

## Trulia's Rent vs. Buy Report: Full Methodology

This document explains Trulia's Rent versus Buy methodology, which involves 5 steps:

1. Use estimates of median rents and for-sale prices based on an area's housing stock.
2. Calculate initial total monthly costs of owning and renting.
3. Calculate future total monthly costs of owning and renting.
4. Factor in one-time costs and proceeds.
5. Calculate net present value to account for opportunity cost of money.

Together, these five steps yield a fair apples-to-apples comparison of the full costs of owning and renting similar units in similar neighborhoods. In March of 2015, we updated the methodology by using Zillow's Home Value Index (ZHVI) and Rent Index (ZRI) for our estimates of prices and rents. We back-calculated the rent vs. buy analysis to March 2014 using the ZHVI and ZRI for accurate year-over-year comparisons.

To explain it as simply as possible, we describe what we do and use the example of Seattle to illustrate each step. The description of the methodology is in plain text. *The illustrative example is in italics.*

**Assumptions are in bold.** At the end of this explanation, there is a single table that shows the whole example beginning-to-end and a list of all the assumptions.

### **STEP 1: USE ESTIMATES OF MEDIAN RENTS AND PRICES BASED ON AN AREA'S HOUSING STOCK.**

This first step sets up a fair apples-to-apples comparison of renting versus buying the median home and the median rental unit. It's NOT right to compare the median rent and median price of homes currently on the market. Doing that would be misleading because the mix of rental and for-sale properties on the market during any one-time period can be very different. To create an apples-to-apples comparison, we use the ZHVI and ZRI, which use the median estimated sales price and median estimated rent for the entire housing stock in a given area. Because these estimates are for the entire stock of housing, they are estimates of the true median prices and rents, rather than estimates of a fluctuating inventory. A full explanation of the ZHVI and ZRI methodology can be found [here](#) and [here](#). Because for-sale units are larger than rental units, on average, the ratio of price – to – rent is typically lower with this apples-to-apples adjustment than without it.

*In the Seattle metro area, the median asking price of for-sale homes listed on Zillow from March 2015 was \$329,000. The median rent for rental listings was \$1595. The ratio of prices to annual rent was 17.2 ( $\$329,000/(\$1595*12)$ ). The monthly mortgage payment, assuming 20% down and 3.87% 30-year fixed mortgage, is \$1237. A naïve comparison suggests that the monthly cost of owning (the \$1237 monthly payment) is 22% less than the monthly cost of renting (\$1595). However, this is hardly an apples-to-apples comparison, as the median listed rental in metro*

*Seattle was 1000 square feet, and the median listed for-sale home was 1874 square feet. The ZHVI price for the entire stock of homes in Seattle is \$344,700, and the ZRI rent is \$1850. The ratio of asking prices to annual rent drops to 15.5. With the adjusted price and rent, the comparison after step one of the analysis suggests that the monthly cost of owning (the monthly payment on 80% of \$344,700 is \$1,296) is 30% below the monthly cost of renting (\$1850, adjusted median rent).*

## **STEP 2: CALCULATE INITIAL TOTAL MONTHLY COSTS OF OWNING AND RENTING**

To calculate the monthly cost of owning and renting, we start with the adjusted price and rent from step one.

For owning, we assume a **20% down payment and 30-year fixed-rate mortgage at 3.87% interest** to calculate the monthly payment on a loan for 80% of the price. In addition to the monthly mortgage payment, we assume **annual renovation and maintenance costs of 1% of the home's value, annual insurance costs of 0.46% of the home's value, monthly utilities at \$100/month in excess of what renters typically pay, and property taxes at the average metro property tax rate**. All of these costs are assumed to increase slightly over time with either inflation or the home's value. In addition, we assume **owners itemize deductions at the 25% rate** (that's the national average, but you can test other tax brackets or not itemizing at all using our [interactive map](#)), so we subtract 25% of the interest portion of the mortgage payment and of the property tax payment.

For renting, we use the monthly rent and then add **renter's insurance at 1.32% of the monthly rent**.

*In the Seattle example, the monthly mortgage payment is \$1296 on the home worth \$344,700. Adding in renovation and maintenance, insurance, utilities, and taxes, and subtracting 25% of the mortgage interest portion and property taxes, brings the monthly cost of homeownership in the first year to \$1747. The initial monthly cost of renting in the first year is the rent plus renter's insurance, which equals \$1874. On this monthly-cost basis, owning now appears to be 7% cheaper than renting at the end of step two.*

## **STEP 3: CALCULATE FUTURE TOTAL MONTHLY COSTS OF OWNING AND RENTING**

Over time, we assume that home values and rents rise modestly and that there is general inflation, which affect many of the costs of owning and renting. Overall, the average monthly cost of owning rises less because the largest cost component – the monthly mortgage payment – is constant in nominal terms, which means it does not change regardless of inflation or price appreciation. But other costs of owning, like insurance, maintenance, and utilities, rise in line with home prices or inflation. We assume that prices and rents rise at the same rate, which averages **2.2% per year, though that varies by metro depending on long-term price appreciation history**. We also assume **inflation is 2% per year**. That implies an assumption of nearly flat prices and rents in real terms – a conservative assumption, and well

below the 30-year average annual home-price appreciation of 3.5% reported by FHFA. We assume **people stay in their home for 7 years**. Because many costs for owning and renting rise over time, the average monthly cost over the 7-year period is higher than the average initial monthly cost.

*For Seattle, our future appreciation assumption is 2.6% per year, which is a weighted average of Seattle's long-term historical price appreciation (4.4% per year over the past 20 years according to FHFA), the assumed 2% rate of inflation, and the most recent year-over-year price appreciation. Seattle's assumed 2.6% appreciation rate is above the national average assumption of 2.5% because prices have historically risen more in Seattle than nationally. Still, our assumption of 2.6% for Seattle is conservative relative to Seattle's long-term price history.*

*The median monthly cost of owning over 7 years is \$1810, and the median monthly cost of renting over 7 years is \$2,030. At the end of step three, therefore, averaging over 7 years the monthly cost of owning is 11% cheaper than renting.*

#### **STEP 4: FACTOR IN ONE-TIME COSTS AND PROCEEDS**

Both owning and renting involve costs and proceeds at the start or end of the 7-year period.

For owning, as mentioned above, we assume a 20% downpayment and price appreciation of 2.2% nationally. We also assume **closing costs of 4% (which includes any mortgage points, title insurance, etc.) when the home is bought and 8% (which includes the full agents' commissions) when the home is sold**. That means that at the start of ownership, there are both the downpayment and closing costs. And at the end of the 7-year period, the owner sells and receives proceeds equal to the current value of the home minus the unpaid principal balance of the mortgage and again pays closing costs. We also assume **capital gains tax of 15% for gains above the \$500,000 exclusion**.

For renting, the only one-time cost is a one-month's security deposit paid at the start of the rental and returned at the end.

*In the Seattle example, the upfront costs include a \$68,940 downpayment and \$13,788 in closing costs – which are 20% and 4%, respectively, of the \$344,700 purchase price. At the end of 7 years with 2.6% annual appreciation (the assumption for Seattle specifically), the sales price is \$413,779. The closing costs are \$33,102, which is 8% of the sales price. The proceeds at sale are the sales price minus the unpaid principal balance of \$236,602, which equals \$177,177. Total capital gains are \$69,079, well below the \$500,000 exclusion. Adding up both closing costs and the downpayment, and subtracting the proceeds at sale, yields a total of -\$61,347 over the 7 year period, which is equivalent to -\$730/month if spread out equally over the 84 months (12 months x 7 years). In other words, the net effect of all the one-time costs and proceeds is to reduce the average monthly cost of ownership by \$730. That brings the monthly cost of owning down to \$1080.*

*The one-time costs for renting cancel each other out: the month's security deposit is paid upfront and returned at the end. The monthly cost of renting therefore remains \$2030. At the end of step four, after taking both recurring and one-time costs into account, the monthly cost of owning appears to be 47% cheaper than renting.*

#### **STEP 5: CALCULATE NET PRESENT VALUE TO ACCOUNT FOR OPPORTUNITY COST OF MONEY**

“Net present value” is the standard way to compare cash flows over time. Intuitively, a dollar today is worth more than a dollar in the future because you could invest the dollar today and get a positive return on that investment. The “discount rate” is the assumed rate of interest you could get; equivalently, it is the opportunity cost of that money. The net present value approach takes the whole stream of costs and proceeds and translates them into the cost measured in dollars at the start of the period. Costs and proceeds farther out in the future get discounted more and therefore “count” less in start-year dollars.

This is important for the rent-versus-buy analysis because the costs and proceeds come at different times for owning and for renting. For owning, there's a big upfront cost – the downpayment – while the proceeds from selling come years in the future. That means that the cost of ownership needs to reflect the cost of tying up lots of cash in the downpayment – that's the opportunity cost. Renting doesn't involve either a big upfront cost or future large proceeds.

Applying a net-present-value calculation to both owning and renting **RAISES** the cost of owning because the future proceeds from selling happen at the end of the period and therefore get discounted significantly, while the initial downpayment doesn't get discounted at all. But the net present value calculation **LOWERS** the cost of renting in start-year dollars because the future dollar flows that get discounted most are all costs, not proceeds.

Net present value calculations depend on assumptions about the return on capital available in the market – this reflects the opportunity cost of capital and is called the “discount rate” We assume a **3.5% discount rate**, which is the sum of our assumption of 2% inflation plus an assumed 1.5% real interest rate. The discount-rate assumption depends on economic conditions and reflects not only today's conditions but interest rates probably increasing over the next few years.

*In the Seattle example, applying the net-present-value calculation means that the monthly cost of ownership in start-year dollars is \$1185. Again, this is **HIGHER** than the undiscounted monthly cost of owning (\$1080, above) because the proceeds from the sale at the end of the period get discounted most. The monthly cost of renting in start-year dollars is \$1771. This is **LOWER** than the undiscounted monthly cost of renting (\$2030, above) because the future cash flows involve no net proceeds. This is our final rent-versus-buy number. The monthly cost of owning is 26% below the monthly cost of renting, after taking into account all costs and proceeds and*

*discounting in order to capture opportunity costs. In dollar terms, the monthly cost of owning is \$463 less than the monthly cost of renting (numbers don't add up due to rounding).*

### **SUMMARY OF SEATTLE EXAMPLE**

In the Seattle example woven into this explanation, we reported the cost of buying versus renting after each step. Here is the summary:

<b>STEP #</b>	<b>Cost of buying versus renting</b>	<b>Why change from previous step</b>
Before step 1: compare median monthly mortgage payment and median rent WITHOUT accounting for unit size and other differences between rental and for-sale units	-22%	
Step 1: use ZHVI and ZRI estimates to compare monthly mortgage payment with rent	-30%	Adjusts for the fact that the subset of homes for rent and the subset of homes for sale during any one time period may be of different in terms of quality and location.
Step 2: add in other monthly costs, like insurance, taxes, and maintenance, to get total initial monthly payment	-7%	Homeownership involves more additional monthly costs than renting
Step 3: calculate future monthly costs and average over the 7-year period	-11%	The monthly costs of renting rise more over time than monthly costs of owning since mortgage payment is fixed
Step 4: factor in one-time costs and proceeds, like closing costs, downpayment, and final sales proceeds	-46%	Even with modest home price appreciation, proceeds at sale can be larger than downpayment plus closing costs
Step 5: apply net-present-value calculation	-26%	Homeownership involves significant upfront costs and future proceeds, which implies a large opportunity cost that raises the net-present-value of the cost of owning

In other words, there are lots of ways to get the rent-versus-buy calculation wrong: failing to adjust for how different for-sale and rental units are (step one) or ignoring one-time costs and proceeds (step four) would make buying appear more expensive relative to renting than it actually is. On the other hand, failing to add in other monthly costs like insurance, taxes, and maintenance (step two) or failing to apply

a net-present-value calculation (step five) would make buying appear less expensive relative to renting than it actually is.

## **SUMMARY OF ASSUMPTIONS**

In our rent-versus-buy analysis, it is necessary to make many assumptions. They are all explained above and summarized here:

Assumptions for our baseline scenario, with alternatives that we present for each metro in this [interactive map](#):

- Mortgage rate of 3.87%. Alternatives in the interactive map: 3.5%, 4.5% and 5.5%.
- Tax bracket of 25%. Alternatives in the interactive map: not itemizing, 15%, and 35% (which also assumes 5% tax bracket for state/local). Note: we compare renting and buying using a single itemizing scenario. Of course, the decision to itemize depends in part on whether you own but also on many other factors, like your state and local taxes, charitable contributions, and other deductible expenses. For people whose total itemized deductions are little different from the standard deduction, the not-itemizing scenario may be most appropriate.
- Stay in home for 7 years. Alternatives in the interactive map: 3 and 5 years.

Assumptions for all scenarios:

- 20% downpayment
- 30-year fixed-rate mortgage
- Annual renovation and maintenance costs of 1% home's current value for owners
- Annual insurance costs of 0.46% of home's current value for owners
- Utilities of \$100/month for owners
- Renters' insurance of 1.32% of monthly rent
- 2% annual inflation
- 4% closing costs at purchase
- 8% closing costs at sale
- 3.5% discount rate for net present value calculation

Assumptions that vary by metro area:

- Property tax rate
- Home price and rent appreciation (averaging 2.5% nationally)