership may give rise to positive spillovers for society, such as wealth accumulation, better outcomes for children, community engagement, etc., although the evidence of these benefits is mixed (Andrews and Sánchez, 2011). Countries use a variety of methods to encourage homeownership, such as tax policies (e.g., allowing the deduction of mortgage interest costs is common) and interventions in the financial markets (e.g., government guarantees in the housing finance market).

Researchers have defined the term “homeownership” in two ways. The U.S. Census Bureau uses a housing-unit-based definition: the number of owner-occupied units in a region divided by the total number of units. Using this formula, the Census Bureau tracked homeownership in the U.S. since 1965, during which time it drifted between 63% and 69%. It is currently about 64%.

Other agencies and organizations that study homeownership use a different, people-based definition—namely, the percentage of people (or families) who own their primary residence. Using this definition, we see significant variations in homeownership rates in the U.S. by income and region. For example, homeownership rates in 2013 were only 49.2% for the bottom half of the income distribution, but 93.5% for the top 10%.

In terms of regions, homeownership rates are highest in New Hampshire (at 75%) and lowest in New York (at 51%). There is an even greater dispersion at the city level.

Similar to regional differences in homeownership in the U.S., there are even more pronounced differences across...
countries, peaking in Romania at 96.6% and bottoming at 43.8% in Switzerland. At 64%, the U.S. homeownership rate is relatively low compared to other developed nations. Most countries in the OECD have seen an increase in homeownership over the past few decades, although the underlying factors driving the changes vary. Household characteristics and aging (since older people are more likely to be homeowners) explain a significant amount of changes (Andrews and Sánchez, 2011).

Most individuals who purchase a home typically use a mortgage, since relatively few homeowners (especially first-time homeowners) have the necessary savings to purchase the home outright. Mortgage features also vary significantly by region, with government interventions often playing a significant role. While fixed rates on mortgages are most common, there are some countries (e.g., the United Kingdom) that have predominately floating-rate mortgages. According to Andrews and Sánchez (2011), terms vary from as low as 10 years in the Netherlands to 30 years in the U.S. and Denmark. Most countries require some type of down payment, typically in the range of 5%–30% of the value of the home. Additionally, while there is generally no penalty for prepaying a mortgage (e.g., in the U.S.), the lenders in some countries (such as in Germany and Japan) may be entitled to compensation for lost income.

The Home as a Consumption Good

While many homeowners may view their home as an investment, a home’s primary function for households is as shelter (i.e., a consumption good). In this section we introduce some general concepts related to owning a home to put the role of the home into more of a consumption framework as a means to consider whether homeownership makes sense for shelter provision. While aspects such as potential appreciation and risk are central to the rent-or-buy decision, other variables, such as expected duration of being in (or owning) the home, marginal tax rates, etc., can also be very important.

Unlike assets such as mutual funds, which are relatively inexpensive to buy and maintain, homeownership comes with a significant number of costs, both transaction-related and ongoing. The costs of homeownership are similar to the costs associated with owning other physical commodities, commonly referred to as the cost of carry. For example, if you buy gold there are a variety of storage and insurance costs associated with owning the asset, which makes the price of gold for spot delivery lower than the price of gold for future delivery under normal market conditions. Similarly, it is important to understand the costs homeowners pay to continue to own homes.

One common expense associated with owning a home is homeowner’s insurance. While homeowner’s insurance is not technically required for all homeowners (e.g., those who have paid off their mortgage), individual homes are subject to a significant amount idiosyncratic risk and homeowner’s insurance provides a guarantee (subject to certain provisions) that if something should happen to a home (e.g., the home were to burn) the owner would be indemnified. According to the Insurance Information Institute, the cost of homeowner’s insurance in the U.S. is approximately 0.5% of the value of the home. Approximately 80% of the premium insures the home’s value, while the remaining 20% covers the value of the contents of the home (i.e., is comparable to what a renter would pay to insure his or her goods inside the home but not the structure itself). The costs of homeowner’s insurance vary significantly by region, based on the prevailing risks in the area. For example, homeowner’s insurance in Florida generally exceeds 1.0% of the home’s value, while homeowner’s insurance in California may be less than 0.25% of the home’s value. Additional types of insurance, such as flood or hurricane insurance, should also be considered by homeowners in higher risk areas and are generally priced based on the prevailing risk of claims.

Property taxes can be another significant cost associated with homeownership. In the U.S., property taxes are generally less than 1% of the home’s value, although they ranged from 0.2% (Maui County, Hawaii) to 3.1% (Wayne County, New York) in 2011. Internationally there are countries with no property tax (e.g., Bahrain, Cayman Islands, Croatia, Liechtenstein, Israel, and Sri Lanka) while property taxes in Iceland (1.65%), France (3%), and the United Kingdom


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(4%) can be higher depending on the property value and location.\textsuperscript{14}

Maintenance is another cost associated with a home. Anyone who has had to replace a roof or HVAC unit in a home has experience with the (potentially significant) costs associated with owning and maintaining a home. Maintenance costs are generally assumed to range between 1\% and 3\% of the home's value annually (e.g., see Smith and Smith, 2006), and also vary significantly based on the size and location of the home. When thinking about maintenance costs, it's important to distinguish between capital improvements (e.g., adding a deck or remodeling the kitchen), which increase the value of the home, and general maintenance (e.g., fixing a broken toilet), which is general upkeep. In reality, while most types of maintenance end up resulting in some type of increase to the home value, even with capital improvements the benefit is typically less than the amount spent on the project, and improvements may depreciate relatively quickly due to changing tastes and fashions.\textsuperscript{15}

A problem with residential real estate indexes (e.g., Case-Shiller), which typically track repeat sales of the same home, is that they do not (and really cannot) distinguish the changes in the value for a home that would have occurred if the home were in the exact condition between the two sales. In some (or potentially many) instances, the homeowner may have spent (significant) monies improving the home that increase the value (for index calculation purposes), but the expenses related to the improvements are not reflected in the repeat sales value. An extreme example of this would be a home purchased for the exclusive purpose of fixing up and reselling (i.e., flipping).

There are costs to buying and selling a home—and they are significantly greater than selling other commonly held assets, especially when compared to financial assets (e.g., an ETF). For example, while many mutual funds can effectively be purchased for free, it may cost 10\% or more of the home's value to actually sell the home. In the U.S. it is common to use a real estate agent when purchasing a home (approximately 87\% of all purchases are through an agent, according to a 2016 analysis by the National Association of Realtors 2016). Commissions of 6\% of the sales price are commonly paid by the seller of a home (which is generally split between the seller's and buyer's agent). Buying a home typically incurs such costs as home inspection costs, taxes, appraisal fees, lender origination fees, moving costs, etc., that can easily exceed 2\% of the home's value. While a round-trip cost of 8\% to buy and sell a home in the U.S. may seem excessive, it can be significantly worse in other countries. For example, round-trip costs can be as high as 25\% in Russia, 20\% in Monaco, and 16\% in France, but as low as 2.4\% in Lithuania, 4\% in Estonia, and 5\% in the U.K.\textsuperscript{16}

National governments encourage homeownership in a number of ways, including through public policies that benefit homeowners. For example, in the U.S. a capital gain of $250,000 from the sale of your primary residence ($500,000 if married) can be excluded from taxation if the home has been owned by the individual and used as the primary residence for a period aggregating at least two years out of the five years prior to its date of sale. Additionally, real estate taxes and mortgage interest can be deductible for tax purposes if the individual claims the itemized deduction for tax purposes.

As previously discussed, there are also a number of intangible benefits associated with homeownership, such as providing the most stable tenure arrangement to satisfy basic household needs and promoting a more active and informed citizenry (DiPasquale and Glaeser, 1999). Households that own homes also tend to accrue greater levels of wealth, which we'll address in the next section.

**Renting**

While there are a variety of explicit costs associated with owning a home (e.g., paying real estate taxes), it is important to realize that some costs will be paid regardless of whether the individual owns or rents. For example, while a homeowner pays real estate taxes explicitly, a renter will pay these taxes implicitly since these costs will be factored into the total rent. There are certain expenses, such as broker's commissions, that may vary based on expected duration of ownership (e.g., fees are less of a burden on a long-term owner than on a short-term owner not only because


\textsuperscript{15} Eighty percent or less is a common recoup rate according to remodeling.hw.net (for rates see http://www.remodeling.hw.net/cost-vs-value/2016/).

\textsuperscript{16} http://www.globalpropertyguide.com/faq/guide-transaction-costs
they’re more frequent, but also because the property has had less time to appreciate, something compounded by mortgage repayment schedules, which favor interest over principal in early repayment years).

One common metric used to determine whether it makes economic sense for a household to buy or rent is the “rent-to-price ratio,” which is the cost of renting relative to buying a comparable home. Szapiro (2014) explores this topic at length and notes that many homeowners would be better off renting than buying. Despite this and similar research, most Americans (84%) believe that owning a home is a good financial decision.17 This is not that surprising when put in the context of Beracha and Johnson (2012), who note that most homebuyers mostly ignore renting in favor of buying and do not consider the true cost of ownership. It is nevertheless worthwhile to understand the relative costs of each to make a more informed decision. Figure 1 provides some perspective about the historical relative costs of renting versus buying (i.e., the rent-to-price ratio) for various regions in the U.S. since 1988.18

There has been significant variation in the rent-to-price ratio historically in the U.S., especially by region. When the rent-to-price ratio is low (e.g., 4%) the cost of purchasing a home is relatively expensive (because rents are cheap), and vice versa. The actual potential benefit of renting versus buying is contingent on a number of variables, though, that extend beyond just rent-to-price ratio. To provide some general guidance on what is likely to result in the best outcome for a household (from a pure economic perspective), we developed a model and performed an analysis.

The analysis is based on quarterly data on rent-to-price data from the U.S. Census (displayed in Figure 1). Actual historical values are smoothed over three quarters to minimize quarter-to-quarter jumps. The model assumes a household will either purchase a house or rent in that region for some period, ranging from one to 15 years. The household is assumed to use a 20% down payment to purchase the home. The remainder of the purchase (i.e., 80% of the value) is financed via a mortgage with an assumed 30-year duration based on prevailing rates from the Primary Mortgage Market Survey data provided by Freddie Mac.19 The mortgage is assumed to be refinanced if at any time during the homeownership period rates drop by 1% from the current mortgage rate (i.e., it is possible for multiple refinancings during the ownership period). The refinancing is assumed to be costless and each new refinancing is assumed to be for a new 30-year term.

Purchase cost is assumed at 2% of the value, and selling cost is 6% of the sale value. Annual maintenance costs are

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18. https://www.census.gov/housing/hvs/data/histtab11.xls
assumed to be 2%, which are assumed to include homeowner’s insurance. Real estate taxes are assumed be 1% of the value of home and are assessed annually. Mortgage interest and real estate taxes are assumed to be deductible and are credited to the account at the marginal tax rate assumed in the calculation. The amount of the interest payment is determined annually to capture the fact interest payments decline as a percentage of the total loan payment over time. Gains after selling the home are assumed to be tax-free regardless of the ownership duration or the amount of the gain.

The assumed purchase and sale prices are based on the prevailing regional average cost of homes for that quarter. As noted in the previous section, using average sales prices likely overstates the actual future appreciation of the home because the maintenance costs associated with owning the home are not generally considered to be capital improvements.

The analysis assumes an equalization of cash flows, where the down payment monies, along with any additional marginal savings (or costs), are invested in a portfolio invested in 50% stocks (represented by the S&P 500 Index) and 50% bonds (represented by the Ibbotson US Long-Term Government Bond Index). The portfolio is assumed to have a 1% annual fee. All gains are assumed to be realized annually from the portfolio account. Taxes paid are based on the marginal tax rate for the bond portion of the portfolio and half the marginal tax rate for the equity portion. All future cash flows are added or subtracted from this account (e.g., if the rent in the following year of purchase is cheaper than the mortgage than this amount would be an assumed inflow). The value of the portfolio (i.e., side account) is compared to the monies the individual would realize after selling the home.

Two key assumptions varied in the analysis are duration of homeownership and the individual’s marginal tax rate. Duration is an important consideration when thinking about homeownership. When researching the potential benefits of homeownership, a variety of values have been used, for example, Beracha and Johnson (2012) use eight years, Belsky, Retsinas, and Duda (2007) use durations of three, five, and seven years, and Rappaport (2010) uses 10 years. For the analysis we assume durations between one and 15 years to provide some perspective on how the potential benefits change over the ownership period.

When thinking about the duration of homeownership, it is important to note the consistent disconnect between the actual and expected duration of homeownership in the U.S. According to the annual National Association of Realtors “Home Buyer and Sellers Trends” reports from 2007 to 2016 (the last 10 years) the actual length of homeownership has been significantly less than the expected duration of homeownership, especially for younger households. The average expectations and actual values over the 10-year test period are included in Figure 2. Given the relatively high transaction costs associated with selling (and buying) a home, these observed durations are notable since they suggest homeowners are likely experiencing more costs (e.g., seller’s commissions) than they may have expected when they first purchased the home.
The other key assumption varied for the analysis is tax rates. While online calculators commonly assume that homeowners itemize and can therefore deduct various expenses associated with homeownership, such as real estate taxes and mortgage interest payments, only 30% of households in the U.S. itemize their deductions.\(^{20}\) This is even more important for renters, since the vast majority of renters saving to buy a home (92%) do not itemize their Federal taxes (Szapiro, 2014). Therefore, we assume five different levels of marginal tax rates, from 0% to 40% in 10% increments. While it is unlikely a homeowner would be in a 20% marginal tax bracket (since this bracket doesn’t exist currently in the U.S. at the Federal level), view these marginal tax rates as approximations, especially if the household crosses thresholds (e.g., if they rent they will not itemize, but if they buy they will be able to itemize half of the homeownership expenses) as well as given the more complex implications associated with the phase outs associated with credits and deductions.

The results of the analysis are included in Figure 3. There are two panels. Panel A includes the median return from buying for the respective scenario, and Panel B includes the probability of being better off buying (i.e., the percentage of scenarios in which the wealth was higher when the individual purchased a home versus rented).

There are a few important takeaways from Figure 3. First, it is unlikely a household is going to be better off buying (again, from a purely economic perspective) if the expected homeownership duration is less than four years at the highest assumed marginal tax rate (40%) and 12 years at the 0% marginal tax rate. While the median real return of 4.38% for a household that stays in a home for 15 years with a 20% marginal tax rate may appear to be attractive, it is important to remember there is a significant deviation in the potential range of outcomes. It is clear, though, that the longer the duration of home ownership and the higher the marginal tax savings (i.e., rate) the higher the probability a household would be better off buying versus renting.

These findings are consistent with research by others, such as Szapiro (2014) who notes the typical, median-income prospective homeowner today could generate over 50% more net wealth over the next 10 years by renting and investing instead of buying a home, and Beracha and Johnson (2012) who find that homeowners would have been better off renting and investing in 65% of the 30 years they analyzed. Also, this analysis assumes an average historical rent-to-price ratio between approximately 5.5% and 6.5% across the four regions. If the analysis were to be repeated using U.S. historical rent prices from Davis,

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\(^{20}\) http://taxfoundation.org/blog/who-itemizes-deductions

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**Figure 3: Buying Versus Renting**

Panel A: Median Return From Buying

Panel B: Probability of Being Better Off Buying
Lehnert, and Martin (2008), where the average historical rent-to-price ratio is approximately 4.4% during the overlapping period (i.e., about 1.6 percentage points lower, on average), but going back to 1960, the potential benefits of home ownership look much worse, where the median real return even at the 15th year for the 30% marginal tax rate is only 1.02% and the probability of a being better off buying is still only 52.73%. In other words, the assumed rent-to-price ratio has significant implications on the relative attractiveness of owning a home. This is akin to value investing: Buying stocks priced high relative to earnings (or other measures) historically has led to lower future returns than buying underpriced stocks.

One key assumption of this analysis is that all monies the investor who decides to rent would have spent on the mortgage are saved. While this may be a valid assumption for an individual who is completely rational from an economic perspective (i.e., *homo economicus*), it does not reflect actual household behavior. Homeownership is often described as a form of “forced savings” that results in a higher net worth for households. For example, based on the Federal Reserve's 2013 Survey of Consumer Finances, homeowners had on average a net worth of approximately $200,000 versus approximately $5,000 on average for renters. One problem with these general statistics is that they overlook the significant differences in the cohorts that own homes versus rent (i.e., households that own homes tend to have higher incomes, which could potentially explain the entire difference in average net worths). Even after controlling for a household’s propensity to save and accounting for household characteristics, though, homeowners build more wealth than renters do, according to research by Di, Belsky, and Liu (2007), whose findings were mirrored by Boehm and Schlottman (2008), Turner and Luea (2009), and others. Therefore, while homeownership may appear to be less than a great “investment” for some from a pure rate-of-return perspective (when compared to renting), it does appear to be an effective “savings” vehicle, enabling households to accumulate wealth they may have spent elsewhere (so long as the household resides in the house for about five years or more).

**Historical Risk and Return of Homes**

Understanding the role of homeownership within a household’s total wealth is important because it is generally the largest asset and liability. Figure 4 provides some perspective on the real returns of homes, compared to stocks, bonds, and bills, over 20-year rolling periods since 1900, with home prices from Robert Shiller’s website and stock,

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**Figure 4: Stocks, Bonds, Bills... and Homes**

Panel A: Historical Real Returns: 1900–2015

Panel B: Historical Risk: 1900–2015

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Figure 4 gives the impression that from 1900 to 2015 homes have had real returns and standard deviations similar to those of bills; however, it is unlikely the vast majority of homeowners have had this experience. While an investor could have purchased an investment that tracks the historical returns of stocks, bonds, and bills with relative ease, the home index tracks the historical performance of a broad index of homes that are regionally diversified, not a single home. Also, the home index is based on repeat sales values, so it likely overstates the true realized return for a homeowner since costs are ignored (as previously noted).

In reality there is a strong idiosyncratic component to the return from investing in an individual house; this significantly affects the risk and return attributes of owning a home. It is difficult to measure the volatility of home prices due the illiquid nature of the market. Also, given the fact most housing purchases are made with a consumption motive (rather than investment motive), as well as high transaction costs, heterogeneity in housing, and limits to arbitrage, the “true” value of homes is difficult to assess, which may lead to prolonged periods of “inefficient” pricing (Black, Fraser and Hoesli, 2006).

Figure 5 has been included to provide some perspective about how the levels of historical volatility (i.e., standard deviation) vary across regions of different sizes. Figure 5 contains the median standard deviation of home prices based on different regions: state, metro, zip code, and neighborhood, from 1996 to 2015 (based on year-end prices). Data for the analysis is from Zillow and is based on an annual frequency to minimize any potential implications of smoothing over shorter periods.

The median volatility of the home price index clearly increases as the size of the region decreases. The volatility for the entire country (note, the country-level standard deviation is not a median) is consistent with the historical Shiller data in Panel B of Figure 4 where the average rolling 20-year standard deviation was 5.35%. If we were to fit a simple regression model to the results in Figure 5 based on the approximate size of the respective regions, the estimated risk level for an individual home would be approximately 12%, which is approximately equivalent to the historical risk for a portfolio of 60% stocks and 40% bills, or 50% stocks and 50% bonds (using the same historical returns data to create Panel A in Figure 4). This 12% estimate is similar to, but slightly lower than, other estimates for the level of volatility for individual homes. For example, Flavin and Yamashita (2002) estimate the risk of individual homes to be approximately 14%, while Case and Shiller (1989) suggest 15%.

Goetzmann (1993) finds that the risk of individual homes is about double the risk of regional portfolios, averaging

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23. At least recently; it would have been more difficult, and more expensive, back in the early 1900s.
approximately 11.1% and 5.8%, respectively, in Atlanta, Chicago, Dallas, or San Francisco. These findings are consistent with the relation noted in Figure 5. Goetzmann also notes that regional diversification dominates local diversification, whereby investing in four homes in four different regions, an investor may achieve a reduction in risk roughly comparable to diversifying across thousands of homes in the same region. This is consistent with research by Glaeser and Gyourko (2007) who also note that unlike other financial assets, much of the variation in house prices is local, not national.

Shiller makes available historical datasets on home prices for four cities: Atlanta, Chicago, Dallas, and Oakland from 1970 to 1986 on his website. While the house price data is somewhat dated, we can use it to estimate the potential distribution of real returns from owning a home over different durations. This is important since it is not clear to what extent the risk of homeownership changes over time. Panel A in Figure 6 includes the distribution of annualized real returns for individual home sales on a percentile basis, and Panel B includes information about the standard deviation of the returns by holding period.

Many potential homeowners may believe the risks associated with owning a home decline over time. A similar belief exists among many investors for equities, and is commonly referred to as “time diversification.” If an asset has negative autocorrelation, it may in fact become less risky over longer periods (versus if the returns are independent and identically distributed, or iid). Blanchett, Finke, and Pfau (2016) demonstrate that this “time diversification” effect has in fact existed historically for equities in 19 of 20 countries studied. Similarly, Panel B suggests (at least for the U.S. over the test period) that the benefit of time diversification also exists in the U.S., i.e., the annualized standard deviation declines by one over the square root of the investment period. This is consistent with the research of Belsky, Retsinas, and Duda (2007), who found that holding property for more time generally did not result in a greater chance of making the home a good investment.

Figures 7 and 8 provide some perspective about the differences in real returns and volatilities of home indexes by U.S. city (Figure 7), based on Case-Shiller data, as well as by country (Figure 8), using data obtained from the Federal Reserve Bank of Dallas as described in Mack and Martínez-García (2011).

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There have been significant differences in the real returns and volatility in the U.S. for city-specific Case-Shiller Indexes. For example, Portland has had a relatively high return with low risk (at 2.87% and 6.41%, respectively) while Las Vegas has had the opposite (at 0.20% and 13.24%, respectively). There is a positive relation between return and risk across cities, where cities with higher returns have had higher volatilities, although the strength of the relationship is relatively weak (with an $R^2$ of 14.66%).

Similar to the U.S. cities, there have been significant differences in the historical real returns and volatilities across countries, although there is virtually no relation across real return and volatility metrics (with an $R^2$ of .28%). The U.S. has had less risk and a lower return than most countries. While the returns in Figure 8 may appear to be over a long historical period, it is only 41 years (from 1975 to 2015 inclusive). Using a sample of high-quality homes from Amsterdam from 1628 to 1774, Eichholtz (1997) finds that the nominal (real) return for homes in Amsterdam over the entire period was 1.8% (0.5%), which is lower than the all-country real return average in Figure 8 (which is 1.84%).

**Market Risk of Homes**

While homes have a relatively high level of idiosyncratic risk, their level of systematic risk is less clear. Ibbotson and Siegel (1984) compare the returns of residential real estate...
to stocks and bonds from 1960 to 1982 and find that the stock beta of residential real estate is relatively low, at 0.05, and that real estate returns are not explained very well—either yearly or over the whole period studied—by market or inflation risk. They also note that smoothing techniques used may underestimate the true risk of residential real estate. Additional research by Goetzmann (1993), Flavin, and Yamashita (2002), and De Roon, Eichholtz, Koedijk (2012) all find low correlations between housing returns and other assets, which suggests that housing can be a potential diversifying asset from a total wealth perspective.

To determine the market risk of homes, we used a factor regression approach. The approach begins with the three-factor model developed by Fama and French (1993), who demonstrate the existence of a small-cap premium ($SMB$) and value premium ($HML$) in addition to the market portfolio ($RMkt$). In addition to these three factors, a momentum ($MOM$) factor has also been included. Momentum is the effect reported by Jegadeesh and Titman (1993), among others, where stocks that have performed well (poorly) historically tend to continue to perform well (poorly). The risk-free ($Rf$) return, $SMB$ factor, $HML$ factor, and $MOM$ factor values are obtained from the data library on Kenneth French’s website.27

The final regression factor is liquidity. A liquid stock is one where it is possible to trade large quantities of the stock quickly, at low cost, without affecting the price. Research by Pastor and Stambaugh (2003), among others, demonstrates that illiquid securities tend to outperform more liquid stocks, which suggests the existence of a liquidity premium (LIQ). We use a monthly liquidity factor available on Pastor’s website.28 The five-factor regression formula is noted in equation 1.

$$R_{h} - R_f = \alpha + B_1 (R_{Mkt} - R_f) + B_2 (SMB) + B_3 (HML) + B_4 (MOM) + B_5 (LIQ) + \varepsilon \quad [1]$$

The analysis is based on data from Zillow for 4,561 neighborhoods from 1996 to 2015. Neighborhood is selected as the region (e.g., versus state or zip code) since neighborhood is the “smallest” region increment available and therefore is most likely to represent the idiosyncratic risk associated with a single home. To be included in the dataset, returns over the entire period must be available. The 5th, 25th, 50th, 75th, and 95th percentiles and average values (across all 4,561 regressions) are included in Figure 9. The actual values for the 50th percentile and average coefficients are included in Figure 9 as labels for reference purposes.

The regression results suggest low systematic risk exists in single-home returns. We observed low coefficients of

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27. [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

correlation between home returns and stock returns, as well as to the size, value, momentum and liquidity factors. Market coefficients were relatively small (averaging 0.05, but ranging between negative 0.07 and 0.23) with a slight value tilt (averaging 0.06 and ranging between negative 0.08 and 0.25).

**Homes Are Not REITs**

REITs might seem to be a reasonable investment proxy or substitute for homes, since both are real estate-based investments, but this does not appear to be true. Cotter and Roll (2015) compare the returns of REITs to the S&P/Case-Shiller Home Price Indexes and find that the Case-Shiller Indexes have a market beta that is approximately one-fifth the total volatility of REITs (0.58) and much higher levels of auto-correlation, especially at the monthly level. Waggle and Johnson (2004) model the risk of individual home standard deviation of 8.81% versus 14.98% for REITs. Table 1 shows the return, standard deviation, and market coefficient (from a single-factor model) for various REIT indexes (data obtained from NAREIT) versus Case-Shiller indexes from 1994 to 2015.

While both the REITs and Case-Shiller indexes are diversified indexes consisting of multiple properties (unlike individual homes), the historical return, standard deviation, and market risk for REITs have been significantly higher (more than double) those of respective home price indexes. It is important to note that the differences in returns of REITs and home prices are not just a domestic effect. Table 2 compares the returns, standard deviations, and one-factor betas for house price indexes using data obtained from the Federal Reserve Bank of Dallas as described in Mack and Martínez-García (2011), and REIT indexes from the FTSE.

Similar to the domestic analysis, the return, risk, and market beta of international REITs have been significantly higher than those for domestic house price indexes. Perhaps even more interesting is that REITs have been a much less attractive investment internationally, with lower returns, higher risk, and a higher market beta when compared to U.S. REITs. While data on the risk of individual homes in other countries over this period is not readily available, even if the risk of individual homes was twice the house price index, the risk (i.e., standard deviation) of homes would still be less than half that of REITs.

**Allocating to Homes**

Up to this point, we have explored the risk of single-home investments in isolation from an investor’s or a household’s total wealth. It’s important, though, to consider homeownership in the context of total wealth, which includes both financial assets (such as retirement savings) and nonfinancial assets (such as human capital). Past research on appropriate housing allocations has delivered mixed findings. Englund, Hwang and Quigley (2002) study single-family housing returns in Stockholm, Sweden, from January 1981 to August 1993 and find that an efficient portfolio would include no housing for shorter periods, but for longer periods, low-risk portfolios would include between 15% and 50% housing. Goetzmann (1993) suggests an allocation of 50%, while de Roon, Eichholtz, and Koedijk (2002) note 30%.

Assumptions around things like maintenance costs, taxes, expected duration of homeownership, etc., will have a significant impact on the analysis. The ideal analysis would likely contain different types of optimizations based on how the home fits into the investor’s or household’s total wealth and financial goals. For example, running some type of surplus optimization, where a liability is created to represent the effective short position the household has with respect to home consumption would be one potential approach; however, for simplicity purposes we use a more traditional optimization for this analysis.

We use three main assumptions for the optimization: level of down payment, risk-aversion level, and whether or not the analysis includes home costs. The level of down payment can vary considerably by homeowner, so three levels are considered: 5%, 20%, and 100% (i.e., the home is purchased with cash). Additionally, three different levels of risk aversion are considered—low, moderate, and high—calibrated such that, in the absence of real estate as an available investment, the household would invest in a portfolio that is 80%, 50%, or 20% equities, respectively (which corresponds to risk-aversion coefficients of 1.2, 2.8, and 11.0, respectively, in the model).
We consider three distinct costs: real estate taxes, general maintenance costs, and transaction costs. The analysis is based on the actual historical returns of house-price indexes for a given zip code, so the real estate taxes are based on the state-level tax rate based on values obtained from the Tax Foundation.\footnote{http://taxfoundation.org/blog/how-high-are-property-taxes-your-state} The real estate tax is reduced by the assumed marginal tax rate of 25%, under the assumption the household can deduct the real estate taxes.

Second, annual maintenance costs are assumed to be 2%. Third, total round-trip buy/sell costs of 8% are assumed to be amortized evenly over the holding period, which is assumed to be 10 years. When costs are included, the quarterly returns are reduced evenly by the total-cost value.

We do not consider the costs associated with the mortgage nor the exclusion of capital gains taxes if a home is sold as a primary residence. While these are both important

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**Table 1: A U.S. Perspective on Homes Versus REITs**

<table>
<thead>
<tr>
<th>Index Type</th>
<th>Return</th>
<th>Std Dev</th>
<th>MktSlope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>11.15</td>
<td>22.44</td>
<td>0.66</td>
</tr>
<tr>
<td>Industrial</td>
<td>8.83</td>
<td>21.62</td>
<td>0.55</td>
</tr>
<tr>
<td>Retail</td>
<td>11.65</td>
<td>21.20</td>
<td>0.39</td>
</tr>
<tr>
<td>Residential</td>
<td>12.35</td>
<td>19.44</td>
<td>0.34</td>
</tr>
<tr>
<td>Diversified</td>
<td>8.68</td>
<td>19.53</td>
<td>0.39</td>
</tr>
<tr>
<td>Health Care</td>
<td>12.33</td>
<td>20.64</td>
<td>0.13</td>
</tr>
<tr>
<td>Lodging/Resorts</td>
<td>4.63</td>
<td>32.51</td>
<td>0.86</td>
</tr>
<tr>
<td>Self Storage</td>
<td>17.60</td>
<td>18.88</td>
<td>0.06</td>
</tr>
<tr>
<td>Mortgage</td>
<td>5.35</td>
<td>32.54</td>
<td>0.32</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>10.29</strong></td>
<td><strong>23.20</strong></td>
<td><strong>0.41</strong></td>
</tr>
<tr>
<td><strong>All REITs Index</strong></td>
<td><strong>10.22</strong></td>
<td><strong>19.27</strong></td>
<td><strong>0.44</strong></td>
</tr>
</tbody>
</table>

**Table 2: An International Perspective on Homes Versus REITs: 1990-2015**

<table>
<thead>
<tr>
<th>Country</th>
<th>House Price Index</th>
<th>REITs Index</th>
<th>Home/REITs Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return</td>
<td>Std Dev</td>
<td>1F Beta</td>
</tr>
<tr>
<td>Australia</td>
<td>6.08</td>
<td>6.30</td>
<td>0.10</td>
</tr>
<tr>
<td>France</td>
<td>3.74</td>
<td>5.85</td>
<td>0.01</td>
</tr>
<tr>
<td>Italy</td>
<td>2.82</td>
<td>6.39</td>
<td>-0.07</td>
</tr>
<tr>
<td>Japan</td>
<td>-2.27</td>
<td>3.84</td>
<td>-0.05</td>
</tr>
<tr>
<td>Netherlands</td>
<td>4.70</td>
<td>6.30</td>
<td>0.06</td>
</tr>
<tr>
<td>Norway</td>
<td>5.36</td>
<td>5.29</td>
<td>0.11</td>
</tr>
<tr>
<td>Sweden</td>
<td>5.05</td>
<td>6.07</td>
<td>0.01</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.74</td>
<td>3.20</td>
<td>-0.06</td>
</tr>
<tr>
<td>UK</td>
<td>5.22</td>
<td>7.10</td>
<td>-0.03</td>
</tr>
<tr>
<td>US</td>
<td>3.16</td>
<td>4.25</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>3.46</strong></td>
<td><strong>5.46</strong></td>
<td><strong>0.01</strong></td>
</tr>
</tbody>
</table>
considerations for each household, financing costs must be paid regardless of when a leveraged purchase is made, and the potential exclusion of taxes only applies when the home is the primary residence of a household, and would not necessarily apply to investments held in certain account-types (e.g., a Roth IRA).

Certain costs included would be paid whether the household rents or buys. If the household owns the home, the costs would be explicit (i.e., they would be paid out of pocket). In contrast, the costs would be factored into the cost of renting, since the landlord would be forced to pay these expenses and would therefore pass them on to the renter. Therefore, a blend of the “no costs” scenario and “with costs” scenario is likely the best representation for a homeowner, while the “with costs” scenario is likely a reasonable approximation from the perspective of an individual looking to buy a home purely for speculative purposes who has no intent of staying in, or renting out, the property.

The optimizations are based on quarterly changes in home prices for various zip codes from the third quarter of 1996 to fourth quarter of 2015. This period is selected since it is the range of available data from homes in the Zillow zip code database. Data must be available for the entire period for a zip code to be included. This limits the analysis to 10,368 specific regions (i.e., zip codes). We use quarterly returns (versus annual returns in previous studies) to allow for a greater number of return series in the optimization.

In addition to the “home,” which is considered a unique asset class in the optimization, 10 other asset classes are included—five equity and five fixed-income (see Table 3). We constrained the optimizer in three ways. First, no shorting (i.e., all weights must be greater than or equal to zero). Second, the sum of all weights must equal 100%. Third, the allocation to one of the 10 base investment asset classes cannot exceed 40% to ensure a portfolio of at least three asset classes. No maximum allocation constraint is imposed on the home allocation. An investment fee (i.e., expense ratio) of 20 basis points is assumed for the 10 investment asset classes to reflect reasonable costs associated with passive investing.

Opposed to that used in a more traditional mean-variance optimization, our objective function is based on the Constant Real Risk Aversion (CRRA) utility function, where we target three risk-aversion levels (y) by maximizing equation 2, where \( t \) is the respective quarter, \( T \) is the total number of quarters, \( w \) is a vector of asset class weights, \( r \) is vector of returns (in percent), and \( c \) is some constant (which is set equal to 1). The risk-aversion levels for an aggressive, moderate, and conservative household are estimated to be 1.2, 2.8, and 11.0, respectively (these correspond to portfolios with equity allocations of 80%, 50%, and 20%, respectively). We use this objective function, versus a more traditional mean variance optimization approach, since we do not want to target a single return or standard deviation, but rather the portfolio that generates the optimal tradeoff between the two.

\[
\text{MAX} \left[ \left( \sum_{t=0}^{T} \left( \frac{(w' r_t) + c}{T} \right)^{1-y} \right)^{1-y} \right]^{1-y}
\]

Table 4 contains the average allocations to home values for the different scenarios.

The most notable difference in the scenarios is the impact of including home costs on the analysis, which significantly reduces the relative attractiveness of homes from an investment perspective. The average allocation with home costs across the nine other scenarios (by risk-aversion and down-payment level) is 2.0% versus 29.3% when excluding the home.

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Table 3: Asset Classes Used

<table>
<thead>
<tr>
<th>Equity (Index)</th>
<th>Fixed-Income (Index)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Growth (Russell 1000 Growth)</td>
<td>Bonds (Barclays US Gov/Cred)</td>
<td>Home</td>
</tr>
<tr>
<td>Large Value (Russell 1000 Value)</td>
<td>TIPS (Barclays US TIPS)</td>
<td></td>
</tr>
<tr>
<td>U.S. Small-Cap (Russell 2000)</td>
<td>High-Yield (Barclays US Corp HY)</td>
<td></td>
</tr>
<tr>
<td>Intl Equity (MSCI EAFE)</td>
<td>Intl Bonds (Barclays Global Agg Ex-US)</td>
<td></td>
</tr>
<tr>
<td>Emerging Markets (MSCI EM GR)</td>
<td>Cash (BoAML US Tres 3-Mo)</td>
<td></td>
</tr>
</tbody>
</table>

---

[^32]: http://www.zillow.com/research/data/
home costs. It appears homes are relatively more attractive for investors with lower levels of risk aversion and moderate down payments (e.g., 20%).

There are certain regions that receive much higher average allocations to homes. For example, if we group the zip codes by state, the highest average allocations to homes are California (39.0%), Hawaii (19.0%), and Massachusetts (15.6%). Not surprisingly these are the three states with the highest average quarterly returns over the test period (at 1.45%, 1.22%, and 1.12%, respectively). While risk (i.e., standard deviation) is also important, a multivariate regression where the dependent variable is the home allocation and the independent variables are normalized coefficients for returns, standard deviation, and market risk suggest that return is approximately five times more important than risk when explaining the variation in the home allocation among the portfolios, and approximately 20 times more important than market beta.

Regional Differences in Home Returns, Volatility, and Market Risk

There are notable differences in the returns, risk, and market betas for home indexes in different regions. In this section we aim to provide some insight into some of the drivers of those differences so that the reader can more accurately assess the risks associated with homes by region.

This analysis, again, is based on the Zillow home price indexes for zip codes from December 1996 to December 2015. We calculated the annual change in the home index, and from these values the real return, standard deviation, and market risk (using the five-factor model in equation 1) are determined. These three variables are the dependent variables for the OLS regressions.

We included a variety of independent variables in the regression. It is important to note that while the dependent variables are based on some kind of variable throughout the period (from December 1996 to December 2015), the independent variables are mostly a single point in time (generally targeting the year 2010, based on availability). Therefore, when interpreting the coefficients, it’s going to be more important to consider the attributes of that zip code today, versus where it was historically, since many communities are changing over time. The independent variables included in the regression are:

- **Price**: Source: Zillow, prices as of December 2010
- **County Unemployment Rate**: Source: Bureau of Labor Statistics 2010 Annual Averages
- **Maximum Industry Exposure**: Source: Custom calculations, primary data from the 2012 Economic Census of the United States
- **% of Households Family**: Source: American Community Survey 2010
- **Population**: Source: American Community Survey 2010
- **Education >= Bachelor’s**: Source: American Community Survey 2010
- **%Same House as 1 Year Ago**: Source: American Community Survey 2010
- **%Born in USA**: Source: American Community Survey 2010
- **%HHs English Only**: Source: American Community Survey 2010
- **Size of Zip Code (Square Miles)**: Source: American Community Survey 2010

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34. [https://www.census.gov/programs-surveys/acs/](https://www.census.gov/programs-surveys/acs/)
Descriptive statistics for the variables have been included in Table 5.

We normalized all independent variables (by subtracting the mean and dividing by the standard deviation) to make it easier to compare the relative importance of the variables in the regression. For example, if the average home price in your zip code is the same as the national average ($219,619), the assumed value would be zero. If instead the home price in the area is $400,000, which is approximately one standard deviation above the average, the assumed value would be 1. Note that it would have been possible to increase the explanatory power of the model by transforming some of the independent variables (e.g., taking the natural log of the home Price); however, the raw values are used so that the coefficients are easier to interpret by readers of varying levels of financial sophistication. Also, transforming the variables had only a minor impact on the results. The results of the three multivariate OLS regressions are included in Table 6.

For returns, each of the coefficients were significant at the 1% level. The five most meaningful variables (based on the absolute value of the regression coefficient) were price, average home size, the percentage of households that speak only English, the percentage of occupants born in the U.S., and the average annual temperature, respectively. These five factors suggest that homes located in areas with other high-priced homes, that are relatively small (i.e., located in cities), with a diverse racial population, and warm temperature have experienced the highest average returns historically.

For volatility, all of the coefficients were significant at the 1% level, except maximum industry exposure (not statistically significant) and percentage of households that are families (statistically significant at the 5% level). The five most meaningful variables (based on the absolute value of the regression coefficient) were the percentage of occupants born in the U.S., the county employment rate, percentage of households that speak only English, housing turnover, and percentage of households with at least college degrees, respectively. These five factors suggest that homes located in areas with a diverse racial population that is well educated, low unemployment, and low housing turnover have experienced the lowest levels of volatility historically (i.e., those that have thrived for the entire period of analysis).

For market risk, all of the coefficients were significant at the 1% level, except average home size, which was statistically significant at the 5% level. The five most meaningful variables (based on the absolute value of the regression coefficient) were the same as volatility regression (with identical signs). The similar results are not that surprising given the relatively high correlation between volatility and market risk (0.818). Again, though, the regressions suggest that homes located in areas with a diverse racial population that is well-educated, has low unemployment and low housing turnover have experienced the lowest levels of market risk.

Table 5: Descriptive Statistics for Regression Variables

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Average</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>3.389</td>
<td>1.564</td>
</tr>
<tr>
<td>Risk</td>
<td>8.259</td>
<td>3.638</td>
</tr>
<tr>
<td>Market Beta</td>
<td>0.163</td>
<td>0.148</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Average</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price ($0,000)</td>
<td>219,619</td>
<td>169,988</td>
</tr>
<tr>
<td>County Unemployment Rate</td>
<td>9.755</td>
<td>2.412</td>
</tr>
<tr>
<td>Maximum Industry Exposure</td>
<td>18.459</td>
<td>5.322</td>
</tr>
<tr>
<td>% of Households Family</td>
<td>67.843</td>
<td>10.931</td>
</tr>
<tr>
<td>Population</td>
<td>19.448</td>
<td>16.179</td>
</tr>
<tr>
<td>Education &gt;= Bachelor's</td>
<td>30.759</td>
<td>17.007</td>
</tr>
<tr>
<td>%Same House as 1 Year Ago</td>
<td>86.428</td>
<td>6.691</td>
</tr>
<tr>
<td>%Born in USA</td>
<td>59.363</td>
<td>18.132</td>
</tr>
<tr>
<td>%HHs English Only</td>
<td>83.762</td>
<td>16.958</td>
</tr>
<tr>
<td>Size of Zip Code (SqMiles)</td>
<td>43.140</td>
<td>85.511</td>
</tr>
<tr>
<td>Housing Turnover</td>
<td>4.435</td>
<td>2.064</td>
</tr>
<tr>
<td>Average Annual Temperature</td>
<td>63.076</td>
<td>10.241</td>
</tr>
<tr>
<td>Average Home Size</td>
<td>1566.496</td>
<td>348.172</td>
</tr>
</tbody>
</table>

Table 6: The Drivers of Return, Risk, and Market Beta for House Price Zip Code Indexes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Return</th>
<th>Risk</th>
<th>Market Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>t stat</td>
<td>Pr &gt;</td>
</tr>
<tr>
<td>Intercept</td>
<td>3.389</td>
<td>308.86 0.000</td>
<td>8.259</td>
</tr>
<tr>
<td>Price ($0,000)</td>
<td>0.956</td>
<td>57.14 0.000</td>
<td>0.854</td>
</tr>
<tr>
<td>County Unemployment Rate</td>
<td>-0.110</td>
<td>-8.77 0.000</td>
<td>0.941</td>
</tr>
<tr>
<td>Maximum Industry Exposure</td>
<td>-0.031</td>
<td>-2.50 0.009</td>
<td>0.022</td>
</tr>
<tr>
<td>% of Households Family</td>
<td>-0.072</td>
<td>-4.33 0.000</td>
<td>-0.086</td>
</tr>
<tr>
<td>Population</td>
<td>-0.065</td>
<td>-4.98 0.000</td>
<td>-0.338</td>
</tr>
<tr>
<td>Education &gt;= Bachelor’s</td>
<td>0.092</td>
<td>4.94 0.000</td>
<td>-0.884</td>
</tr>
<tr>
<td>%Same House as 1 Year Ago</td>
<td>0.065</td>
<td>4.29 0.000</td>
<td>0.308</td>
</tr>
<tr>
<td>%Born in USA</td>
<td>-0.209</td>
<td>-14.61 0.000</td>
<td>-1.065</td>
</tr>
<tr>
<td>%HHs English Only</td>
<td>-0.321</td>
<td>-20.72 0.000</td>
<td>-0.901</td>
</tr>
<tr>
<td>Size of Zip Code (SqMiles)</td>
<td>0.076</td>
<td>6.59 0.000</td>
<td>-0.081</td>
</tr>
<tr>
<td>Housing Turnover</td>
<td>0.162</td>
<td>12.41 0.000</td>
<td>0.897</td>
</tr>
<tr>
<td>Average Annual Temperature</td>
<td>0.164</td>
<td>13.08 0.000</td>
<td>0.387</td>
</tr>
<tr>
<td>Average Home Size</td>
<td>-0.395</td>
<td>-23.56 0.000</td>
<td>-0.515</td>
</tr>
</tbody>
</table>

Observations | 9,489 | R² | 53.33% | Adjusted R² | 53.26% | 9,489 | R² | 53.81% | Adjusted R² | 53.74% | 9,489 | R² | 58.60% | Adjusted R² | 58.54%

No Portfolio Is an Island: The Impact of the Home

When building portfolios, investment professionals and financial planners often focus entirely on the available set of investible assets for the financial portfolio, such as stocks and bonds. In reality, the financial assets are only one of many assets owned by the client, and considering the risks of the “other” assets can be an essential aspect to building truly efficient portfolios when viewed from a total wealth perspective.\(^{36}\) For example, Cochrane (2007) contends that the optimal portfolio for an investor should deviate from the market portfolio to the extent that he or she is different from the average person.

When thinking about the impact of the home on a portfolio, the first decision is whether to purchase a home at all. Our analysis suggests many households are likely better off renting, especially those who are likely to be in the home for less than six years and those paying a relatively low tax rate. However, to realize the potential benefit of renting, the household must be disciplined and be willing to “save the difference” between renting and owning. It is worth noting that while the other potential benefits associated with owning a home may outweigh the investment considerations (e.g., the local school districts\(^ {37}\) it is important to be aware of the additional potential costs associated with purchasing a home so that the household can plan accordingly.

If an individual decides to purchase a home, the key risk to consider is the idiosyncratic risk associated with that home. The risks associated with owning a single home are very different than those for a diversified portfolio of homes (e.g., a Case-Shiller Index). While many people consider houses to be a “safe” investment, the historical volatility of individual homes has been approximately double that of city-specific home price indexes, with an annual standard deviation of 12%. This level of volatility has historically been associated with a portfolio that is 60% stocks and 40% bills. Therefore, a home is hardly a risk-free asset. The risks of home equity are further magnified by leverage. For example, a household that puts a 20% down payment on a home has

\(^{36}\) See “No Portfolio Is an Island” by Blanchett and Straehl (2015) for additional work on this topic.

\(^{37}\) Or a spouse who is unwilling to be a “renter.”
an asset with an equivalent level of volatility as large as a three-times leveraged stock index, easily the riskiest asset in the household portfolio. It is worth noting (again) that there is very little market risk for homes (the average market coefficient for the five-factor regressions was 0.18), and relatively little exposure to the size or value factors as well.

Unlike other assets that have an obvious and somewhat intuitive impact on how a household should invest their financial assets, the impact of homeownership is less clear. For example, a household with a fully accrued pension benefit has an asset that is effectively bond-like, and can therefore take more risk in the remainder of their portfolio (versus the average household that may have fewer pension benefits). Defined-benefit pensions, for the most part, are all the same in terms of their impact on a household's total wealth. In contrast, the potential impact of homeownership depends on things like the unique risks associated with the home (e.g., is it in an economically diverse area?), the extent of leverage used to purchase the home, the household's other wealth and non-financial assets (e.g., human capital and pensions), and the household's housing goals (e.g., does the household plan on staying in the house into the foreseeable future). Therefore, the true impact of a home is less clear and is going to be largely driven by that household's unique facts and circumstances.

**Conclusions**

A home is a unique household asset since it is both an investment and a consumption good. A home is an investment good such that it allows the household to accumulate wealth (i.e., equity in the home) over the duration of homeownership, and a consumption good since it provides shelter. When assessing the value of homeownership, it is important to understand both aspects—that is, to understand the risks associated with owning a home and whether it is the best way of providing shelter (as opposed to renting). We explored both of these perspectives at some length.

We found there are significant risks associated with homeownership. These risks are primarily idiosyncratic (i.e., not market-related), driven largely by the illiquid nature of owning a single home. We found the risk of homeownership is approximately double that of city-specific home price indexes (e.g., Case-Shiller indexes), with an annual standard deviation of 12%, which is approximately equivalent to the historical volatility of a portfolio invested in 60% (50%) stocks and 40% (50%) bills (bonds). While the return on house price indexes has exceeded inflation historically (a real return of approximately 1%), the actual real return realized by homeowners, after considering the various costs associated with owning and selling a home, is likely lower than inflation and potentially negative (in nominal terms). Therefore, renting is likely a better option for many households, especially those with lower marginal tax rates (i.e., households that do not itemize deductions) and those who plan to move again within a few years. We also note significant differences in the returns, volatility, and market risk of homes and REITs, which suggests REITs are a relatively poor proxy for residential real estate from an investment perspective.

And we have identified some of the factors, such as home price, county unemployment rate, housing turnover, home size, and even average annual temperature, that can differ by region and are strongly related to the returns, volatility, and market risk of homeownership. Households may use this factor information to better approximate the risk of their homes. Overall, the impact of owning a home on the optimal total wealth financial portfolio is likely to vary significantly by household, based on the unique risks associated with the home, household wealth, and other non-financial household assets.

**References**


