2012 V00 0: pp. 1–31
DOI: 10.1111/j.1540-6229.2011.00321.x
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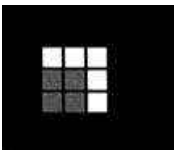

# Lessons from Over 30 Years of Buy versus Rent Decisions: Is the American Dream Always Wise?

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Homeownership is touted as the "American Dream." It is credited with enhancing wealth; increasing civic pride; and improving self-esteem, crime prevention, child development and educational outcomes, among other benefits. This article does not dispute any of these claims. Instead, this study hypothesizes that crowding toward homeownership raises the price of homes above their fundamental value resulting in the purchase of a home becoming a contraindicative action. After setting the holding period to the average American's tenure in a residence, renting (not buying) proves to be the superior investment strategy over most of the study period.

Homeownership is the "American Dream" (Matthews and Turnbull 2007, Cauley, Pavlov and Schwartz 2007, Phillips and Vanderhoff 2004, Painter and Redfearn 2002 and Tu and Eppli 1998, among many others). Homeownership is the most viable path to wealth creation for the majority of Americans (Engelhardt 1994, Haurin, Hendershott and Wachter 1996, Rohe, McCarhty and Van Zandt 2002). Homeownership enhances civic pride and improves voter turnout (Rohe, McCarthy and Van Zandt 2002, Dietz and Haurin 2003). Homeownership contributes to better societal outcomes—less crime, a better familial environment, *etc*. (Haurin, Parcel and Haurin 2002). These and other similar statements go nearly unchallenged in both the public and academic press. The concept of homeownership seems to be entrenched in our national psyche as an imperative, and it is supported at the highest levels of government.[1] The significant public policy efforts to enhance the percentage of homeownership combined with constant societal coercion toward homeownership ("why throw your money away on rent") serve as casual proof of this statement. In fact, the strong inclination toward homeownership is so pervasive that in our daily lexicon home ownership has become homeownership.

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[1]For example, June is the National Homeownership Month (110th Congress 2007).

Might there be some fallacy in this paradigm? Is there any evidence that does not support ownership? If so, what does that evidence suggest about future buy versus rent decisions? This article seeks to investigate the efficacy of the ownership paradigm and address these and other questions with a deceptively simple but straightforward analysis of the rent versus buy decision and what drives property pricing. In particular, financial arguments concerning the relationships between the rent-to-price ratio and property appreciation and the rent-to-price ratio and price volatility are combined with the national imperative to buy to investigate the rent versus buy decision.

Two major findings evolve from the analysis. First, *ex ante* and *ex post*, individuals were better off in economic terms, on average, to have rented for most of the years in the study period. This first result is strongly dependent upon fiscally disciplined individuals that, without fail, reinvest any residual savings from renting. Second, fundamental drivers now appear to be in place that favor homeownership over renting in the near-term future.

While the first finding might seem to fly in the face of the homeownership paradigm (specifically wealth creation), it is reasonable to find that most individuals still preferred homeownership during the sample period because ownership is in essence a self-imposed savings vehicle. Periodic mortgage payments (most typically monthly and amortizing) reduced any debt affixed to the residence and property appreciation, which occurred almost universally during this time period, allowed owners to take advantage of a levered appreciating asset in lieu of non-wealth-enhancing consumption spending. Said another way, while renting may have been wise, any extra savings from renting might be spent on non-wealth-enhancing goods resulting in any benefits from renting versus owning disappearing in a cloud of consumption spending rather than savings.

Additionally, the systematic bias toward homeownership in the United States helps explain the general upward trend in homeownership rates from 62.9% in 1965 to 67.4% in 2009 with a peak of 69.1% in 2005.[2] Rather than constantly evaluating whether owning is preferable to renting, the movement from renting to owning is almost exclusively a one-way path that is correlated with levels of income and wealth (Xiao and Liu 2007).[3] Thus, and not surprisingly, homeownership self-selects to the wealthier individuals in society, while simultaneously absorbing a significant set of self-imposed savers that might otherwise spend income and wealth on non-wealth-enhancing consumption. Therefore, the first

[2]U.S. Census Bureau: http://www.census.gov/hhes/www/housing/hvs/historic/index.html.

[3]According to Sinai (1997), less than 4% of owners ever transition back to renting and one-third of those transition back to owning within two years.

finding is reconcilable with earlier works that tout the wealth enhancement attribute of homeownership.

The second finding might seem unwise to many given the recent crash in the real estate markets around the country. However, rent-to-price ratios and required rates of appreciation now seem to be in place along with other fundamental drivers that favor ownership over renting in the near-term future.

Sections on a review of the extant literature, proposed hypothesis, data, methodology, results and concluding remarks follow in order.

## Literature Review

Potential homebuyers use "comps"[4] as the conventional yardstick to estimate the value of their future residence. This approach is analogous to valuating a share of Microsoft at $30 just because someone else recently paid $30 for a Microsoft share. Advocates of the efficient market hypothesis can argue for the validity of this approach, but only if there are many market participants that continuously evaluate Microsoft based on its future expected cash flows. Case and Shiller (1989), and more recently Beracha and Skiba (2011), show that residential real estate markets are in fact predictable and therefore inefficient. The inefficiency of the residential real estate market underscores the notion that the "comps" approach only provides the buyer with a relative rather than absolute valuation. In other words, the "comps" approach can only help us decide whether to buy property A or property B, but it is useless in making a buy versus rent decision due to its inability to provide an estimate of value in absolute terms. Shiller (2007, 2008) argues that failure to value housing based on its fundamentals combined with future home prices optimism lead to a feedback-speculative bubble where home prices are set well above their intrinsic value.

In contrast, some studies that seek to explain over- or undervaluation in the housing market use the price-to-income ratio as guidance (Case and Shiller 2004, McCarthy and Peach 2004, Beracha and Hirschey 2009). The price-to-income approach relies on the argument that home prices appreciate, at the very most, at the same pace as income growth over the long run. If homes appreciate faster than income growth, they become unaffordable unless a permanent deterioration in average house size and quality takes place (Shiller 2007).[5] Hence,

[4]The recent sale prices of nearby homes with similar characteristics.

[5]Gyourko, Mayer and Sinai (2006) show that in some "Superstar Cities" home appreciation has exceeded average income growth for an extended time period. This appears possible because high-income populations outbid low-income populations for the scarce space that is associated with these cities.

it is reasonable to expect that in general the price-to-income ratio for urban areas is mean reverting in nature, where above and below long-term average price-to-income ratios imply over- and undervaluation, respectively.

The rent-to-price ratio is also a common gauge in valuing residential real estate overtime (Martin 2008). The rent-to-price ratio is similar to the dividend-to-price ratio in corporate equities and is expected to fluctuate within a narrow range because theory suggests that the total cost of homeownership equals the cost of renting. However, while rent prices capture the vast majority of the total cost of renting, the total cost of homeownership is not so straightforward. More specifically, the price of property is not the total cost of homeownership. The total cost of ownership also includes varying factors such as maintenance, insurance, opportunity cost, property taxes, expected appreciation, buying and selling expenses and consideration of a different tax treatment from renting. Because home prices only represent a portion of the total cost of home ownership, most of the rent-to-price volatility is embedded in the volatility of home prices rather than that of rents (Verbrugge 2006, Kim 2008). This limits the ability of the rent-to-price ratio to serve as a single reliable home valuation measure.

The literature also includes studies that use more sophisticated methods to estimate value. Himmelberg, Mayer and Sinai (2005) point out the inability of price-to-income and rent-to-price ratios to accurately reflect housing costs. Instead of these ratios, the authors apply the user cost of housing to estimate the level of over- or underpricing in different U.S. residential markets. Verbrugge (2006) tests the standard Jorgensonian (frictionless) theory, according to which home user costs equal rents, finding a substantial divergence between the two that persists for long periods of time.[6] These findings, however, do not necessarily imply unexploited arbitrage opportunities because of the presence of transaction costs. Smith and Smith (2006) investigate the relationship between long- and medium-term internal rates of return and homeownership. The authors compare internal rates of return with expected rates of return to determine housing over- and underpricing. Interestingly, given the time period, the authors conclude that purchasing property at current market prices still appears to be a sound long-term investment strategy.[7]

To date, there does not appear to be any study that makes a long-term "horse race" comparison between renting and owning. This article contributes to the

[6] In an earlier study, Blackley and Follain (1996) also show divergence between user cost and rent.

[7] With the advantage of hindsight, one wonders if this conclusion was influenced by the paradigm of homeownership; however, this is mere speculation and beyond the scope of this work.

literature by making such a comparison across different cities and geographical regions in the United States over a period of 32 years.

## Hypothesis

Theoretically, as a purely financial asset, it can be shown that the price of a home must equal the present discounted value of its expected utility and expected returns to housing. Emotionally, however, buying a home is often considered an integral part of "living the American dream." Moreover, common wisdom advocates that owning a home is by far superior to "throwing your money away on rent." This belief is further reinforced by governmental policy and segments of the U.S. tax code that reward homeownership. Additionally, after periods of meaningful appreciation, homebuyers appear to fear that home prices will soon climb to levels they cannot afford. This is consistent with Shiller's (2007, 2008) argument that a psychological feedback mechanism contributed significantly to the recent housing boom where prices elevated above their fundamental value.

Given the paradigm of homeownership, and combining this predisposition toward owning with the fear of rising home prices, it can be argued that from the point of view of potential homebuyers that purchasing property seems preferable to renting despite low rent-to-price ratios and other economic factors that otherwise favor renting. As a result, potential homebuyers mostly ignore renting in favor of buying and do not consider the true cost of ownership. Such behavior is likely to cause home prices to rise above their fundamental rent value, which in turn makes renting highly preferable in economics terms. Therefore, it is hypothesized that when viewed across time, renting property will trump purchasing property in a future value "horse race." Furthermore, this should occur in the presence of other measures such as required and expected rates of appreciation that favor renting.

## Data

To identify rent-to-price ratios, this article relies on a data set constructed by Davis, Lehnert and Martin (2008) for the stock of owner-occupied housing. This rent-to-price index is based on five micro data sets from the Decennial Censuses of Housing (DCH) surveys with price indexes for housing prices and rents between 1960 and 2000. To improve the quality of the index, Davis, Lehnert and Martin (2008) use a hedonic model to control for the size, age, number of bedrooms and location of the property. The authors use rent and house price indexes to interpolate rent-to-price ratios between the DCH surveys and to extrapolate them beyond the year 2000. These ratios are created for the United States as a whole, its four geographical regions and 23 major metropolitan areas,

and it is available between 1978 and 2007 on a semiannual basis.[8,9] According to the authors, this is the first publicly available dividend yield over a long period of time for owner-occupied housing in the aggregate United States. In order to extend the rent-to-price indexes until the second half of 2009, this article uses the same method employed by Davis, Lehnert and Martin (2008) to extrapolate rent-to-price values. The extrapolation is based on the Bureau of Labor Statistics rent indexes and home price indexes from the Federal Housing Finance Agency (FHFA).

Home price indexes from the FHFA are also employed to calculate housing price appreciation and volatility. The average 30-year fixed mortgage rates are obtained from Freddie Mac and converted from a monthly to a six-month average rate that was offered to borrowers during the first and second half of each year in the sample period.[10] Finally, the risk-free rate and the broad stock market returns are obtained from Ken French's data library.[11]

## Method

### *Buy versus Rent Analysis—The Model*

For purpose of the buy-versus-rent analysis, a model is constructed simulating an individual that faces a buy versus rent decision at different times and locations.[12] Under the scenario that the individual buys a home, the model calculates the sale proceeds the individual expects to receive at the time of disposition of the property. The model does not allow sale proceeds to turn negative due to severe housing depreciation as any rational homeowner is assumed to take advantage of the mortgage default option in these situations. If the individual rents a home, the model calculates the expected value of an investment portfolio funded with money that otherwise would be used for homeownership at the end of the holding period. Higher expected proceeds from sale compared with the expected value of the investment portfolio would suggest that the individual is better off buying a home. Conversely, if the expected proceeds from sale

[8] All 28 areas are listed in Table 1.

[9] The data is available on Professor Morris A. Davis' Web site: http://morris.marginalq.com.

[10] Summary statistics traditionally reported are omitted in the interest of brevity. However, these statistics are available upon request from the authors.

[11] Dr. French's data library is available on his Web site: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[12] Typically, the term agent is used to represent actors in an economic model. This convention is abandoned here so as not to imply that real estate professionals are involved in the model.

are lower than the expected future value of the portfolio, renting a home is recommended. More formally

$$\begin{aligned} SP_{hp} < 0 &\rightarrow SP_{hp} = 0 \\ SP_{hp} \geq 0 &\rightarrow SP_{hp} = SP_{hp} \end{aligned} \tag{1}$$

and

$$\begin{aligned} SP_{hp} > IP_{hp} &\rightarrow \text{Buy} \\ SP_{hp} < IP_{hp} &\rightarrow \text{Rent} \\ SP_{hp} = IP_{hp} &\rightarrow \text{Indifferent} \end{aligned} , \tag{2}$$

where $SP_{hp}$ is the expected sale proceeds at the end of the holding period, and $IP_{hp}$ is the expected value of the investment portfolio at the end of the rent period. Thus, this piece does not seek to calculate the cost of ownership but rather to create a "horse race" between renting and owning by making a comparison between the value of an investment portfolio held by renters and the net selling proceeds collected by homeowners at the end of a holding period.

The model makes the following assumptions regarding the buy scenario. The individual uses a typical 20% down payment, and the remaining balance is financed with a conventional 30-year fixed-rate mortgage at the average market interest rate at the time of purchase. Additionally, following Verbrugge (2006), the individual pays closing costs[13] of 2% of the purchase price of the property along with the original purchase price at the date of closing. The expected property holding period is eight years, and the individual pays 6% in selling fees at the end of the holding period.[14, 15] As per Himmelberg, Mayer and Sinai (2005), the individual annually faces property taxes of 1.5% of the property value and maintenance and insurance expenses of an additional 2% during the holding period.[16] The individual also anticipates that all expenses associated with owning the property (property tax, insurance and maintenance) will increase each year at a rate equal to the price appreciation of the property. Finally, the model assumes that the individual itemizes and is in the 25% marginal tax rate bracket. Symbolically, the sum of annual outflows (out-of-pocket expenses)

[13]Closing costs include discount points, mortgage initiation fees, appraisal costs and lawyer and recording fees.

[14]According to Hansen (1998), the Census data show that eight years is the average home holding period in the United States.

[15]For robustness, expected holding periods between six and ten years are also examined, but the general results of this article remain mostly unchanged. These results are not reported in this article for purposes of brevity but are available upon request.

[16]In a comment to Smith and Smith (2006), Mayer suggests a range of 2–3% for maintenance and capital expenditure.

for the individual from homeownership is

$$OF_t = IM_t + PT_t{}^*(1 - \tau_I) + P_t + i_t{}^*(1 - \tau_I), \tag{3}$$

where $OF_t$ is the sum of individuals cash outflows during year $t$, and $IM_t$ and $PT_t$ are the cost of insurance plus maintenance and property tax at time $t$, respectively. $P_t$ and $i_t$ are the portions of the mortgage payment that go toward principal and interest during year $t$, and $\tau_I$ is the individual's marginal tax rate. The expected sum of the proceeds from sale at the end of the holding period is calculated using

$$SP_{hp} = \Pr ice_0{}^*(1 + A)^{hp*}(1 - SE) - MB_{hp}, \tag{4}$$

where $\Pr ice_0$, $A$ and $SE$ are the original purchase price, average percentage annual price appreciation of the property and selling expenses in percentage terms, respectively. The holding period in terms of years is defined as $hp$, and $MB_{hp}$ is the mortgage balance at the end of the holding period calculated as

$$MB_{hp} = MB_0 - \sum_{t=1}^{hp} P_t, \tag{5}$$

where $MB_0$ is the original mortgage balance and the other parameters are as defined previously.

Alternatively, if the individual rents a home, the model assumes that he/she initially seeds an investment portfolio with a sum equaling the total of the down payment and closing costs ($CC$) under the buy scenario. At the end of each year, the individual deposits into the portfolio an amount equaling the difference between out-of-pocket expense ($OF_t$) and the annual amount paid in rent. If the difference between the two happens to be negative, the individual withdraws rather than deposits that amount from the portfolio.[17] According to Himmelberg, Mayer and Sinai (2005), the opportunity cost associated with homeownership equals the risk-free rate plus an additional risk premium to compensate for the higher risk of owning versus renting. On the other hand, the authors point out that owning a home serves as a hedge against future rent changes, which eliminates much of the risk associated with owning compared to renting.

This article uses two different approaches to determine the rate of opportunity cost ($R$) associated with owning in order to span different types of homebuyers. The first approach simply assumes that the investment portfolio held by the

[17]This deposit or withdrawal ensures a fair comparison between the final value of the investment portfolio value and the property's proceeds from sale.

renter earns the risk-free rate. This approach may be appropriate for a homeowner who is not expecting to upgrade or downgrade residences and expects to stay in the same geographical area. The risk-free rate is appropriate for such homeowners because they receive constant utility from their homes while they benefit from a hedge against future rent changes. The fact that they are not expecting to change their home quality removes the risk associated with the resale value of their home. The second approach assumes that the homeowner's opportunity cost (the return on the renter's investment portfolio) is the return on a portfolio of equal risk to his or her levered residence. Hereafter, this portfolio is referred to as a risk-equal portfolio, and it includes a different mix of stocks and risk-free treasuries to match the risk associated with a levered residence in each particular location.[18] This approach is suited for homeowners who expect to change the quality of their residences. These homeowners do not fully benefit from the hedge associated with homeownership because the resale value of their current homes relative to the cost of their future residences is material. Under both approaches, a 20% capital gain tax ($\tau_{CG}$)on the portfolio is applied, and rent is expected to grow each year at rate $G$. Mathematically, the expected value of the renter's investment portfolio ($IP$) at the end of the holding period is

$$IP_{hp} = IP_0 + \left( \sum_{t=1}^{hp} (IP_{t-1}{}^{*}R) + OF_t - \mathrm{Re}\,nt_0{}^{*}(1+G)^t \right)^{*}(1-\tau_{CG}), \tag{6}$$

where

$$IP_0 = \mathrm{Pr}\,ice_0 - MB_0 + CC \tag{7}$$

and

$$IP_t = IP_{t-1}{}^{*}(1+R) + OF_t - \mathrm{Re}\,nt_0{}^{*}(1+G)^t \quad \text{for} \quad t > 0. \tag{8}$$

Here, $\tau_{CG}$ represents the tax rate for capital gains and $\mathrm{Re}nt_0$ represents initial rents. All other notations are as defined earlier. The initial rent and purchase prices are derived from the rent-to-price indexes described earlier by setting the price to 100 and calculating the rent price by multiplying the rent-to-price ratio by 100 at time 0.

Equation (6) is of particular interest as it accounts for the homeowners' benefit from a hedge against a future rise in mortgage payment while receiving constant

[18] Volatility of the broad stock market returns and home prices in each location during the 1978–2009 period are used to calculate the particular risk-equal portfolio for each location. The risk-equal portfolio includes a mix of stocks and risk-free treasuries that yields the same eight-year standard deviation as the equity of a home purchased with a 20% down payment.

quality of housing. Renters, on the other hand, face uncertain future rents for a constant quality home. Because this piece seeks to make a "horse race" comparison between renting and owning, it is necessary to adjust either the rent or buy side for this accepted benefit from ownership. Accordingly, in order to account for this hedge,[19] rents are grown annually at rate $G$, which is discussed in the next two subsections, thereby reducing the benefit from renting.

*Buy versus Rent Decisions—Ex Ante*

In order to make an *ex ante* buy versus rent decision, the individual is required to make projections on the future opportunity cost, home price appreciation and rent growth in the area considered during the expected holding period. If these projections are employed in Equations (4) and (6), $SP_{hp}$ and $IP_{hp}$ can be calculated and compared to formulate a decision.

The *ex ante* analysis begins with a decision process that is based on stochastic rent growth, price appreciation and opportunity cost. Each of these three stochastic factors is assumed to be normally distributed with mean and standard deviation equal to the eight-year mean and standard deviation observed over the 25 years prior to each decision.[20] The probability that renting will be preferred to buying for each period is estimated by running a Monte Carlo simulation with 1,000[21] iterations to compare the expected renter's portfolio value to the expected home selling proceeds. To compensate homebuyers for the value of the prepayment and default option embedded in the mortgage, the present value of the mortgage is reduced by 2.9%, which is consistent with the estimated value of these options by Chen *et al*. (2009).[22] Additionally, because rent growth, price appreciation and opportunity cost are correlated and not independent, each of the 1,000 iterations generates values for these three stochastic variables that are highly correlated to actual observations during the 1978–2009 time period. Finally, the probability that the potential homeowner

[19]Appreciation is extended to an anonymous reviewer who brought this initial oversight to our attention.

[20]Prior to 1978, when regional data on rent growth and home price appreciation are missing, the rent growth and price appreciation on the whole United States is employed.

[21]With 1,000 iterations, the standard deviation of the *ex ante* probability that renting is preferred to buying is below 1% (about 0.8%). The standard deviation with only 500 iterations is significantly higher at around 1.7%, but an increase in the number of iterations to 3,000 or 5,000 yields only a modest improvement in accuracy.

[22]The value of 2.9% is derived by averaging Chen *et al.'s* (2009) results for a fixed-rate mortgage with 0.04 and 0.07 standard deviations in spot rate and 2% refinancing fee. This figure is also in line with the observed value of these options during the period 1978–2009, which is calculated to be 2.7% and 3.7%, on average, with and without tax consideration, respectively.

stays in the home each year is set to 7/8 (probability of moving is 1/8). Using a staying probability of 7/8 rather than a constant holding period of eight years captures the uncertainty with regard to when selling fees will be paid and over what time period mortgage origination costs are spread.

A second approach to making an *ex ante* decision does not attempt to project future home price appreciation. Instead, the model presented earlier is used in order to find the price appreciation ($A$) needed to make the individual indifferent between buying and renting. This unique equilibrium value is hereafter referred to as the required appreciation rate and is calculated for each point in time and for different locations throughout the sample period. Finding the required appreciation rate is done by equating $SP_{hp}$ to $IP_{hp}$[23] and solving for price appreciation while assuming that rent growth will be equal to home price appreciation[24] and the risk-free or risk-equal opportunity cost are set to the average return observed over the prior 25 years. Using the *ex ante* required appreciation rate value at a particular time and location, the individual can make an informed decision of whether buying or renting is likely to be a better monetary decision based on the individual personal projection. More to the point, any future projection of annual home price appreciation, which exceeds the required appreciation rate, suggests that buying is preferred. Conversely, any projection that falls below the required appreciation rate is associated with a rent recommendation. Hence, the lower the value of the required appreciation rate the higher the probability the individual will conclude that buying is preferred to renting and vice versa. To put the required appreciation rates in perspective, their values are compared with historical appreciation rates and with the actual appreciation rate that followed the *ex ante* analysis.[25] Mathematically and intuitively, the model implies that the value of the required appreciation rate is positively related to the opportunity cost and mortgage rates and inversely related to rent-to-price ratios.

*Buy versus Rent Comparisons—Ex Post*

While future projection of home price appreciation is required in order to determine *ex ante* whether buying is preferred to renting, *ex post* comparison can be done by observing past home appreciation. This means that in hindsight it

[23]The individual assumes that the opportunity cost during the holding period will be similar to the opportunity cost experienced over the 25 years leading to the *ex ante* decision.

[24]This assumption is made on the basis that over the long run purchase prices must be supported by rent prices, which implies that both grow at the same rate.

[25]Exposition of these calculations are suppressed here for space consideration. Results, however, are reported in the tables and figures included herein.

can be determined whether buying was preferred to renting. Setting the holding period to eight years and using the actual opportunity cost and rent growth that occurred during the holding period, the *ex post* required appreciation rate is calculated for each point in time and location. To further simulate homebuyer conditions, the buyer is allowed to take advantage of the mortgage prepayment option and refinance once a year in the event that the after-tax benefits associated with refinancing exceeds the cost of refinancing.[26] This *ex post* required appreciation rate is then compared with the actual home appreciation rates to reach an *ex post* conclusion.[27] For example, if the *ex post* required appreciation rate at a specific point in time and location was 5% and the actual average annual appreciation rate during the following eight years was 4% (6%), with hindsight the individual was better off renting (buying). This comparison is made for the United States as a whole, its four regions and across 23 major metropolitan to provide evidence that supports or rejects the hypothesis that renting is mostly preferred to owning. Results indicating that the average required appreciation rate was greater than the average actual appreciation would serve as evidence supporting the hypothesis that renting, from a monetary point of view, was preferred to owning. Similarly, results that show a higher number of periods where renting was preferred compared to the number of periods where buying was preferred would be consistent with the same hypothesis.

Finally, the *ex post* value of the hypothetical investment portfolio is compared to the amount of proceeds from sale. Comparing these two values provides economic meaning to the monetary difference between buying and renting a home. This comparison is calculated for each eight-year holding period from 1978–1986 through 2001–2009 for the United States as a whole and its four regions by quadrant and is expressed as the value of the investment portfolio divided by the amount of sale proceeds.

## Results

### *Cross-Sectional Analysis of Buy versus Rent in the Present*

Table 1 Panel A provides the results of the buy-versus-rent analysis associated with the second half of 2009 for each of the 28 areas included in the sample

[26]The benefit from refinancing is defined as the present value of the after-tax cash flows associated with the marginal interest rate decrease, given the remaining expected mortgage holding period and discounted at the new mortgage rate, that is, it is a net present value decision.

[27]Based on the eight-year holding period assumption associated with the model, hindsight buy versus rent decisions can only be made for the period on or before the second half of 2001.

**Table 1** ■ *Ex ante* current required appreciation rate (RAR) relative to past appreciation.

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|
| Area | RAR | Average 25 yrs | RAR–25 yrs | STD (RAR–25 yrs) | Average Boom | RAR–Boom | STD (RAR–Boom) |
| Panel A: Risk-Free Opportunity Cost | | | | | | | |
| **USA** | **3.25%** | **4.26%** | **−1.01%** | **−0.66** | **7.87%** | **−4.62%** | **−3.00** |
| **Midwest** | **3.26%** | **3.94%** | **−0.68%** | **−0.90** | **5.43%** | **−2.17%** | **−2.87** |
| Chicago | 3.52% | 4.75% | −1.23% | −0.89 | 7.98% | −4.46% | −3.21 |
| Cincinnati | 3.12% | 3.57% | −0.45% | −0.61 | 3.95% | −0.83% | −1.12 |
| Cleveland | 2.30% | 3.36% | −1.06% | −0.81 | 3.24% | −0.94% | −0.71 |
| Detroit | 1.71% | 3.61% | −1.90% | −0.67 | 3.26% | −1.55% | −0.54 |
| Kansas City | 2.32% | 3.29% | −0.97% | −0.72 | 4.94% | −2.62% | −1.94 |
| Milwaukee | 3.75% | 4.56% | −0.81% | −1.23 | 6.78% | −3.03% | −4.59 |
| Minneapolis | 2.89% | 4.15% | −1.26% | −0.57 | 8.34% | −5.45% | −2.46 |
| St. Louis | 3.16% | 3.73% | −0.57% | −0.44 | 6.42% | −3.26% | −2.50 |
| **Northeast** | **3.90%** | **5.03%** | **−1.13%** | **−0.35** | **9.87%** | **−5.97%** | **−1.82** |
| Boston | 4.56% | 5.40% | −0.84% | −0.21 | 9.85% | −5.29% | −1.31 |
| New York | 4.75% | 5.75% | −1.00% | −0.25 | 11.99% | −7.24% | −1.83 |
| Philadelphia | 3.70% | 5.27% | −1.57% | −0.52 | 10.10% | −6.40% | −2.11 |
| Pittsburgh | 3.07% | 3.91% | −0.84% | −1.19 | 4.85% | −1.78% | −2.51 |
| **South** | **2.97%** | **3.59%** | **−0.62%** | **−0.48** | **6.92%** | **−3.95%** | **−3.05** |
| Atlanta | 2.73% | 3.31% | −0.58% | −0.43 | 4.95% | −2.22% | −1.66 |
| Dallas | 1.95% | 1.97% | −0.02% | −0.01 | 4.02% | −2.07% | −1.08 |
| Houston | 1.90% | 2.58% | −0.68% | −0.41 | 4.99% | −3.09% | −1.85 |
| Miami | 3.03% | 4.62% | −1.59% | −0.43 | 16.26% | −13.23% | −3.60 |
| **West** | **4.14%** | **4.77%** | **−0.63%** | **−0.29** | **11.08%** | **−6.94%** | **−3.19** |
| Denver | 2.50% | 4.02% | −1.52% | −0.62 | 5.21% | −2.71% | −1.11 |
| Honolulu | 5.30% | 5.99% | −0.69% | −0.14 | 12.43% | −7.13% | −1.41 |
| Los Angeles | 4.38% | 5.50% | −1.12% | −0.21 | 15.87% | −11.49% | −2.20 |
| Portland | 4.02% | 5.66% | −1.64% | −1.12 | 8.78% | −4.76% | −3.24 |
| San Diego | 3.44% | 5.29% | −1.85% | −0.41 | 14.07% | −10.63% | −2.33 |
| San Francisco | 4.65% | 6.48% | −1.83% | −0.50 | 11.09% | −6.44% | −1.74 |
| Seattle | 3.81% | 6.06% | −2.25% | −1.50 | 9.33% | −5.52% | −3.68 |

**Table 1** ■ continued

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|
| Area | RAR | Average 25 yrs | RAR–25 yrs | STD (RAR–25 yrs) | Average Boom | RAR–Boom | STD (RAR–Boom) |
| Panel B: Risk-Equal Opportunity Cost | | | | | | | |
| **USA** | **3.96%** | **4.26%** | **−0.30%** | **−0.19** | **7.87%** | **−3.91%** | **−2.54** |
| **Midwest** | **3.38%** | **3.94%** | **−0.56%** | **−0.74** | **5.43%** | **−2.05%** | **−2.72** |
| Chicago | 4.26% | 4.75% | −0.49% | −0.35 | 7.98% | −3.72% | −2.68 |
| Cincinnati | 3.19% | 3.57% | −0.38% | −0.51 | 3.95% | −0.76% | −1.03 |
| Cleveland | 3.19% | 3.36% | −0.17% | −0.13 | 3.24% | −0.05% | −0.04 |
| Detroit | 3.68% | 3.61% | 0.07% | 0.02 | 3.26% | 0.42% | 0.15 |
| Kansas City | 3.08% | 3.29% | −0.21% | −0.16 | 4.94% | −1.86% | −1.38 |
| Milwaukee | 4.32% | 4.56% | −0.24% | −0.36 | 6.78% | −2.46% | −3.73 |
| Minneapolis | 4.31% | 4.15% | 0.16% | 0.07 | 8.34% | −4.03% | −1.82 |
| St. Louis | 3.76% | 3.73% | 0.03% | 0.02 | 6.42% | −2.66% | −2.04 |
| **Northeast** | **6.03%** | **5.03%** | **1.00%** | **0.31** | **9.87%** | **−3.84%** | **−1.17** |
| Boston | 6.78% | 5.40% | 1.38% | 0.34 | 9.85% | −3.07% | −0.76 |
| New York | 7.00% | 5.75% | 1.25% | 0.32 | 11.99% | −4.99% | −1.26 |
| Philadelphia | 5.87% | 5.27% | 0.60% | 0.20 | 10.10% | −4.23% | −1.40 |
| Pittsburgh | 3.15% | 3.91% | −0.76% | −1.07 | 4.85% | −1.70% | −2.40 |
| **South** | **3.58%** | **3.59%** | **−0.01%** | **−0.01** | **6.92%** | **−3.34%** | **−2.58** |
| Atlanta | 3.67% | 3.31% | 0.36% | 0.27 | 4.95% | −1.28% | −0.96 |
| Dallas | 3.93% | 1.97% | 1.96% | 1.02 | 4.02% | −0.09% | −0.05 |
| Houston | 3.76% | 2.58% | 1.18% | 0.71 | 4.99% | −1.23% | −0.73 |
| Miami | 5.21% | 4.62% | 0.59% | 0.16 | 16.26% | −11.05% | −3.01 |
| **West** | **5.36%** | **4.77%** | **0.59%** | **0.27** | **11.08%** | **−5.72%** | **−2.63** |
| Denver | 4.60% | 4.02% | 0.58% | 0.24 | 5.21% | −0.61% | −0.25 |
| Honolulu | 7.62% | 5.99% | 1.63% | 0.32 | 12.43% | −4.81% | −0.95 |
| Los Angeles | 6.58% | 5.50% | 1.08% | 0.21 | 15.87% | −9.29% | −1.78 |

**Table 1** ■ continued

| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|
| Area | RAR | Average 25 yrs | RAR–25 yrs | STD (RAR–25 yrs) | Average Boom | RAR–Boom | STD (RAR–Boom) |
| Portland | 6.24% | 5.66% | 0.58% | 0.39 | 8.78% | −2.54% | −1.73 |
| San Diego | 5.52% | 5.29% | 0.23% | 0.05 | 14.07% | −8.55% | −1.88 |
| San Francisco | 6.92% | 6.48% | 0.44% | 0.12 | 11.09% | −4.17% | −1.13 |
| Seattle | 4.84% | 6.06% | −1.22% | −0.81 | 9.33% | −4.49% | −2.99 |

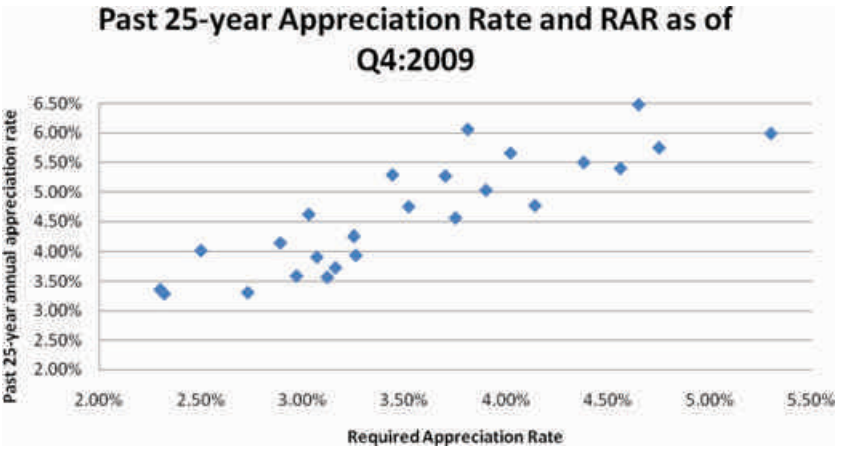
*Notes:* Table 1 reports the RAR as of the second half of 2009, according to the model and assumptions described in the text. RAR is the annual appreciation rate potential homeowners must realize to be indifferent between buying and renting. *Average 25 yrs* and *Average Boom* are the average annual appreciation occurred during the 25 years ending in Q4:2009 and seven years ending in Q4:2006, respectively. $RAR - 25\ yrs$ and $RAR - Boom$ represent the RAR minus the average appreciation each area experienced during the past 25 years and during the boom period, respectively. Finally, $STD(RAR - 25\ yrs)$ and $STD(RAR - Boom)$ are associated with the number of standard deviations between the excess of RAR over the past 25 years and boom period appreciation and the average appreciation during that time. The RAR in Panel A is calculated using the expected risk-free rate as the opportunity cost. The RAR in Panel B is calculated using the expected rate of return on a risk-equal portfolio as the opportunity cost.

when the risk-free rate is used as the opportunity cost. Column (2) reports the required appreciation rate, in annual percentage terms, which makes potential homeowners indifferent between buying and renting. For the United States as a whole, the required appreciation rate is currently 3.25%. This implies that the average potential homebuyer in the United States should require appreciation of more than 3.25% annually during the next eight years in order to justify buying rather than renting a home. If the potential homebuyer believes that real estate appreciation in the United States is likely to be less than 3.25% annually, renting is preferable to buying. As of the second half of 2009, the required appreciation rate ranges from a low of 1.71% for Detroit to a high of 5.30% for Honolulu. Among the regions, the required appreciation rate for the West is the highest with 4.14%, and it is lowest for the South at only 2.97%.

To put the present required appreciation rates in perspective, column (3) reports the historical 25-year average annual price appreciation for each area. Column (4) reports the difference between the present required price appreciation and the 25-year historical average. Column (5) shows the difference between the required appreciation rate and historical appreciation rates in terms of standard deviations. Out of the 28 areas considered, none has a required appreciation that is greater than the average return experienced during the last 25 years. These results imply that if the average appreciation experienced during the past 25 years is a reasonable expectation for the future, buying is currently preferable to renting. However, all 28 areas are associated with required price appreciation rates that are not statistically significant at the 5% level from their average past 25-year appreciation. Overall, the relatively low and negative values reported in columns (4) and (5) suggest that current housing prices in most areas are slightly below their fundamental rent value when historical long-term price appreciation is considered.

The same information reported in columns (3), (4) and (5) is reported in columns (6), (7) and (8), respectively, when the historical price appreciation from the recent housing "boom" period is considered. According to column (7), the required appreciation rate is lower than the appreciation experienced during the "boom" period for all 28 areas, and for 15 of the 28 areas the difference is statistically significant at the 5% level. These 15 areas include the United States as a whole and three out of the four U.S. regions. These results suggest that presently a much lower rate of appreciation compared to that of the housing boom is required to justify buying a home over renting. Overall, the results presented in Panel A mostly imply that as of the end of 2009 individuals who expect to maintain the same home quality in the future are likely to be better off owning rather than renting if their future price appreciation projections are based on past performance.

**Figure 1** ■ Current required appreciation rates (RAR) versus past housing appreciation.

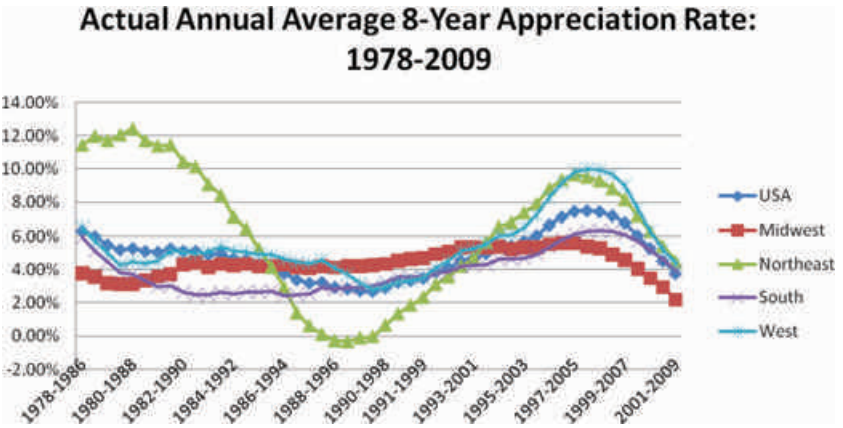



*Note:* The 25-year period of housing appreciation ends in Q4:2009. RAR calculated as of the second half of 2009, according to the model and assumptions described in the text. RAR is the annual appreciation rate potential homeowners must realize in order to be indifferent between buying and renting and is calculated using the expected risk-free rate as the opportunity cost.

Figure 1 illustrates the relation between the current required appreciation rate and the average appreciation rate during the past 25 years in annual percentage terms. The clear positive relation between the past and required future price appreciation provides evidence that individuals generally expect areas that performed relatively well in the past to continue and perform well in the future and vice versa. While these results suggest that homeowners expect high appreciation to persist in areas that experienced high appreciation in the past, determining whether these expectations are reasonable is a separate issue that is beyond the scope of this article.

Table 1 Panel B presents the same information reported in Panel A except now the opportunity cost used to calculate the required appreciation rate is the expected rate of return on a risk-equal portfolio. Due to the higher expected return on the portfolio used by the individuals who rent rather than own, the required appreciation rate is higher than it is in Panel A. For the United States as a whole, the required appreciation rate is 3.96% and ranges between 3.08% for Kansas City to 7.62% for Honolulu. Compared with the appreciation rate experienced over the last 25 years, the current required appreciation rate is lower for United States as a whole. This is also true for two regions and seven cities included in the sample. The current required appreciation rate is still, however, mostly lower than the appreciation rate experienced during the recent

**Figure 2** ■ Housing average price appreciation rate.




*Note:* The geometric annual average return for each eight-year holding period is calculated from data obtained from the FHFA. The figure spans the 1978–2009 period with a semiannual frequency.

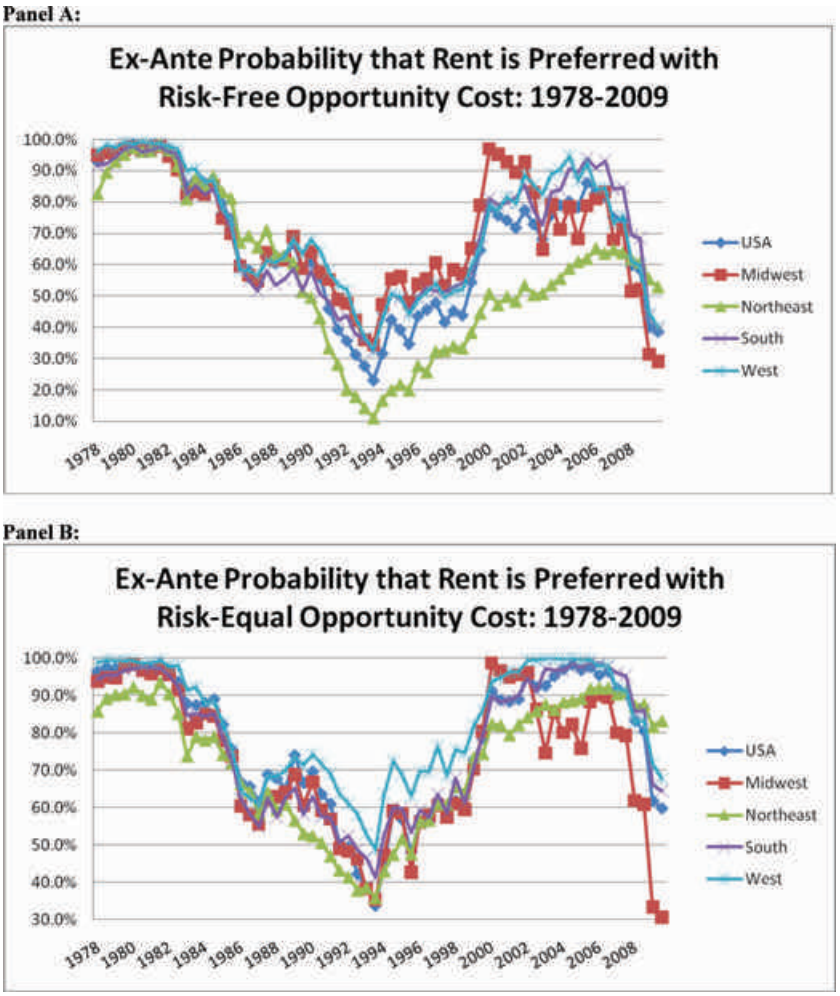
housing-boom period (columns 7 and 8). These results suggest that as of the end of 2009, individuals in most areas who expect to change the quality of their homes in the future are likely to be better off renting rather than owning if their future price appreciation projections are based on past performance.

*Time-Series Analysis of Buy versus Rent*

Figure 2 illustrates the geometric annual average appreciation rate for the United States and its four regions. The average annual rate is reported with semiannual frequency for each rolling eight-year period spanning 1978–1986 to 2001–2009. The Northeast is the most volatile region in the sample with average eight-year appreciation ranging between −0.34% and 12.42% annually. For the United States as a whole, the range is considerably smaller with a low of 2.67% and a high of 7.50%. This figure is provided in order to put in perspective the time series required appreciation rates derived from the model.

The *ex ante* probability that renting is preferred to buying at each point in time between 1978 and 2009, given a 7/8 probability of staying in the same home an additional year, is presented in Figure 3. Panels A and B assume opportunity cost equal to the expected risk-free rate and risk-equal rate, respectively. A glance at these panels reveals that during the majority of the 1978–2009 time period renting was the *ex ante* preferred choice from a monetary perspective. As denoted in Table 2 for the United States as a whole, 71.9% of the time the *ex ante* probability that renting is preferred to buying exceeds 50% when the

**Figure 3** ■ *Ex ante* probability that renting is preferred to buying: 1978–2009.




*Notes:* The *ex ante* probability that renting is preferred to buying is calculated semiannually between 1978 and the second half of 2009, according to the model and assumptions described in the text. The probability in Panel A is calculated using the expected risk-free rate as the opportunity cost. The probability in Panel B is calculated using the expected rate of return on a risk-equal portfolio as the opportunity cost.

opportunity cost is the expected risk-free rate. When the expected return of a risk-equal portfolio is considered, over 90% of the time the probability that renting is *ex ante* preferred exceeds 50%. On average, the *ex ante* probability that renting is preferred to buying is about 61% and 77% when risk-free and

**Table 2** ■ Buy versus rent: Results of time-series analysis.

| | USA | Midwest | Northeast | South | West |
|---|---|---|---|---|---|
| Panel A: Risk-Free Opportunity Cost | | | | | |
| *Ex* ante% of time prob. rent preferred | 71.87% | 85.93% | 64.06% | 81.25% | 84.37% |
| *Ex* ante avg. rent prob. | 61.12% | 69.61% | 57.03% | 69.21% | 71.17% |
| *Ex ante*% of time RAR >AAR | 62.50% | 68.75% | 41.66% | 60.42% | 62.50% |
| *Ex post*% of time RAR >AAR | 64.58% | 64.58% | 41.66% | 62.50% | 64.58% |
| *Ex ante* annual avg. RAR − AAR | 0.80% | 1.00% | −0.36% | 1.25% | 0.67% |
| *Ex post* annual avg. RAR − AAR | 1.03% | 1.30% | −0.22% | 1.54% | 0.91% |
| *Ex post* average portfolio value/sale proceeds | 1.2563 | 1.2992 | 1.6276 | 1.4424 | 1.2633 |
| Panel B: Risk Equal Opportunity Cost | | | | | |
| *Ex ante*% of time prob. rent preferred | 90.63% | 85.94% | 85.94% | 95.31% | 98.43% |
| *Ex ante* avg. rent prob. | 76.93% | 72.21% | 72.13% | 76.66% | 82.43% |
| *Ex ante*% of time RAR >AAR | 72.92% | 68.75% | 54.16% | 75.00% | 79.17% |
| *Ex post*% of time RAR >AAR | 75.00% | 66.67% | 68.75% | 72.92% | 75.00% |
| *Ex ante* average RAR − AAR | 1.36% | 1.11% | 1.34% | 1.74% | 1.61% |
| *Ex post average RAR − AAR* | 2.04% | 1.47% | 4.85% | 2.41% | 2.60% |
| *Ex post average portfolio value/sale proceeds* | 1.4541 | 1.3301 | 3.6034 | 1.6417 | 1.5999 |

*Notes:* Table 2 summarizes the *ex ante* and *ex post* results for the buy-versus-rent analysis. *Ex ante% of time prob. rent preferred* is the percentage of time the *ex ante* probability that rent is preferred exceeds 50% during the 1978–2009 time period. *Ex ante avg. rent probability* is the average *ex ante* probability that renting is preferred during the 1978–2009 time period. The *RAR* is calculated according to the model and assumptions described in the text for the moving eight-year holding period spanning 1978–1986 to 2001–2009, and it is defined as the annual appreciation rate potential homeowners must realize to be indifferent between buying and renting. *AAR* is obtained from FHFA. The results in Panels A and B are calculated using the expected risk-free rate and expected return on risk-equal portfolio as the opportunity cost, respectively.

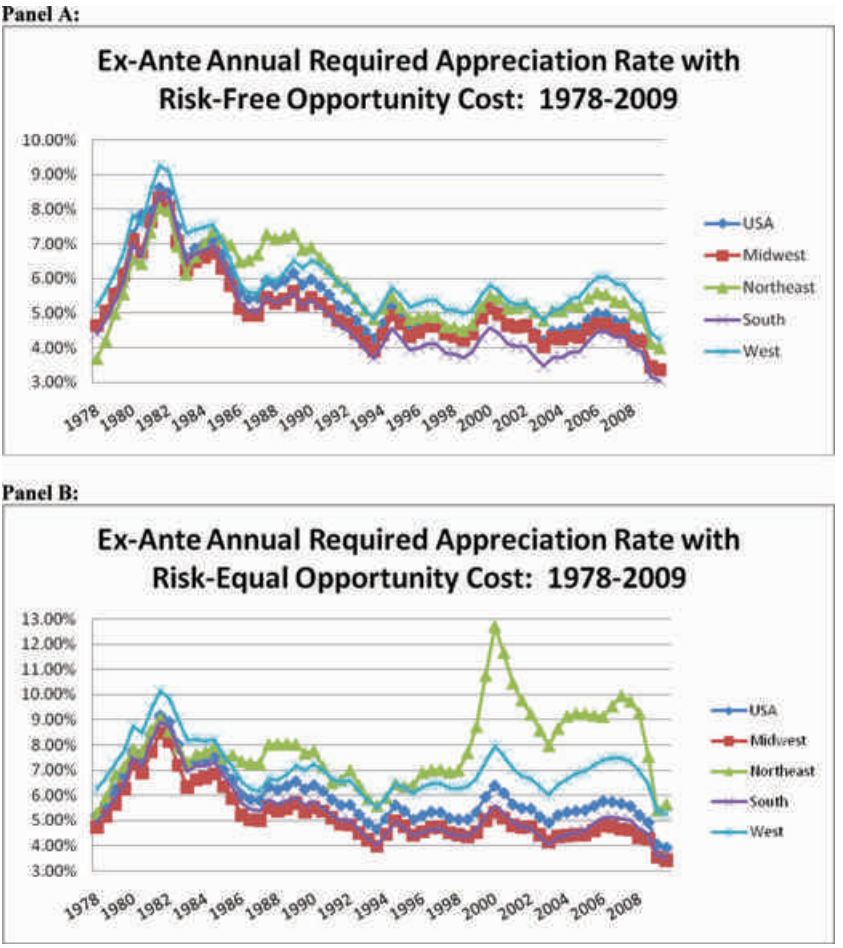
risk-equal opportunity cost are considered, respectively. However, it appears that as of the end of 2009, the probability that renting is preferred to buying is below 50% for the United States and three of its four regions when the expected risk-free rate is considered. This suggests that for many individuals buying is preferred to renting under current market conditions.

Figure 4 demonstrates the *ex ante* required appreciation rate for the United States and its four regions from the first half of 1978 to the second half of 2009. The required appreciation rate is shown in percentage terms with semiannual intervals. Panel A includes the required appreciation rate when the expected risk-free rate is used as the opportunity cost, and Panel B reports the required appreciation rate when the expected return on a risk-equal portfolio is used. The average required appreciation rate for the United States during this time period is 5.36% and 5.97% for Panels A and B, respectively, and reached a high of 8.60% and 9.19% at the second half of 1981. The lowest required appreciation rates for the United States are 3.36% and 3.94% when risk-free and risk-equal expected returns are used and are both associated with the second half of 2009. These observations imply that the current housing condition in the United States instigates the lowest price appreciation hurdle for homeowners since at least 1978.

It is important to note that while the model used to derive the required appreciation rates over time includes some constants, five variables are, however, changing with time: rent-to-price ratio, mortgage interest rate, expected return on the investment portfolio, rate of rent growth and growth rate of homeowner expenses. The last two are set to equal the required appreciation rate. Generally speaking, the high required appreciation rates observed in the early 1980s resulted from high mortgage rates that acted as a headwind for homeowners and provided high return on the renter's investment portfolio. Additionally, at that time, renters enjoyed low rent-to-price ratio levels that were not observed again for 20 years. The low required rate of appreciation that is seen in the second half of 2009 appears to be the result of historic low interest rates and expected return on investment coupled with an increasing rent-to-price ratio, which is a by-product of the recent sharp decline in home prices.

Table 2 compares the time series *ex ante* required appreciation rate to the actual appreciation rate. On average, the *ex ante* required appreciation rate for the United States is higher than the actual appreciation rate that followed 62.5% of the time and by an average of 0.8% annually when the risk-free rate is used as the opportunity cost. When the risk-equal portfolio is used, the required appreciation rate for the United States is higher than the actual appreciation rate 72.9% of the time and by an average of 1.4% annually. These results suggest that *ex ante* homeowner expectations for price appreciation did not

**Figure 4** ■ *Ex ante* required appreciation rate: 1978–2009.

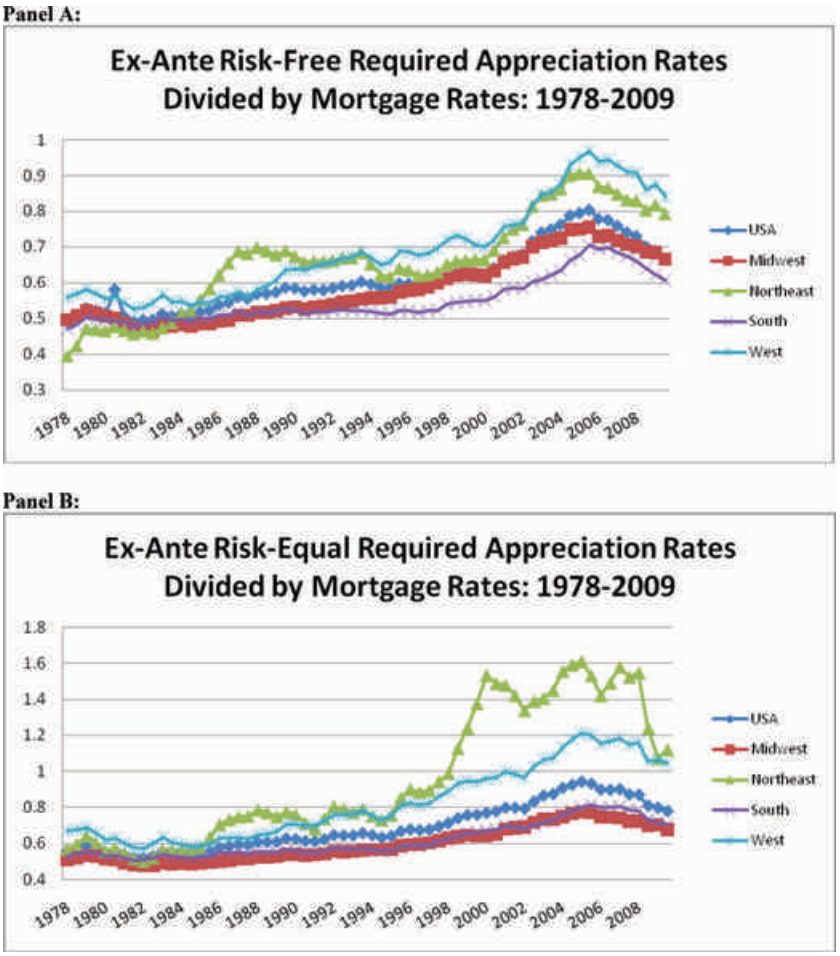



*Notes:* RAR is calculated semiannually between 1978 and the second half of 2009, according to the model and assumptions described in the text. RAR is the annual appreciation rate potential homeowners must realize to be indifferent between buying and renting. The RAR in Panel A is calculated using the expected risk-free rate as the opportunity cost. The RAR in Panel B is calculated using the expected rate of return on a risk-equal portfolio as the opportunity cost.

materialize on average, and given the expected opportunity cost renting was preferred to owning during the majority of the time between 1978 and 2009.

Figure 5 shows the ratio between the *ex ante* required appreciation rates and mortgage rates through time. Because mortgage rates include inflation expectation, the ratio of required appreciation rate to mortgage rate serves as a proxy

**Figure 5** ■ *Ex ante* required appreciation rates relative to mortgage rates: 1978–2009.




*Notes:* RAR are calculated semiannually between 1978 and the second half of 2009, according to the model and assumptions described in the text and divided by the average 30-year mortgage rate. RAR is the annual appreciation rate potential homeowners must realize in order to be indifferent between buying and renting. The RAR in Panel A is calculated using the expected risk-free rate as the opportunity cost. The RAR in Panel B is calculated using the expected rate of return on a risk-equal portfolio as the opportunity cost.

for inflation-adjusted required appreciation rate. Examination of both Panels A and B exposes that the ratio is generally increasing from the beginning of the sample period until the mid 2000s. The increasing required appreciation rate relative to mortgage rate suggests that expectations for price appreciation in real terms has increased until the height of the housing boom and reversed since

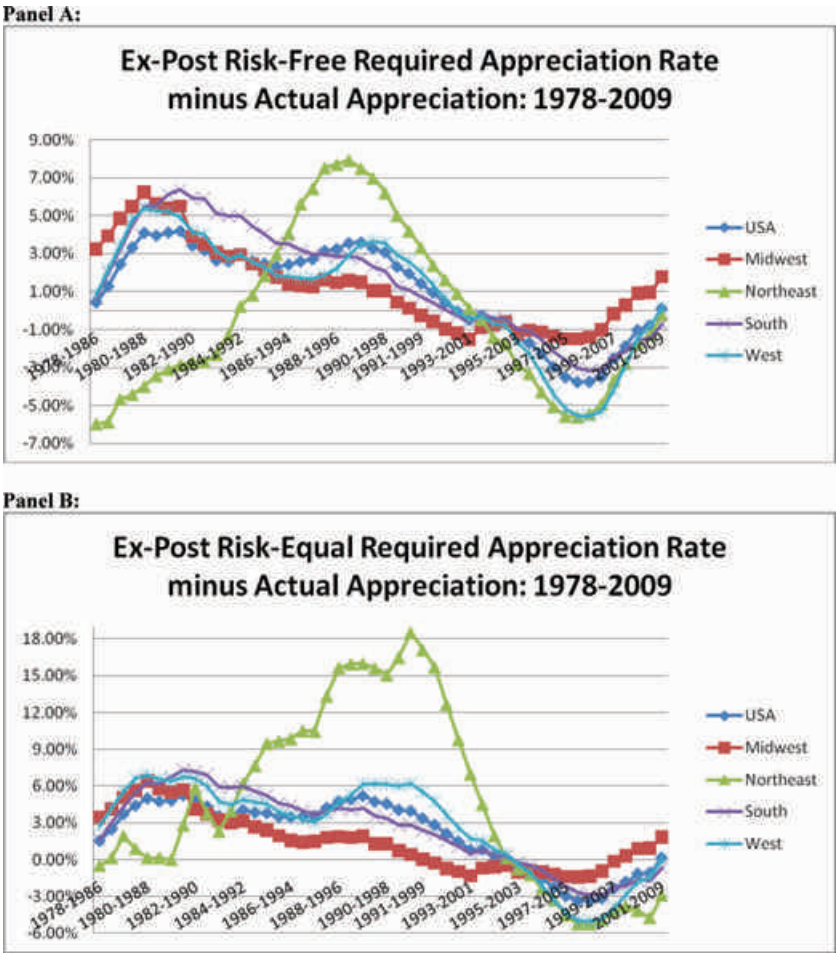
then. The average ratio for the United States in Panel A (B) is 0.61 (0.69) with a high of 0.80 (0.94) in 2005 and a low of 0.49 (0.52) during the second half of 1981. Figure 5 also demonstrates the differences in the required appreciation rate between regions because mortgage rates are assumed to be equal across regions. The West carries the highest required appreciation rate during most of the period, while the South is mostly associated with the lowest required appreciation rate.

Figure 6 provides an *ex post* illustration of the buy versus rent analysis from a monetary point of view for individuals that moved into their homes between the first half of 1978 and the second half of 2001 for an eight-year period. Unlike the *ex ante* analysis, in the *ex post* analysis the actual rather than the expected risk-free rate and return on a risk-equal portfolio are used. Also, in the *ex post* analysis the actual rent growth is included as well as opportunities for mortgage prepayment and refinancing. For the United States and its four regions, the figure shows the required appreciation rate at each point in time minus the actual appreciation rate accrued during the following eight-year holding period. Hence, a positive value signifies that the *ex post* required appreciation rate was higher than the actual appreciation and suggests that renting was preferred to buying at that point in time. Following the same logic, a negative value suggests that buying was preferred to renting at that point in time. As summarized in Table 2, Panels A and B of Figure 6 show that when the United States as a whole is considered, renting was preferred to buying 65% and 75% of the time, respectively. On average, the annual required appreciation return was 1.03% and 2.04% higher than the actual appreciation when risk-free and risk-equal returns are considered. In retrospect, the period spanning the mid 1990s to the early 2000s was the only time frame in which buying was preferred to renting. This narrow time period is associated with homeowners that purchased a home just before the recent boom and sold it shortly before its sequential bust. However, because most homeowners never transfer back to be renters (Sinai 1997), it seems unlikely that many in this group avoided the subsequent housing collapse. The overall findings reported in Figure 6 are consistent with the hypothesis that homebuyers bid up home prices to levels that are, on average, higher than their fundamental rental value and caused renting to be the better monetary option during most of the 32-year period examined.[28]

Finally, to the horse race in question, Figure 7 highlights the economic significance between buying and renting a home by showing the value of the hypothetical investment portfolio at the end of the holding period relative to the net proceeds from sale upon disposal of the property. A value of 1 signifies that

[28]This is with the exception of the Northeast region when risk-free opportunity cost is considered. Under this scenario, renting is preferred to owning only 42% of the time.

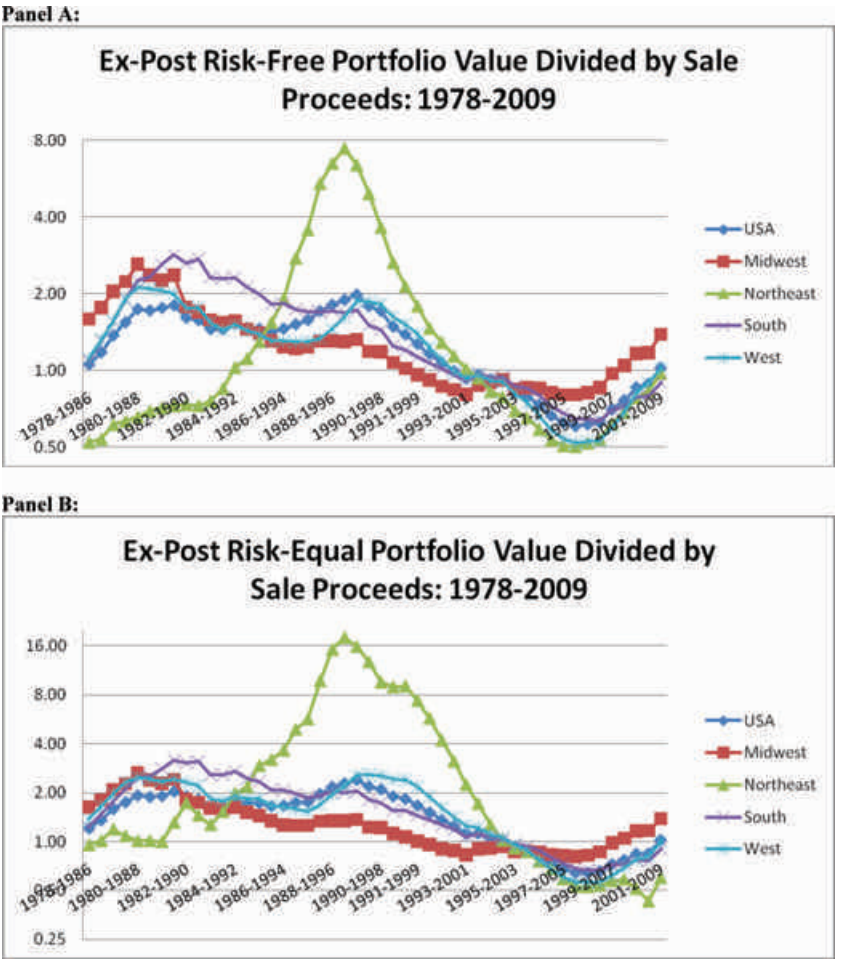
**Figure 6** ■ *Ex Post* RAR minus actual appreciation rates: 1978–2009.




*Notes:* RAR is the annual appreciation rate potential homeowners must realize to be indifferent between buying and renting and is calculated with semiannual frequency, according to the model and assumptions described in the text. Actual housing appreciation is defined as the average annual housing appreciation occurred during the holding period (eight years) following each point in time and is obtained from the FHFA. The RAR in Panel A is calculated using the risk-free rate as the opportunity cost. The RAR in Panel B is calculated using the rate of return on a risk-equal portfolio as the opportunity cost.

the value of the portfolio equals the amount of proceeds from sale. A value of 2 (0.5), for example, would suggest that the value of the portfolio held by a renter is twice (half) as much as the sale proceeds captured by the homeowner at the end of the eight-year holding period. Similar to the results from

**Figure 7** ■ *Ex post* portfolio value relative to sale proceeds: 1978–2009.




*Notes:* Figure 7 demonstrates the value of the hypothetical investment portfolio relative to the amount of sale proceeds at the disposal if a residential property purchased between 1978 and the second half of 2001 and held for eight years. The values of the investment portfolio and sale proceeds are calculated according to the model and assumptions described in the text. In Panel A, the return on the portfolio is the risk-free rate. In Panel B, the return on the portfolio is the return on a risk-equal portfolio.

Figure 6, the value of the investment portfolio exceeds the amount of proceeds from sale for most of the time across the United States and its four regions. As it is reported in Table 2, for the United States on average, the value of the investment portfolio at the end of the eight-year holding period is 26% and 46% higher than the amount of sale proceeds when risk-free and risk-equal opportunity cost

are employed in the analysis. According to the model, when risk-free opportunity cost is considered, individuals that rented a home in the United States for eight years beginning in 1989 accumulated an investment portfolio valued 98% higher than the amount of proceeds from sale from a comparative purchase. On the other hand, the portfolio value of individuals that began renting at the beginning of 1999 accumulated 37% less total value than the comparative proceeds from sale over the same period. The most extreme difference between the value of the investment portfolio at the end of any eight-year holding period and the amount of sale proceeds from a comparative purchase occurred in the Northeast under the risk-equal approach. For the Northeast region, the value of the investment portfolio would have been as high as 1,699% above or as low as 57% below the amount of proceeds from sale if individuals rented their place of residence beginning at the second half of 1988 or the first half of 2001, respectively.

It is important to note the generally similar results between the *ex ante* and *ex post* scenarios. The similar results imply that *ex post* renting is mostly preferred to owning because real estate price appreciation was too low relative to expectations and not due to the difference between the actual and expected rent growth, interest rates and opportunity cost. Moreover, this suggests that the fact that renting was mostly *ex post* preferred to buying did not come as a surprise to the sophisticated potential homebuyer. Also, worth noting is the fact that renting was preferred to owning during most of the time period examined regardless of whether risk-free rate or return on risk-equal portfolio was used as the opportunity cost. While the difference between the opportunity costs makes a difference on the margin, it does not seem to sway the overall results.

## Conclusion

Homeownership is virtually universally viewed as being the superior choice when whether to buy or rent residential property is being decided. Evidence suggests that ownership increases preferable societal outcomes and increases individual wealth (Engelhardt 1994, Haurin, Hendershott and Wachter 1996, Rohe, McCarthy and Van Zandt 2002, Haurin, Parcel and Haurin 2002 and Dietz and Haurin 2003, among others). In fact, there seems to be an almost national obsession with homeownership, resulting in a paradigm that favors homeownership.

This work challenges this homeownership paradigm. Consistent with the hypothesis that Americans' mania to own results in a crowding toward homeownership, the results of this article show that renting was preferred to buying, from a monetary perspective, during most of the 1978–2009 time period. This result is conditional on an individual taking any residual money from renting and reinvesting at a rate equal to, or greater than, the risk-free rate. Additionally and perhaps surprisingly, conditions (historically low mortgage and required

appreciation hurdle rates along with relatively low rent-to-price ratios) now seem in place to favor present purchases.

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## Appendix A: Sensitivity to Volatility in Stochastic Variables: 1978–2009

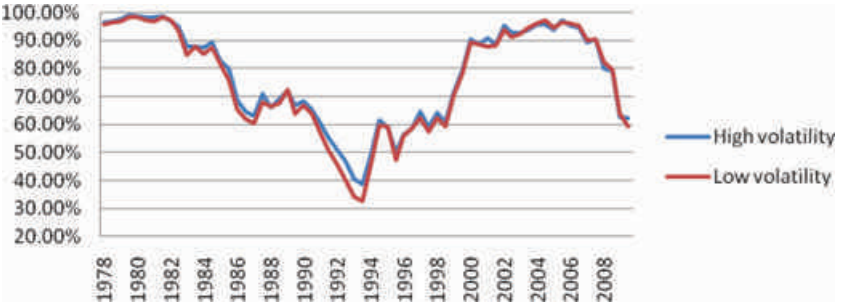
Panels A1 through A5 illustrate the sensitivity of the *ex ante* probability that renting is preferred to buying to the volatility of the stochastic variables. The probability is calculated semiannually between 1978 and the second half of 2009, according to the model and assumptions described in the text and using the risk-equal portfolio as the opportunity cost. In Panels A1, A2 and A3, the volatility of the renter's portfolio return, rent growth rate and home price appreciation change independently to high and low volatility, where high volatility is defined as two times the original volatility assumption and low volatility as half the original volatility assumption. In Panel A4, the moving probability, which drives the holding period, changes independently to 1/16 (long holding) and 1/4 (short holding). In Panel A5, all four stochastic variables, mentioned above, carry high or low volatility simultaneously.

A cursory review of these panels suggests that volatility differences in a renter's portfolio returns (Panel A1) and rent growth rate (Panel A2) do not independently lead to significantly different outcomes in the rent versus buy decision. However, low volatility in home price appreciation (Panel A3) appears to favor renting over buying. Additionally, shorter holding periods (Panel A4) seem to

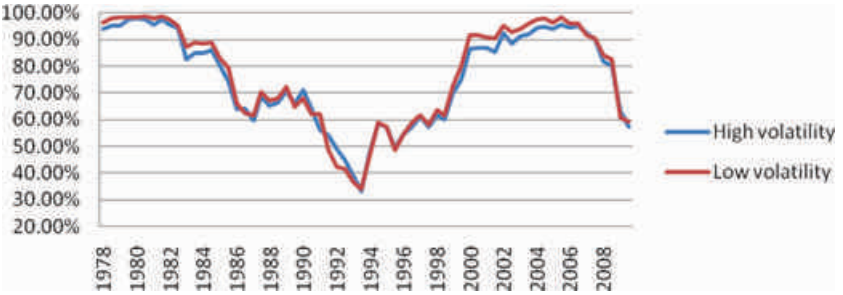
favor renting. Finally, when low volatility and high volatility are compared for all of the stochastic variables (Panel A5), renting is again favored.

Taken as whole, these results make tentative suggestions about the relationships between the parameters in the model. For example, among other issues, Panel A5 seems to suggest that property appreciation dominates the other stochastic variables. While the interaction of these variables is very interesting, it is apparent that that a full-blown investigation into these relationships is beyond the scope of this work. Accordingly, future research seems warranted.

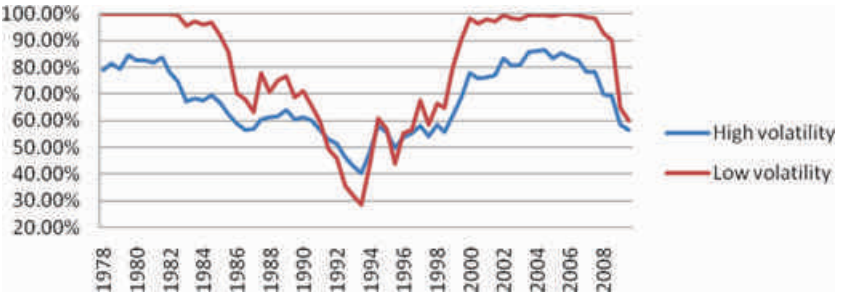
**Panel 1A** ■ Renter's portfolio return.



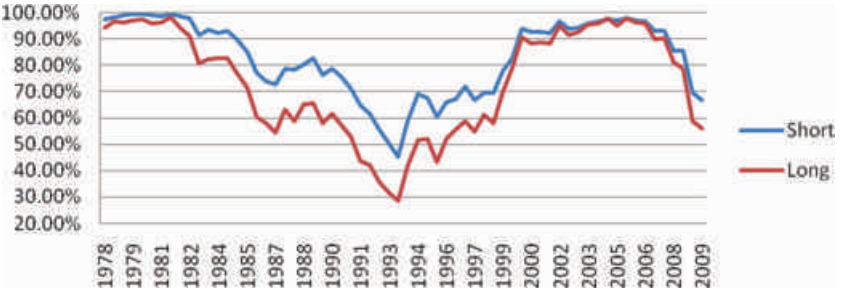

**Panel 2A** ■ Rent growth rate.



**Panel 3A** ■ Home price appreciation.




**Panel 4A** ■ Holding period.




**Panel 5A** ■ All stochastic variables.