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Abstract

Housing wealth is about one half of household net worth, and consumption is a considerable fraction (about two thirds) of Gross Domestic Product in the United States. Empirically, movements in housing wealth are associated with movements in consumption in the same direction. This observation has led many economists, commentators and policy makers to study how housing wealth and consumption are linked together. A sizeable portion of the comovement between housing wealth and consumption reflects common factors driving both variables, rather than the "wealth effect" of the former on the latter; however, a growing body of evidence suggests that the comovement is larger in developed financial markets and in the presence of liquidity constraints.

`Keywords:` Borrowing Constraints, Consumption, Consumption Function, Household Budget Constraint, Housing Wealth, Housing Wealth Effect.

`JEL Classifications:` C2, E2, G1, R2.

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1. Introduction: What is Housing Wealth?

At the aggregate level, housing wealth measures the market value of all the residential assets located in a particular country. According to this definition, housing wealth of U.S. households at the end of 2008 was 25.4 trillion dollars. Housing wealth is about one half of total household net worth (which is 52.9 trillion dollars), and is larger than the Gross Domestic Product (14.4 trillion dollars). Moreover, since financial wealth is more unequally distributed than housing wealth, housing wealth accounts for almost two thirds of the total wealth of the median household. Table 1.1 lists the balance sheet of the household sector in the United States at the end of 2008 using data from the Flow of Funds Accounts of the United States (FOF), using a breakdown of total household assets that differentiates housing capital from other forms of wealth. A large fraction (80 percent) of housing wealth is made up by the stock of owner-occupied homes. The remaining 20 percent (residential real estate held by nonfarm noncorporate businesses) is made up by the rental housing stock.

Figure 1 plots household consumption expenditures in the United States along with wealth divided into housing wealth and non-housing wealth. The series have been converted in 2005 billions of dollars using the deflator for personal consumption expenditures. The stock of housing wealth is large and moves slowly over time, but it exhibits a sharp increase between 1997 and 2005, followed by a bust between 2005 and 2008: size and persistence explain why changes in housing wealth are potentially an important candidate for understanding trends and cycles in aggregate consumption expenditures.

Figure 2 plots annual changes in housing wealth and personal consumption expenditures in the United States from 1952 to 2008. The two variables tend to move together in post-world war II U.S. history. Their contemporaneous correlation is 0.47. This correlation is larger than the correlation between consumption and the residual components of household wealth: for instance, the contemporaneous correlation between changes in financial wealth and consumption equals 0.38.

The comovement between housing wealth and consumption poses a challenging question for macroeconomists, policymakers and commentators. Do fluctuations in consumption reflect fluctuations in housing wealth, or are both variables determined by some other macroeconomic factor that moves them, such as technological change, movements in interest rates, or other factors that contribute to business cycle fluctuations?

	U.S. Households' Balance Sheet, 2008 billion $		FOF entry
A	**Assets**	**67,134**	B.100:1
B	Real Estate (Owner-Occupied Homes)	20,398	B.100:3
C	Residential Real Estate of Noncorporate Business (Rented Homes)	4,964	B.103:4
D	Other Tangible Assets	4,779	B.100:2 less B.100:3
E	Financial Assets less Residential Real Estate of Noncorp. Business	36,992	B.100:8 less B.103:4
F	**Liabilities**	**14,216**	B.100:31
G	**Household net worth**	**52,917**	A--F
	Housing wealth	25,362	B+C
	Non housing wealth	27,555	D+E−F

Table 1.1: Composition of Household Wealth in the United States

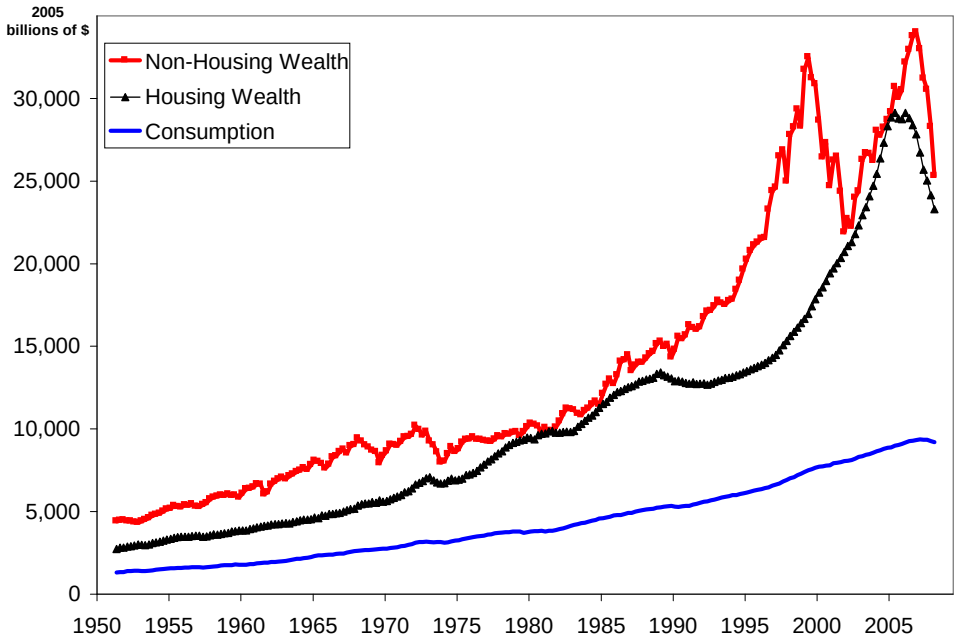

Figure 1.1: Housing wealth, Consumption and Non-Housing wealth in the United States from 1952 to 2008. The series are expressed in 2005 billions of dollars.

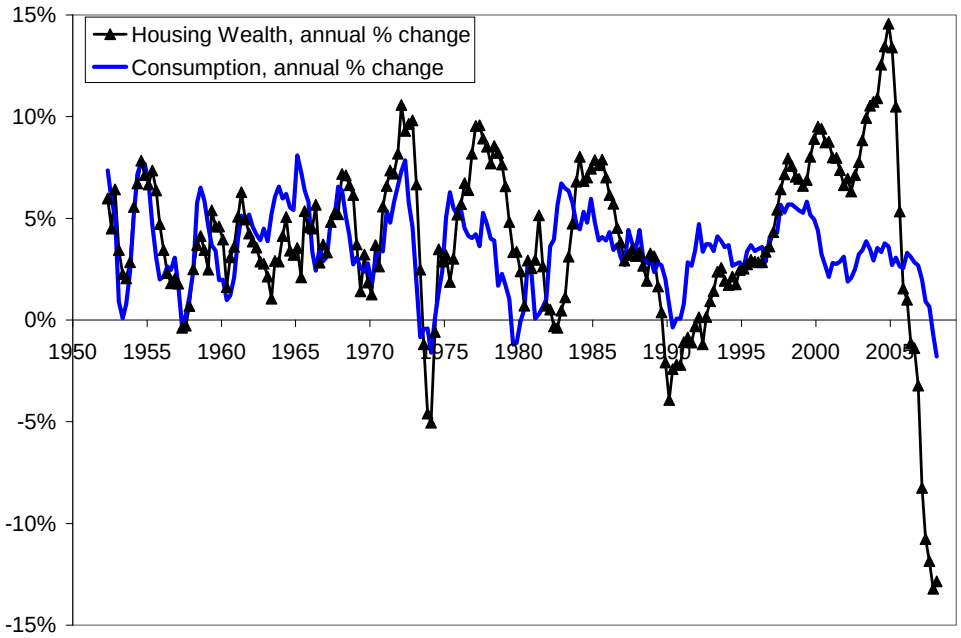

Figure 1.2: Annual changes in housing wealth and consumption in the U.S., from 1952 to 2008.

2. Housing Wealth and Consumption

A standard macroeconomics textbook contains a section presenting the economy's consumption function. In this consumption function, the standard determinants of consumption are wealth W and permanent income Y, and the consumption function reads as follows:

$$C = \alpha W + \beta Y \tag{1}$$

where α and β measure respectively the marginal propensity to spend out of wealth and permanent income. This equation can be obtained as the solution to a problem where individuals maximize utility over time given a set of intertemporal trading opportunities, under very special assumptions about the set of trading opportunities and about the nature of the income process that the individual faces. An equation such as (1) dates back in the history of economic thought to at least Keynes, and was given prominence in the seminal work of Milton Friedman and Franco Modigliani.

When total wealth is broken down into housing HW and non-housing wealth NW, a generalization of the above equation that allows for different marginal propensities to consume of housing and non-housing wealth can be written as:

$$C = \alpha_N NW + \alpha_H HW + \beta Y. \tag{2}$$

It is typical to interpret the coefficient α_H in equation (2) as measuring the "housing wealth effect". At the basic level, in fact, this equation states that if housing wealth were to change by, say, 1 dollar, consumption should change by α_H dollars. This equation provides the basis to think about the connection between housing wealth and consumption. However, it is entirely silent about the reasons why housing wealth moves. One important caveat in interpreting the results from this equation is that, while it is reasonable to interpret part of changes in the two right-hand side variables as exogenous at the *individual* level (bequests, lottery winnings, unemployment spells, gentrification and deterioration of a neighborhood are somewhat outside the control of the individual), the interpretation of this equation at the *aggregate* level is more complicated, since, to a large extent, all variables of equation (2) are jointly determined.

Movements in non-housing wealth, for instance, might either reflect a new view of future profits or occur because market participants apply a different set of discount factors to those expected profits, where the discount factors incorporate both risk-free interest rates and equity premiums. From a theoretical standpoint, these movements could have different effects on household spending. The same reasoning applies to housing wealth: changes in the value of the housing stock might reflect genuine shifts in tastes between housing and consumption goods, or could result from changes in availability of residential land, or from movements in sectoral technologies. It is reasonable to assume that all these changes could affect consumption, but their effects might differ.

The empirical literature (surveyed in the next section) grapples with the obvious identification problem of separating endogenous from exogenous movements in housing wealth. The theoretical literature studies instead the question of whether a housing wealth effect exists, what it means, and how to think about it.

3. The Theory

3.1. A Basic Model

To illustrate the ideas, this section considers a simple model of consumption and housing choice. A household lives forever and has preferences defined over current and future non–housing consumption c_t and housing services h_t. That is, the household problem is defined by:

$$\max E_t \sum_{t=0}^{\infty} \beta^t \left(u\left(c_t\right) + v\left(h_t\right) \right) \tag{3}$$

where β is the household discount factor, and E_t is the expectation operator. This preference specification is standard in models of household behavior. Life-cycle and bequest considerations, endogenous labor supply, non-separability between housing and consumption, and housing tenure choice are ignored here. The household faces the following budget constraint in any period t:

$$c_t + q_t h_t + s_t = Y_t + q_t h_{t-1} + R_t s_{t-1}. \tag{4}$$

where q_t is the price of housing, s_t is non-housing wealth (for instance, shares in a firm or holdings of government debt), R_t is the return on non-housing wealth, Y_t is labor income. In equation (4) , the right-hand side measures total resources available to the household at the end of the period t. These resources, in the absence of portfolio adjustment costs, can be used for consumption, housing wealth accumulation and non-housing wealth accumulation. Setting aside general equilibrium considerations, one can treat q_t, R_t, and Y_t as exogenous (and possibly random), and assume that the household chooses plans for consumption c_t, housing h_t and financial wealth s_t. In this simple framework, random changes in q_t, R_t, and Y_t can proxy respectively for housing wealth shocks, non-housing wealth shocks, and income shocks. For given initial conditions, the solution to the household problem can then be rearranged to express optimal household consumption as a function of lagged non-housing wealth s_{t-1}, housing wealth h_{t-1}, and innovations to q_t, R_t and Y_t. It has the interpretation of a consumption function.

What are the implications for non–housing consumption of a shock to housing wealth in this model? To gain some intuition, consider the simplest possible case where the household, because of large adjustment costs to housing, does not change house between two consecutive periods: $h_t = h_{t-1}$ for every t. It is easy to see that changes in q_t are irrelevant for consumption behavior of this household, since $q_t h_t = q_t h_{t-1}$ in every period, so that housing wealth disappears from the household budget constraint. Intuitively, higher housing values ($q_t h_{t-1}$) result in higher housing costs ($q_t h_t$) that exactly offset the housing wealth effect on non-housing consumption; when q_t rises, wealth in units of consumption increases, but, unless the individual changes housing expenditures, housing wealth does not imply larger consumption. This basic logic is what leads Buiter (2008) to assert that housing wealth is not net wealth, unless individuals decrease their housing consumption in response to housing price changes.

If the household can change housing consumption between two periods (h_t needs not to equal h_{t-1}), an additional effect kicks in. When house prices rise, the so-called substitution effect will cause households to reduce their demand for housing, and will free up resources that can be spent

on non-housing consumption. In this scenario, the immediate effect of an increase in housing wealth is that of stimulating consumption. The interpretation of the rise in consumption, however, is subtle: part of the rise in consumption does reflect the result that wealth, measured in units of consumption, is larger, so that the individual will optimally reallocate part of the larger wealth among all expenditure categories. Part of the rise in consumption, instead, simply reflects the economics of asset substitution: the household can now achieve higher utility by consuming less housing and more non-housing consumption goods than before.

3.2. Extensions

What is missing from the basic theory above?

1. The simple theory above makes the extreme assumption that changes in the price of housing are purely exogenous. To see why modifying this assumption might change the results, consider the case where changes in the price of housing are the consequence of a shift in tastes between non-housing and housing goods: for instance, individuals might decide that they prefer to live in larger and nicer homes rather than dining out: under this assumption, it is possible that increases in the price of housing are associated with lower consumption, since the change in house prices is the consequence of a shift in preferences away from consumption goods. Empirically, evidence in favor of a mechanism of this kind comes from the observation (at least in the United States) that movements in housing prices are positively correlated with movements in housing investment: this evidence would seem to support the idea that movements in housing prices (and wealth) are the consequence of shifts in housing demand, rather than housing supply.

2. Another consideration that is missing from the basic story is the presence of borrowing constraints. The structure of financial markets in many developed economies implies that households have easy access to housing wealth through second mortgages, home equity loans, or home equity lines of credit. If liquidity-constrained households - who are believed to have a high marginal propensity to spend on average - can borrow more whenever their housing wealth rises, this channel is likely to lead to a larger correlation between movements in housing wealth and movements in aggregate consumption. Moreover, one can expect larger aggregate effects from changes in housing wealth since housing wealth is more evenly distributed across the population than non-housing wealth: if relatively poor people have higher than average propensity

to consume, the aggregate consumption response to changes in housing wealth might be larger than otherwise.

3. The basic model also sidesteps life-cycle and housing tenure considerations. The representative household of the model displays a profile of housing consumption that is constant over time. In reality, the way consumption is connected to movements in housing wealth should also depend on whether individuals expect to modify their housing consumption in the future. Cross-sectional data show that housing wealth typically increases over the life cycle, before flattening out at a relatively old age. This is true both at the extensive margin (home ownership rates increase with age) and at the intensive margin (the average size of owner-occupied houses increases with age). Taking these elements into consideration, one should expect that life-cycle considerations should imply a negative response of consumption to increases in aggregate housing prices, since - to the extent that renters plan to become homeowners at some point of their life, or homeowners plan to move to larger homes - higher housing prices require larger savings than otherwise if individuals are planning to buy a larger home.

4. A final aspect to consider is how persistent changes in housing wealth are relative to changes in other forms of wealth. Historically, changes in housing returns have been more persistent than changes in the return to, say, stockmarket wealth. Households consumption might respond more to a given size change in housing wealth if this change is not expected to reverse quickly.

3.3. Taking Stock

A message from the basic theory is that, after solving the household intertemporal optimization problem, one can derive an aggregate consumption function where consumption is expressed as a function of income and wealth, and where the marginal propensity to consume out of housing wealth is positive or negative depending on the underlying characteristics of the economy.

In a more realistic setting, however, especially when the goal is to model the economy as a whole (rather than the behavior of a single economic agent), one should assume that wealth is endogenous, and that its fluctuations are driven by current or expected movements in technology, tastes, taxes, or some other unidentified economic fundamentals. These fundamentals, in turn, may affect at the same time both consumption and wealth itself, thus making any statement about links from wealth to consumption (or vice versa) hard to interpret.

Yet central bankers, practitioners and policymakers routinely think of movements in wealth as exogenous, mostly because these movements are hard to predict or explain based on movements in readily available observable variables that one can regard as purely exogenous.

4. Empirical Studies

4.1. The Conventional Wisdom

A simple regression on quarterly United States data for the period 1952.I-2008.IV of:

$$\Delta \left(\log C_t \right) = \alpha + \beta_{HW} \Delta \log \left(HW_{t-1} \right) + \beta_{NW} \Delta \log \left(NW_{t-1} \right)$$

where C, HW and NW measure respectively consumption, housing wealth and non-housing wealth, and Δ is the first difference operator, yields the following coefficients (standard errors below):

$$\Delta \left(\log C_t \right) = \underset{0.0006}{0.007} + \underset{0.035}{0.136} \Delta \left(\log HW_{t-1} \right) + \underset{0.013}{0.056} \Delta \left(\log NW_{t-1} \right).$$

More sophisticated regressions yield similar results, at least qualitatively if not quantitatively. This simple regression has the virtue of being simple, easy to estimate, replicable and straightforward to interpret. According to this regression, the elasticity of consumption to housing wealth is 0.14, after controlling for movements in non-housing wealth (the elasticity of consumption to non-housing wealth is lower, at 0.06). These estimates are more often converted into dollar-to-dollar estimates using the fact that, in the sample in question, the average ratio of housing wealth to annual consumption is about 2.3, and the average ratio of non-housing wealth to annual consumption is about 2.75. A one dollar increase in housing wealth then generates an increase in annualized consumption of about 6 cents, and one dollar increase in non-housing wealth generates an increase in consumption of about 2 cents.

The results of this simple regression are the basis for a series of wisdoms about wealth effects and the basis for thinking about housing wealth and consumption. In particular, the larger sensitivity of consumption to housing wealth is one of the many reasons why policymakers might be more worried about changes in housing than non-housing wealth.

4.2. Studies Based on Aggregate Time-Series Data

Perhaps one of the most prominent studies of the link between housing wealth and consumption is the FRB/US model, which is one of the econometric models of the U.S. economy used by the

Federal Reserve. One of the model blocks describes household consumption behavior as a function of total wealth and its composition. This model predicts, among other things, a marginal propensity to consume out of net tangible assets (housing wealth and consumer durables less home mortgages) which ranges between 5 and 10 cents on the dollar (see for instance Brayton and Tinsley, 1996).

Several studies have reviewed the literature and provided additional estimates of the so-called housing wealth effect. The broad consensus from the literature based on time-series data is not very different from the FRB/US model, with some studies finding larger elasticities for housing wealth, and some other studies finding the opposite. Poterba (2000) surveys a variety of estimates from the literature.

More recent studies corroborate the findings from the empirical literature of the 1990s. Carroll, Otsuka and Slacalek (2006) propose a time-series based method that exploits the sluggishness of consumption growth to distinguish between immediate and eventual wealth effects. Using U.S. data, they estimate that the immediate (next-quarter) marginal propensity to consume from a $1 change in housing wealth is about 2 cents, with an eventual effect around 9 cents, substantially larger than the effect of shocks to financial wealth.

Case, Quigley and Shiller (2005) find a strong correlation between aggregate house prices and aggregate consumption in a panel of developed countries. According to the central estimates, a 1 percent increase in housing wealth increases consumption by roughly 0.11 percent in the international panel. For a panel of U.S. states, an updated version of their 2005 paper (Case, Quigley and Shiller, 2011) reports elasticities of consumption to housing wealth that range from 0.03 to 0.18, with a central estimate of 0.08.

The main problem with studies based on aggregate data is that such data do not rule out alternative explanations for the time series correlation: either indirect wealth effects or reverse causation running from changes in household saving to changes in wealth. Iacoviello and Neri (2010) address this problem in a structural equilibrium model where both consumption and housing wealth are endogenous, and are driven by movements in technology, preferences, monetary policy. They show that their model quantitatively replicates the positive correlation in the data between consumption growth and housing wealth growth. The bulk of this correlation simply captures common factors that move the two variables in the same direction, such as shifts in preferences, interest rates, or technology. However, a non-negligible portion of this correlation reflects the contribution of liquidity constraints. This result echoes the conclusions of Muellbauer and Murphy (2008), who argue that

housing collateral and downpayment constraints are the key to understanding the role of house-price variations in explaining medium-term consumption fluctuations.

4.3. Studies Based on Micro Data

A growing literature has used household-level data to connect movements in consumption and movements in housing wealth. One of the main questions in this literature is to study how households respond to changes in the value of their housing wealth. A central issue concerns how to identify movements in housing wealth that are orthogonal to other factors that might also affect consumption.

Campbell and Cocco (2007) study micro data from the UK Family Expenditure Survey from 1988-2000. They use repeated cross-sections of household expenditure data and regional home price information to estimate a small, positive consumption response to home prices for young homeowners, and a large positive response for old homeowners. Using mean home values and consumption as reported in their paper, this translates into marginal propensities to consume out of housing wealth of 0.06 for young homeowners, and 0.11 for old homeowners.

Mian and Sufi (2009) investigate how existing homeowners respond to the rising value of their home equity, which they refer to as the home equity-based borrowing channel. They use land topography-based housing supply elasticities in order to identify exogenous variations in house price growth across different geographical areas and individual-level data on homeowner debt and defaults from 1997 to 2008. They show that existing homeowners increase their borrowing significantly in response to changes in their home equity, and use the extra borrowing mainly for real outlays, such as consumption or home improvements.

5. Conclusions

Housing wealth is a major component of household wealth. Housing wealth is linked to non-housing consumption through the logic and algebra of the budget constraint: by moving to a smaller or larger house, a household can free up or use resources that would otherwise go into non-housing consumption or other forms of saving. Empirically, housing wealth and consumption tend to move together: this could happen because some third factor moves both variables, or because there is a more direct effect going from one variable to the other. Studies based on time-series data, on panel data and on more detailed, recent micro data point suggest that a considerable portion of the effect of housing wealth on consumption reflects the influence of changes in housing wealth on borrowing

against such wealth.

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