

Buy vs. Rent

Understanding the economic question

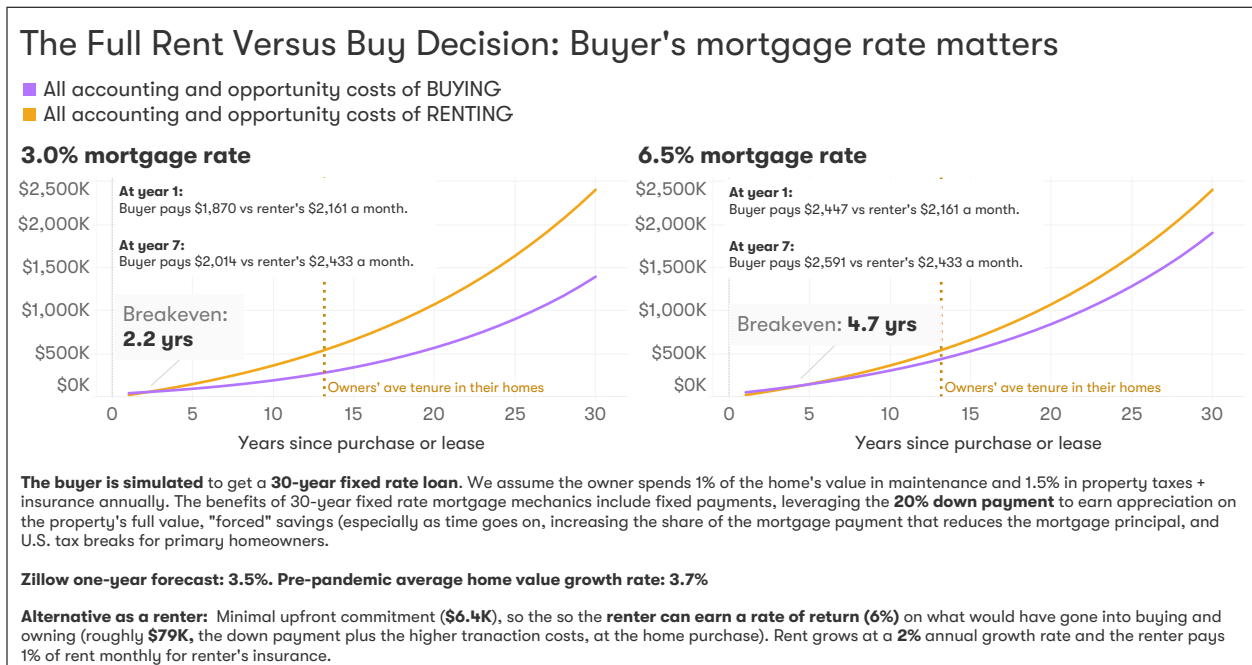
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Rather than ask “Can the typical household own a home?” here we seek to answer “Should they?” We strip the decision down to its financials by estimating comparable for-sale prices and asking-rate rents on the typical home and then simulating transaction costs, home values, rents, insurance, property taxes, maintenance expenses, and mortgage dynamics into the future to determine if the household is financially better off renting or buying the same home. (Not considered in this paper are cases in which properties available to purchase are not really available to rent.)

If you’re a risk-loving, stock-savvy individual who loves living in a different city every few years and never wants to paint a wall, you’re a “lifestyle renter.” If you want to shape your home into your legacy over many decades, you’re obviously a buyer.

We’re talking about the household in between: a typical risk-averse household unfamiliar with stock markets beyond retirement funds. The household is interested in the lifestyle that buying a home has to offer, but its members aren’t certain they will want to (or be able to) stay in the house they can afford for decades. What is that cutoff point? In other words, how much time is needed for the financial advantages of buying with a fixed-rate mortgage in the U.S. to overcome the large transaction costs of becoming an owner?



When mortgage rates are near 3%, the majority of buyers break even and start building up a windfall relative to a renter investing fully but conservatively within a few years. With mortgage rates above 6%, home buying is for households making a long run financial decision again.

A consumer should buy if...

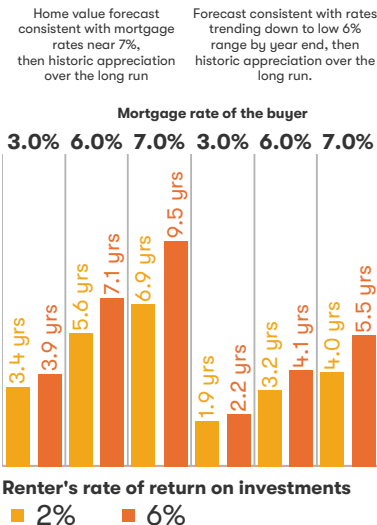
- They are confident they will or can stay in the home long enough for the financial benefits of buying their primary home to overcome the lower upfront costs of renting the same unit and investing in stock markets. This is the breakeven year.
- They consider the “price” of selling before the breakeven year worth whatever value they place on having full control and the option to customize the property during that time.

The Full Rent vs Buy Decision

Breakeven Year

The number of years you have to own the home for fixed payments, leverage, tax breaks, and “forced savings” to outweigh the advantages of renting: lower up-front costs and the opportunity to access an alternative investment, like a high yield cash account or the stock market.

Here we show how the financial advantage of home buying varies with the home value forecast, the mortgage rate of the buyer, and the buyer’s ability to access alternative investments like stocks.

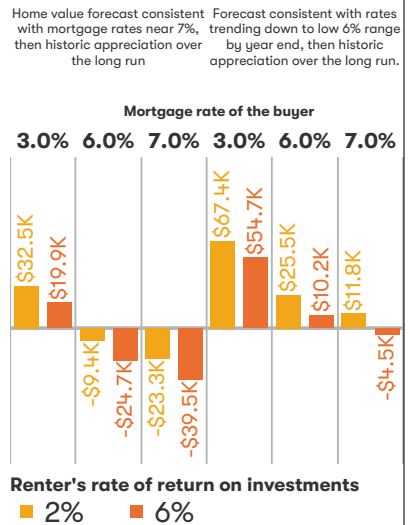


Annual savings or cost of owning if moving after 5 years

While owners, including older Americans, stay an average of 13 years, life happens. Younger buyers in particular move more often.

Full control over your space and the opportunity for customization, may still be worth the economic cost of ownership even if leaving earlier than intended.

When mortgage rates were near 3%, a new homeowner could still earn a windfall after only 5 years. Today, short hold periods or home flipping is much harder, but for those with trade-skills, sweat equity can further reduce the economic loss of a short tenure owning.



The buyer secures a **30-year** fixed rate mortgage with a **20%** down payment. The owner spends 1% of the home’s value in maintenance and 1.5% in property taxes plus insurance annually. Mortgage amortization, tax breaks, and home price growth are incorporated.

Zillow one-year forecast under improving mortgage rates: 3.5% (assumes mortgage rates remain near mid-6% for H1, then trend down to low 6% by year end). **Flat if back to 7%.**

Pre-pandemic average annual appreciation: 3.7% (includes housing crash).

Alternative as a renter: Minimal upfront commitment (**\$6.4K**), so the renter can earn the given rate of return on what would have gone into buying and owning (roughly **\$79K**, the down payment plus the higher transaction costs, at the home purchase). Rent grows at a **2%** annual growth rate and the renter pays 1% of rent monthly for renter’s insurance.

The rent versus buy equation separated into three components:

1. Upfront financial commitment
2. Affordability of recurring monthly costs
3. Investment component

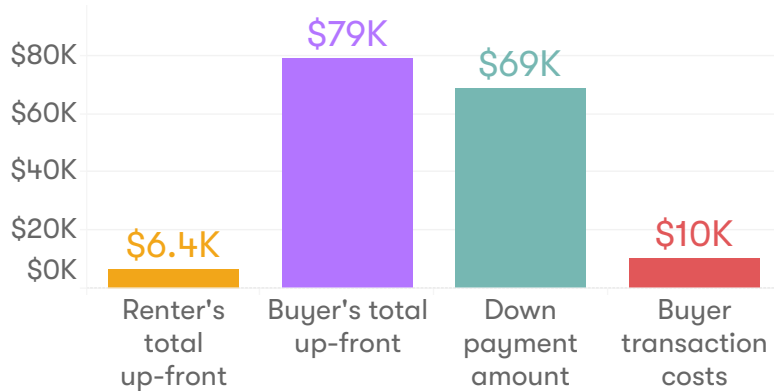
Our contribution here as **public-facing Zillow economists** is not just to update previous reporting on Zillow's rent versus buy breakeven, but to explore renting versus buying so that the customer can really **understand the decision and its tradeoffs**. When we report one number that supposedly summarizes so much complexity, we ask the audience for significant trust and hide a lot of detail. Each breakout is still fairly complex, but much less so.

There is also value in the details, especially for individual households, each with different concerns. Renting versus buying, depending on where you are in the country or on your credit profile, can be nuanced. It can be good for affordability and stability into the future, but bad as a real estate investment, for example. Breaking down the rent versus buy decision into three components goes a step beyond a black-box style number to help customers make decisions according to what matters to them.

Upfront costs:

Perhaps most salient to the potential buyer are the upfront costs to achieving homeownership. Have they saved enough to become a homeowner in the first place? To simplify what will be a fairly complex decision, we're going to assume the potential buyer could put 20% down and then we explore whether they actually want to buy. Increasing access to assistance for a down payment and not to seed a stock

Understand Rent Versus Buy: Up-front financial commitment



The renter's up-front financial commitment is first and last month's rent as well as the security deposit (one month's rent). We use a \$35 dollar application fee (available for multiple application within one month on Zillow).

Transaction costs for a mortgaged buyer is highly individual. The systems to operate and measure those costs are young and our sample sizes are still growing before they can represent the general mortgage experience. We assume a fixed 3% transaction cost at the home's purchase.

This graph does not include the buyer's or seller's agent commissions, which have been traditionally paid for by the seller via a pre-arranged agreement, or other seller transaction costs at sale, such as excise taxes. Those cost however are included in Zillow's full Rent vs. Buy simulation.

portfolio is another point in favor of homeownership, to be explored later.

BUYING WITH A FIXED-RATE MORTGAGE:

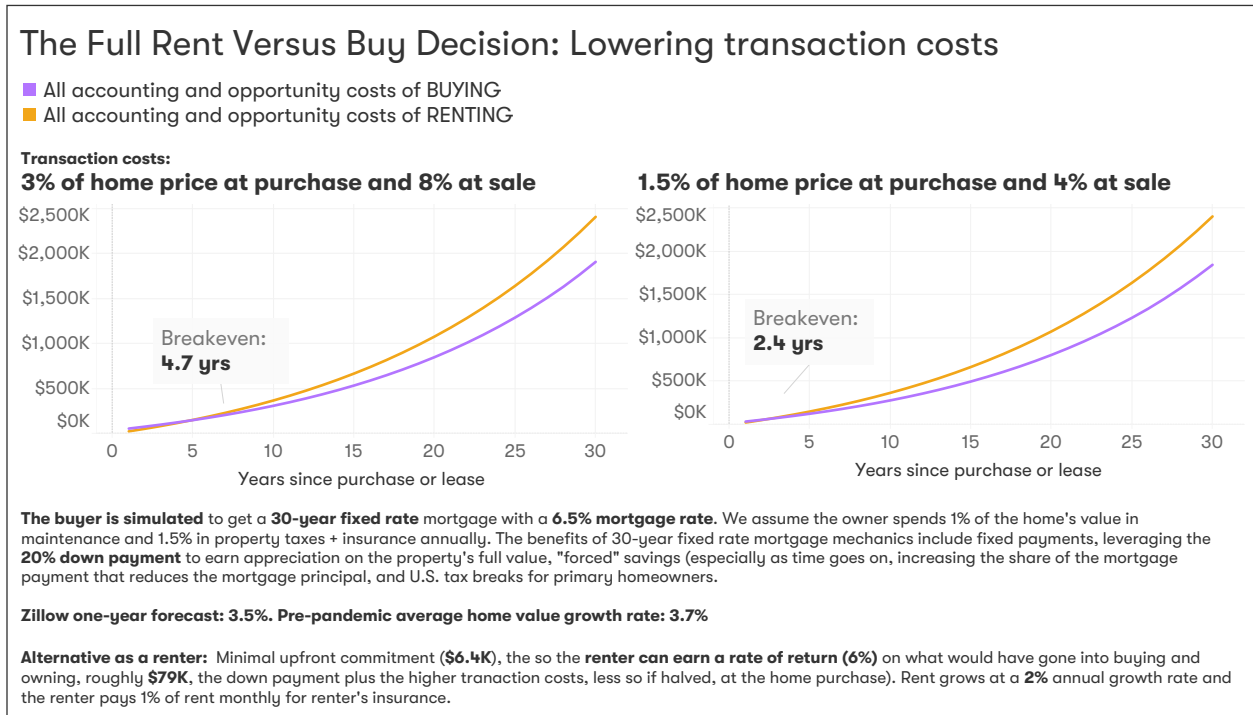
Transaction costs:

The big, true (paid and gone) transaction costs when buying a home include the buyer's and seller's real estate agents' commissions (usually paid by the seller), excise taxes, and myriad mortgage, title, inspection and paperwork fees that all add up, make buying something you don't want to do often. It's the kind of financial decision that requires commitment. Even at today's rates and more modest home price expectations, we'll show that it can still make a lot of financial sense to buy a

home; that even with eroded new homeowner affordability, a buyer will overcome the upfront costs. But the monthly savings for a buyer are smaller than they were when rates were lower and the upfront costs can be even more sizable as home prices rise, so it will take longer and be advantageous to only the more committed and stable of buyers.

Over time, innovative property technology companies, especially customer-obsessed ones like Zillow, will use software, cleaner processes and data piping to make mortgages and home buying easier and/or cheaper to execute. To demonstrate the power this has in increasing the scenarios in which a customer would break even as a buyer even if they have to move earlier than they intended, we allow the user to explore what happens when we halve the transaction cost on both the buy side (from 3% to only 1.5% of

home price at purchase) and sell side (from 8% to only 4% of forecasted home price at sale) of the transaction.



Down payment

The down payment is not truly an accounting cost, since you'll get it all back when you sell (so long as home prices don't fall), but you still need to save up for it to get the loan. Since home prices outpaced income by a long stretch during the pandemic, it takes significantly longer to save up for the same down payment share, even when saving median household income at the same rate. As housing competition slows down, it might not be as important to have a big down payment as a means to outbid others; today's potential buyer may still need to delay homeownership to save enough to make the mortgage payment affordable or to qualify for a loan (typically your debt-to-income ratio, including debt unrelated to housing, like student loans, has to be below 43%).

UPFRONT COSTS TO RENT

Ultimately, the biggest benefit to renting is avoiding the big upfront financial commitment required for buying, which keeps the household better able to accept change, like job loss, or to proactively explore different lifestyles and areas. Beyond

the rent itself, a renter typically pays many application fees (but only \$35 for multiple rental applications within a month on Zillow) as well as a broker fee in expensive markets like New York City (assumed to be zero in our simulation). (The rental deposit and first and last month's rent are not true accounting costs like the down payment, since we will assume you get them back, but since they were tied up instead of invested, we will account for that in our math.)

Monthly affordability (recurring costs)

The next most salient (easy to see and understand) cost of renting or buying are the monthly costs. Which option is more affordable on a regular basis? To figure this out, we need to add up all the recurring costs. For the renter, this is simpler: rent, renter's insurance (1% of rent monthly in our simulation), and other potential fees, such as pet or parking fees (0 in our simulation), which are likely to be varied and particular to individual buildings and renters.

RECURRING COSTS OF BUYING IN OUR SIMULATION

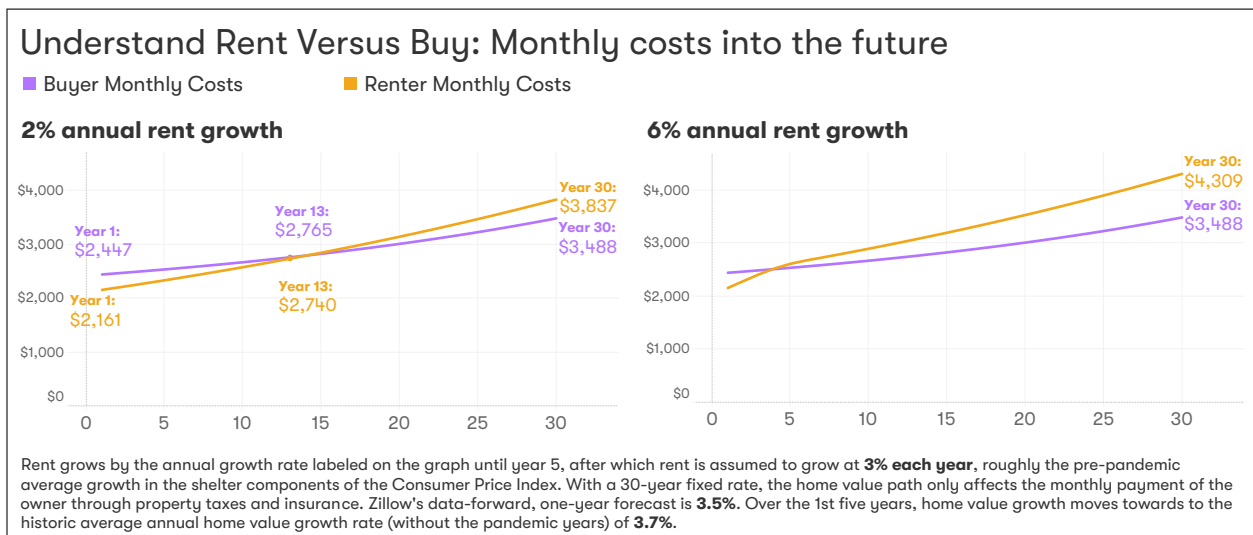
- Interest portion of the mortgage: The portion of your mortgage payment that goes to interest is the cost of leverage, a big advantage of mortgages (discussed more below). Shortening the loan term does not just allow the borrower to access a low rate, but the shorter amortization schedule also pays down the mortgage faster by decreasing the interest portion in your mortgage payment.
- Property taxes: Simulated as 1% of home value. In a high tax district, breaking even will take longer than shown. (Local-tax-informed rent versus buy break-evens will be released soon.)
- Property insurance: Simulated as 0.5% of home value. In a flood plain? In a high-risk fire area like California? The breakeven will take longer or will never happen, depending on the level of insurance needed for a fair mortgage.
- Home maintenance: Steadily setting aside 1% in the home's value every year to smooth out spending on home repairs.
- Condo or HOA fees: Assumed 0 in our simulation, but fair and healthy HOA costs and management are likely critical to homeowner success when an HOA is in place.

- For simplification, we assume no differences in utility payments between buying and renting, that is, your landlord fully accounts for utility costs in the rent or you use and pay utilities when renting as you would when owning.

FIXED-RATE MORTGAGES: A HEDGE AGAINST FUTURE RENT GROWTH

When mortgage rates rose, mortgage payments increased dramatically, putting rent and buying more on even footing for the first time in a long time. The renter can avoid some uncertainty (such as unexpected maintenance expenses or increases to property insurance brought on by climate change), but the renter is ultimately more at the mercy of market-rate dynamics. Despite home prices continuing to grow, a fixed-rate mortgage holder has a payment that remains fixed, acting as insurance against future rent growth (and/or having to move to avoid it) as well as future increases to the mortgage rate, had they delayed purchasing. When asking-rate rent growth is flat or soft, like it is now, and especially when falling, the urgency behind this benefit falls back, but significant rent growth will most likely return if all our thinking regarding [generational underbuilding](#) is correct.

New homeowners that lock in higher mortgage rates are insulated by the future opportunity to refinance should the economy undergo future stress (mortgage rates are often counter-cyclical to general economic health) while the household continues to earn well.



The investment decision

Perhaps hardest to shape for the buyer is the investment decision of buying, perhaps especially one's primary home with a mortgage or some other financial invention. Mortgages are complex financial products. Even more challenging are the tax implications to consider.

INVESTING (WITH A FIXED-RATE MORTGAGE)

Aside from potentially offering a smaller payment on a monthly basis, the next most compelling value that pulled folks toward home buying over the past decade was record home price appreciation. Homeowners today hold some of the highest home equity of all time. High rates, and even the results of this very analysis, mean that home prices should grow more modestly into the future. In our simulation, we'll let the user choose between different scenarios depending on what they're comfortable believing about future home price growth.

Leverage and home equity growth

Leverage is an underappreciated benefit of buying with a mortgage. With only the down payment (and hefty transaction costs, of course), the buyer accesses future home price appreciation on the full value of the property, not just the 20% that was put down. But the rub is you had to borrow a huge amount of money to do it. Some people, usually only the very wealthy, do leveraged investments in stock markets, because you'd be on the hook for debt in a market as up and down as the S&P 500. You can do it in real estate for your primary home because the U.S. government has long insured a big bulk of U.S. mortgages, so if you do lose your job and can't pay the premium anymore, the eventual holder of your mortgage can still be recouped/compensated. This support from the federal government keeps these kinds of loans happening for buyers of primary homes.

Forcing us to act long term — “forced savings”

A small portion of the mortgage payment goes to principal at the beginning of your loan and then as time passes, a larger and larger share of your payments are also taking down your debt, so that when you sell the home and dissolve

the mortgage loan, you'll be paying back less. The lower the rate, the larger the share of the payment that goes toward principal, especially in the early months, and the greater the advantage of "forced savings" involved in paying your mortgage.

When the rate is below 3%, as it was in 2021, the share that pays down your debt is actually quite big in the early years, but as interest rates rise, that share "asymptotically approaches zero." That \$500 SAT word is a super fancy way of saying that after the mortgage rate rises past 7%, the share that goes to principal in the early months is already super small and can't get much smaller, even if rates go higher and higher.

Tax benefits

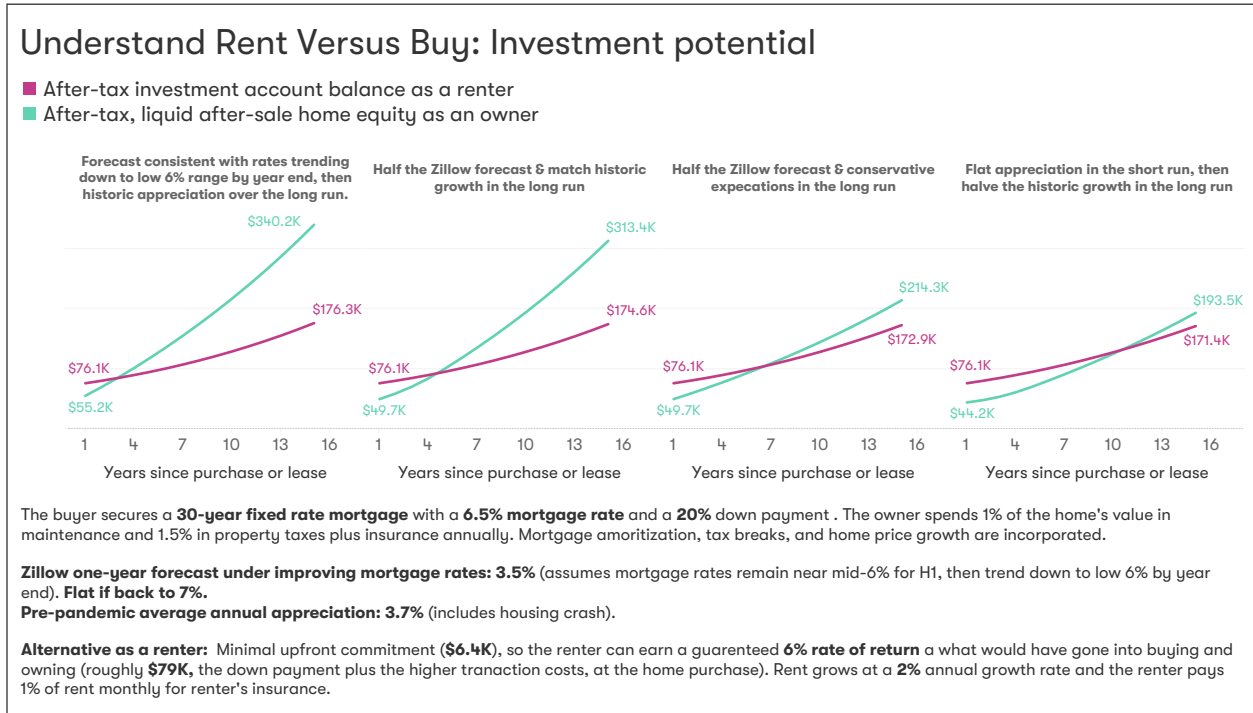
The U.S. has long encouraged and supported home buying, so there are big tax benefits. The property tax deductions and mortgage interest deduction (MID) used to be bigger deals, but then standard deduction doubled in 2016, balancing the playing field between buyers and renters from those sources in all but the most expensive homes. But then, those homeowners don't get to run away to enjoy the tax breaks too much, since both the MID and state and local tax deductions (SALT) have been capped. The real benefit is the capital gains exclusion: \$250K for singles and \$500K for married-filing jointly. That's no taxes on profits up to \$500K. In stock markets you'll likely pay 15%, 25% if very high income, on the profit you make.

RENTING AND INVESTING IN STOCKS

Renters who invest in stocks instead accept the uncertainty and risk of stock market volatility and potential rent hikes.

This is what economists call the "opportunity cost" of buying. It's what you lost when you didn't take the road not taken. When you used your down payment to buy the house, you lost the opportunity to earn a rate of return on an alternative asset. A renter can invest their down payment, and any savings each month, if any, into a diversified investment portfolio with much lower transaction costs or broker fees than in real estate. The stock market is traditionally more volatile, allows fewer tax breaks, and is without the government-

insulated, mortgage-specific financial advantages, like leverage using federally insured debt, discussed above.



What kind of return we assume the renter earns on the alternative asset is the important question to answer next, and to do that well, we have to think about the typical first-time buyer, the person who is making this decision. This is not a wealthy, risk-loving individual. The primary form of investment of the typical American is real estate, because stock markets, in many ways, have only recently become available to them. The typical American likely finds stock markets intimidating. There is a whole debate in economics called the “equity premium puzzle,” which tries to figure out why people underinvest in stocks, even relative to stocks’ greater risk. We’re fairly conservative and financially uninformed when we approach those mysterious financial markets. Real estate is tangible, right in front of you. And it is the asset whose value you can personally influence by taking good care of it, fixing it up with your own sweat equity, offering a greater promise of control than putting your money into the black box of the stock market through a website.

In our main simulation, the renter is fully investing the money that would have been used to buy a home or maintain

ownership of a home into a relatively conservative investment (earning a risk-free 6% return every year) in order to reflect the risk aversion of a financially informed household. We also explore how much more quickly the buyer overcomes up-front cost, making buying the financially advantageous choice if the stock market underperforms or if the household will fail to truly invest by keeping its savings in a lower-interest savings

Stress testing the breakeven year across options

Method for home price path	Mortgage rate	Alternative rate of return	Early rent growth	Transaction costs	
				3% of home price at purchase and 8% at sale	1.5% of home price at purchase and 4% at sale
Forecast consistent with rates trending down to low 6% range by year end, then historic appreciation over the long run.	6.0%	2%	6%	3.0 yrs	1.6 yrs
			2%	3.2 yrs	1.6 yrs
		6%	3.6 yrs	1.9 yrs	
	6.5%	2%	6%	4.1 yrs	2.0 yrs
			2%	3.3 yrs	1.8 yrs
		6%	3.6 yrs	1.8 yrs	
	7.0%	2%	6%	4.0 yrs	2.2 yrs
			2%	4.7 yrs	2.4 yrs
		6%	3.6 yrs	1.9 yrs	
Home value forecast consistent with mortgage rates near 7%, then historic appreciation over the long run	6.0%	2%	6%	4.0 yrs	2.0 yrs
			2%	4.5 yrs	2.5 yrs
		6%	5.5 yrs	2.8 yrs	
	6.5%	2%	6%	5.0 yrs	3.7 yrs
			2%	5.6 yrs	4.2 yrs
		6%	6.0 yrs	4.5 yrs	
	7.0%	2%	6%	7.1 yrs	5.3 yrs
			2%	5.4 yrs	4.1 yrs
		6%	6.2 yrs	4.7 yrs	
6.5%	2%	6%	6.6 yrs	5.1 yrs	
		2%	8.2 yrs	6.1 yrs	
	6%	5.9 yrs	4.5 yrs		
7.0%	2%	6%	6.9 yrs	5.2 yrs	
		2%	7.4 yrs	5.6 yrs	
	6%	9.5 yrs	7.0 yrs		
Flat appreciation in the short run, then halve the historic growth in the long run	6.0%	2%	6%	5.9 yrs	4.3 yrs
			2%	7.3 yrs	5.2 yrs
		6%	7.8 yrs	5.6 yrs	
	6.5%	2%	6%	11.0 yrs	7.7 yrs
			2%	6.7 yrs	4.9 yrs
		6%	8.4 yrs	6.1 yrs	
	7.0%	2%	6%	9.1 yrs	6.6 yrs
			2%	14.0 yrs	10.0 yrs
		6%	7.5 yrs	5.6 yrs	
6.5%	2%	6%	9.8 yrs	7.3 yrs	
		2%	10.8 yrs	8.0 yrs	
	6%	18.2 yrs	13.6 yrs		

account (a risk-free 2% return every year). While in our model we're delivering a guaranteed return to the renter and there are no transaction or broker costs for investing in the stock market, one should still approach stock markets as a buy-and-hold strategy. Having to sell a home in a down market because of a liquidity problem (the loss of a job or the need for cash) before the owner intended can be financially punishing. If you can confidently hold onto your home for a long time, you'll more reasonably earn the long-term average you may expect in the stock market.

Methodology: Simulating the rent vs. buy equation

Economic question: A customer has a given lifestyle in mind. They have multiple paths they can take in gaining this lifestyle. We want to answer whether it is better to rent or to buy the same home to achieve that lifestyle.

Buying a home =

- a consumption decision for ongoing shelter and utility in the space
- plus an investment decision on an appreciating asset (with maintenance).

So the alternative, and opportunity cost, is renting to consume shelter and utility from the space, and investing in some alternative asset unrelated to real estate that has a similar risk and return.

What we'll do: Simulate the purely financial aspect of the decision so that the decision maker can decide if it is financially advantageous to commit to homeownership with a fixed-rate loan. Functionally, we'll estimate the time horizon the buyer needs to maintain ownership to breakeven or if the difference in simulated costs on a short(er) horizon is at least at a price low enough to pay for the utility of full control of the property over that time.

Optimality then implies that a renter becomes a buyer if and only if:

$$S_{t=T}^B \geq S_{t=T}^R$$

Where $S_{t=T}^B$, $S_{t=T}^R$ denote the net present value for being a buyer and a renter respectively at time T, the intended years after purchase the buyer hopes to move again. The savings accrued from renting each period are the saved/invested funds that would have been used for a down payment and transaction costs invested at the risk-free rate plus the

recurring costs of owning a home net the recurring cost of renting (rent, rent insurance, application fees, etc.)

$$S_t^B = \text{OriginalUpfrontCosts}^{Buyer} + \text{TotalRecurringCost}^{Buyer} + \text{CapGainTax}^{Owner} + \text{ClosingCosts}^{Seller} + \text{OpportunityCost_Cumulative}^{Buyer} - \text{HomeEquity}$$

$$\text{HomeEquity}_t = \text{HomePrice}_t - \text{MortgageBalance}_t$$

$$S_t^R = \text{RentalBrokerFee}^1 + \text{TotalRecurringCost}^{Renter} + \text{OpportunityCost_Cumulative}^{Renter}$$

Setting the price and rent at the time of purchase, t=0

As the average of the middle third of unbiased neural Zestimates within any region studied, the Zillow Home Value Index is our most reliable estimate of a “typical” home price within an area. So we set the price at purchase,

$$P_{t=0} = ZHVI_{t=0}.$$

PRACTICAL REALITIES TO KNOWING THE PRICE AND RENT ON THE SAME HOUSE:

- Set of properties ever rented is distinctly different from the set of properties ever purchased.
- Only a subset of properties are sold or listed in every period.
- Set of properties listed for rent and for sale in the same period is negligible.

ZESTIMATION AT ZILLOW

The Zestimate, $Z_{t=n}^{FS}$, and Rental Zestimate, $Z_{t=n}^R$, are unbiased property-level estimates of current home price and market-rate asking rent, respectively. They use advanced machine learning algorithms and neural networks trained with historical home prices or listed asking rents against property features to jointly minimize error (median absolute percent

¹ The rental broker fee is the only upfront cost not already incorporated into another column (rent paid at time zero) or given back (security deposit). The down payment component of the original upfront costs of the buyer come back as home equity (Price_t – Mortgage Balance_t).

error, or MAPE) and minimize bias (median percent error) in predicting property valuation or rent.

ADVANTAGES OF NEURAL NETWORKS:

- Improved performance at higher data volumes/histories
- Radical improvement in Zestimate bias (MAPE)
- Significant improvement in accuracy (especially at price tails)
- Enough advancement to learn underlying patterns along spatial and temporal dimensions
- Ability to extrapolate, like parametric approaches, but unlike traditional ML classification methods
- [Zestimate accuracy](#)

So we should be able to exploit the estimates, with some reservation discussed later, on the same individual homes to estimate a “true” or at least “truer” price-to-rent ratio than previously available. With these property-level estimates of price and asking rent, our preferred method for evaluating the breakeven simulation at scale (for many different regions and scenarios) is to set rent in the first year such that

$$R_0 = ZHVI_{t=0} \times \text{MEDIAN}_{i=1,\dots,K}(Z_{i,t=0}^R / Z_{i,t=0}^{FS})$$

In which K is the total number of housing units (single-family, townhouses, condos and co-ops; excludes mobile homes) in the region.

WHY NOT JUST USE THE ZESTIMATE AND RENTAL ZESTIMATE AT THE PROPERTY LEVEL?

The computer processing load to estimate the full simulation is too great to reliably run the buy vs. rent break even simulation at the property level for public production. So we apply the typical price-to-rent ratio to the ZHVI and only have to calculate the buy vs. rent simulation for each scenario for each metro once. The $\text{MEDIAN}_{i=1,\dots,K}(Z_{i,t=0}^R / Z_{i,t=0}^{FS})$ also has public metrics potential for other applications by researchers beyond this one.

ALTERNATIVES USED TO DEMONSTRATE THE IMPORTANCE OF ESTIMATING A ZHVI-COMPARABLE RENT

- Median rent of households who moved in the past year to detached, two- to four- bedroom, single-family rentals (Zillow analysis of 2021 ACS, IPUMS.org). This estimate is typically the lowest for rent, including some very long or familial tenant-landlord relationships and other ways that tenants can experience lower “off-market” rents.
- Zillow Observed Rent Index (ZORI): Rental-market propensity weighted average rental Zestimate. Propensity is conditional on property type, year built and bedroom count. ZORI is a very useful metric designed to capture the rented housing stock, not the full stock, to make it comparable to ZHVI.

REMAINING CONCERNS IN THIS APPROACH

- One available listing on Zillow could represent multiple units, among other data quality differences between rental Zestimation and home price Zestimation, likely driving different distributions of errors.
- A subset of all rental units is listed on Zillow in every period, and that sample is likely to be toward higher quality and larger properties. Low-end rentals are more likely to go straight to Craigslist. In contrast, we likely see a more complete sample of homes that hit the for-sale market due to our for-sale market’s maturity. However, rental stock is systematically higher quality and larger than for-sale stock. At the moment, we do not know if these dynamics balance each other out.

Setting future price growth

The user will purchase the typical home in the metro (ZHVI) with only 20% down on a 15- or 30-year fixed-rate loan. The buyer will then earn appreciation on the full purchase price. To account for the user’s level of risk and what they’re willing to accept about the future of home price growth, they can choose three different home price path scenarios that will set P_t as the consumer holds the home after purchase:

- Data-forward in the short run, optimistic in the long run
 - ZHVF (Zillow’s one-year forecast for ZHVI) over the first year, after which the growth rate moves toward the long-term historical growth rate along a cubic spline over five years.
- Data-forward in the short run, more practical/conservative for the long run
 - ZHVF (Zillow’s one-year forecast for ZHVI) over the first year, after which the growth rate moves toward half the long-term historical growth rate along a cubic spline over five years.
- Conservative in the short run and the long run
 - Flat over the first year, after which the growth rate moves toward half the long-term historical growth rate along a cubic spline over five years.

Costs and benefit streams of buying

TRANSACTION COSTS AT PURCHASE

$3\% \times P_0$ at purchase and $8\% \times P_{t=n}$ at sale

- Assumed to include commissions, fees (title, mortgage fees and points, etc.), excise taxes, etc., and can vary greatly by individual, state and local jurisdictions.
- Ongoing work: Estimating “true” or observed transaction costs for home buyers from Zillow’s database.

INTEREST PORTION OF MORTGAGE PAYMENT

Assumes a 15- or 30-year fixed-rate loan, mortgage rate locked at $t=0$. Mortgage rate is set in the simulation to explore before the pandemic (3%) and now (7%). (We will use this 4 percentage point change to explore the sensitivity to many of the parameters set in the simulation.)

PROPERTY TAXES

Assumed $1\% \times P_t$ annually

- This is a dramatic simplification since property taxes vary widely across different and unique sets according to county, city and school district.
- Ongoing work: Effective property taxes within these overlapping boundaries was recently estimated but are not incorporated in this simulation yet.

PROPERTY INSURANCE

Assumed $0.5\% \times P_t$ annually

- Ongoing work:
 - Insurance premiums are also available in public records within the same region cross-sections to estimate property taxes above.
 - A potential collaboration with Allstate Insurance Company as well as climate risk information providers should increase the transparency in this area, especially as it relates to home purchasing decisions in locations impacted by the climate crisis.

MAINTENANCE COSTS

Assumed $1\% \times P_t$ annually

- This is an oversimplification. Maintenance costs are likely highly personal as it is dependent on the human capital or professional network of the potential buyer, the costs and availability of help/skilled labor in the region, and/or the age of the house.

CAPITAL GAINS TAXES ON PROFIT ABOVE \$375K

Assumes half of the household is married, so can deduct the average of \$500K and \$250K, when applying the capital gain exclusion for the primary purchase. The estimated taxes use the local median household income to set the tax rate, but this is almost always 15%.

CONDO OR HOA FEES

Assumed 0 in our simulation

- Fair and healthy HOA costs and management are likely critical to homeowner success where an HOA is in place.

PROPERTY TAX AND MORTGAGE INTEREST DEDUCTIONS

These are only triggered in the simulation if property taxes and mortgage interest exceed the standard deduction (data on other itemized deductions not incorporated). Since new limits on SALT deductions and the doubling of the standard deduction, at the median, this is almost never triggered without other itemized deductions to overcome the standard, so this is more or less negligible in the simulation.

Renting and investing

RENT GROWTH

Because of relatively short rent histories within Zillow's database, we do not yet have a formal forecast for asking-rate rent. To explore the impact of rent growth, we allow the user to choose 2% or 6% in the first year before splining to 2% annual growth by the fifth year.

RENTAL BROKER FEE

Assumed 0

RENT DEPOSIT

You get it back, but used in opportunity cost calculations together with 1st and last months rent required at signing (and so tied up instead of invested in our simulation logic)

RENTERS INSURANCE

1% of rent monthly

$$\begin{aligned} \text{TotalRecurringCost_Buyer} &= \text{MortgagePayments_Cumulative} \\ &+ \text{PropertyTax_Cumulative} + \text{OwnerInsurance_Cumulative} \\ &+ \text{Maintenance_Cumulative} + \text{CondoHOAfee_Cumulative} \\ &- \text{ExtraDeductions_Cumulative} \end{aligned}$$

$$\begin{aligned} \text{TotalRecurringCost_Renter} &= \text{Rent_Cumulative} \\ &+ \text{RenterInsurance_Cumulative} \end{aligned}$$

Opportunity cost and the renter's investment stream

A major contribution from this work is to disentangle the investment streams of this decision from the more salient if still not totally certain upfront and monthly costs of the two options: rent or buy.

To make a comparable decision to buying, as a renter, we assume that the renter is fully investing the money that would have been used to buy a home.

RATES OF RETURN AVAILABLE IN THE SIMULATION

- Risk free 2% over all time
- Risk free 6% over all time

The money invested by the renter includes any “savings” (the difference in monthly costs between buying and renting) each month. To keep it fair between the choices, the renter also then has to take money out of their investments to cover the difference during periods when out-of-pocket renter’s costs are larger than the homeowner’s for a similar property. The easiest way to mechanically code this is to estimate what the buyer would have earned as a return in the alternative asset with all the money they spent on housing. We then do the same thing for the renter.

The renter’s investment gains are then the buyer’s opportunity cost (what would have been earned in the stock market after capital gains taxes but can’t be earned if it’s locked up in housing as an owner) minus the renter’s opportunity cost (what they didn’t earn from stock markets because their money was tied up in renting).

Investment value of the renter

- = *After-tax interest earned investing everything they spent to buy and own*
- *After-tax interest earned investing everything they spent to rent*
- + *Original upfront costs for the buyer*
- *Original upfront costs for the renter*

The buyer’s comparable investment gain is their home equity (home price at sale minus the mortgage balance) minus the transaction costs and taxes they pay to liquidate the asset and get the return, and minus the down payment which they made in the first place.

Investment value of the buyer

- = *Home value at sale*
- *Mortgage balance at sale*
- *Seller transaction costs*
- *Capital gains tax of the owner after sale*

Zillow Research

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