



Price Versus Interest Rate Expectations

Effects on Home-Buyer Decisions

By Phillip J. Korb, Deborah A. Ford, and Daniel A. Gerlowski

From the 1950s until 2007, housing prices in the United States always moved in an upward direction, albeit at varying rates of growth. The Case-Shiller Index of 10 cities, now the most quoted measure of house prices, rose from 62.82 in January 1987 to 100 in January 2000. The same index stood at 226 in July 2006 (see www.homeprice.standardandpoors.com). Exceptions could be found for certain geographic areas, such as Houston in the early 1980s, or for short periods of high interest rates, such as the late 1980s, but this did not convince most Americans that single family housing prices were risky. Indeed, for many households, housing became regarded as their largest investment. Mortgage interest

rates and housing prices were the primary determinants of housing payments, and buyers viewed monthly payments as the price they paid for investing in housing.

Beginning in about 2001, interest rates remained low, underwriting standards fell, and demand increased; house prices thus began rising at historically high rates. In 2007, this housing “bubble” burst, and prices have been falling ever since; by January 2011 the Case-Shiller Index of 10 cities stood at 155. After three years of declining home prices, there continues to be an oversupply of housing from foreclosures and a historically high inventory of new houses. In addition, high unemployment in a con-

tinuing recession has caused many potential buyers to avoid making a large commitment such as purchasing a home. With Case-Schiller indices continuing to show declines in all categories of housing and in many geographical areas of the country, many potential homebuyers believe prices will continue to decline.

In terms of interest rates, the 30-year fixed mortgage rate has fallen near a historical low of around 4.625%. Correspondingly, the 15-year fixed rate has fallen to a range of 75 basis points lower (i.e., approximately 3.875%). Most homebuyers would not anticipate rates falling much further. In fact, most buyers are concerned that mortgage rates might rise over the next year. Because the recently revealed Federal Reserve's quantitative easing phase two program (i.e., QE2, announced in November 2010) is aimed mainly at buying activity in the front and mid-part of the Treasury curve, the rate on long-term bonds—that is, the 30-year bond, which has a tremendous influence on the bellwether 30-year fixed rate mortgage—should be largely unaffected by the Federal Reserve's policy. In fact, since the Federal Reserve's announcement, the yield on the 30-year fixed rate mortgage has inched up.

The potential for falling prices and rising interest rates has placed some buyers at a crossroads in an unfamiliar environment. From a market perspective, the demand for housing requires evaluating market conditions differently from those in recent history. Other studies have identified the role of interest rates and housing prices on housing demand (see Taufiq Choudhry, "Does Interest Rate Volatility Affect the US Demand for Housing? Evidence from the Autoregressive Distributed Lag Method," *Manchester School*, vol. 78 no. 4, July 2010, p. 326; Jane Dokko, Brian Doyle, Michael T. Kiley, Jinill Kim, Shane Sherlund, Jae Sim, and Skander Van den Heuvel, "Monetary Policy and the Global Housing Bubble," *Economic Policy*, vol. 26, no. 66, April 2011, pp. 233–283; Jonathan Kohn and Sarah Bryant, "Modeling the U.S. Housing Bubble: an Econometric Analysis," *Research in Business and Economics Journal*, vol. 2, pp. 1–14, 2010). Home buyers want to buy a house, but do not want to own an asset that might be worth

less than they paid for it a year later. Even if they believe that housing prices may decline further, their future monthly mortgage payment could rise if mortgage rates rise in the interim. The focus of the discussion below is on the monthly mortgage payment, highlighting the tradeoff between interest rates and home prices and providing a framework for consumers to decide whether to buy now or buy later based on their expectations of interest rate increases and home price decreases.

Mechanics of the Buyer's Dilemma

Given that the buyers will be living in their homes for some time and that their homes are fulfilling a basic need, a buyer is concerned with the monthly payment on a mortgage loan, not simply the current price of the house per se. Since the payment will be determined by the size of the loan, the interest rate, and the maturity term, potential buyers should try to quantify their expectations with regard to prices and interest rates. The monthly payment is calculated as follows:

$$P = \frac{Lc(1 + c)^n}{(1 + c)^n - 1}$$

Where:

P = monthly payment,

L = loan amount,

c = monthly interest rate

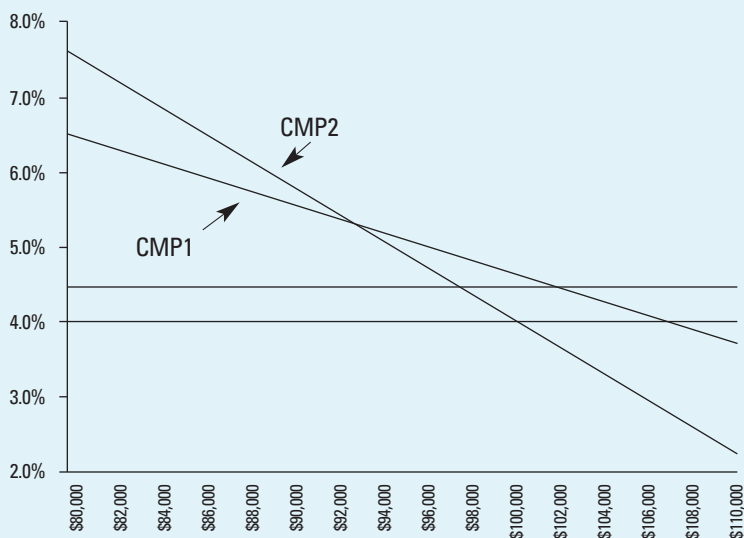
n = number of months to maturity

The combinations of interest rate *c*, and loan amount *L* that yield a constant monthly payment *P* for a fixed term *n* can be easily calculated using the above formula. The constant monthly payment (CMP) curve is the locus of points representing interest rates and loan amounts yielding a given monthly payment for a specific number of months. *Exhibit 1* shows two constant monthly payment curves. CMP1 shows the interest rate and loan amounts for a 30-year fixed payment mortgage at 4.5% of \$100,000. CMP2 shows the interest rate and loan amounts for a 15-year fixed payment mortgage at 4.0% of \$100,000. The constant monthly payment on CMP1 is \$506.69 and the constant monthly payment on CMP2 is \$739.69.

Both curves show a negative tradeoff between interest rates and home prices due to the properties of compounded interest. The trade-off is more sensitive for the shorter term loan because the same loan amount is being repaid over a shorter period of time. Thus interest-rate movements have a magnified effect over shorter periods of time.

The CMP curve can play a role in buyers' decision making. All other things being equal, buyers are willing to purchase a

EXHIBIT 1
Constant Monthly Payment, Alternative Loan Terms



CMP = Constant Monthly Payment

given home at different prices if interest rates change accordingly. In a sense, declining prices and rising interest rates impact the buyer in opposite directions, benefiting from the one but suffering from the other. The CMP curve shows where these effects are equal. Using the CMP curve, if interest rates are expected to rise faster than housing prices fall, a consumer should purchase now. If, on the other hand, buyers expect to see future interest rates and housing prices below the CMP curve, then they should defer their purchase.

Expectations and Breaking Even

The tradeoff between interest rates and loan amounts presents the opportunity to identify a break-even situation for buyers who expect to see changes in the financial and real estate markets.

Two key assumptions are made in the analysis to follow:

- Other contributions to house price, such as seller concessions, are fixed.
- The size of the monthly payment represents the maximum amount of loan the buyer can afford based on underwriting practices;

thus, a larger loan means a higher monthly payment, and hence “more home.”

To keep the analysis tractable and to focus on the timing of the buying decisions, several other factors influencing the home buyer decision should be kept constant: Expected rent paid and property taxes (adjusted for their income tax benefit) are assumed constant over the decision horizon. Both would shift the CMP in a predictable way and not alter its slope for any given individual.

A more complex factor to include would be the risk of changes in expected home prices and interest rates. Simple economics would argue that inflationary trends raise housing prices, interest rates, and the volatility associated with interest rates (as measured by Choudhry 2010); however consumer expectations may differ, since the pre-housing bubble price run-ups were fueled, in part, by government policies keeping interest rates low. Although predictive risk is not included in this analysis, one can accept the premise that, in riskier environments, individuals will likely be biased toward postponing their home-buying decision. These factors could be added to the analysis, but would likely increase the complexity without significantly altering the results.

Consider a buyer who can, today, get a \$100,000 mortgage, for 15 years, at a rate of 4.0%, resulting in a constant monthly payment of \$739.69; this option is point A in Exhibit 2. Consider a buyer, expecting interest rates to rise to 5.0% next year, who would be indifferent to buying today versus next year if the housing price and loan amount are expected to fall to \$93,537.69, a 6.46% decline; this option is shown as point B in Exhibit 2. Comparing points A and B, if a home buyer is indifferent and all other things are held equal, the buyer may be said to consider B to be a break-even point.

Point C in Exhibit 2 represents a scenario in which prices are expected to fall by a smaller amount, say to only \$98,000. The buyer would prefer to not wait until next year to purchase the home, because next year that loan amount will be available only at a higher monthly payment, in this case \$774.98. To the home buyer, points above the CMP curve are worse than break-even; that is, they would prefer to buy now.

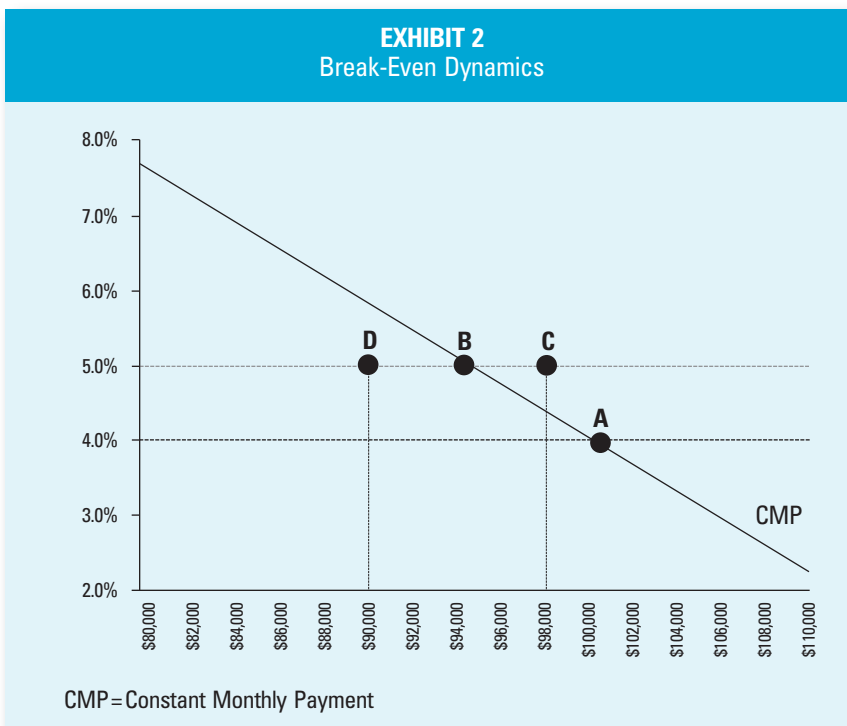


EXHIBIT 3
30-Year Mortgage Monthly Payment

Loan Amount	Interest Rate							
	4.50%	4.75%	5.00%	5.25%	5.50%	5.75%	6.00%	6.25%
\$100,000	\$506.69	\$521.65	\$536.82	\$552.20	\$567.79	\$583.57	\$599.55	\$615.72
\$95,000	\$481.35	\$495.56	\$509.98	\$524.59	\$539.40	\$554.39	\$569.57	\$584.93
\$90,000	\$456.02	\$469.48	\$483.14	\$496.98	\$511.01	\$525.22	\$539.60	\$554.15
\$85,000	\$430.68	\$443.40	\$456.30	\$469.37	\$482.62	\$496.04	\$509.62	\$523.36
\$80,000	\$405.35	\$417.32	\$429.46	\$441.76	\$454.23	\$466.86	\$479.64	\$492.57
\$75,000	\$380.01	\$391.24	\$402.62	\$414.15	\$425.84	\$437.68	\$449.66	\$461.79
\$70,000	\$354.68	\$365.15	\$375.78	\$386.54	\$397.45	\$408.50	\$419.69	\$431.00

Point D in Exhibit 2 represents a scenario in which home prices are expected to fall by a larger amount, say to \$90,000. The buyer would postpone the purchase until a period when more housing would be available for the given monthly payment. At the expected rate of 5.0%, the \$90,000 housing price can be financed with a \$711.71 monthly payment. In fact, at any point below the line, a potential buyer would be rational to postpone the purchase of a home. In a sense, below the CMP curve housing prices have fallen further relative to the interest rate change shown in the CMP. Given that housing prices have been flat or falling over the past few years and that interest rates have not yet begun to rise significantly, many current buyers have expectations that would place them below the CMP curve. As a rational response, they are correctly choosing not to purchase a home now.

The same analysis can be applied to the data in the following tables. In *Exhibit 3*, for 30-year fixed mortgages, if housing prices were expected to decline by 5% and interest rates were expected to rise by half a point, from 4.5% to 5.0%, then buying now and paying 4.5% on a \$100,000 mortgage with a monthly payment of \$506.69 would be preferable to paying 5.0% on a \$95,000 mortgage with a monthly payment of \$509.98. Conversely, a 10% decline in housing prices would result in a \$90,000 mortgage. Even if mortgage rates rose to 5.25%, resulting in a monthly payment of \$496.98, a buyer would be better off waiting rather than buying now and paying a mortgage of \$100,000 at 4.5% with a monthly payment of \$506.69.

The same holds true in *Exhibit 4*, using data for 15-year fixed rate mortgages. This scenario requires a much higher rise in interest rates to make a buy-now decision more favorable than waiting. If housing prices declined 5%, interest rates would need to rise a full percentage point, from 4.25% to 5.25%—generating a monthly payment of \$752.28 versus \$763.68—before buying now would be a better option.

Making a Decision in Uncertain Times

Throughout 2010, most U.S. housing markets were flat or declining and had been for several years prior. There is currently a structural excess supply in the housing market, even with policies favoring low

interest rates. Potential home buyers are pessimistic about the future, having curtailed their spending through most of 2010 and seeing persistently high unemployment, business failures, and substantial

and into 2011 have created uncertainty in the financial markets; uncertainty can only raise future interest rates.

Taken together, there are two unique characteristics peculiar to the current hous-

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home foreclosures. In simple economic terms, supply is high and demand is low. Further evidence provided by recent Case-Shiller housing indices have led many potential buyers to expect lower housing prices in the future, either directly or in the form of seller subsidies and concessions.

Home buyers may also expect to see higher interest rates in the coming year. Press reports on the size of the debt in the United States indicate a greater demand for government borrowing and money creation. Buyers also believe that, because rates now are so low now, they are unlikely to go much lower in the future. By not focusing more on the longer term part of the Treasury curve, it is hard to believe that current Federal Reserve policy will result in lower mortgage interest rates. In addition, economic movements through 2010

ing market. Home buyers, for perhaps the first time in recent history, may expect to see falling home prices and rising interest rates. Based on the extent of these expected movements in housing prices and interest rates, financial planners may want to use this model to assist in advising their clients on whether to buy now or wait a little longer. □

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EXHIBIT 4 15-Year Mortgage Monthly Payment								
Loan Amount	Interest Rate							
	4.25%	4.50%	4.75%	5.00%	5.25%	5.50%	5.75%	6.00%
\$100,000	\$752.28	\$764.99	\$777.83	\$790.79	\$803.88	\$817.08	\$830.41	\$843.86
\$95,000	\$714.66	\$726.74	\$738.94	\$751.25	\$763.68	\$776.23	\$788.89	\$801.66
\$90,000	\$677.05	\$688.49	\$700.05	\$711.71	\$723.49	\$735.38	\$747.37	\$759.47
\$85,000	\$639.44	\$650.24	\$661.16	\$672.17	\$683.30	\$694.52	\$705.85	\$717.28
\$80,000	\$601.82	\$611.99	\$622.27	\$632.63	\$643.10	\$653.67	\$664.33	\$675.09
\$75,000	\$564.21	\$573.74	\$583.37	\$593.10	\$602.91	\$612.81	\$622.81	\$632.89
\$70,000	\$526.59	\$535.50	\$544.48	\$553.56	\$562.71	\$571.96	\$581.29	\$590.70

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