The Tale of Two Booms: Do Housing Prices Explain Excessive U.S. Consumption?

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Abstract: This paper investigates the relationship between house prices and consumption in the United States over the past three decades. It analyzes three hypotheses about the nature of that relationship: wealth effect, liquidity constraint, and financial norms. Evidence from a panel of state-level sales data supports the wealth effect and the financial norms hypotheses. The results are somewhat unclear about the liquidity constraint effect. The paper addresses the run-up in house prices beginning in the mid-1990s and examines the effect that this may have had on consumption.

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I. Introduction

The housing market decline and subsequent mortgage market collapse are widely viewed as important factors in the current economic downturn. Many economists have also recognized the role that the housing market buildup had in fueling consumption and economic growth over the previous decade (Case, Quigley, and Shiller, 2006; Cynamon and Fazzari, 2008). There has not been econometric analysis to date, however, of the impact that housing prices have had on consumption in the United States over the past three decades. This paper provides that analysis.

The following section of the paper documents the consumption boom and subsequent bust in the United States since the middle 1980s. This paper focuses on three hypotheses that link housing prices and this consumption behavior: the wealth effect, liquidity constraints, and changing financial norms. The wealth effect asserts that individuals spend a percentage of their wealth in each period. This percentage should be close to the real interest rate because that would allow the individual to maintain their wealth over time. I test the wealth effect by estimating the effect is the level of housing prices on consumption. The liquidity constraint effect comes from the idea that households may not be able to consume at their intertemporal optimal level because of borrowing constraints. If this is the case, an increase in house value could relax the constraint and allow them to increase current consumption. According to this model, we would expect the impact of the liquidity constraint to work through the house price growth. Yet it is unclear as to whether there would be a stronger growth effect in the earlier or later part of the 1975 to 2002 sample due to differences in theory about how other factors in the economy impact the liquidity constraint over time. The financial norms hypothesis starts with the fact, beginning in the 1980s, institutional changes in credit markets made it easier for households to borrow against the value of their homes. As the value of houses increased in the later period, consumers became more comfortable with home equity lending and cash out refinancing as these practices became the prevalent social norm. This change made Americans more willing to tap rising home equity to finance consumption. Under this hypothesis, it is house price growth that will matter for consumption, and the impact should be stronger in the second part of the sample than in the first.

The baseline consumption model estimated here comes from Japelli and Pagano (1989) and it is modified to include both the level and growth rate of house prices. The model is estimated from a panel of state-level data. Following Garrett, et al. (2005), quarterly state sales tax collections are divided by tax rates to measure consumption spending subject to sales tax (roughly sixty percent of aggregate consumption). The use of state-level data allows me to exploit regional variation in house prices to estimate the model. In addition, the panel data allow comparison of
the estimates across reasonably short periods of time, which is important to distinguish between the hypotheses described above.

The results demonstrate a statistically and economically significant effect on consumption spending of both the level of house prices and their growth rate. The level effect implies the presence of a strong wealth effect that has not changed much over time. The growth effect rises substantially in the second part of the sample. This finding is consistent with the financial norms hypothesis but it is unclear as to whether it supports the liquidity constraint idea. I also use the model to estimate the impact of the post-1995 housing bubble on consumption subject to sales tax.

The concluding section of the paper puts the analysis into a larger perspective and considers the effect of housing on the emerging U.S. recession for 2008 and beyond.

II. Motivation

Consumption Boom and Bust

The growth in the consumption rate and decrease in the savings rate in the United States has been a topic of conversation among economists and business journalists for several decades. The aggregate savings rate has decreased steadily in the United States since the mid-1980s to a point where it was zero or slightly negative from the middle of 2005 through the beginning of 2008. Of course, a decline in saving implies a rise in consumption. Consumer spending has risen significantly so that consumption now accounts for about 70 percent of U.S. Gross Domestic Product (GDP). Keynesian macroeconomic theory asserts that strong consumption fuels high economic output and low unemployment. Based on this Keynesian view, the consumption growth of the last decade acted as a stimulus and, according to Cynamon and Fazzari (2008), may have been a cause of the mildness of the 2001-2002 recession.

Yet while the economy seemed to prosper on the back of the consumption trend it was clear to many that the decreasing trend in savings was unsustainable. Most economists believed that at some point the trend had to stop and that it might even reverse. In particular, the increase in debt associated with higher consumption spending suggests that the consumption boom was associated with rising financial fragility. Following the sub-prime mortgage crash in the summer of 2007, household borrowing and consumption growth slowed, especially by the second half of 2008. This shift from consumption boom to bust is the most obvious cause of the current recession.
Link to House Prices

Along with the consumption rate, house prices in the United States have surged, especially since the mid 1990s. Some economic analysts worried several years ago that the bursting of a housing price bubble could create big problems for the U.S. economy. Karl Case and Robert Shiller (2004), the creators of the Case-Shiller Index, were among them. A few years later, Edward Gramlich (2007) expressed concern about subprime mortgages specifically. However, only in the summer of 2007 did concerns about the unsustainable trends in the housing market become widespread. Since then, house prices have fallen about ten percent from their highs nationally in real terms and more than twenty-five percent in certain high growth geographic areas.¹

There are a variety of theories regarding the relationship between house prices and consumption. It is possible that causation could move in either direction. Yet it is likely that as consumers see the value of their homes rising they are more comfortable with their financial situation and they increase consumption for any of the reasons described below. When the housing market collapsed in the summer of 2007 much of the popular press speculated about the decline in consumption that would follow.

There is a clear correlation between house prices and consumption, but correlation does not prove causation. Therefore, this issue requires a more rigorous statistical analysis.

III. Hypotheses Tested

There are several hypotheses about the impact of housing prices on consumer spending and we will focus on three of them here. The first two theories, the Wealth Effect Theory and the Liquidity Constraint Theory both rely on the life-cycle model as the explanation for the way that consumers allocate their intertemporal spending. The third theory, the Financial Norms Theory, uses a concept of bounded rationality and lack of information to describe consumer habits.

Wealth Effect

The wealth effect hypothesis is based on the fact that increases in house prices are increase the wealth of the homeowner. Since it is assumed that consumers are rational under this hypothesis, we assume that they had previously budgeted their current and expected future resources to maximize their utility. In this case, individuals will allocate their expected resources

¹ National real house price numbers referred to in this paper are from the Office of Federal Housing Enterprise Oversight (OFHEO) house price index deflated by the Personal Consumption Expenditure (PCE) price index. References to specific geographic areas are based on the Case-Shiller house price index.
so that the marginal utility of an additional dollar of consumption in the current period is equal to the marginal utility of a dollar in any future period. Therefore, when given a new amount of unexpected wealth individuals would, on average allocate the additional consumption fairly evenly over all future time periods. This allocation can be modeled as a consumption perpetuity where the additional amount consumed each period is roughly equal to the value of the unexpected wealth increase multiplied by the interest rate. It is also important to note that if the Wealth Effect Hypothesis holds we would not expect to see significantly different magnitudes of consumer spending changes resulting from house price changes between different periods of time, assuming that the expected real rate of return on wealth is roughly constant.

If the change in consumption is related to the unexpected change in wealth, the level of consumption spending should be related to the level of wealth. Therefore, the wealth effect will be estimated empirically by relating the level of real house prices to the level of real consumption spending. If housing wealth remains high, consumption will remain high. Thus, a one-time increase in housing wealth leads to a permanent change in consumption through this channel.

**Liquidity Constraints**

According to the liquidity constraint hypothesis, consumers seek to smooth their spending across time to maximize their utility, but they are not able to reach their optimal plan due to a liquidity constraint. For example, a consumer’s expectations may cause her to want to substitute current consumption for future consumption in order to maximize intertemporal utility. Yet she may be constrained in her current consumption because she does not have sufficient income and cannot obtain sufficient credit to reach the optimal current consumption level implied by her life-cycle optimization problem. When her house price increases, she is able to access her increased home equity and use it as collateral for additional borrowing. She is then able to use this money to finance additional current spending.

As a result, under the liquidity constraint hypothesis we would expect the level of consumption spending to increase when house prices increase. Note that an increase in housing equity through this channel has a temporary increase on consumption. The household can access the new equity to relax the liquidity constraint, but once this equity has been tapped for this purpose, the effect on consumption disappears.

The magnitude of increase in spending through liquidity-constraint channel would correspond with the proportion of the population that is liquidity constrained. For example, we might expect to find bigger effects of liquidity constraint in younger households; however, we would need micro-level data to test this relationship. We could expect that the relationship
between house price growth and spending increases to change over time if the proportion of consumers that are liquidity constrained changes or if the extent of their liquidity constraint changes.\(^2\)

The importance of the liquidity constraint hypothesis will be estimated empirically by exploring the effect of the change in house prices on the level of consumption spending.\(^3\) Thus, the liquidity constraint hypothesis can be distinguished empirically from the wealth effect that depends on the level of house prices.

**Financial Norms**

The financial norms hypothesis proposes that consumers rely to some extent on societal norms to guide their spending and financial decisions. Consumers are only boundedly rational as a result of their lack of information. They follow the behavior of others that they see around them about the appropriate use of credit for current consumption. There is a sense of safety in numbers. They believe (partially thanks to the mass media) that if many other people are drawing freely on home equity credit lines to finance current consumption, then this behavior is appropriate and acceptable for them as well. This theory has been put forth more recently by Cynamon and Fazzari (2008) and has drawn attention for its mix of behavioral and Keynesian Economics (Akerlof 2008).

When house prices increase, consumers have additional access to credit (collateralized by their increased home value). According the financial norms hypothesis, households will spend a portion of the available funds in the short term to the extent that this kind of behavior has become the prevailing norm. Empirically, the change in house prices should be related to the level of consumption spending.

This empirical implication is similar to the prediction from the liquidity constraints model. But the magnitude of the effect could be much greater since it is not limited to liquidity constrained households.

We also might expect to see consumers reacting differently in different periods to increases in their house prices. This kind of behavior depends on prevailing norms or habits. Cynamon and Fazzari (2008) argue that financial norms have changed in recent decades for a variety of reasons. Among them are the modern influences of mass media and the associations with social and

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\(^2\) For a more in depth look at the liquidity constraint hypothesis as it is applied to aggregate spending in macro economies see Jappelli and Pagano (1989).

\(^3\) If consumers expect to be liquidity constrained for more than one period, the impact of a change in housing prices may affect spending for more than a single period as consumers smooth how they spend the additional liquidity that they obtain. I examine this possibility by including lags of the change in home prices in the empirical specification.
economic reference groups “virtual or real” that consumers see around them. They learn consumption norms from these groups and then act accordingly. Changes in financial markets that allow households to more easily tap home equity for consumption also affect what consumers perceive as “normal” behavior. Based on the societal forces that Cynamon and Fazzari identify, changing financial norms would lead to a stronger relationship between the change in house prices and consumption in recent years compared with an earlier period when it was much less common for households to finance consumption by extracting home equity.

III. Specification, Data, and Estimation

Specification

\[ \log(C_t) = \log(C_{t-1}) + i_t + \text{HPgrowth}_t + \log(\text{HPlevel}_{t-1}) + \log(\text{SP}_t) + \varepsilon_t \]

The baseline specification used in this paper comes from Jappelli and Pagano (1989). This approach relies on a first-order condition for optimal consumption spending over time by a household that maximizes its life-cycle utility. The log level of current consumption \( C_t \) in this model depends on lagged log consumption \( C_{t-1} \) and the real interest rate \( i_t \). To test the hypotheses described in the previous section, I add the log level of the lag real house price index \( \text{HPlevel}_{t-1} \), real house price growth (equivalent to the change in the log of real house prices, \( \text{HPgrowth}_t \)), and the log lag of real stock market value \( \text{SP}_t \).

The impact of house prices and house price growth on consumption will help to discriminate between the hypotheses discussed in section II. The wealth effect implies that a higher level of housing wealth (as expressed through the house price index) would increase the level of consumption. To avoid an omitted variable bias, I also included the log of the lag of the S&P 500 stock price index. The liquidity constraint effect would cause an effect of house price growth on consumption because with the availability of mortgage refinancing, that growth would act as additional liquidity that would allow homeowners to better smooth their intertemporal utility by increasing their spending in a period of rising house prices. Finally, the financial norms story implies an impact of house price growth on the level of consumption. As house prices increase and households behave according to financial norms that encourage borrowing against home equity for consumption.

Both the liquidity constraint and financial norm hypotheses suggest that the impact of house prices on consumption could have changed over the past several decades as institutional changes in the financial system increased the ability of households to borrow against their homes. Note, however, that the liquidity constraint and financial norms hypotheses make the opposite
predictions about changes in the house price growth effect. The share of liquidity constrained households likely decreased with greater household access to credit. Thus, changes in house prices should have smaller effects on consumption toward the end of the sample than at the beginning of the sample if liquidity constraints are the dominant reason why house prices affect consumption. In their development of the financial norms idea, Cynamon and Fazzari (2008) argue that greater access to finance beginning in the middle 1980s made households more comfortable with borrowing for consumption. As this behavior spread through the economy, households learned to be more comfortable with extracting home equity and financial institutions extended credit secured by homes more readily. If changing consumption and borrowing norms were important for consumer spending, the impact of house price growth on consumption should be larger in recent years.

The data is split in two time periods. The 1986/1987 split was chosen because it was roughly in the middle of the sample. Also, the tax reform passed in 1986 led to a big expansion of home equity credit lines that made it much easier for households to borrow against housing equity. It is worth noting that the results are fairly robust to splitting of the data anywhere between 1985 and 1991.

Data

There is no widely available state level measure of consumption. Therefore, to measure consumption on a state level this paper follows the work of Thomas Garrett, Ruben Hernandez-Murillo, and Michael Owyang (2005) measuring the impact of consumer sentiment on consumption. State sales tax revenue is obtained from the U.S. Census Bureau’s “Quarterly Summary of State and Local Government Tax Revenue.” The sales tax revenue was then divided by the sales tax rate of the state to proxy consumption on all items in the state that were subject to the sales tax. The consumption data was then deflated by the national Consumer Price Index (CPI) that is produced by the Bureau of Labor Statistics and seasonally adjusted using the Census X-12 ARIMA method. The data goes from the first quarter of 1975 through the first quarter of 2002. It is only for 43 states and the District of Columbia.⁴

Using this sales tax proxy for consumer expenditures by state allows me to use a panel of state consumption data. This provides much more variation to estimate the house price effects than an aggregate data study would allow. The approach is especially important because the hypotheses that I am testing require me to split the data into relatively short periods of time. The

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⁴ Delaware, Montana, Oregon, New Hampshire, Alaska, Utah, and Nevada were not included because they either do not have a sales tax or they had incomplete reporting of their sales tax revenue over the period.
aggregate data would not have provided me with enough degrees of freedom to accurately test the three hypotheses.

The consumption that is subject to this sales tax makes up about sixty percent of total consumption. The roughly forty percent of consumption that is not subject to state sales taxes include more basic goods like food, shelter, and utilities. For this reason, we might expect that the portion of aggregate consumption studied here is more variable than total consumption.\(^5\)

Quarterly state house price data is obtained from the Office of Federal Housing Enterprise Oversight (OFHEO) quarterly state house price index for Q1 1975 through Q1 2002. Historical stock prices of the S&P 500 were obtained from Yahoo! Finance. The inflation adjustments for the real interest rate, house prices, and S&P 500 use the Personal Consumption Expenditures Price Index (PCEPI) inflation figures provided by the Federal Reserve Bank of St. Louis. This is a seasonally adjusted price index.

**Estimation**

In order to properly estimate each of the explanatory variables, state fixed effects are introduced in the OLS regressions to control for the variation across states that does not change over time. Omitting fixed effects could lead to bias in the other explanatory coefficients. In addition, the purpose of this research is to estimate the effect of changes in house prices over time, not across states. Because the regression includes state fixed effects, only time variation in the data affects the estimated coefficients.

**IV. Results**

**Results of the Baseline Regression**

The two regression outputs in Table 1 present results from estimation of the baseline model in the early period (1975-1986) and in the later period (1987-2002Q1).

The house price variables obviously have a statistically significant impact on consumer spending in both the early and the late periods. The estimated effect of house price growth is substantially larger in the later period. The level of house prices has a modestly smaller effect on consumption in the later period.

The effect of the level of house prices provides strong evidence that the wealth effect has played an important and roughly constant role over time. The effect of the stock price index also

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\(^5\) For a more in depth analysis of retail sales and personal consumption expenditures, see Rodgers and Temple (1996).
supports the importance of the wealth effect. The fact that the coefficient for the inflation-adjusted level of the S&P 500 is roughly half of the coefficient for the level of house price wealth gives credibility to both results. In the United States the level of housing wealth is roughly equal to twice the level of stock market wealth. Therefore, we would expect the elasticity of consumption to be about twice as great with respect to the level of house prices as with respect to stock market wealth.

The important effect of house price growth, particularly in the later period, is an original contribution of this paper. It supports the financial norms hypothesis and possibly the liquidity constraints model. In later periods consumers have become more willing to use increases in the value of their homes for consumption.\textsuperscript{6}

The positive coefficient of the real interest rate in both periods is somewhat of a puzzle, since most theories imply that consumers spend less when interest rates are higher. One theory suggests that because a non-trivial share of the population may live off of fixed income, a reduction in interest rates is a reduction in income for a substantial number of individuals.

### Implications of the Results on Consumption throughout the Economy

In the mid-1990s there was a divergence from the historical average of inflation-adjusted housing prices throughout the economy. Figure 2 shows this divergence clearly. With the information from the baseline regression, it is possible to estimate the impact that this increase in house prices has had on consumption since the mid-1990s.

The average level of the national inflation-adjusted OFHEO house price index in the twenty-year period from 1975 to 1994 is just less than 1.95. The graph in Figure 2 shows the relative price stability during this period. From 1995 onwards, though, the inflation-adjusted measure increases to above 3.32 at its maximum point in the second quarter of 2006. My results imply that the growth in house prices during this roughly ten-year period fueled consumption and that the increased level of house prices was also an important cause of greater consumption.

One might assume a slight upward trend in inflation-adjusted house prices over a period of several decades. As real GDP increases and per capita wealth grows, it may make sense that people choose to spend a larger amount of their wealth on their consumption of housing. But it seems clear that the increase in inflation-adjusted house prices of over fifty percent was highly unusual.

\textsuperscript{6} I explored the effect of adding lags of all variables to the baseline model. Lags had no important effect on the total impact on consumption for any variable except house price growth. When lags are added into the equation the growth effect becomes even larger, so the baseline result may be conservative.
Assume that the fifty percent increase in the housing stock nationally is an accurate measure of the housing boom. The wealth effect coefficient from the late period (in logs) is 0.2088. Therefore, the house price boom may have accounted for over ten percent of consumption \((0.2088 \times 0.50 = 0.1044)\) at its peak. This is a huge effect and would explain a large reduction in the U.S. saving rate. In addition, the growth rate effect associated with the financial norms hypothesis led to additional consumption. Certain regions of the country experienced double digit house price growth in some quarters. While this was not a regular occurrence, consistent periods of four to six percent real growth over different quarters was not unusual in many parts of the country. Based on the regression results, each percentage point growth in the price of housing led to approximately a one percent increase in consumption during that quarter. During some of the stronger periods of house price growth (especially in certain parts of the country) this effect alone could have created at least 5 percent of consumption.

**Conclusion and Implications**

When inflation-adjusted house prices took off in the United States in the mid-1990s the results presented here suggest that they had a statistically and quantitatively significant impact on consumption. Since consumption makes up roughly seventy percent of the current U.S. economy, this study would suggest that the effects of the house price boom of the last decade have had a non-trivial impact on the economy overall. As the level of housing wealth in the United States grew, there was a wealth effect that led consumers to spend significantly more. As the growth of housing prices remained high during this period, households seem to have extracted equity from their homes for additional spending, as predicted by the financial norms hypothesis.

The obvious question on the minds of many Americans during the current economic downturn is just what the impact of falling house prices will be now that the bubble has burst. Of course, the growth effect was gone by early 2009, even allowing for some lags. It seems likely that the rapid shift from growth to deflation in house prices accounts for a major part of the large drop in consumption that has already occurred in the U.S. and that has pushed the economy into recession. The negative influence of the wealth effect may have further to go. These effects are likely even more important in regions of the country that experienced a greater housing price boom and now face the prospect of a significant housing price decline.
Appendix A

Figure 1

[Graph of Consumption Rate over time]

Figure 2

[Graph of Real HPI over time]
### Table 1

<table>
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<th>Log of Spending for the Period 1975-1986</th>
<th>Coefficient</th>
<th>Std. Dev.</th>
<th>t-stat</th>
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<td>Log of the Lag of the Real Value of the S&amp;P 500</td>
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<table>
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References