WEALTH EFFECTS AND MACROECONOMIC DYNAMICS

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Abstract. The effect of wealth on consumption is an issue of long-standing interest to economists. Conventional wisdom suggests that fluctuations in household wealth have driven major swings in economic activity both in the United States and abroad. This paper considers the so-called consumption wealth effects. There is an extensive existing literature on wealth effects that has yielded some insights. For example, research has documented the relationship between aggregate household wealth and aggregate consumption over time, and a large number of household-level studies suggest that wealth effects are larger for households facing credit constraints. However, there are also many unresolved issues regarding the influence of household wealth on consumption. We review the most important of these issues and argue that there is a need for much more research in these areas as well as better data sources for conducting such analysis.

Keywords. Borrowing constraints; Consumption; Deleveraging; Financial wealth; Household debt; Housing wealth; Saving; Wealth effects

1. Introduction

The effect of wealth on consumption is an issue of long-standing interest to economists.[1] The relationship is particularly important from a policy perspective, given the large swings in financial asset prices and property values over the last few decades in both the United States and many other developed countries. The conventional wisdom is that the resulting fluctuations in household wealth have driven major swings in economic activity. Indeed, the plunge in asset prices during the financial crisis is frequently cited as an important contributing factor to the unusually slow economic recoveries in the United States and some other developed countries. Similarly, the large drop in asset prices in Japan following their peak in 1990 is viewed as having restrained growth during the subsequent decade in that country.

Against this backdrop, it is perhaps not surprising that a great deal of empirical research over the last 25 years has focused on the so-called wealth effects – the impact of changes in wealth on household consumption and the overall macroeconomy. Such studies have used different types of data and frameworks to examine the relationship between wealth and spending, including macroeconomic time series, cross-country comparisons, within-country regional comparisons, household survey results, and credit bureau records. The existing literature also considers how the wealth effects vary across countries. Overall, the research has yielded some important findings about the nature of household wealth effects, but consensus has yet to be reached on many important issues. We review these questions and argue that

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there is a need for more research in the area as well as a pressing need to develop better data sources for such research. Our analysis and commentary largely focuses on the United States, but we include evidence and studies from other countries where relevant.[2]

2. Theoretical Framework

The idea that fluctuations in household wealth can influence consumption is firmly rooted in the Permanent Income Hypothesis (Friedman, 1957) and the Life Cycle Hypothesis of Modigliani and Brumberg (1954) and Ando and Modigliani (1963). These models posit that households consume the present discounted value of their expected lifetime incomes. Within this context, permanent changes in household resources ('windfalls' according to Friedman, 1957) result in higher consumption, while transitory changes leave spending little changed.

This theoretical framework is the basis for reduced-form equations linking consumption to income and wealth. The 'consumption function' often used to estimate household wealth effects typically takes the following functional form:

$$c_t = \alpha_t + \beta_t^1 y_t + \beta_t^2 w_{t-1} + \gamma X_t + \varepsilon_t \tag{1}$$

where c_t is consumption, y_t is income, w_{t-1} is beginning of period net worth, and X_t is a vector of additional controls that should influence household spending (all in period t).[3]

One conceptual drawback to the simple consumption function above is that all the components of household net worth are assumed to have the same relationship with consumption. Indeed, equation (1) incorporates the assumption that assets are fungible and 'money is money' (Thaler, 1990). However, there are a number of reasons to think that fluctuations in housing wealth might have a different effect on consumption than fluctuations in financial wealth. As we discuss in much more detail below, one reason that one might expect a more muted response to housing wealth is that housing is also a consumption good – households consume a service flow from housing by living in their home – such that increases in home prices not only raise net worth but also raise the price of future consumption. Further, households with low liquid financial assets can borrow against the amount of equity in their homes in order to increase spending in the wake of home price increases. On the one hand, one might expect the latter 'collateral channel' of housing wealth effects to be associated with high marginal propensities to consume, since low-financial wealth households are more likely than other households to lack access to uncollateralized credit and, in turn, more likely to have consumption below their optimal level. On the other hand, the relative high transaction costs of borrowing against home equity should lead households to do so infrequently and only when they really need access to the money, which (all else equal) should tend to reduce the response of consumption to home price gains.

Even just within financial wealth, different components may have different degrees of relative liquidity, which should affect the response of consumption to wealth changes – it is easier to consume the gains in one's savings account or directly held stock portfolio than gains in one's personal retirement account or company pension plan. As a result, some studies consider the relationship between consumption and asset price fluctuations after further dividing financial wealth into its liquid and illiquid components (see, for example, Byrne and Davis, 2003; Aron *et al.*, 2012; Duca and Muellbauer, 2013).

In practice, there are multiple approaches to estimating household wealth effects using the consumption function with macroeconomic or household-level data. For example, the variables may be specified in levels, logs, or a hybrid log-level approach proposed by Muellbauer (2007). Lags of the independent variables may be included to allow for the gradual adjustment of consumption to its determinants. However, one common feature of studies using this framework is that they characterize only the partial-equilibrium

relationship between consumption and household net worth. In particular, any indirect effects that occur through the influence of wealth on macroeconomic dynamics that, in turn, affect the other determinants of consumption will be picked up in the coefficients on those variables and not the coefficient on wealth.

3. Aggregate Wealth Fluctuations and Policy Discussions

Figure 1 plots nominal stock price indices and home price indices in the United States and select other industrialized countries. The data show that not only have there been large swings in asset prices in the United States, but there have been similar swings – especially in stock prices – abroad. For example, stock prices in the United Kingdom and Germany rose during the 1990s and then collapsed starting in 2000, only to rise again in the mid-2000s and then drop during the global financial crisis. Nominal home prices also trended upward at a strong clip in a number of countries through the mid-2000s only to decline around the time of the global financial crisis. The drop was most severe in the United States and Spain, while in Australia home prices have continued to trend up after only a slight correction. The asset price patterns in Japan are somewhat different since their business cycles have occurred at different times.

Figures 2 and 3 depict the relationship between consumption growth and house price growth and consumption growth and stock price growth, respectively, in select industrial countries. The data suggest that asset price changes and consumption growth are positively correlated. Indeed, there has been much policy debate, as well as discussion in the literature, regarding the impact of fluctuations in household net worth on economic activity.

In the United States, for example, the Federal Reserve's February 1996 *Monetary Policy Report to Congress* noted: "In the household sector, the accumulation of financial wealth brought on by the rise in the stock market has provided the wherewithal for increases in consumption greater than would otherwise have been expected – countering the potential negative influences of more burdensome levels of consumer debt" (p. 286). In a 2002 speech, then Federal Reserve Governor Edward Gramlich remarked that "the link between aggregate household wealth and spending has remained one of the sturdier empirical relationships in macroeconomics." In a section focusing on job losses and the financial crisis, the 2013 *Economic Report of the President* stated that "A total of $16 trillion in wealth was erased by the financial and housing crisis, causing families to pull back on spending plans, reduce personal debt and increase savings, in turn leading companies to cut back hiring, lay off valued employees, and halt investment plans." Similar policy discussions regarding the influence of asset prices on the economy have occurred in other developed countries. In a 2008 speech, Anthony Roberts, then head of the Economic Analysis Department at the Reserve Bank of Australia, noted, "The high level of attention given by policymakers to household wealth underscores the importance of understanding its relationship to consumption." Earlier, in 1998, Mervyn King, then Deputy Governor of the Bank of England, commented, "In the past, domestic demand has been sensitive to developments in the housing market. In the late 1980s prices increased by 40 percent in two years, while consumption rose by over 9 percent. Borrowing using housing as collateral – so called equity withdrawal – amounted to almost 50 percent of the increase in consumption over that period."[4]

Some of the policy discussion has focused on the size of the wealth effects in Europe compared with the United States. Peter Praet, a member of the ECB executive board, noted in October 2013 that "The response of households also depends on the availability of financial products that make it possible to extract equity from illiquid assets (housing wealth). This availability is limited in many European countries and, accordingly, the response of consumption to wealth shocks – the wealth effect – seems to be more modest than in the United States (as much of the literature has found)."[5] The high level of attention given by policymakers in the United States and other developed countries to household net
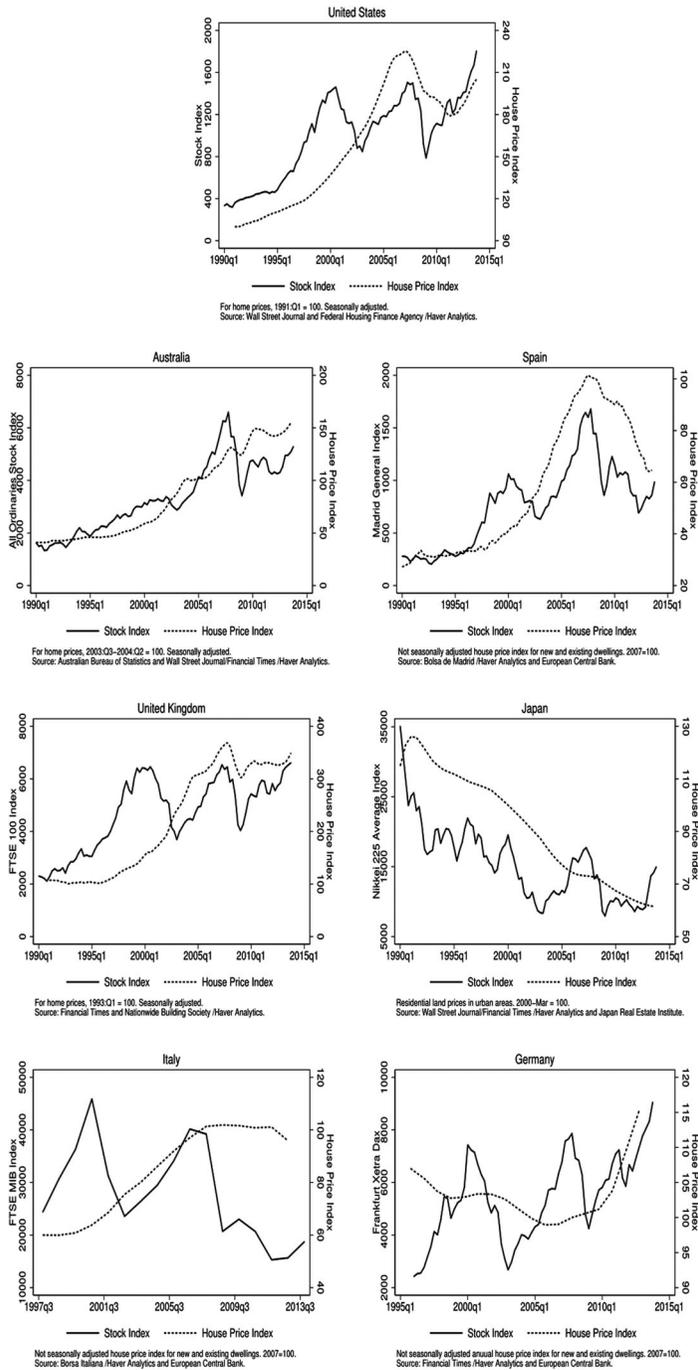
Figure 1. Stock Market and House Price Indexes.

worth fluctuations underscores the importance of understanding the relationship between wealth and consumption in order to better grasp how these fluctuations impact economic activity.

4. Estimating Wealth Effects Using Macro Data: Evidence from Different Countries

As noted earlier, standard consumption theory implies that changes in net worth that permanently alter households' resources should cause consumption to change in the same direction. This posited relationship is consistent with the strong positive correlation between asset prices and consumption across developed countries seen in Figures 2 and 3.

There is an extensive literature estimating wealth effects using aggregate data that include results from many different countries and time periods. Davis and Palumbo (2001) present an analysis based on typical forecasting models and conclude that consumer spending in the United States rises by between 3 and 6 cents for every additional dollar of household net worth, with the effect occurring gradually over a period of several years. Tan and Voss (2003) perform related macroeconomic analysis using Australian data and find that Australian consumption rises about 4 cents for every additional (Australian) dollar in wealth. Slacalek (2009) analyzes the relationship between housing wealth, financial wealth, and consumption across 16 industrialized countries. He finds that the marginal propensity to consume (MPC) out of wealth (total, financial or housing) averages about 5 cents per dollar of net worth across countries. However, the response of consumption to wealth shocks in continental Europe is quite small compared to that in the so-called Anglo-Saxon countries (the United Kingdom, Australia, the United States, and Canada) and other nations outside the Euro area.

Many studies using the aggregate consumption function framework estimate different responses for different types of wealth. For example, Carroll *et al.* (2011) find an MPC out of financial wealth for the United States of 6 cents and a housing wealth effect of 9 cents. In a study of the G7 countries (other than Germany), Boone and Girouard (2002) find long-run MPCs out of financial wealth between 4% and 10% and long-run MPCs out of housing wealth of 3% to 10% with the largest effects occurring in Canada and Japan. A more recent study of the United States, Japan, and the Euro area, Kerdrain (2011), finds that the long-run MPC out of financial wealth is very similar for the different regions, at about 5 or 6 cents, but that the MPC out of housing wealth is much larger in the United States (about 5 cents per dollar) than elsewhere (1 to 1.5 cents per dollar). He concludes that wealth fluctuations – especially in the United States – are very important for explaining the evolution of consumption during the recent financial crisis.

Some authors have focused on differences in financial systems as one explanation for why wealth effects differ across countries. For example, Slacalek (2009) notes that the Anglo-Saxon countries where he finds relatively large wealth effects are all countries with well-developed mortgage markets. Ludwig and Slok (2004) examine a panel of 16 OECD countries and find, among other things, that consumption is more sensitive to changes in assets prices in countries with market-based financial systems (characterized by larger stock markets and a higher degree of stock market capitalization) rather than bank-based systems. The former systems are prevalent in Anglo-Saxon countries and the latter in continental Europe. Relatedly, Barrell, and Davis (2007) consider the impact of financial liberalization on consumption using data from a number of large industrialized countries. They argue that enhanced financial markets reduce credit constraints and enable households to more easily access their net worth – especially their illiquid assets – to smooth through income shortfalls. The authors find differences in consumer behavior following financial liberalization in the United States, United Kingdom, France, Canada, Sweden, and Japan, but not in Germany. Another feature of the financial system that may influence the cross-country pattern of aggregate MPCs is that the fraction of collateral against which banks will lend varies across countries and over time (Muellbauer, 2007). For example, in countries with high down-payment requirements, households that wish to purchase a home must save a lot such that positive house price shocks may lead more households to increase their saving (lower their consumption).
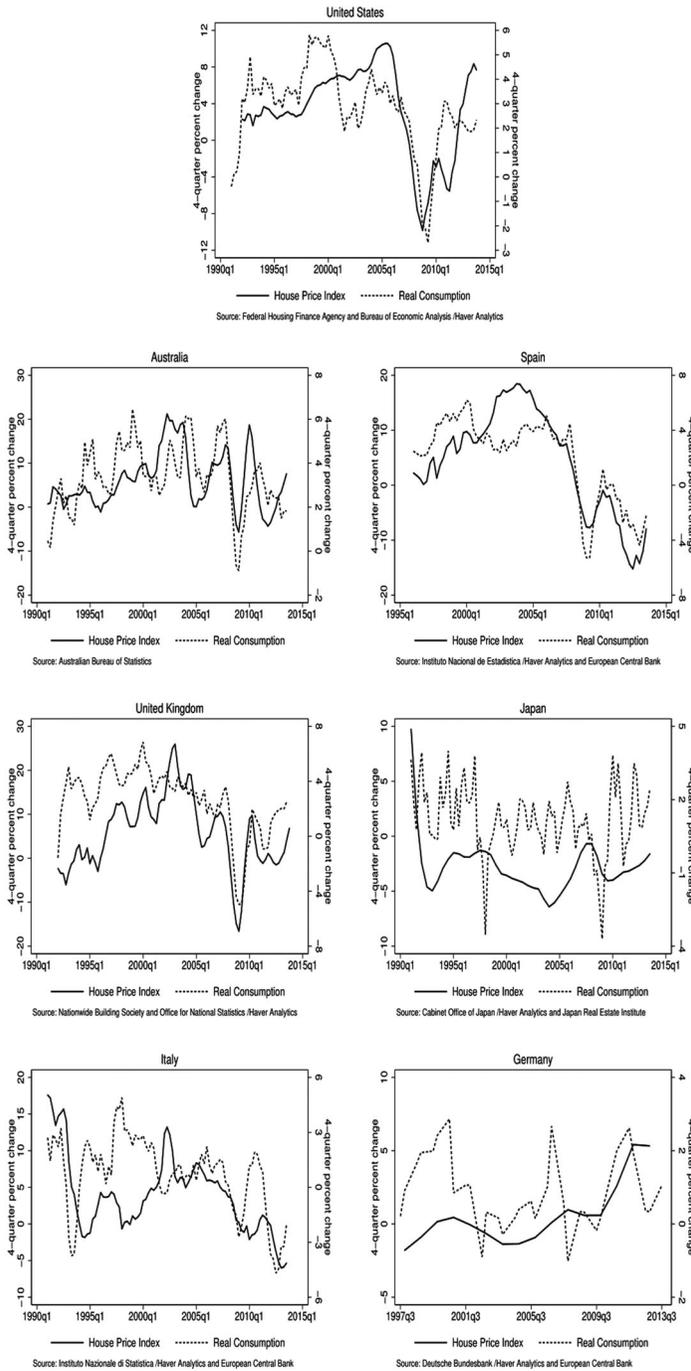
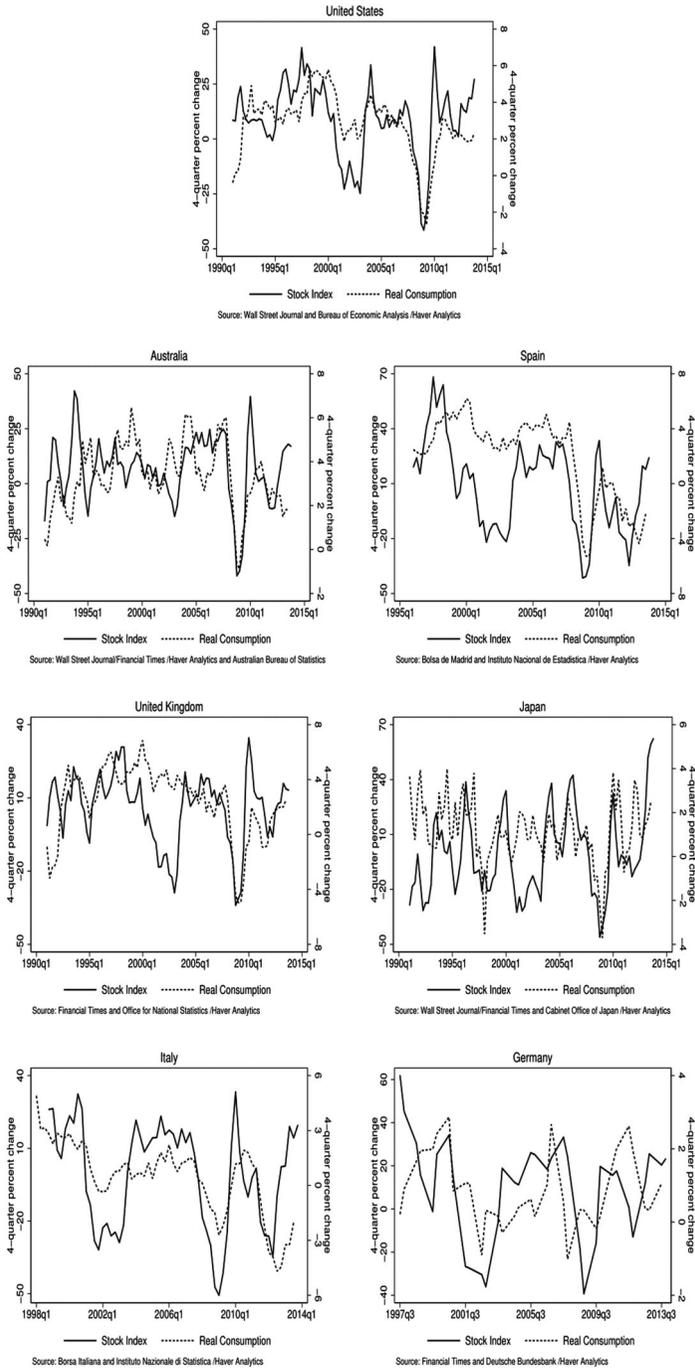**Figure 2.** Consumption Growth and House Price Growth.

Figure 3. Stock Price Growth and Consumption Growth.

Other differences in MPCs estimated with aggregate data may reflect the particular time periods analyzed and the asset price shocks realized during those time periods. For example, Ludgwig and Slok (2004) find increased sensitivity of consumption relative to asset prices during the 1990s compared to the 1980s. Boone and Girouard (2002) note that between 1995 and 2001 real estate prices grew in the United States and France and expanded strongly in the United Kingdom, but fell in Germany and Japan and were unchanged in Canada and Italy. To the extent that households respond differently to changes in housing wealth than to changes in financial wealth, these patterns will likely change the estimated MPCs out of household wealth.

The different distribution of wealth across households within different countries also likely influences the MPC out of wealth estimated with aggregate data. For instance, the homeownership rate is much lower in Germany and France than it is in the United States, implying that the portion of the population exposed to house price fluctuations varies across countries. Financial wealth holdings – especially directly held shares of stock – also differ notably across countries among households in the bottom 75% of the income distribution (see Norman *et al*., 2002). Lower income households are typically thought to have a higher MPC out of wealth fluctuations than richer households; so differences in financial wealth distributions across countries may influence the size of the estimated financial wealth effects.

We explore some of these issues further in the remaining sections of this paper. All told, though, there is much work to be done to better understand the differences in household wealth effects (financial and housing) both within the United States and across other countries.

5. Limitations of the Macro Framework

While macroeconometric models provide useful guidance on the relationship between aggregate consumption and wealth, these models, which are based on a representative agent framework, also have limitations. As Carroll (2012) argues, "Disaggregated data is [sic] essential, because any particular episode constitutes only a single macroeconomic datapoint . . . ." (p. 3). Estimating household wealth effects using macroeconomic time series data on household consumption, income, and net worth ignores potential differences across individuals in terms of wealth and income inequality that may impact their propensity to consume out of net worth (see Carroll, 2012, for an illustration of this issue).

Yet, household wealth effect analysis using aggregate time series data can generate accurate estimates of the parameters under certain conditions. These conditions need not be as extreme as requiring spending behavior to be homogenous across individuals as noted by Blundell *et al*. (1993).[6] According to the authors, heterogeneity does not lead to aggregation bias if it is constant over time and uncorrelated with the relationship of interest to be estimated. That is, the so-called aggregation factors that link the underlying micro-level relationships to the aggregate equations need to be roughly constant over time. That said, the authors cite a number of examples where the aggregation assumptions they outline do not hold. For example, changes to the economic environment (wealth holdings, income, and so on) need to be distributed evenly and consistently across households over time – conditions that are unlikely to be met given that there is time-varying heterogeneity across households in wealth holdings and, in turn, asset price exposure in the United States and other countries. Indeed, Boone and Girouard (2002) show that the share of total net worth held in housing wealth versus financial wealth versus other assets differs over time and across countries. Carroll (2012) notes that the top 20% of U.S. households hold the vast majority of the country's overall net worth, and Bricker *et al*. (2012) show that this uneven distribution of wealth has become more pronounced over time. These results suggest that the net worth distribution matters when considering the relationship between wealth and consumption, and including total net worth rather than its disaggregated components when estimating consumption may lead to incorrect inference.

Time-varying spatial dispersion of asset price shocks is another reason that estimating consumption using aggregate net worth may lead to incorrect conclusions because different locations tend to
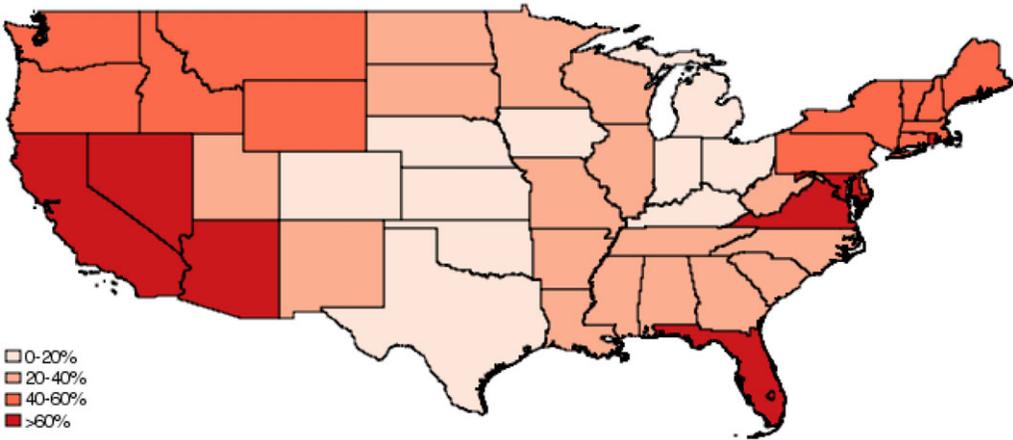
Figure 4. House Price Changes by State (2002–2006).
Source: FHFA/Haver Analytics.

have different demographic characteristics that may affect the response of consumption to net worth fluctuations. For instance, one might expect a stronger housing wealth effect via the collateral channel in locations where the population is concentrated in demographic groups that are more likely to face credit constraints. In the United States, a coastal home price boom in the mid-1980s resulted in a different geographic pattern of house price appreciation than occurred in the 2000s. Real home prices surged 39% in the Boston area between 1984 and 1986, but increased relatively little in Phoenix or Miami – areas that saw a pronounced boom and bust in the recent cycle (see Figure 4 for the price dispersion across states in the United States during the housing boom between 2002 and 2006). Presumably, the spatial dispersion of home price shocks also tends to vary over time in other countries as well. Assuming a common wealth shock across locations could thus lead to inaccurate forecasts of the average response of consumption to wealth.[7]

The presence of credit constraints for some households also drives heterogeneity in households' responses to changes in wealth. Constrained households are likely to consume at a suboptimal level because they cannot borrow to finance expenditures at their desired level. As a result, the response of their consumption to net worth gains may be particularly powerful (at least to the extent that those gains can be liquefied). Because lower-income households are more likely to face credit constraints, this logic represents one justification for the concavity of the consumption function featured in models like that of Carroll *et al*. (2012). This concavity implies that the predicted MPC out of wealth will rise with a household's income or resources.

The link between credit constraints and heterogeneity in household wealth effects has received much attention in the empirical literature. Lehnert (2004) finds higher propensities to consume out of housing wealth for younger U.S. households compared to their somewhat older counterparts, arguing that young households are the most likely to be credit constrained. Campbell and Cocco (2007) present a comparable analysis using U.K. data and find similar results. In more recent work, Cooper (2013) uses several alternative approaches to show that borrowing constraints strengthen the relationship between consumption and housing wealth in U.S. household-level data. Windsor *et al*. (2013) find similar results using panel data from Australia. Using spending and balance sheet data at the regional level, Mian *et al*. (2013) find significantly higher propensities to consume for poorer and more levered households – again,

the groups most likely to be credit constrained. All told, although the precise results differ from paper to paper, the findings in this branch of the literature are strongly consistent with the view that housing wealth effects are larger for households that are more likely to be facing borrowing constraints.[8] As noted above, heterogeneity arising from credit constraints can interact with time-varying spatial dispersion of wealth shocks to produce aggregate MPCs out of wealth that change over time. This sort of heterogeneity may also lead to unstable aggregate MPCs if the heterogeneity itself evolves; as we discuss below, this will be the case if financial innovation or other developments cause access to credit to change over time.

Heterogeneity, even if time varying, does not necessarily rule out estimating household wealth effects using aggregate time series data. Indeed, Duca and Muellbauer (2013) consider a macro model that in addition to distinguishing between liquid and illiquid financial asset holdings, incorporates time-varying parameters to account for the fact that credit constraints (and financial innovation) result in the disaggregated wealth components not having a constant impact on consumption over time.

6. Key Unresolved Issues Regarding Wealth Effects

As noted above, much previous research has examined the relationship between consumption and household net worth using macroeconomic (time series) data. In some contexts, this approach has proved useful; for example, these models have yielded simple rules of thumb about how much aggregate household spending has changed over time in response to fluctuations in household net worth – both total net worth as well as its subcomponents. Still, as discussed, these aggregate approaches have their limitations, underscoring the importance of researchers and policy analysts understanding more about the underpinnings of household wealth effects. We already described one area of reasonable consensus in the existing wealth effects research – wealth effects appear to be more pronounced for households facing credit constraints. There are also many other topics related to wealth effects where much less in known and agreed upon. In this section, we review where the literature stands on five additional important – and as yet unresolved – issues regarding wealth effects.

6.1 *What Are the Linkages between Housing Wealth and Consumption?*

As has already been discussed, housing wealth has traits that make it distinctive from other types of wealth. Researchers need to explore these traits and their implications for the propensity to consume out of housing wealth in order to fully understand the influence of home prices on macroeconomic dynamics. Although much attention has been paid to some aspects of housing wealth, particularly in the wake of the dramatic swings in home prices over the last decade, consensus has not been reached about the size of the housing wealth effect in different contexts or (relatedly) its underlying drivers.

One line of inquiry concerns whether housing wealth is 'really wealth' given the dual role that housing plays as an asset and a consumption good. Using a standard life-cycle permanent income consumption model, Buiter (2010) argues that housing wealth should not have an obvious relationship with household spending because it is a consumption good in addition to being an asset. When home prices rise, the ownership (or rental) costs of housing increase, implying a higher cost of housing consumption. In the strictest version of this model, the higher cost of housing has to be offset by lower non-housing consumption leaving overall consumption unchanged. Buiter's model, however, uses a specific utility function so the results are not completely generalizable. The model also does not allow for credit constraints, so there is no collateral channel through which home price appreciation might affect consumption.

Elaborating somewhat further (and allowing for people to differ by homeownership status), some households will be better off when home prices rise and others will be worse off. Renters are unambiguously worse off if any of the gain passes through to rents because, for a given amount of

income they must reduce their consumption of non-housing goods in order to offset the higher cost of their shelter. The impact of home price appreciation on homeowners is less clear. Like renters, homeowners will face higher future housing costs, but they also experience a capital gain; accordingly, if housing costs do not increase one-for-one with home price appreciation (because, for example, the homeowner plans to downsize in the near future), then homeowners could be better off when house prices rise and increase their consumption accordingly. Muellbauer (2007) provides a more extensive discussion about why housing wealth may or may not impact consumption.

Related considerations regarding the relationship between housing wealth and consumption include the Case *et al*. (2013) argument that there might be psychological reasons why homeowners increase their consumption in response to housing appreciation. Even if rising home prices do not actually yield welfare gains to homeowners, they may spend their housing gains because of societal perceptions that home appreciation makes one better off or they may be myopic and fail to understand that despite the house price gains they face higher future housing costs.[9,10] Gan (2010) argues that gains in housing wealth matter for consumption because they lower households' desired precautionary saving since housing equity can serve as a buffer against future income risk. On the other hand, Levin (1998) points to behavioral arguments involving self-control that suggest that consumption should not be very sensitive to changes in the value of illiquid assets like housing, particularly in comparison to changes in more liquid forms of wealth.

An empirical complication that has clouded the debate over the true relationship between consumption and housing wealth is that other (independent) developments can induce a co-movement between them. The 'common causality hypothesis' discussed in Attanasio *et al*. (2011) and Disney *et al*. (2010) implies that housing wealth fluctuations may not have a true impact on consumption even if an empirical relationship is found between the two. In particular, an unobserved (third) factor such as future income expectations could be driving increases (or decreases) in both house prices and consumption. Thus, it is possible to see a positive correlation between consumption and housing values that is not the result of housing wealth appreciation *causing* consumption to rise.

Putting aside common causality complications as well as the ambiguities that arise out of the strict life-cycle permanent income model, the role that housing wealth can play as collateral likely (all else equal) contributes to a positive relationship between housing wealth and consumption.[11] When home prices rise, homeowners have more collateral against which they can borrow in order to finance additional purchases of goods and services (including home improvements) and to meet other financial needs. Constrained homeowners are therefore likely to increase their spending when home prices increase as long as home equity loans are available in the country in which they live, and they can monetize the equity in their homes with relatively low transaction costs.

Financial intermediaries are a key part of this collateral channel of wealth effects, as liquefying housing capital gains requires a bank or other financial institution to loan households funds against the value of their housing equity. This implies that the collateral channel of housing wealth effects will be sensitive to the strength of the financial sector and the degree of financial liberalization in a given country. We have already noted how greater financial liberalization may explain the more significant housing wealth effects that appear to characterize the United States, the United Kingdom, and Australia as compared with countries with less liberalized credit markets like Japan, Italy, and Spain. Duca *et al*. (2010), for example, note that banks in Italy are reluctant to lend to households against the value of their housing collateral because Italian law makes it hard for the bank to claim the collateral in the event of a default (pp. 212–213).

Regardless of institutional and regulatory differences, countries may see differences in the collateral channel of housing wealth effects over time, as the health of their financial institutions and markets vary. For example, when banks or other lenders have inadequate capital relative to the losses they expect on their portfolios, their willingness and ability to lend will be diminished. In contrast, lenders will be more likely to supply credit when their balance sheets are sound and loan performance is good. A key

implication is that, because a large portion of lending is tied to the housing market, financial institution health and, in turn, credit availability will vary with home prices. This, in turn, creates a mechanism that should amplify collateral-related housing wealth effects. In other words, rising home prices potentially stimulate consumption not only by creating more valuable borrowing collateral, but also by increasing the willingness of financial intermediaries to lend against a given amount of collateral.[12] The experience of the last few years should provide ample data to explore such effects more fully going forward.

Note that this type of amplification is less likely to occur for wealth effects related to capital gains on stocks and bonds since financial intermediaries are generally less necessary for the consumption of gains on these assets. Indeed, stocks and bonds can most often be sold easily and cheaply, at least in countries with developed financial markets, to finance a household's desired consumption. In contrast, selling a home is disruptive and involves non-trivial transaction costs. Moreover, households that hold stocks and bonds likely have other sources of liquid saving that they can draw down to realize stock and bond-related wealth gains in the absence of selling their actual portfolio positions.[13]

6.2 *The Underpinnings of Stock Market Wealth Effects*

Although stocks do not provide consumption services like housing, other complications present themselves when thinking about the mechanism behind stock market wealth effects. First, rising stock prices require individuals who do not own stocks but intend to do so in the future (for example, younger households with plans to begin saving for retirement) to purchase them at a higher price. Second, some increases in stock prices reflect higher expected future dividends because of upward revisions to firms' productivity, while other increases reflect reductions in the rate at which future dividends are discounted. In the former case, stockholders are unambiguously better off, but in the latter case they are not because the discounted value of planned future consumption is also revised upward. Third, some recent evidence suggests that because of behavioral considerations individuals might respond anomalously to stock market gains realized in defined-contribution pension accounts. In particular, Choi *et al.* (2009) find that individuals tend to raise their retirement plan contributions after experiencing good returns; if these higher contributions are funded by reduced consumption, one would see a wealth effect in the opposite direction from what standard theory predicts.

In the data, there is a strong positive relationship between aggregate consumption and aggregate stock prices. But, given the considerations above, some analysts have argued that this relationship may not stem from the direct effect financial wealth on consumption but rather from a signaling channel. In particular, since stock prices tend to rise and fall with optimism about the economy, it may be the case that consumption is responding primarily to revisions to households' expectations about future wage growth. This argument is closely related to the 'common causality hypothesis' pertaining to the observed positive correlation between home prices and consumption that is discussed above.

The standard empirical approach to this question is to look at whether stockholders have a different response to stock price increases than nonstockholders – a topic that is covered in some detail by Poterba (2000). Indeed, the existence of a direct wealth effect is supported by findings that the response of stockholders is more pronounced. Poterba and Samwick (1995) find stockholders' food consumption reacts more strongly to stock market movements than that of nonstockholders, and Dynan and Maki (2001) find a similar response for a broad measure of consumption. Maki and Palumbo (2001) create synthetic data on saving and capital gains for different cohorts of households during the 1990s and find that the largest declines in saving (and therefore the biggest increases in consumption) occurred for the groups most likely to hold stocks.

Much less work has been done on this question over the past decade, with the focus of the empirical wealth effects literature shifting largely to the housing area. However, Dynan (2010) finds preliminary evidence that incorporating more recent household-level data into analyses of the differential behavior of

Table 1. Ownership Rates by Type of Asset

Year	Housing	Stocks
2001	66.9	52.3
2004	68.4	50.3
2007	67.9	53.2
2010	64.6	49.9

Notes: Table reports the percentage of the population with wealth holding in housing and the stock market (including stocks held indirectly in 401(k)-type retirement accounts). Results are weighted to be nationally representative.

Source: Survey of Consumer Finances and authors' calculations.

stockholders and nonstockholders considerably weakens the earlier results. Given that the dramatic swings in stock prices since the late 1990s offer a greater opportunity for identification of the underpinnings of the stock market wealth effect, more research should revisit the earlier findings.

An additional line of research that warrants further consideration with regard to the underpinnings of financial wealth effects is Nguyen and Claus (2013). These authors build on the idea of 'negativity bias' from the psychology literature and consider whether differences in households' feelings toward an event cause their consumption to respond asymmetrically to positive and negative news. Their empirical evidence suggests that consumers react more strongly to negative news than positive news, consistent with the idea of a negativity bias. It is conceivable that households exhibit such a bias with respect to stock market changes such that a drop in financial asset values may generate a stronger consumption response than an increase in financial asset values.

6.3 *The Relative Size of Housing Wealth versus Financial Wealth Effects*

How the housing wealth effect compares with the financial wealth effect is a question of keen interest to both policymakers and researchers. As the discussion in Section 6.1 as well as that in Section 5 make clear, a household's ability to borrow and/or liquefy home equity may be essential to its ability to raise consumption in the face of housing capital gains. Although the illiquidity of housing leads some to argue for a smaller propensity to spend out of this type of wealth than out of financial wealth, it is worth noting that financial wealth encompasses both very liquid assets like cash and stocks along with highly illiquid assets like a job-based pension plan or a defined contribution retirement account. To the extent that illiquid positions make up a large portion of a household's financial wealth then the estimated total financial wealth effect may appear small relative to the housing wealth effect even if households' MPC out of liquid financial wealth is similar to housing wealth.[14]

In the aggregate, just as cross-country differences in the concentration of wealth matter for the comparison of wealth effects across countries, as discussed in Section 4, the differential concentration of housing and financial wealth across households matters for the relative size of their associated wealth effects. In particular, housing wealth is more broadly held than other types of wealth. Table 1 shows that roughly two-thirds of U.S. households own homes while only about half hold stocks (including stocks held indirectly through mutual funds, defined-contribution retirement plans, and the like).[15] In addition, the share of housing wealth in total wealth is much higher for lower-income homeowners than for higher-income homeowners, as shown in Table 2. Compared with higher-income households, lower-income households are more likely to be credit constrained and myopic, so the higher housing wealth concentration in lower parts of the income distribution should tend to make the aggregate MPC out of housing wealth higher than the aggregate MPC out of financial wealth.

Table 2. Housing Wealth Concentration by Income Quintile

Income quintile Year	1	2	3	4	5
2001	65.0	41.9	32.7	22.3	11.4
2004	73.3	51.3	37.7	28.3	11.1
2007	69.9	49.4	41.7	27.3	11.4
2010	71.0	48.3	37.6	26.3	13.6

Notes: Table reports the median share of housing wealth as a percentage of total wealth according to the Survey of Consumer Finances. '1' represents the lowest quintile of income in a given year and '5' represents the highest quintile.

Source: Survey of Consumer Finances and authors' calculations.

All told, then, the size of the housing wealth effect relative to that for financial assets is largely an empirical question. Although this question received much attention within the wealth effects literature during and after the recent housing boom and bust, consensus has yet to be reached. As noted above, the literature that uses aggregate data largely points to a larger wealth effect for housing than for financial wealth. The studies using more granular data are more mixed. Case *et al.* (2005) find relatively large housing wealth effects and relatively small financial wealth effects using state-level panel data. Bostic *et al.* (2009) find similar results using household-level data, and Mian and Sufi (2011) conclude that housing wealth effects are very large based on individuals' credit-record evidence on the amount of housing capital gains that were liquefied during the housing boom. In contrast, Dvornak and Kohler (2007) examine wealth effects using state-level data in Australia and find larger stock market wealth effects than housing wealth effects. And, after paying particular attention to the borrowing collateral role of housing wealth Cooper (2013) finds slightly larger financial wealth effects than housing wealth effects. Controlling for borrowing constraints may explain why Cooper's results differ from the previous findings about the relative size of the wealth effects using U.S. data. Indeed, as already mentioned, Slacalek (2009) finds large differences across countries and financial systems in the relative size of the financial and housing wealth effects. In some countries, the housing wealth effect dominates, while in others the financial wealth effect is larger (see Slacalek, 2009, table 3). In addition, Sierminska and Takhtamanova (2012) show that the relative size of the financial wealth effect versus housing wealth effect depends on the country studied, and that the within-country differences may be driven by certain age groups.

6.4 *Wealth Effects and the Liabilities Side of the Balance Sheet*

Wealth effects are typically viewed as stemming from movements in the prices of assets such as stocks and homes. However, a household's net worth is also a function of the debt that it holds. The U.S. economy's sluggish performance following the Great Recession raised questions about whether the high levels of household debt and leverage that were left after the mortgage boom and bust damped consumption more than would have been expected based only on the associated movements in wealth. If so, a lesson would be that economists should take account of changes in household debt and leverage in addition to looking at movements in overall wealth. Other countries, to varying degrees, also had problems with debt and leverage following the global financial crisis. High levels of household debt to GDP characterized Canada, the United Kingdom, Australia, Spain, and South Korea (as of mid-2011). Since the crisis, household deleveraging has been most significant in the United States, but deleveraging has also occurred in Australia

and South Korea.[16] In contrast, Germany, Japan, France, and Italy have relatively low shares of household debt relative to GDP – perhaps because of the relatively high household saving rates in those countries.[17]

The theoretical case for a special role for household debt in determining consumption is not completely clear, as the traditional models used by economists suggest that debt does not exert an independent influence on consumption (although a positive and endogenous relationship would be expected because debt represents a way to finance spending that is spurred by other considerations). However, going beyond the simple models, a case can be made on several grounds that high debt and leverage does impede consumer spending. First, households with high debt face high future debt servicing costs that may impact their consumption, especially in countries where debt contracts typically have floating interest rates and future payments are somewhat uncertain. Second, some households may target a given level of debt relative to their income or assets; if the events of recent years increased these ratios (or lowered households' target ratios), one might expect these households to choose to pare back their consumption in order to pay down debt. Third, high-debt households may have become more worried about future credit availability, leading them to cut their consumption so as to increase their savings. Fourth, households whose current income is lower than their permanent income may have been forced to reduce their consumption because their high debt ratios prevented them from obtaining the additional credit they may have needed to finance their desired spending.[18]

Turning to the empirical literature, in household-level data, Dynan (2012) and Cooper (2012) both find that high debt, conditional on other standard consumption predictors, had a negative impact on consumption growth during the Great Recession. As Cooper (2012) highlights, this negative relationship existed prior to the Great Recession, suggesting that the recent period is not unusual in that respect. Even so, debt could have had a larger recent impact on consumption since more households are burdened by high debt and leverage compared with earlier periods. In addition, Dynan and Edelberg (2013) show that high-debt households were more likely to report scaling back their consumption in 2009, after controlling for other drivers of spending. Mian *et al.* (2013) analyze regional data and conclude that leverage helped amplify the negative wealth effect on consumption associated with declining house prices during the Great Recession. The household-level empirical research on the relationship between debt and consumption is, as yet, limited.[19] At best, it considers only the period through the Great Recession in the United States and does not directly speak to the economy's weak performance during the recovery. Moreover, the standard errors in many of these studies are large. Finally, the emphasis has been on establishing the relationship rather than discerning why a relationship exists – an issue that is highly relevant to the discussion pertaining to what, if any, policies should be used to address the situation. These shortcomings suggest many promising avenues for further empirical research.

More theoretical work on the connection between household debt and leverage and macroeconomic activity is also needed. Some preliminary steps in this direction have been taken (see, for example, Eggertsson and Krugman, 2012) but more work needs to be done to realistically characterize the complex linkages found in the actual economy. More research examining cross-country differences in household debt holdings and deleveraging, as well as their impact on consumption, would also be worthwhile. For example, Damar *et al.* (2013) show that a reduction in credit supply (available credit) in Canada during the financial crisis reduced borrowing and hindered consumer spending in that country.

6.5 *Has the Wealth Effect Changed over Time?*

There are reasons to think that the wealth effect – at both the aggregate and individual levels – may change over time. Understanding such changes and what drives them is central to efforts to predict future consumption at any given time.

To begin, shifting demographics may have altered the size of the aggregate wealth effect. In principle, older households with shorter remaining life horizons over which to annuitize wealth changes should

have a larger MPC out of wealth shocks than younger households. Of course, such age differences may depend on whether households' planning horizons actually depend on their expected remaining lifespan – they might be muted if households take a dynastic view and intend to share their gains with their descendents. But, generally, this consideration implies that the aging of the baby boom generation should tend to increase the aggregate MPC out of household wealth.

Financial innovation may have also changed the link between wealth and consumption. Indeed, as already noted, a number of cross-country studies either find that financial systems and the relative amount of mortgage market regulation matter for the size of the estimated wealth effects or explicitly control for financial liberalization in their estimates on the grounds that it likely matters for the relationship between consumption and housing wealth. In the United States, as discussed by Gerardi *et al.* (2010), starting around the early 1980s, technological advances and institutional developments (including regulatory and tax code changes) reduced credit constraints, increasing credit availability and lowering the cost of borrowing. The effect of such changes on the size of the wealth effect is unclear. On the one hand, having fewer credit-constrained households might reduce the estimated housing wealth effect since, as discussed above, the empirical evidence suggests that credit constraints tend to be associated with a stronger effect. On the other hand, financial innovation – at least in the United States – made it easier and cheaper to realize home equity gains through home equity loans and cash-out refinancing transactions, such that homeowners still constrained could borrow more easily against their housing capital gains. This second trend should have tended to increase the aggregate wealth effect. Of course, in recent years, credit availability has swung in the other direction undoing some, though not all, of these changes.

On the financial asset side of the balance sheet, financial innovation has allowed more households to own stocks through vehicles such as mutual funds and defined contribution retirement accounts. Although the ownership rate of these assets has been around 50% since 2000 in the USA (Table 1), it was only a little more than 30% in the late 1980s (Dynan, 2009). As a result, more stocks are now held in the United States by lower-income households that likely have higher marginal propensities to consume. All else equal, this should have tended to increase the estimated financial wealth effect, although the effect could be muted or even go the other way if households view their retirement accounts as 'off limits' for consumption. Behavioral theories suggest that the spending of some households might even fall in the face of capital gains on their retirement accounts if they invest more to 'chase returns,' further damping the aggregate MPC.

All told, many factors may have changed household wealth effects over time. As mentioned above, some empirical studies based on aggregate data have found evidence of such changes. For example, Ludwig and Slok (2004) find larger wealth effects in the 1990s relative to the 1980s and, more recently, Duca and Muellbauer (2013) find changes after incorporating time-varying wealth effect parameters into their model. However, assessing the direction in which wealth effects have changed in recent years is difficult using aggregate data because of the small sample sizes. For example, recent research by Soss and Mo (2013), analysts at Credit Suisse, shows that the estimated wealth effects for both housing and financial wealth in the United States are smaller when post-financial crisis data are used in the analysis, but the limited variation seen since the crisis (home prices were roughly flat over the period they examined and the stock market mostly trended upward) means that the authors could not effectively estimate separate coefficients for the different periods. The authors' study also had limited control variables, which raises questions about the robustness of their results. That said, researchers should be able to draw inferences on how the wealth coefficients may have changed in response to these developments using household-level or regional data, where the price variation and available controls for other factors that impact consumption are much richer.

7. Data Challenges

As has been discussed throughout this piece, macroeconomic data have offered limited insight into the relationship between household net worth and consumption. The variation in macroeconomic time series data is limited, which hinders identification, particularly when relationships are changing over time and the determinants of consumption are inter-related.

Household survey datasets tend to be much richer in scope and they typically have many observations such that there is much more opportunity for identification. Yet, they too have shortcomings. First, most household datasets do not have all of the elements needed for estimating consumption functions – a panel dimension, complete balance sheet information, broad measures of consumption, good income measures, and demographic information (which can proxy for preferences, risk of job loss, access to credit, and other things). Even when such information is available (as in the cases of the U.S. Panel Study on Income Dynamics and the U.S. Health and Retirement Survey), the data tend to be noisy because of recall error and other measurement problems, leading to imprecise estimates of key relationships. Household survey data are also not without identification issues, but these issues can be circumvented by, for instance, looking at effects across different groups of households (see Cooper, 2013, for more details).

Recently, U.S. researchers have turned to administrative records, such as data from credit bureaus or financial services companies. These datasets tend to be quite detailed and accurate in terms of the data the companies track and record, but they lack direct measures of household consumption, income, and total wealth. Researchers such as Mian *et al*. (2013) have aggregated these types of administrative records to the regional (county or zip code) level and then combined them with other regional information related to consumption, income, and net worth in order to do more complete analyses. This approach shows some promise and should be explored more fully. However, identification with regional data can be difficult because the set of covariates is not as rich as it would be with individual-level household survey data. For example, there is no data source in the United States that offers complete information about financial wealth by region, let alone liquid versus illiquid wealth. An ideal solution might be to merge the less noisy administrative data on the available variables into household surveys with comprehensive wealth, income, and consumption data in order to have the best of all worlds.

Data from outside of the United States also offer interesting opportunities. For example, a recently compiled harmonized Euro-area database modeled after the U.S. Survey of Consumer Finances can be used to consistently analyze cross-country net worth and spending behavior (see Christelis *et al*., 2013a, for more details).[20] Also, the highly comprehensive administrative level databases in many of the Scandinavian countries do not necessarily suffer from the shortcomings of the U.S. data. In addition, Windsor *et al*. (2013) analyze the relationship between house prices and household spending using the Household Income and Labor Dynamics in Australia (HILDA). This survey has received limited research attention despite having a very similar structure to the frequently studied, U.S.-based, Panel Study of Income Dynamics, and deserves further consideration and analysis.

8. Conclusion

To date there has been much interesting research on and debate surrounding the influence of wealth shocks on macroeconomic dynamics. Much remains to be learned in this area. Understanding wealth effects is critical not only for forecasting consumption and broader economic growth well, but also for gauging the risks to the economic outlook and setting appropriate macroeconomic policy. Such issues are particularly important during periods of large fluctuations in asset prices.

Research has documented the average historical relationship between aggregate consumption and aggregate household wealth, and some findings have been established about how households respond to wealth changes. For example, a large number of studies suggest that the consumption of households facing credit constraints is more responsive to housing capital gains than that of other households. However,

we have identified a need to learn much more about the underpinnings of wealth effects and how the effects might vary for different components of household wealth, including on the liabilities side of the balance sheet. On a related topic, more work is needed to understand how aggregate wealth effects may have changed (and still are changing) over time. Wealth effects research has also been limited to some extent by lack of good data sources, and, accordingly, some focus should also be placed on ways we can improve existing datasets and create new ones.

Acknowledgments

Notes

1. We use the terms 'wealth' and 'net worth' interchangeably throughout this paper. Both terms refer to the total value of households' assets less their liabilities (debt). We also discuss financial wealth and housing wealth, which refer to analogous concepts for particular components of household net worth.
2. We focus on the United States partly because the majority of existing household wealth effect studies use U.S. data or U.S. data combined with data from other industrial countries.
3. Theory also yields the so-called 'Euler equation,' which characterizes the change in consumption from one period to the next and was the basis of much empirical literature in the 1980s and 1990s. However, this framework is not suitable for capturing the long-run impact of household net worth on consumption.
4. http://www.bankofengland.co.uk/archive/Documents/historicpubs/speeches/1998/speech20.pdf
5. http://www.bis.org/review/r131018a.pdf
6. See also Stoker (1984) and Pesaran (2003).
7. When we discuss assuming an average wealth effect across individuals, we mean assuming an average effect for a given category of net worth, not an average effect across net worth categories.
8. Other recent related housing wealth effects research includes Abdallah and Lastrapes (2013), Bostic *et al*. (2009), and Case *et al*. (2005, 2011, 2013).
9. The actual empirical results in Case *et al*. (2013) should be viewed with some caution since the authors' estimates do not seem to be stable over time as they have included additional years of data in successive studies, especially their finding regarding the asymmetry of the housing wealth effect.
10. Note, though, that Browning *et al*. (2013) show that most homeowners do not feel richer when home prices rise.
11. Home equity loans are most widely available and used in the United States. The U.S. Tax Reform Act of 1986 increased the appeal and use of such loans by making the interest payments on such loans tax-deductible (up to a point).
12. Empirically testing this loan supply channel is difficult. Cooper and Peek (in progress) are exploring the difference in the relationship between home price changes and consumption for renters compared to homeowners as a potential source of identification – a strategy that has been followed previously by Attanasio and Weber (1994), Attanasio *et al*. (2009), and Attanasio *et al*. (2011). All else equal, renters not planning to switch into homeownership should only see their consumption affected by house price fluctuations to the extent those fluctuations impact bank health and, in turn, renters'

ability to secure auto and personal loans to help finance their spending. This approach relies heavily on being able to adequately control for shifts in the availability of credit across housing tenure groups.

13. Bank health is also less directly tied to financial market volatility than housing market price changes in the United States since banks are not allowed to hold stocks in their portfolios. Banks are allowed to hold stocks in their portfolios in other countries, but by virtue of sheer asset exposure, bank health should depend more heavily on home price fluctuations than stock price fluctuations. In addition, U.S. banks can and do hold bonds in their portfolios so they are not completely isolated from firm health and other non-housing-related economic fluctuations.

14. Aron *et al*. (2012), Muellbauer and Williams (2012), Aron and Muellbauer (2013), and Duca and Muellbauer (2013) find a systematically higher relationship between consumption and liquid financial wealth than between consumption and illiquid financial wealth in the United States and across a number of other countries.

15. The data come from the Survey of Consumer Finances (SCF), weighted to be nationally representative. Because the SCF oversamples wealthy households who are the most likely to hold stocks, its data are viewed as being particularly accurate for these types of comparisons.

16. Although the Australian economy experienced neither a recession nor large declines in wealth, high levels of debt (even more so than in the United States) may have contributed to that country's subdued consumption growth.

17. http://www.mckinsey.com/insights/global_capital_markets/uneven_progress_on_the_path_to_growth

18. Relatedly, high debt and leverage have impaired some households' ability to refinance their mortgages into lower-rate loans and lower their required mortgage payments in recent years. As a result, the consumption of cash-constrained households likely did not increase as much as it typically does when interest rates fall.

19. There are also recent empirical papers examining differences in household debt across countries especially relative to the United States. In particular, Christelis *et al*. (2013a) find that many of the cross-country differences in household debt are due to differences in the economic environment and not differences in household characteristics (see also Sierminska and Doorley, 2012; Christelis *et al*., 2013b).

20. Eurosystem Household Finance and Consumption Survey (HFCS).

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