

The Role of Macroeconomic Fundamentals in the Determination of House Prices

Larry Allen
Lamar University

Cynthia Barnes
Lamar University

Howell Lynch
Loyola University—New Orleans

This paper attempts to explain the variance of housing prices as a function of macroeconomic fundamentals. The analysis is based on data from six advanced countries. The sample range is from 2001-2012. A panel regression procedure is applied to the data set. The findings suggest that house prices can be interpreted as a function of macroeconomic variables. These macroeconomic variables include percentage real GDP growth, the current account and first differences in the current account as a percent of GDP, first differences in the imbalance between investment and savings, and the public debt as a percent of GDP.

INTRODUCTION

House prices took on enlarged macroeconomic significance after the U.S. housing market bubble inflated and deflated in the new millennium's first decade. A wave of house price inflation engulfed housing markets worldwide. The deflation of the bubble in the U.S. led the global economy into deep recession. At first glance, the housing bubble seemed to be the inevitable result of booming sub-prime lending. Some sub-prime loans came to be called "ninjna" loans for "no income, no job, no assets." Long before the spread of subprime mortgage lending, housing assets enjoyed one key characteristic endearing to speculators. Compared to other speculative assets, house purchases entailed small down payments. During the heyday of subprime lending, down payments on some subprime loans dropped to zero.

On the surface, subprime lending practices deserve blame for igniting the financial crisis. A deeper examination, however, lays bare macroeconomic fundamentals that drove the housing bubble and acquiescence to sub-prime lending practices. A phase of low interest rates and weak wage growth convinces households and businesses to accept higher risks. A secular decline in interest rates persuades banks to accept greater risks in a bid to earn the same rates of return as earned in the past. Under the pressure of sluggish wages, households embrace higher risks to maintain existing living standards, or to preserve an expected rate of improvement in living standards. Rajan (2010) pins the blame for easy credit policies in the U.S. on political pressures bred by rising income inequality. Rising income inequality may aggravate the tendency to accept higher risks, particularly among those who feel priced out of markets.

Subprime lending makes homes more affordable to those in low income brackets who are finding homes unaffordable.

Before the U.S. housing bubble burst, then Federal Reserve Chair Ben Bernanke put the spotlight on macroeconomic imbalances as a competing explanation for the U.S. housing boom. He cited a “global savings glut.” The savings glut pushed down interest rates, fueling a housing boom financed by an influx of foreign capital. The upshot was a large U.S. current account deficit, low interest rates, and rising asset prices concentrated in the housing market. Other researchers followed up on Bernanke’s clue regarding the role of global imbalances.

The prime objective of this paper lies in finding and accounting for a connection between house prices and what would be called weak macroeconomic fundamentals. Weak macroeconomic fundamentals include low savings, rising current account deficits, and large public debt.

The paper is structured as follows: The next section reviews the literature reflecting much of the relevant research since the global finance crisis. Section three introduces the variables that enter into this study and the hypotheses behind each variable. This section will also specify a regression equation to test the collective importance of variables reflecting macroeconomic fundamentals. Section four will report and discuss the results. The last section draws conclusions from the statistical findings.

LITERATURE REVIEW

Researchers have investigated from several angles the tangled linkages between housing markets and general macroeconomic conditions. Naturally monetary policy is one of the usual suspects where any type of inflation is concerned. Taylor (2007) attributed U.S. house price inflation to the Federal Reserve and the federal funds rate. Iacoviello and Minetti (2003) concluded that financial liberalization heightened the sensitivity of house prices to monetary policy. Bernanke (2010) in a speech to the American Economic Association observed for advanced countries that there was a positive correlation between house prices and capital inflows between 2001Q4 and 2006Q4. According to Obstfeld and Rogoff (2010), a similar correlation between capital inflows and real estate prices surfaces in Asian countries prior to the East Asian Financial Crisis.

Adams and Fuss (2009) conducted a panel regression on 15 OECD countries for a 30 year period. They reported weak evidence of an international housing market. Their findings suggested that a 1% boost in economic activity led to a 6% boost in house prices in the long-run. Also, higher long-term interest rates reduce house prices. The most unexpected of these findings suggested that the lagged response of house prices to macroeconomic shocks may span 14 years.

Beltratti and Morana (2009) employed a large-scale macro-econometric model to explore linkages between house prices and macroeconomic developments in G-7 countries. The sample period stretched from 1980 to 2007. They concluded that U.S. macroeconomic and financial shocks largely drive global macroeconomic and financial shocks. They found that global macroeconomic shocks are a major cause of international co-movement in house prices. Their findings suggested two-way causation between housing markets and macroeconomic conditions. Particularly interesting were the findings that investment spending reacts more than consumer spending to real house price shocks. Also, house price shocks induced larger macroeconomic effects than stock market shocks.

Hirata and Kose, et. al. (2013) found from their research that house prices in advanced economies grew almost at the same pace as economic activity, but the growth rate of house prices had accelerated over recent decades. Over the past four decades, real house prices have grown at an average rate of 2 1/4 percent per year, slightly slower than the growth of output. The growth of house prices differs significantly across countries (ranging from less than 1/2 percent per year in Germany, Japan, and Switzerland to over 3 percent per year in Spain and the United Kingdom) and over time.

Hirata’s and Kose’s, et. al. (2013) findings showed that there was a relatively high degree of comovement between house prices and credit. The strong relationship can be a reflection that housing was used as collateral in mortgage lending and that house price movements affected the borrowing capacity of households and firms.

The lack of comovement between house prices and interest rates suggests that the availability of credit (especially during periods of lax lending standards) might be one of the dominant drivers of house price movements in advanced economies. Indeed, the recent house price boom prior to the global financial crisis coincided with a period of ample liquidity in the financial sector.

According to Cesa-Bianchi and Cespedes, et. al. (2015), house price inflation leads consumer price inflation. House price inflation also leads interest rate increases. In particular, house price inflation leads changes in the same direction in nominal short-term interest rates by three to four quarters. The authors could not infer any causal relation between the evolution of house prices and short-term interest rates (and, ultimately, monetary policy) from these correlations. However, they show that house price inflation is procyclical and leads inflation and interest rate changes (the latter, with a slightly stronger coefficient) by a few quarters: a set of comovements that is consistent with a monetary policy authority reacting countercyclically to output and inflation.

Cesa-Bianchi and Cespedes (2015) also found that the correlation with the external sector of the economy was more stable and statistically significant, but quantitatively weaker. House price changes were linked with cross-border credit flows, current account deteriorations, and real exchange rate appreciations at all lead and lags, but with weak associations. The negative correlation between house prices and the current account balance, in particular, was consistent with the evidence previously reported in other studies (Aizenman and Jinjark 2009, Bernanke 2010, Ferrero 2012).

Adam, Kuang and Marcet (2011) advance a simple open economic pricing model that can explain the house price and current account dynamics in G-7 countries between 2001 and 2008. This model suggests macroeconomic fundamentals such as real interest rates can touch off boom and bust dynamics in house prices, but the response to these fundamentals varies across countries. Housing booms lead to current account deterioration and higher consumption expenditures. For the U.S. economy, this model indicates that the U.S. housing bubble could have been avoided and the U.S. current account deficit narrowed if the early 2000's had seen a smaller drop in interest rates. The model predicts a positive correlation between house prices and current account deficits.

Liang (2012) takes up the whole issue of global imbalances and savings glut as the underlying cause of asset price inflation in the U.S. and the global financial crisis. He concludes that interest rates mainly reflect monetary policy and not high rates of savings in Asian countries. Ferrero (2012) underscores the relaxation of borrowing constraints and dollar-pegged foreign exchange rates. The pegged exchange rates give the Federal Reserve a global reach in interest rate policy. This study concluded that the U.S. owed about two thirds of its boost in real house prices to low interest rates, relaxed borrowing constraints, and foreign exchange rate pegs. The same factors accounted for half of the boost in its current account deficit.

Allen, Kenyon, and Natarajan, (2012) found that for the U.S., easy money policies lifted house prices, but that house prices were much more sensitive to monetary policy in some regions than in others.

Miles (2014) reexamines the issue of the Federal Reserve's culpability. This study finds that long-term interest rates exert a stronger influence on house prices than the federal funds rate. Given that long-term rates partially exhibit a life of their own independent of the federal funds rate, these findings soften the Fed's role. This study also found that the linkage between the federal funds rate and long-term rates grows looser over time, while the linkage between house price and long-term rates remains tight.

THE DATA AND MODEL

To examine how far macroeconomic fundamentals enter into the determination of house prices, we use a regression equation estimated with panel data from six different countries. The countries are Australia, Germany, France, Japan, United Kingdom, and the United States. Germany and Japan are included because these countries avoided large run-ups in house prices immediately prior to the global financial crisis. The remaining countries exhibited a run-up in prices. Housing prices in Germany and Japan fell between 1997 and 2005. The sample period (2001-2012) covers the bubble-building period leading up to the crisis and the subsequent crisis.

The dependent variable in the regression equation is the rate of growth for residential property prices. This data is taken from the website of the Bank for International Settlements, (<http://www.bis.org/statistics/pp.htm>). Aside from the constant term, the first explanatory variable is the percentage change in real GDP. This data is available on the International Monetary Fund's website. The coefficient for this variable is expected to bear a positive sign. House price booms are likelier to occur when GDP growth is above average. Higher GDP growth translates into higher demand.

The second explanatory variable is the current account. This variable is also available from the International Monetary Fund's website. Researchers cited in the previous section noted the strong correlation between current account deficits and house prices. A large current account deficit indicates a large inflow of foreign capital. This foreign capital adds to the pool of capital available for mortgage financing. This argument, however, misses important points. A current account deficit indicates a strong demand for foreign goods, which subtracts from the demand for domestic goods and domestic employment. Previous studies suggest this coefficient should bear a negative sign, but this study anticipates a coefficient bearing a positive sign in the regression below. A current account surplus is an economic growth driver, which supports house prices. To capture the impact of inflowing capital on house prices, this study incorporates the first difference in the current account. This variable is the third explanatory variable. The coefficient of this variable is expected to bear a negative sign, suggesting an increase in the inflow of foreign capital accelerates house price inflation.

A fourth explanatory variable is an interaction variable comprised of two elements. The first element equals investment spending as a percent of GDP minus savings as a percent of GDP. Investment spending as a percent of GDP and saving as a percent of GDP are available on the International Monetary Fund's website. This number tracks higher if investment spending races ahead of savings. Low savings are one of the factors that create political pressure for low down payments and lax lending standards, which in turn enhance the value of houses as vehicles for speculation. A growing disparity between investment and savings ranks as one of those weaknesses in macroeconomic fundamentals that raise the risks of housing booms. An increase in investment spending relative to savings enlarges aggregate spending, which becomes more inflationary as an economy approaches full-employment.

An increase in housing investment itself may account for an increase in investment spending relative to savings. Since inflationary forces become stronger as actual GDP approaches potential GDP, this variable is multiplied by a gap variable. The output gap is equal to a ratio. The numerator in the ratio equals actual GDP minus potential GDP. The denominator equals potential GDP. In a booming economy, the number stands above zero. This ratio is calculated by the International Monetary fund and reported on its website. It is a cyclical indicator. Housing booms are likelier to occur as slack in the economy narrows. Restraints on new housing supply surface as the economy nears or exceeds potential GDP. Increases in either the difference between investment and savings or the gap variable add to the demand for housing.

A fifth explanatory variable is the government debt as a percent of GDP. This variable is also available from the International Monetary Fund's website. The coefficient of this variable is expected to bear a positive sign. A large public debt suggests a government that has been supporting aggregate demand. Strong aggregate demand favors rising prices. If large public debts lead to austerity measures, then the coefficient of this variable likely bears a negative sign. Austerity measures are likelier to be the exception than the rule. High public debts give governments an incentive to follow expansionary monetary policies. Easy money holds interest rates low, and may end in inflation, which helps debtors, including indebted governments.

A sixth explanatory variable is a trend variable generated to increase at 3% a year. The inclusion of this variable reduces the risks that other explanatory variables act as proxies for broader long-term trends rather than their own individual influence.

MODEL AND DATA ANALYSIS

The regression equation incorporating the above variables takes the following form:

$$\% \Delta \text{HP} = a + b * \% \Delta \text{GDP} + c * \text{CA} + d * \text{DCA} + e * (\text{IS} * \text{GAP}) + f * \text{DEBT} + g * \text{TREND} + U \quad (1)$$

Where:

- a = constant
 HP = residential property prices
 %ΔGDP = percentage growth in real GDP
 CA = current account balance as percent of GDP
 DCA = first difference of CA
 IS = the differences between investment spending as a percent of GDP and saving as a percent of GDP
 GAP = gap between actual and potential GDP
 DEBT = public debt as a percent of GDP
 TREND = variable representing secular trend
 U = residual
 a, b, c, d, e, f, g, represent coefficients

The above equation is estimated using the panel regression option on EViews. The estimation uses the fixed effects option for the cross-section component and the random effects option for the period component. The results of estimating equation 1 are reported in Table 1.

**TABLE 1
 RESULTS FROM ESTIMATING EQUATION 1**

	constant	DGDP	CA	DCA	IS*GAP	DEBT	TREND	STAT
Coefficient	0.3542	1.1861	0.0112	-0.0245	0.0091	0.0014	-0.0014	R ² = 0.58
T-Statistic	4.01	3.1897	2.4551	-3.5489	1.8777	1.9777	-3.6623	D.W. =1.98
Significance	0.0002	0.0024	0.0170	0.0008	0.0653	0.0526	0.0005	

The regression of Equation 1 produced an R-Square of 0.5, a good fit of the equation with the data. A Durban-Watson statistic of 1.98 indicates an absence of first order serial correlation. A perfect number for the Durban-Watson is 2.00, but 1.98 is unusually close. First order serial correlation indicates the omission of important explanatory variables. The third row reports the t-statistic for the coefficient right above it. A t-statistic less than 2.00 indicates a coefficient that is not statistically significant at the 5% level of significance. The last row in Table 1 reports the level of statistical significance for each coefficient. A statistical significance level greater than 0.05 indicates a higher than 5% chance that the real value of the coefficient equals 0.0. The coefficients in Table 1 are highly significant, indicating there is virtually zero chance that the coefficients equal zero.

All the coefficients have the hypothesized signs. The positive correlation between GDP growth and house prices is expected. GDP growth translates as income growth which can fuel the demand for housing. Excepting the constant term and the trend variable, the GDP growth variable carries the second largest t-statistic, indicating a high level of significance. The largest t-statistic, other than constant and trend variables, is reported for the coefficient on the variable DCA. The negative sign for this coefficient suggests growth in a current account deficit accelerates house price inflation. This finding corroborates previous studies linking current account deficits with house price inflation. Foreign capital helps to finance housing booms. The coefficient for the CA variable is highly significant and it bears a positive sign as hypothesized. A stable current account deficit does not fuel house price inflation. A stable current account surplus lifts house prices. Current account surpluses often drive economic growth, which increases housing demand.

The coefficient for the interaction variable (IS*gap) bears a positive sign. It is statistically significant at the 0.06 level of statistical significance, only slightly short of the 0.05% level of significance, the widely accepted standard. The positive sign for this coefficient is as hypothesized. Increases in investment spending without proportionate increases in savings add to the conditions favorable to a housing boom. Extra investment spending without extra savings is inflationary unless slack exists in the economy. If instead of saving out of current income, people speculate by purchasing houses without down payments, housing receives an extra inflationary impetus. The gap variable enhances the inflationary effects as the economy approaches full employment. This finding is not surprising since prices move upwards as slack in the economy vanishes, that is, as the gap variable passes from negative to zero or positive.

The coefficient for the Debt variable bears a positive sign at approximately the 0.05% level of significance. The positive sign supports the hypothesis that the large public debts signal government support for aggregate demand which encompasses housing demand.

Aside from the constant, the largest t-statistic is reported for the trend variable coefficient. This coefficient bears a negative sign, indicating the tendency for house prices to fall in the last part of the sample.

CONCLUDING THOUGHTS

This paper aims to uncover the relationship between macroeconomic fundamentals and house prices. Strong GDP growth signals a healthy economy, which stimulates rising house prices. Other macroeconomic variables associated with rising house prices are not associated with macroeconomic strength. A rising current account deficit goes with rising house prices. An excess of investment spending over savings adds to the growth in house prices. A large public debt augurs well for house prices. A macroeconomic system with high GDP growth, a climbing current account deficit, low savings rate relative to investment spending at full employment, and high public debt, is likelier to produce a housing bubble.

Put differently, a macro economy experiencing output growth with relatively low export growth and savings growth is likelier to develop a bubble in a non-tradable good like housing. One interpretation is that as the macroeconomic economy receives less support from export growth, households and business aim to preserve living standards and profits by bearing higher risks. Households without savings purchase houses with little or no down payment. Businesses likewise undertake riskier ventures to preserve profits. These ventures lead to faster technological innovation, but also lead to bubbles in non-tradable goods. For these reasons, housing bubbles are linked to weak macroeconomic fundamentals.

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