Joint Center for Housing Studies

Harvard University

Housing Wealth Effects:
Housing's Impact on Wealth Accumulation,
Wealth Distribution and Consumer Spending
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Introduction and Summary

Over the past 50 years, housing expenditures have accounted for more than one fifth of the nation's gross domestic product. But housing's influence on the economy extends beyond its direct contribution Careful analysis reveals that housing also influences the level of consumer spending. When housing wealth increases, consumers spend more. Indeed, they spend even more freely when capital gains from home sales and home equity borrowing escalate in tandem with rising home values.

In fact, housing's indirect contributions to economic growth through consumer spending can be sizable. Strong home price appreciation, record home sales and unprecedented levels of borrowing against home equity spurred housing's contribution to consumer spending to new heights in 2001, 2002, and 2003. In each of these years, model estimates suggest that housing-related effects accounted for at least one quarter of the growth in personal consumption expenditures.

Federal Reserve Board Chairman Alan Greenspan (2001, 2003) has rightly credited housing wealth, realized capital gains, and home equity borrowing with shoring up the economy in the aftermath of the stock market collapse of 2000 and the recession of 2001, primarily through their effects on consumer spending. Typically, housing leads the economy into recession as interest rate hikes take steam out of housing demand and job losses further undermine homebuilding, home sales, and home price appreciation. During 2001, the Federal Reserve Board aggressively lowered interest rates to forestall looming problems in the economy created by the bursting stock, high-tech, and telecommunications bubbles. In the process, the Fed helped trigger record levels of home equity borrowing and home sales. Without the accelerating pace of home sales and cash-out refinancings, housing's lift to consumer spending would likely have been about half as great. Given that consumer spending makes up about two thirds of all economic activity, the recession would have been worse and the recovery less robust in the absence of this stimulus.

Perhaps the most important finding of this study, therefore, is that expansionary monetary policy can provide both a rapid and substantial lift to consumer spending under the right set of circumstances. However, the recent period was unusual in several respects. Home prices likely received a boost from the stock market both before and after the stock bubble burst. Before it burst, home prices likely got a lift in at least some areas from investors plowing some realized

stock gains into real estate. When stock values fell, some investors pulled money out of the stock market and put it into real estate in search of positive returns. Meanwhile, interest rates fell to 45-year lows. While a similar convergence of circumstances could recur, housing's contribution to personal consumption is likely to settle back into its narrower historical range. Still, should the Fed once again elect to reduce overnight bank borrowing interest rates sharply in an attempt to stave off a recession before it starts, housing could once again help the economy through a soft spot rather than contribute to its contraction.

Housing-Related Effects on Consumer Spending

Modeling of consumer spending reveals that the effects of changes in housing wealth and stock wealth on consumer spending are similar in magnitude but different in timing: housing wealth effects are more immediate. Consumers spend about 5 1/2 cents out of every dollar increase in housing wealth or in stock wealth in the long run. It takes only about one year for spending from housing wealth to reach four fifths of this long-run effect compared with several years for stock wealth. Consumers may be slower to spend out of gains in stock wealth because they are cautious about making lifestyle changes based on near-term movements in stock prices that could well prove unsustainable. The immediacy of the response to gains in housing wealth, on the other hand, means that housing produces a quicker lift to the economy.

The model of consumer spending on which this study is based also suggests that liquidation of home equity and realization of capital gains from home sales can add significantly to growth in consumer spending in the short run. However, unlike the lasting impact that gains in housing and stock wealth have on consumer spending, the impacts of home equity extraction and realized capital gains are only temporary and their statistical significance is not nearly as great as that of housing wealth. Therefore, while they can give a large temporary boost to spending, it is home price growth that imparts lasting benefits. As long as home prices continue to climb on average nationally, housing typically adds at least marginally, and during some periods substantially, to consumer spending.

When wealth effects driven purely by gains in home values are summed with the short-term burst in spending generated by home equity borrowing and capital gains, a dynamic model of consumer spending reveals that the contribution of these housing-related factors to four-quarter growth in personal consumption expenditures climbed steadily from near zero in 1995 to

1.2 percentage points by the third quarter of 2003. In the third quarter of 2003, half of the housing related effects were traditional wealth effects—the influence of increases in home values on consumer spending. Realized capital gains in the third quarter of 2003 contributed nearly as much. Meanwhile, the release of home equity through second mortgage borrowing and cash-out refinancings made its peak contribution to growth in consumer spending in early 2003 at 0.3 percentage points.

Housing's Unique Role in Household Wealth and Finances

In addition to making important contributions to the larger economy, housing remains the primary store of wealth for most Americans. Home equity constitutes roughly one fifth of total household net wealth. At last measure, over two thirds of households owned a home but only about half owned stocks or mutual funds containing stocks. And fully six in ten homeowners had more home equity than stock equity.

Furthermore, housing wealth is far more broadly distributed across income levels than stock wealth. The top one percent of stock holders in 2001 held one out of every three dollars of stock wealth while the top one percent of homeowners held a lesser one out of every eight dollars of home equity. Home equity is especially important to lower income households. Among homeowners with under $20,000 in income, three quarters have more home equity than stock equity. Meanwhile, the median wealth of these low income owners is 81 times greater than the median wealth of renters with comparable incomes.

Housing also has been an important anchor for household wealth. Whereas nominal declines in home values are relatively uncommon even at the level of individual homes, nominal declines in stock values are common. In addition, stock values can rise and fall rapidly even over the course of a single day. Home values are not subject to these frequent and large swings. As a result, the nation's aggregate housing wealth is far less volatile than the nation's stock wealth.

Housing is also a leveraged investment so that even small percentage gains in home values can be large relative to the downpayment invested in a home. In 2003 for example, about one in ten homebuyers put less than ten percent down on their home. Moreover, the loss incurred on a home, apart from credit reputation if a homeowner is forced to default, is limited to the amount invested in the home at purchase plus any equity extracted after purchase. But investing in a home, unlike investing in unleveraged financial assets, involves maintenance expenditures,

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debt service, and transaction costs to buy and sell. Therefore, its true cost can only be calculated by comparing it to renting and investing the downpayment in some other asset instead.

Finally, housing is a unique investment because households can borrow against home equity at favorable rates relative to unsecured debt to finance consumption and investment. In addition, home equity loans and lines of credit have built-in tax advantages for households that itemize deductions. Home equity loans and lines of credit outstanding totaled about $1 trillion in 2003. That same year an estimated $139 billion of home equity was liquidated through cash-out refinancings. By tapping home equity, homeowners are able to lower their debt costs. For all these reasons, housing's contribution to household finances is unique and of great importance both to homeowners and the broader economy.

Organization of the Report

This report describes research on the role of housing wealth in household net worth and the impact of changes in household wealth on consumer spending that was conducted by the Joint Center for Housing Studies of Harvard University and Macroeconomic Advisers, LLC for the National Association of REALTORS®[1]. The research team applied economic theory to model the influences of stock wealth, housing wealth, and home equity withdrawals on consumer spending. The result is a unique contribution to the literature on housing-related drivers of consumer spending.

The first part of the report examines housing as a component of household wealth with special attention to how housing wealth differs from stock wealth. The second part examines housing-related effects on consumer spending and summarizes the results of the econometric study prepared by Macroeconomic Advisers, LLC for this report. The report has two appendices. The first appendix discusses the datasets used to measure housing wealth in the United States[2]2. The second appendix discusses the models used to estimate the impact of housing on consumer spending and the housing variables entered in the models. Beyond these details, the interested reader is referred to Macroeconomics Advisers, LLC *Special Analysis on Equity Wealth,*

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[1] Established in 1959, the Joint Center for Housing Studies is a collaborative venture of the John F. Kennedy School of Government and the Harvard Design School. Macroeconomic Advisers is an economics consulting and forecasting firm that supplies macroeconomic modeling inputs to many of the nation's leading housing trade organizations, businesses, and federal agencies.

Housing Wealth, and Personal Consumption Expenditures (2004) for a complete discussion of data, methods, and results of the econometric estimations.

It is important to note that the results reported here are sensitive to model specifications and the modeling approach selected. The models used are rooted firmly in economic theory, employed well-accepted measures of spending and wealth, and produced statistically significant findings confirming the value of the approach selected. Therefore, the results presented are based on a systematic extension of consumer economic theory to the estimation of the independent effects of housing wealth, stock wealth, and home equity extraction on consumption.

Housing as a Component of Household Wealth

Housing accounts for a significant share of total household wealth. Although home equity's share of aggregate household wealth moderated as a consequence of the incredible surge in stock wealth in the 1990s (which was only partially wiped out during the 2000-2002 market decline and rebound in 2003), it remains large.

Home equity constituted 19 percent of household wealth in the fourth quarter of 2003. This is almost the same share as stocks and mutual funds combined.[3] Though the sum of stocks and mutual funds (which includes bonds) is now on par with home equity, homeownership is more widespread than ownership of these financial assets and contributes more to the balance sheet of the typical household. When last measured in 2001, for instance, about six in ten homeowners had more home equity than stock wealth.[4] The share was even larger among low income homeowners (Chart 1). Only among households with incomes over $100,000 did a slim majority have more stock wealth than home equity wealth. Both for these reasons and because housing wealth, as detailed below, is far less volatile than stock wealth, housing remains an important component of overall household wealth and the broader economy.

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[2] It is worth noting that information on the distribution of household wealth across households is from the Survey of Consumer Finances that was last released for 2001 and likely overstates stock wealth holdings. Thus, figures in this report for 2001 on household wealth holdings are conservative estimates of housing's true role.
[3] These figures are from the Flow of Funds data released by the Federal Reserve Board. Here and elsewhere where these data are used, the figures include holdings of nonprofit organizations in the household sector.
[4] Figures related to the distribution of wealth among households reported here are from the Survey of Consumer Finances. In 2001, there is reason to believe that stock wealth holdings were overestimated to a significant degree. Therefore all estimates of the importance of housing wealth to household balance sheets in this most recently reported year are likely conservative estimates of housing's true importance. In addition, stock wealth here includes stocks held as part of mutual funds and defined contribution retirement plans.
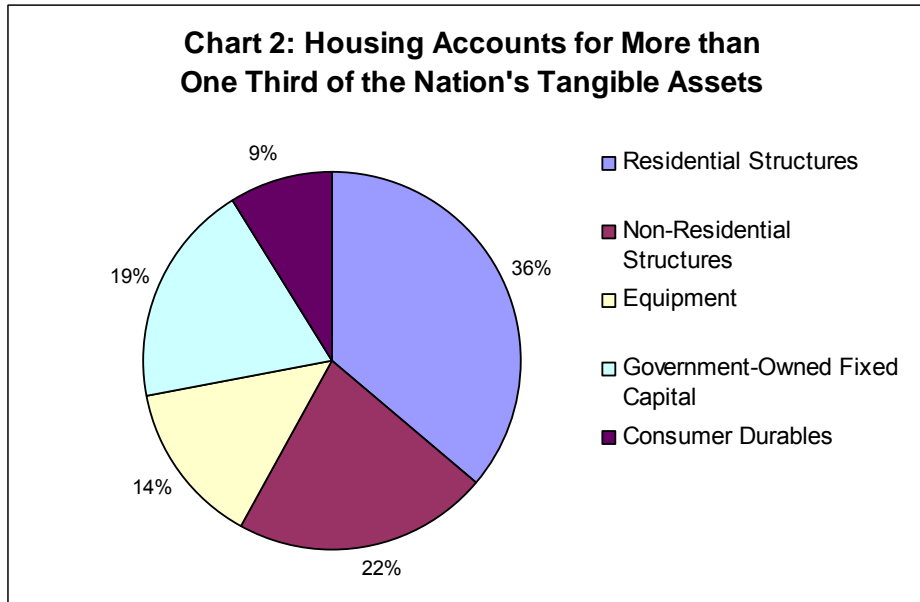
Chart 1: The Majority of Homeowners Hold More Wealth in Homes Than Stocks
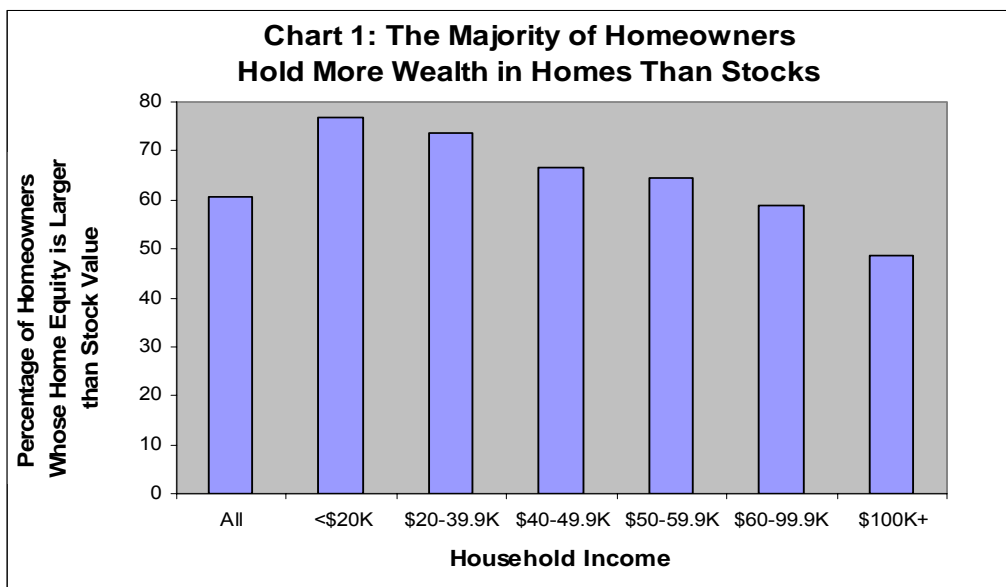
Source: JCHS tabulations of the 2001 Survey of Consumer Finances.

The Scope of the Nation's Housing Wealth and Output

Housing is not only one of the largest assets in the typical household portfolio, but also accounts for more than one third of the nation's tangible (nonfinancial) assets. The total value of the housing stock was $11.1 trillion dollars when last estimated in 2001 by the Bureau of Economic Analysis in its Survey of Current Business, constituting the nation's largest single investment in tangible assets (Chart 2). At 36 percent of the total, it eclipses the next largest asset class—non-residential structures. According to the Federal Reserve Board's Flow of Funds, the value of the housing stock owned by households alone had reached $15.2 trillion by the fourth quarter of 2003.

The flow of services produced by the housing stock was estimated at $1.2 trillion in 2003 by the Bureau of Economic Analysis.[5] Spending on utilities totaled $237 billion and $543 billion was spent on other household operations and complementary goods (including furniture, appliances, kitchenware, furnishings, cleaning, and telephone). In addition, investment in new residential structures amounted to $554 billion in 2003.

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[5]This figure includes tenant rent and owner-occupied rent equivalent, a measure of the value to homeowners of the services generated by residing in a home.

**Chart 2: Housing Accounts for More than
One Third of the Nation's Tangible Assets**

- Residential Structures
- Non-Residential Structures
- Equipment
- Government-Owned Fixed Capital
- Consumer Durables

9%
36%
19%
14%
22%

Source: Bureau of Economic Analysis, Survey of Current Business, 9/2002.

In total, housing consumption, operations, complementary goods, and investment in new housing accounted for about $2.53 trillion of the roughly $10.99 trillion in goods and services produced in 2003, amounting to 23.1 percent of gross domestic product (GDP). The share of housing in GDP— the broadest measure of the nation's output—has hovered between one fifth and one quarter for the past 50 years.

While housing is clearly a significant sector of the economy, it also is noteworthy that the value of residential real estate has grown far more steadily than the aggregate value of corporate equities (Chart 3). Although for several decades housing wealth exceeded stock wealth, the 1990s represented an unusually strong period of stock growth. For the first time in a generation, the value of corporate equities surpassed the value of residential real estate in 1997. The gap widened dramatically until the second quarter of 2000 when plummeting corporate equity values narrowed the gap. By the fourth quarter of 2001, the value of residential real estate once again was greater than the value of corporate equities. In 2003, the value of home equity on household balance sheets exceeded the value of stocks directly owned by households by $2.6 trillion.

Chart 3: Real Estate's Historic Lead Over Stock Wealth Has Been Restored
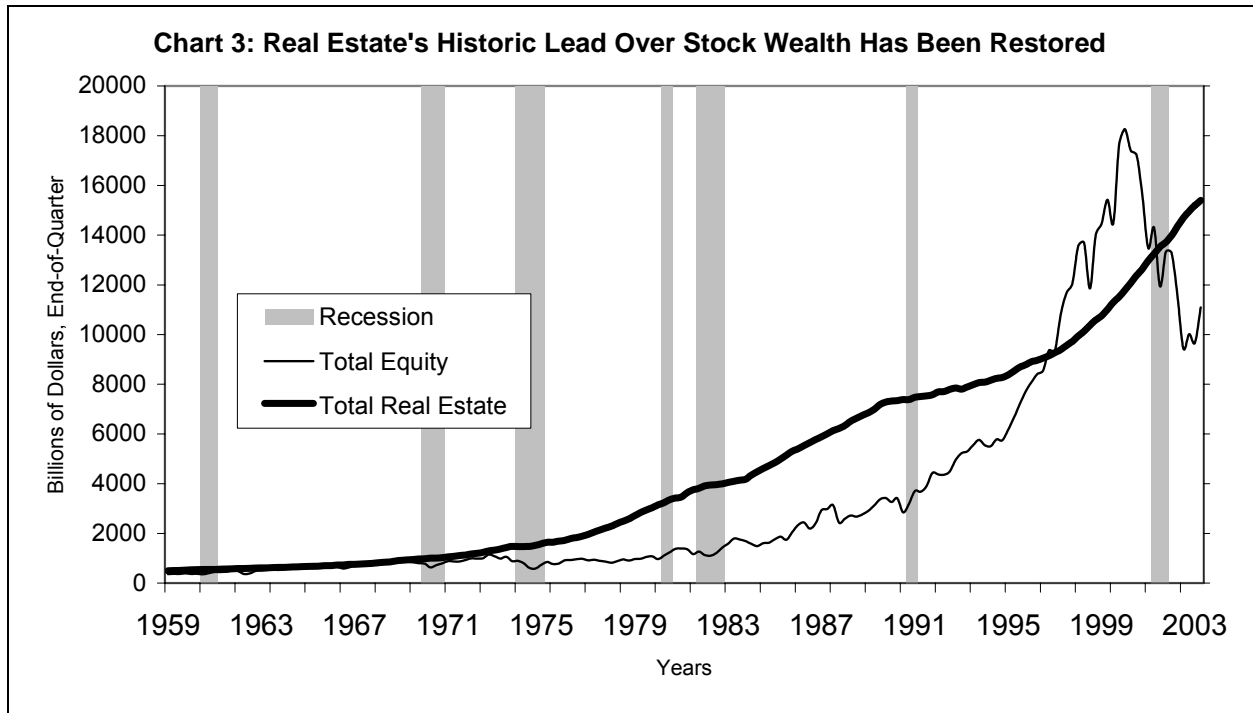
The Distribution of Housing Wealth

While significant within the scope of the entire U.S. economy, aggregate measures of housing and stock wealth disguise the dramatically different distribution of these assets across households. In 2001, about 68 percent of households owned a home but only 52 percent held stocks either directly or indirectly. The top one percent of stockholders controlled 33.5 percent of stock wealth as of 2001, while the top one percent of homeowners controlled only 13 percent of home equity. Meanwhile, the bottom half of stockholders controlled only 2.5 percent of stock wealth while the bottom half of homeowners controlled 12.7 percent of home equity. Furthermore, households in the bottom income quintile held only 1.2 percent of stock wealth but a much larger 5.7 percent of home equity (Chart 4). The broader distribution of housing asset ownership and value means that changes in stock wealth affect a far smaller share of households and mostly affect those with larger disposable incomes.

**Chart 4: Homeownership and Home Equity are
More Broadly Distributed than Stocks**
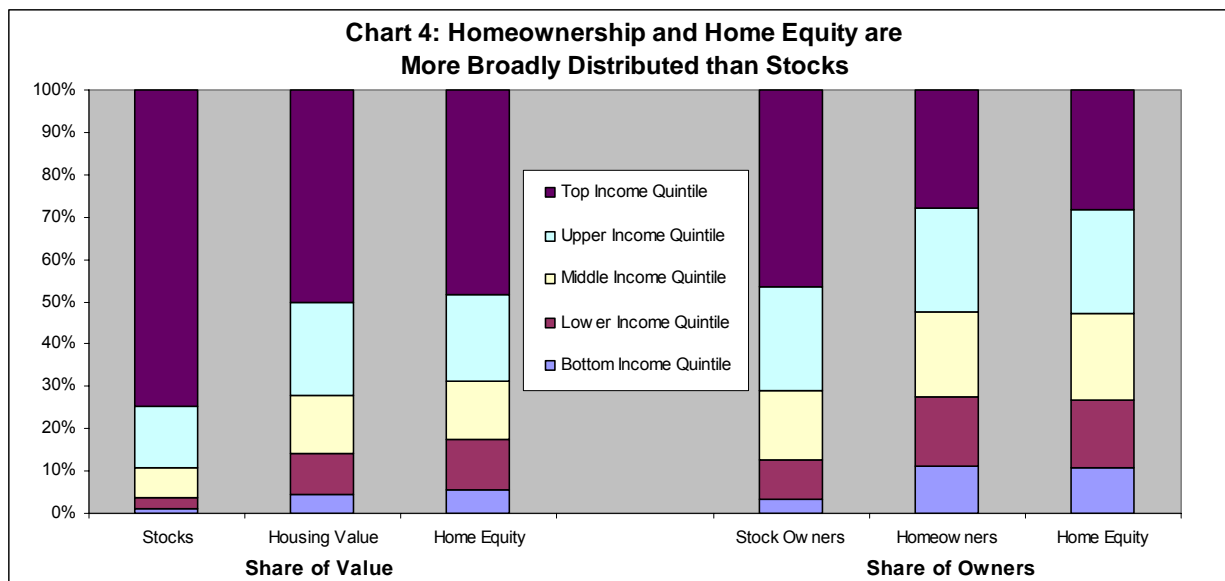
Source: JCHS tabulations of the 2001 Survey of Consumer Finances.

In 2001, the typical household had a net worth of $86,100. Net worth varied substantially by both age and in relation to other demographic factors. For example, the net worth of families with incomes in the lowest 20 percent was $7,900 compared with $833,600 for families with incomes in the top 20 percent of the income distribution. Together, holdings of stocks, bonds, mutual funds and retirement accounts represented two thirds of all financial asset holdings, with a median holding of $127,500. The value of a typical household's primary residence accounted for 46.8 percent of non-financial asset holdings, followed by ownership equity in a business at 29.3 percent. Overall, the value of a typical household's primary residence was $122,000. On the other side of the balance sheet, home secured debt, totaling $70,000 accounted for three quarters of a typical household's debt.

The Importance of Housing Wealth to Individual Households

Homeowners tend to accumulate substantially more wealth than renters. Preliminary estimates using the Panel Study of Income Dynamics suggest that a typical renter household in 1984 had accumulated $42,000 in net wealth by 1999 but a typical owner household in 1984 had accumulated $167,000 over the same period. Marital status, age, race and ethnicity, initial wealth and household income in 1984 accounted for only $20,000 of the net $125,000 accumulated wealth difference. The remainder reflects the contribution that a leveraged investment in a home makes to average wealth accumulation, as well as the contributions of any unobserved
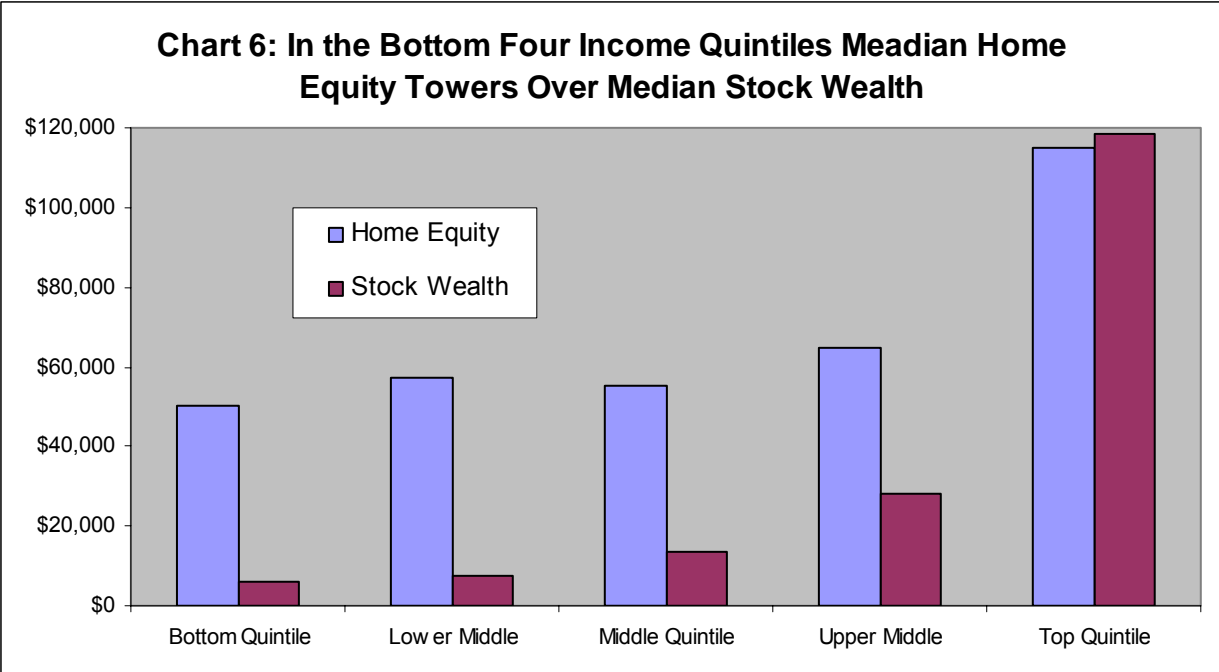
characteristics of homeowners that may result in higher propensities to accumulate wealth than renters of comparable initial wealth, income, age, race and family type (Di et al. (2003)).

Indeed, the differences between the wealth of owners and renters even of comparable incomes are stark (Chart 5). For households with incomes under $20,000, about half of whom are over 65, the ratio of median owners' wealth to median renters' wealth is fully 81 to 1. Among households with over $50,000 in income that ratio falls but still remains high at nearly 8 to 1. And home equity is a large part of the difference, especially for lower income households. Among homeowners with incomes under $20,000, median housing wealth outstrips median non-housing wealth by more than 5 to 1.

Chart 5: The Net Wealth of Owners Dwarfs the Net Wealth of Renters			
Income	Owners Median Net Wealth	Renters Median Net Wealth	Owner/Renter Ratio
<$20,000	72,750	900	80.8:1
$20,000-49,999	111,890	7,670	14.6:1
$50,000+	291,120	37,700	7.7:1
	Owners Housing Wealth	Owners Non-housing Wealth	Renters Net Wealth
<$20,000	50,000	9,890	900
$20,000-49,999	55,000	42,000	7,670
$50,000+	90,000	175,600	37,700

Source: JCHS tabulations of the 2001 Survey of Consumer Finances.

Comparing median stock holdings to home equity holdings across income quintiles further highlights the marked difference in the distribution of housing equity and stock wealth. Taking all households together rather than just homeowners, median home equity towers over median stock holdings across the lowest three income quintiles, is higher among those in the fourth income quintile, and is barely edged out in the top quintile (Chart 6). Narrowing the focus just to homeowners and looking at differences by race and ethnicity, median home equity is highest for non- Hispanic white households. On a relative basis, however, home equity is a much larger share of wealth than stock equity for black and Hispanic households (Chart 7).

Chart 6: In the Bottom Four Income Quintiles Meadian Home Equity Towers Over Median Stock Wealth

Source: JCHS tabulations of the 2001 Survey of Consumer Finances.

Chart 7: The Stock Wealth of Minorities Lags Their Home Equity Even More So than For Whites
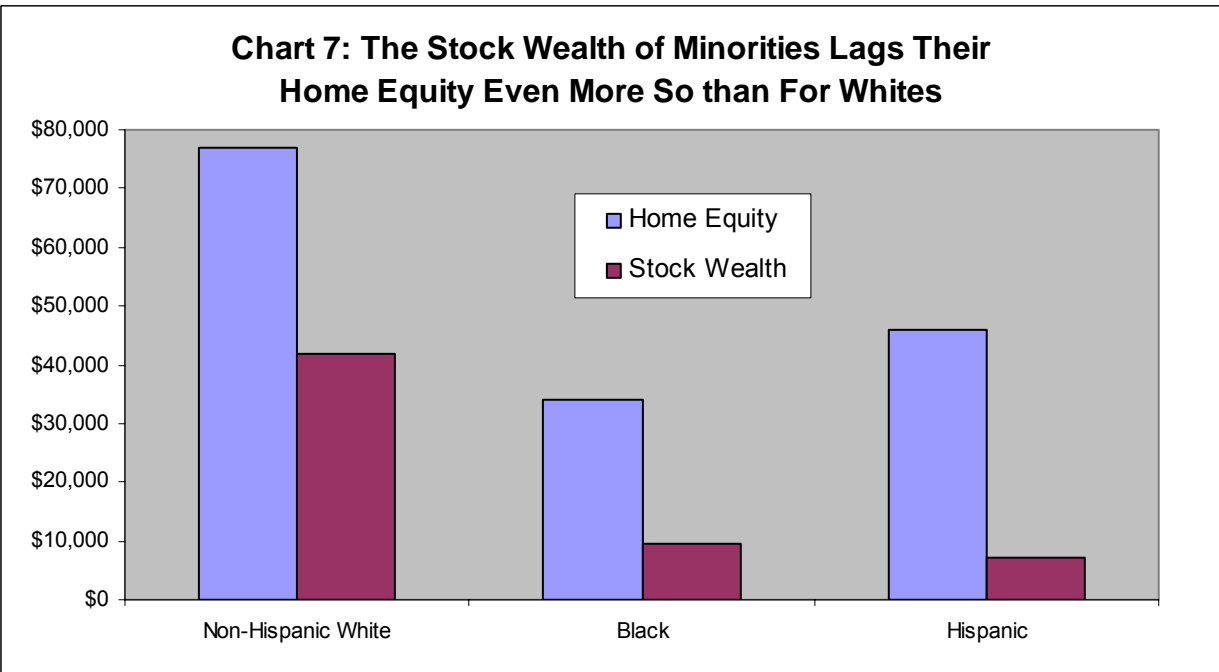
Source: JCHS tabulations of the 2001 Survey of Consumer Finances.
Note: Sample size too small to produce reliable estimates for Asian/others.

Returns to Homeownership

In addition to the benefits a home provides as shelter, investment in a home also yields a financial return as home values rise. Compared with financial assets, however, investing in a home is unique in many respects.

- Housing is a tangible asset that is usually highly leveraged when purchased. The Federal Housing Finance Board estimates that in 2002, about 9.8 percent of all mortgages had loan-to-value ratios of more than 90 percent and 6.2 percent involved ratios of more than 95 percent.
- Unlike investing in stocks, investing in homes incurs capital costs, maintenance costs to keep the structure from depreciating in value, property taxes, and insurance costs

- Unlike stocks, housing is both a consumption and investment item.
- Transaction costs relating to the sale or purchase of a home are substantially higher than costs associated with stock purchases and sales.
- Homeowners buy individual homes and most own only one. Therefore, their investment in housing is not diversified. By contrast, most people who own stocks own many different corporate equities.

Housing returns are leveraged returns and unlike stocks, which people can quickly buy or sell when they perceive opportunities to earn higher returns elsewhere, homeowners typically only sell homes at a loss if they are either forced to do so or buy another right away at a depressed price in the same market (Belsky and Duda (2002)). Furthermore, the returns to homeownership depend in part on the relative costs of owning and renting comparable units over the period the housing asset is held.

In the aggregate, home price changes are far less volatile than stock value changes. But individual returns from homeownership can vary and depend importantly on the market conditions in particular locations. Individual home prices, like prices of individual corporate equities, tend to be more volatile than home price measures based on aggregate data. Home prices in a metropolitan area may deviate significantly from national home price trends weighted for changes across metropolitan areas, for example. In fact, fairly significant home price swings
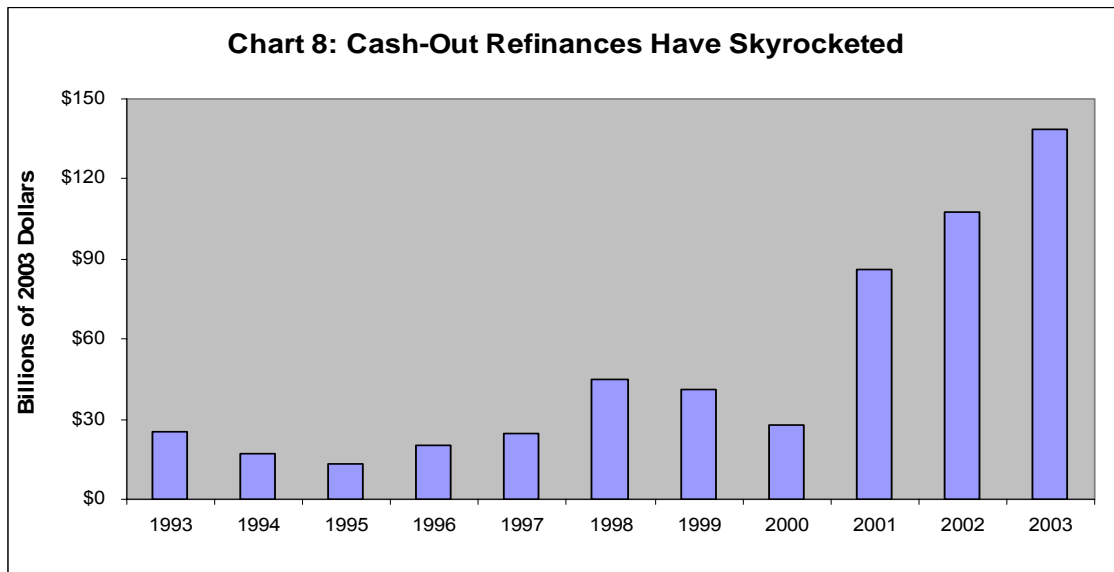
at the metropolitan level are more the rule than the exception. Although such swings are often associated with places like New York, Boston, and Los Angeles, many other markets also have exhibited substantial volatility. While it is true that between 1983 and 2003 the standard deviation of annual home price change was very high at 11.6 percent in Boston, 9.9 percent in Honolulu, 9.7 percent and in San Jose, 8.7 percent in Los Angeles, and 7.9 percent in New York, it was also 7.3 percent for Albany, 6.8 percent for Allentown, and 5.8 percent for both Philadelphia and San Antonio. Furthermore, the average standard deviation for the top 100 metros was 4.7 percent. Deviations in home prices around metropolitan home price indices can also be large. Even at the zip code level, neighborhood home price indices usually explain only about 80 to 90 percent of the price change of an individual home (Goetzmann and Spiegel (2002)). Nonetheless, home price volatility has been low in many metropolitan areas as well. For example, the standard deviation of annual home price changes was 1.5 percent or less in Cleveland, Indianapolis and Louisville, as low as 1.5 to 2.0 percent in another 11 of the largest 100 metropolitan areas, and only 2.5 percent in Chicago and 2.3 percent in Atlanta.

Home Equity Extraction

Housing is an attractive investment for several reasons. Chief among them is that homeowners can build wealth directly both through home price appreciation and forced savings in the form of mortgage payments that pay down principal. But it is also appealing because it provides a store of wealth owners can borrow against at favorable rates to finance other forms of consumption and investments. They can tap home equity without moving either by taking out a home equity loan or line of credit, or by refinancing and substituting a larger new mortgage for the smaller current mortgage. Homeowners can also tap home equity without increasing their debt by selling a home and buying another one using only a portion of the equity from the previous home. All three of these forms of home equity extraction reached record levels in the past three years.

Home equity borrowing through cash-out refinances soared to unprecedented heights in 2003 (Chart 8). A combination of strong home price appreciation and the lowest mortgage interest rates in over 40 years motivated homeowners to extract equity from their homes as never before. Freddie Mac estimates that the amount of home equity cashed out at the time of refinance, net of paying off second mortgages as part of the refinance process, was about $139

billion on primary conventional loans in 2003.[6] Freddie Mac also estimated that the amount of second mortgages paid off and rolled into refinanced first mortgages totaled $65 billion that year.

Chart 8: Cash-Out Refinances Have Skyrocketed

Billions of 2003 Dollars

Year	Value
1993	~$25
1994	~$17
1995	~$13
1996	~$20
1997	~$25
1998	~$45
1999	~$41
2000	~$28
2001	~$86
2002	~$108
2003	~$138

Source: Freddie Mac.

Meanwhile, debt outstanding on home equity loans and lines of credit also surged, roughly tripling to $1.0 trillion by the fourth quarter of 2003 (Chart 9). Home equity released at the time of sale through realized capital gains skyrocketed as well. One way to estimate realized capital gains on housing is to multiply existing home sales by the appreciation of home prices over the average length of time a family remains in the same home. Sales of existing homes and the median price of existing homes sold both are reported by the National Association of REALTORS®. Assuming an average 7-year holding period, inflation-adjusted realized capital gains on housing briefly rose to a peak in the late 1970s but, more recently, climbed to a record $332 billion in the fourth quarter of 2003 (Chart 10).

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[6] Freddie Mac bases its estimates on primary conventional conforming loans only.

Chart 9: Second Mortgage Borrowing Has Increased Sharply
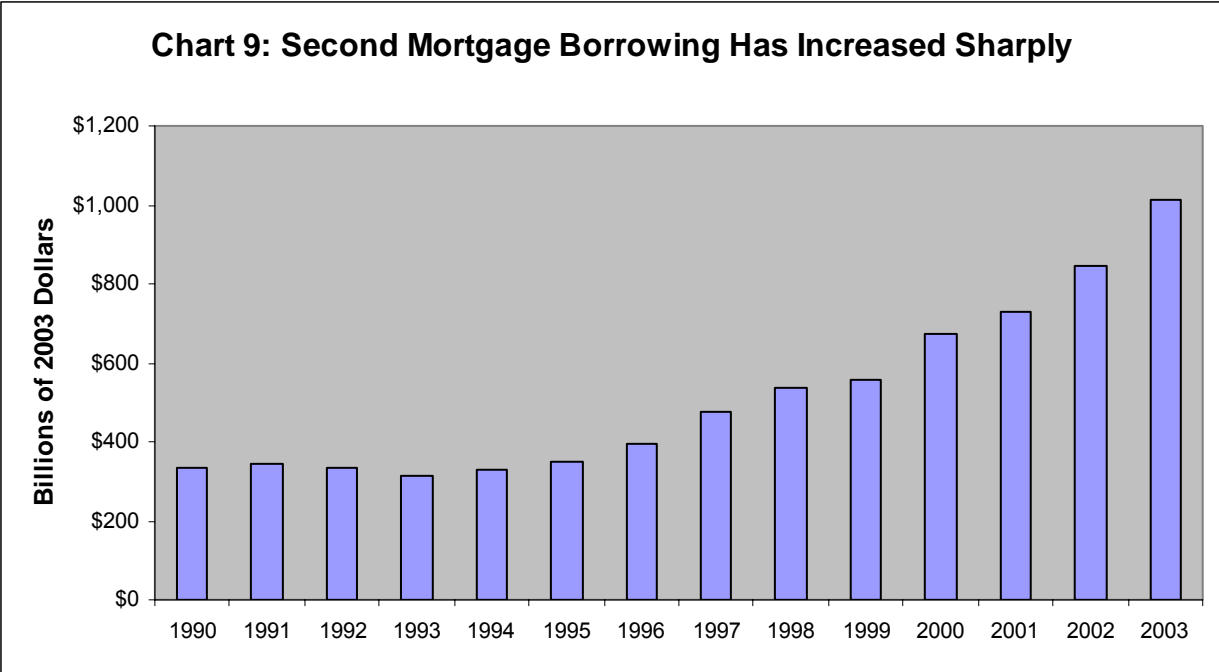
Source: Federal Reserve Board, Flow of Funds.
Note: Second mortgage loans and lines outstanding from Flow of Funds.

Chart 10: Proxy for Realized Housing Capital Gains

The gains proxy is existing homes sales the 7-year change in the median sale
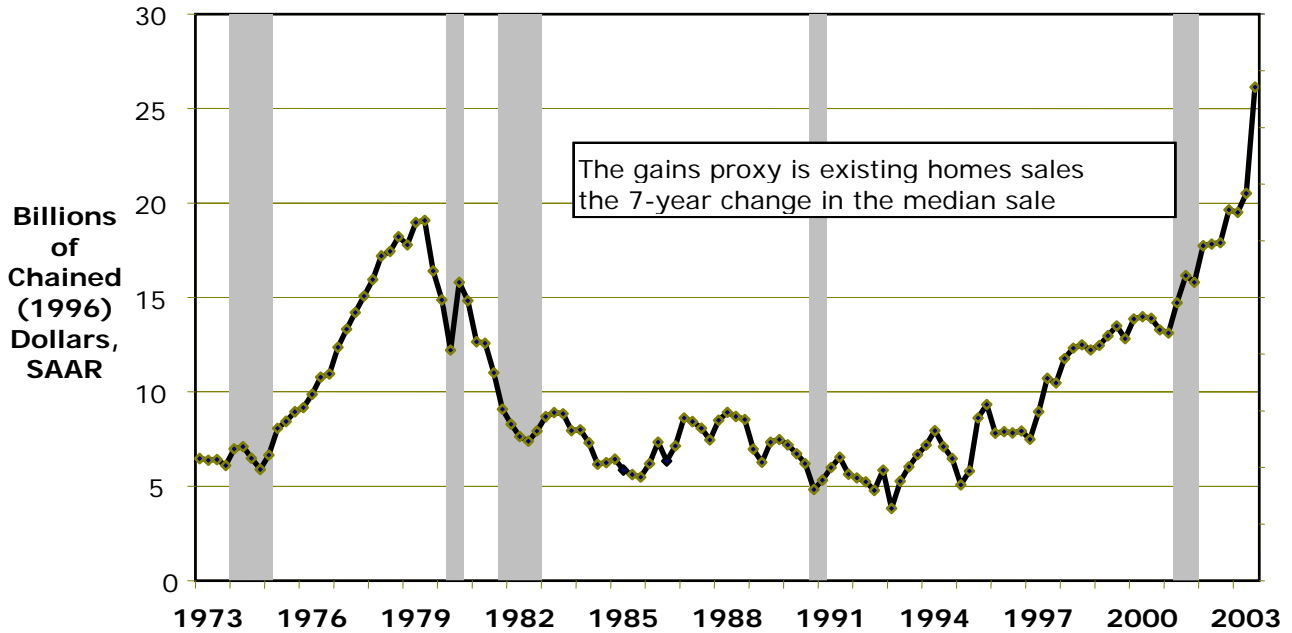
Source: National Association of Realtors; Macroeconomic Advisers, LLC
Note: Shaded bars are recessions

How do homeowners or home sellers use the home equity they extract? The answer depends on the way in which the equity is converted to cash. A survey of borrowers who took cash out when they refinanced in 2001-2002 found that the most common reported use was to pay off a second mortgage (45 percent). But nearly equal shares of borrowers reported using at least some of the proceeds to make home improvements (40 percent) (Brady 2000; Canner et al. 2002). More to the point, about 35 percent of the proceeds reportedly went to home improvements, 16 percent to consumer expenditures, and the rest to paying off second mortgages and other debts (Chart 11).

Chart 11: Reported Uses of Money Cashed Out in Refinancings in Two Recent Time Periods Are Similar

Legend:
- Repayment of other debts
- Home improvements
- Consumer expenditures
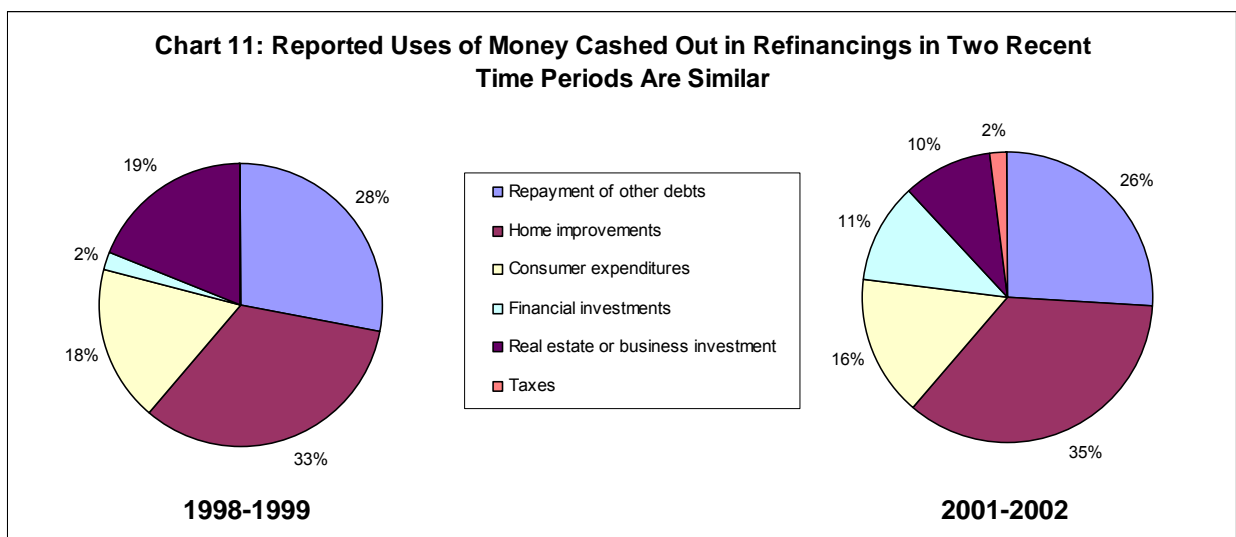- Financial investments
- Real estate or business investment
- Taxes

1998-1999: 28%, 33%, 18%, 2%, 19%

2001-2002: 26%, 35%, 16%, 11%, 10%, 2%

Source: The Federal Reserve Board Survey of Consumers, 1999 and 2002.

A survey of home equity line and loan borrowers conducted from May through October 1997 found that the most frequent use of home equity lines was for home improvement (69 percent) while home equity loans were most often used to repay debt (61 percent). Excluding car and truck purchases (37 percent), only very small fractions of loan or line borrowers used the proceeds for personal consumption (Canner et al. 1998).

Finally, the only survey to try to gauge the share of home equity that is not reinvested in another home after homes are sold is a 2001 survey conducted by the National Association of REALTORS®. According to this survey (National Association of REALTORS® (2002)), 76 percent of repeat homebuyers used all of the capital gains from the sale of the previous home as a downpayment on their current home while another ten percent put only some of the realized gains back into their home. Furthermore, 15 percent of repeat homebuyers *did not* use their

realized net equity for a downpayment on their current home but instead used it for some other purpose including five percent who used the gains for a downpayment on a second home.

Housing-Related Effects on Consumer Spending

With realized capital gains, home values, and home equity borrowing all at record levels in 2001, again in 2002, and yet again in 2003, it is small wonder that interest in housing's role in triggering consumer spending has been ignited. Surveys of how capital gains, home equity loans and lines, and cash taken out at the time of refinancing are spent suggest that large fractions are consumed or spent on residential investment in the form of remodeling.

In addition, economists have long suspected that increases in the level of wealth trigger an increase in consumer spending. They have also developed and further extended a "life-cycle" theory to explain the mechanisms by which an increase in wealth stimulates spending. The theory can also be used to predict the magnitude of these so-called "wealth effects."

However, while the effects of increases in the level of wealth on consumer spending have been studied and modeled by economists for years, the impact of realized capital gains and home equity extractions through additional borrowing have not been the subject of published research. Furthermore, the studies of wealth effects that do make a distinction between housing and other wealth effects yield very different results using a variety of different data sets and empirical approaches. To address these concerns, models were developed for this study to examine the independent influences of changes in the level of stock and housing wealth, realized capital gains and home equity withdrawals through expanded borrowing on consumer spending.

Modeling the influence of multiple variables on consumer spending in the short and long run results in a more accurate analysis than household surveys of how owners spend because those surveys can lead to misleading estimates of the impact of housing-related effects on spending. Even when households report using proceeds from a loan for an express purpose, it is possible that absent the loan they would have used other forms of wealth for that purpose anyway. Furthermore, households may simply bring forward or accelerate spending rather than add to overall spending in the long run. The only way to disentangle how changes in wealth, home equity extraction, and realized gains influence spending is to model them explicitly.

Doing so reveals the central role that housing played in propping up the economy when it fell into recession in 2001 and in helping the economy recover in 2002 and 2003 when the nation

continued to register job losses. It also reveals that the aggressive rate reductions of the Federal Reserve Board in advance of, during, and following the recession facilitated housing's contribution to economic growth by triggering record levels of home equity borrowing, supporting home prices, and driving home sales higher despite mounting unemployment.

The Wealth Effect Defined

The wealth effect is the name given to the independent influence that changes in the level of wealth exert on consumption. These effects are measured in macroeconomic models in two ways: 1) the marginal propensity to consume from wealth, and 2) the elasticity of consumption with respect to wealth. The marginal propensity to consume is the increase in aggregate consumer spending created by an increase in aggregate wealth. It is usually expressed as the number of cents spent out of each dollar gain in wealth. The elasticity of wealth with respect to consumption is the *percentage* change in consumer spending brought about by each percentage change in wealth. In macroeconomic models of aggregate spending and wealth, the elasticity of consumption with respect to wealth is influenced by the ratio of wealth to consumption over the time period investigated. Thus, different levels of wealth relative to consumer spending may influence the size of wealth elasticities.

Wealth effects are not instantaneous. Rather, a change in wealth can result in spending changes that occur over several months or quarters before they reach their long-run impact on consumer spending. Hence, wealth effects have lags that determine how rapidly an increase in wealth produces a long-run equilibrium impact on spending.

Economists typically model aggregate consumption as a function of aggregate income and aggregate wealth. They routinely find that changes in the level of aggregate wealth have a statistically significant exogenous influence on consumption on the order of three to seven cents per dollar gain in wealth. Most studies find that it takes several quarters before wealth effects reach their long-run impact. However, the precise estimates of wealth effects, as well as the number of quarters over which they are distributed, vary from study to study because estimates depend on the time period examined, the data sets used, and the modeling approach employed.

Although a significant statistical relationship is almost always found between wealth and spending, a debate has ensued over the reasons for this relationship. Morck and his colleagues (1990) argued that asset prices are correlated with future output growth and thus are simply a

leading indicator of consumer spending. Similarly, Poterba and Samwick (1995) contended that future expectations may drive both consumer spending and stock wealth. Romer (1990) suggested that the impact of changes in wealth on consumer spending really reflect the impact of consumer confidence on both. Most economists, however, adhere to the view that wealth influences consumer spending because consumers intend to spend some if not all of their wealth rather than bequeath it (Poterba (2000)). This view was first formalized in 1963 by Ando and Modigliani in one of the most influential papers in consumer theory.

    None of these explorations into the influence of wealth examined whether spending might also be affected by the timing and magnitude of realized gains upon sale or by extraction of equity when an asset is indivisible like housing and can only be tapped through borrowing.

Theoretical Insights into Wealth Effects

    Neoclassical economic theory holds that consumer spending is a function of income and wealth. Friedman (1957) conjectured that consumers base their consumption in a single period in part on their expectation of future income. He dubbed this expected future income stream "permanent income." Ando and Modigliani (1963) extended the theory of consumer spending by arguing that consumers smooth consumption over their life cycle. To accomplish this smoothing, consumers typically borrow against future earnings early in life, then build wealth and repay debts in middle life, and finally spend down their wealth and use government transfer payments in retirement. Ando and Modigliani theorized that once consumers obtain wealth, they spend it in roughly equal increments over the number of additional years they expect to live.

    More specifically, life cycle theory conjectures that what consumers spend in a given year is a function of 1) how long they expect to live, 2) what they expect their permanent income to be (which is the sum of expected labor income and government transfers over their lives but is net of income earned from assets), 3) their wealth entering the year (irrespective of the composition of that wealth), and 4) their rate of time preference. A key insight gleaned from this theory is that the marginal propensity to consume out of wealth rises with the age of the consumer.

    This microeconomic theory of how much a consumer spends at any point in his or her life can be aggregated across all consumers to make predictions about, and estimates of, the impact of rising wealth on aggregate national consumer spending in a given year. For example, because

the average age of households in the United States is 49 and life expectancy is about 79 years, assuming that the average rate of time preference is 4 percent, then one would expect the marginal propensity to consume out of a $1 increase in wealth to be about 5.5 cents. That is, for every $1 gain in wealth, consumer spending will increase by 5.5 cents that year.[7] Notice that the theory is intended to explain long-run changes in consumer spending based on increases in wealth in any period. Therefore, it assumes that consumers instantaneously increase their spending as wealth rises.

To make these predictions, however, the life cycle theory of consumption makes several simplifying assumptions. For example, the model assumes that every consumer intends to spend their last dollar on the last day of their life, thus the only reason some leave bequests is that they die sooner than they had expected. Conversely, the only reason some run out of money before they die is because they lived longer than they expected. While unlikely to hold in all cases, the intuition behind the model may be robust when averaged across all consumers in an economy.

For this analysis, the most important simplifying assumptions in the standard life cycle model are that 1) consumers make no distinction between different forms of wealth, and 2) consumers have unimpeded and costless access to perfect capital markets. The assumption that there is no difference in how consumers view wealth gains in different assets means that the theory is largely silent on the question of whether stock and housing wealth should have different effects on consumer spending. The assumption that consumers have costless and unimpeded access to perfect capital markets means that the theory is entirely silent on the question of how liquidity constraints, imperfect information on the value of assets or borrowing costs, and transaction costs associated with tapping capital markets might influence the timing, and potentially the level, of wealth effects.

The reason that the life cycle theory remains largely—but not entirely—silent on differences in the effects of different forms of wealth on consumer spending is that theory itself implies that, at a minimum, if the average age of owners of different assets is not the same, then when aggregated to the national level the wealth effects of those assets should not necessarily be

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[7] Economists express this by stating that the consumer's budget constraint equates the present discounted value of lifetime consumption to the sum of the initial endowment of wealth, the discounted value of after-tax labor income, and the discounted value of transfer payments. The present discounted value depends on the real after-tax rate of return on wealth. The effect is governed by the wealth the consumer has accumulated to that point and how much longer they expect to live from that point forward. Wealth is observable but lifetime expectations of income and

equal. Thus, the theory predicts that wealth effects should be greater for assets held by consumers who are on average older and therefore have less time to spend down their assets than consumers who are younger on average.

Obviously, the life cycle hypothesis is a highly stylized representation of consumer spending and the constraints that households actually face. Nevertheless, the life cycle model is deeply grounded in theory and underpins most efforts to explain and model wealth effects.

Previous Empirical Evidence of Wealth Effects

Many efforts have been made to estimate the macroeconomic effects of wealth on personal consumption.[8] Each modeling attempt involves choices about which measures of income and wealth to use, how to decompose wealth, what functional form of the equations to use, what modeling approaches to use and constraints to impose, and what time period to cover.

Even though life cycle theory does not speak directly to possible differences in wealth effects stemming from various forms of wealth, many models decompose wealth into two or more components. The most common approach is to divide wealth into corporate equities and one or more other components of wealth.

The longest, most consistent and most regularly updated wealth effect estimates have been provided by the quarterly macroeconomic model of the U.S. economy maintained by the research staff of the Board of Governors of the Federal Reserve System. The initial model was developed under the general direction of Ando and Modigliani during the 1960s. The 1978 version of the model separated household net wealth into three components: the value of corporate equities, tangible assets (including the value of residential structures but net of the value of land), and the stock of consumer durables. The marginal propensity to consume out of corporate equities was 2.9 cents per dollar spread over eight quarters, while the implied marginal propensity to consume out of housing investment was constrained to be twice that (5.8 cents)

transfer payments are not. Therefore, proxies must be used in estimating wealth effects. These are created using current income and current transfer payments, the discount rate, life expectancy, and expected retirement age.
[8] In addition, several efforts have been made to use microeconomic data to test for wealth effects, including housing wealth effects. These have produced mixed results. Skinner (1989) found small but significant housing wealth effects using data from the Panel Study of Income Dynamics. Using the same dataset, Englehardt (1996) did find a consumption effect of realized capital gains on housing. On the other hand, Thaler (1990) and Hoynes and McFadden (1997) did not find evidence that expectations of capital gains in housing altered households' savings behavior. Similarly, Levin (1998), using the Retirement History Longitudinal Survey, found no effect of housing wealth on consumption.

with no lag. By 1983 these estimates had increased to 4.2 cents and 8.4 cents, then fell to 3.8 cents and 7.5 cents by 1985 (Brayton and Mauskopf (1985)). After a major overhaul of the model in the 1990s, wealth was separated into corporate equities and all other forms of wealth (Brayton and Tinsely (1996)).[9] Thus, the capacity to estimate the impact of housing wealth was constrained to equal that of other forms of non-stock wealth. The marginal propensity to consume out of equity wealth was three cents and all other wealth was 7.5 cents. Using these estimates, the huge run up in stock values in the second half of the 1990s implied that the overall marginal propensity to consume rose to a peak of about 5.5 cents by early 2000 and stood closer to three cents by early 2004.

While the sharply lower wealth effect of stock equities is surprising, it is confirmed by others using various modeling approaches.[10] For example, using international cross sectional data, both Case et al. (2001) and Bayoumi and Edison (2003) found that the wealth effect from corporate equities is materially less than that from the value of real estate assets. Using data from 1984-2000, Bayoumi and Edison found that each dollar increase in housing wealth led to an increase in consumption spending of seven cents, whereas a one-dollar increase in stock wealth led to an increase of only 4.5 cents. Based on data from 1975 to 1999, Case and his colleagues found that the elasticity of consumer spending with respect to housing wealth was between 11 and 17 percent across the countries studied but was only two percent for stock wealth. Ludwig and Slok (2002) of the International Monetary Fund also reported larger wealth effects for real estate than corporate equities using data from several OECD nations. Furthermore, in a regression of retail spending across states in the U.S. from 1982 to 1999, Case and his colleagues found that the elasticity of consumption with respect to housing wealth ranged between five and nine percent, while the estimated coefficients for stock wealth effects were statistically insignificant from zero.

Focusing exclusively on stock wealth effects, Starr-MacCluer (1998) found that a one-dollar increase in stock market wealth produced somewhere between a three to seven cent

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[9] As part of the model overhaul, the equation was changed from a linear to a log-linear form. Hence, elasticity was held constant and marginal propensity to consume was allowed to vary after 1996.

[10] One possible reason why many of the estimates of the separate wealth effects of housing and other wealth deviate so much from each other is that the lagged response of consumption to the value of corporate equities unwittingly is truncated. This creates the unintended consequence that estimated responses may be lower than the real long-run response if the lag structure had not been constrained.

increase in consumer spending. Davis and Palumbo (2001) found an effect in the range of three to six cents on the dollar and Kiley (2000) found a 3.3 cent effect. Taking the measure of these studies of stock wealth effects, Edison and Slok (2001) placed the stock wealth effect in the U.S. at between three and seven cents on the dollar. This is consistent with the range of estimates of stock wealth effects generated by the modelers at the Board of Governors of the Federal Reserve.

Hence, despite different approaches, stock wealth estimates usually fall within a relatively narrow band, while housing wealth estimates usually fall within a wider and higher band.

Extensions of Life Cycle Theory

In the absence of a well-defined theory describing the level or speed with which wealth effects reach their long-run impact and how these effects might differ by form of wealth, many plausible explanations have been advanced in the literature.[11] Case and his colleagues (2001) offered the following as possible reasons to expect differences: 1) some forms of wealth are viewed as temporary or uncertain, so spending based on them is either lower or occurs over a longer period of time;[12] 2) the taxes on some forms of wealth are waived upon bequest, so these forms may be more often held until death; 3) accumulation of some forms of wealth is an end in itself and they are not used for consumption purposes; 4) the value of some forms of wealth is harder and more costly to assess than others, so spending may be affected; and 5) some forms of wealth are framed in the minds of their owners as being for current use while others are viewed as long-term savings, and so are spent down only later in life.[13]

Less consideration has been given in the literature to the potential wealth effects of home equity extraction over and above what is attributable to housing wealth effects. Canner and his colleagues (2002) argued that home equity could produce differences in wealth effects if 1) some

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[11] Explanations have also been advanced for differences in the level and timing of effects across countries, though we will not describe them here because our focus is on the United States. See Edison and Slok (2001) and Ludwig and Slok (2002) for examples.

[12] The view that the volatility of an asset class's value should influence the timing or size of its wealth effects is also held by Edison and Slok (2001). They conjectured, and then found evidence to support the view, that telecommunications, media, and information technology stocks should result in lower marginal propensities to consume than other stocks because their owners perceive them as more volatile.

[13] The view that assets held as long-term savings produce different wealth effects is developed in greater detail by Poterba (2001) in his effort to explain why the wealth effects of directly held stocks might deviate from the wealth effects of stocks held in retirement accounts.

homeowners are liquidity constrained but have future expectations that cause them to increase consumption, 2) some homeowners seize the opportunity to realize a portion of their relatively illiquid capital gains when interest rates fall by taking cash out when they refinance, and 3) as Case and his colleagues (2001) also argued, homeowners on average underestimate their home values and increase spending when they find out the true value upon sale or refinance.

Many of these possible explanations provide reason to believe that housing could well have larger long-run wealth effects, or at least have long-run effects that are achieved faster, than stock wealth effects. For example, tax policy may accelerate and increase wealth effects from housing because unlike capital gains from stocks, those on home sales are often not taxed during one's lifetime. More importantly, if gains in home values are considered more permanent than gains in stocks, housing wealth effects could well occur faster than stock wealth effects. Relying on what are seen as permanent gains, households may feel free to increase their spending. Given the extreme volatility of stock prices, it is easy to imagine that consumers might well view housing gains as more dependable. It is less obvious, however, why the wealth effects of housing should be larger in the long run as a result of the lower volatility of house values.

Also, given the financial frictions caused by transaction costs, uncertainty and imperfect and asymmetric information sharing between borrowers and lenders (none of which are addressed by textbook life cycle theory), one can easily imagine circumstances under which the easy availability of liquidity generated by housing or mortgage market transactions could affect the timing of consumer expenditures. And it could also increase the magnitude of housing wealth effects because owners tend to underestimate the value of their homes by at least several percentage points on average (Kain and Quigley (1972); Goodman and Ittner (1992)). Upon sale or refinance, the recognition that housing wealth is greater than previously estimated should equate to larger wealth effects, *ceteris paribus*. Additionally, borrowing against home equity or releasing the equity upon sale could reduce the costs of financing consumption relative to other alternatives. Lower overall debt costs of consumption, all else equal, increases lifetime spending by reducing the amount of income that must be diverted to servicing debt.

On the other side of the ledger, the fact that housing wealth is more likely than stock wealth to be viewed at least in part as a consumption item and not an investment item could reduce wealth effects relative to stocks. Finally, the influence of different attitudes towards short and long-term forms of savings with respect to housing and stock wealth effects is ambiguous.

Both housing and stocks held in retirement accounts are likely perceived as long-term savings (note that most homeowners maintain significant levels of home equity in retirement).

Of course, the average age of owners of different forms of wealth could also drive differences in wealth effects, as could differences in the average income of owners.

Except for average age of owners, theory does not suggest an order of magnitude for any of these possible effects. Hence, they are matters that must be left to empirical estimation.[14]

Data and Methods

The detailed specifications used to model housing wealth are described and discussed in Appendix 2 with additional information in the report prepared by Macroeconomic Advisers (2004). Here, instead, several salient facts about the modeling approach and the data used to fit the models are summarized.

First, an error correction approach was selected to model consumer spending. This approach estimates a long-run consumption spending trend and then estimates the dynamic short-run responses to changes in variables around the trend. These models are well suited to the purpose of this study because they can be used to test for, and estimate the impact of, both lasting and transitory influences on spending. It turns out that the changes in the levels of housing and stock wealth have long-run impacts on consumer spending while home equity withdrawals and realized capital gains have fleeting influences that in recent years have been unusually large.

Second, the model structure and specifications (the variables included and the functional form of the equations within the models) are firmly rooted in life cycle theory and the theory of fixed capital investment. This means that the effects of wealth on service consumption and durable goods are modeled separately. Life cycle theory is used to structure the service consumption model and fixed capital investment theory is used to structure the model of wealth effects on the net change in durable goods expenditures.

Life cycle theory was designed to explain what might be called service consumption, not

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[14] In addition, some of these explanations are more consistent with the life cycle theory of consumer spending than others. Since the purest formulation of life cycle theory assumes perfect markets and unconstrained access to credit, explanations that relate to the obvious violation of these assumptions, are more consistent with it than others. In this regard, explanations that stress the impact of the cost of gaining accurate assessment of house values and the relaxation of liquidity constraints through home equity extraction are the most consistent. The impact of expectations about the permanency of wealth gains is also compelling since it is rational to discount the contribution of wealth to consumer spending if it could evaporate in a future period.

service consumption plus durable goods spending. Service consumption includes a component that represents the cost of the portion of a durable good that is "consumed," but not the total amount spent to purchase the good. For example, it includes the cost of using a car in a particular quarter, not the full cost of the car in the quarter it was purchased. Though a seemingly technical issue, it has significance for how the wealth effect is modeled and sets this effort apart from others. Durable goods spending should be treated instead as an investment in fixed capital that earns an implicit return that is consumed as a flow of services by owners. We have seen no attempt to estimate an investment model for expenditures on durable goods that distinguishes between the value of corporate equities and housing wealth, and then combines it with a consumption function to explain the different contributions of these wealth effects to the behavior of personal consumption expenditures.

Third, we constructed two proxy variables for housing related wealth effects. For our measure of home equity withdrawals we used the net change in the value all households' mortgage debt over the period less households' expenditures on new residential construction. Hence, home equity withdrawals represent the flow of net new funds borrowed in the mortgage market that are not invested in housing and so could be used to support consumer expenditures. Finally, we constructed a proxy for capital gains realized upon the sale of homes. To do this, we multiplied existing homes sales reported by the National Association of REALTORS® by the inflation-adjusted appreciation of home prices over the average of seven years we assumed that owners remain in the same residence.

Empirical Results

The models used to predict changes in consumption performed well. The error correction model for service consumption, without housing liquidity effects, explained 37 percent of the variation in consumer spending and with liquidity effects explained 46 percent. It also did a good job in predicting turns in the data series (Chart 12).

Chart 12: The Actual and Predicted Change in Consumption Spending
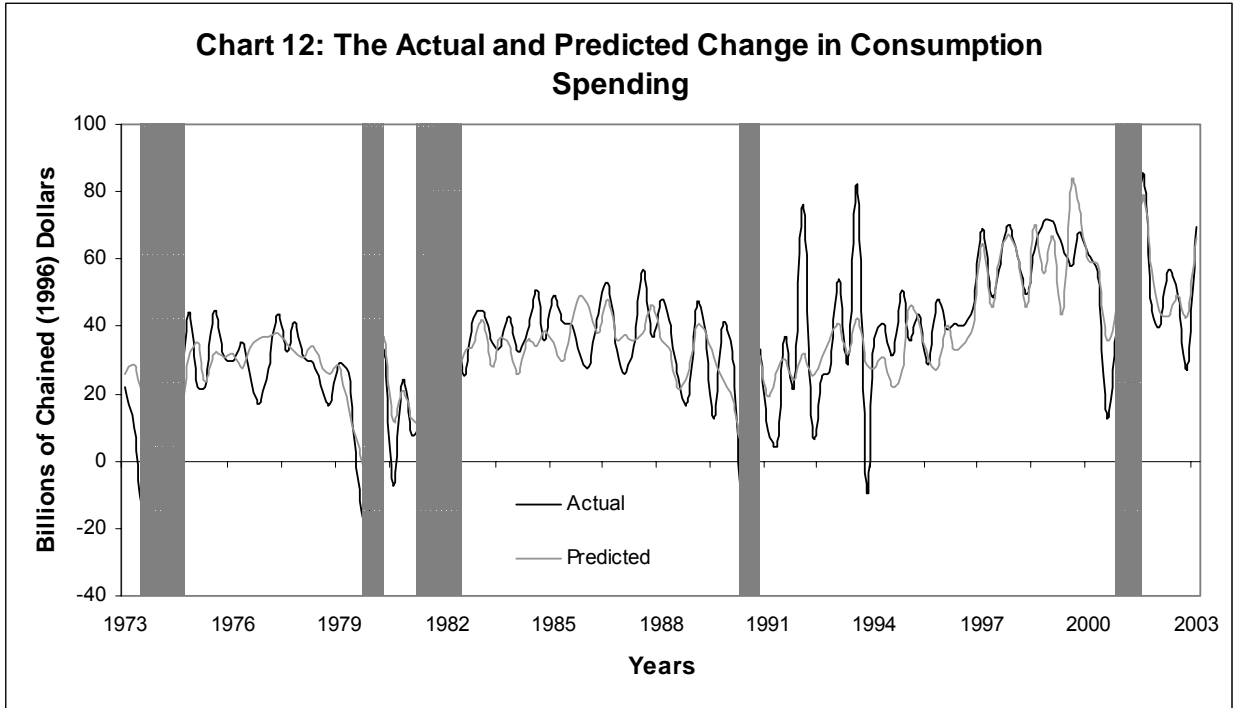
Source: Macroeconomic Advisors, LLC.
Note: Shaded bars are recessions.

In the long run, the model finds that consumers spend about 5 1/2 cents for every dollar gain in both real estate wealth and corporate equity wealth. However, gains from housing wealth approach that level much faster (Chart 13).

Chart 13: The Estimated Marginal Propensity to Consume Per Dollar of Wealth
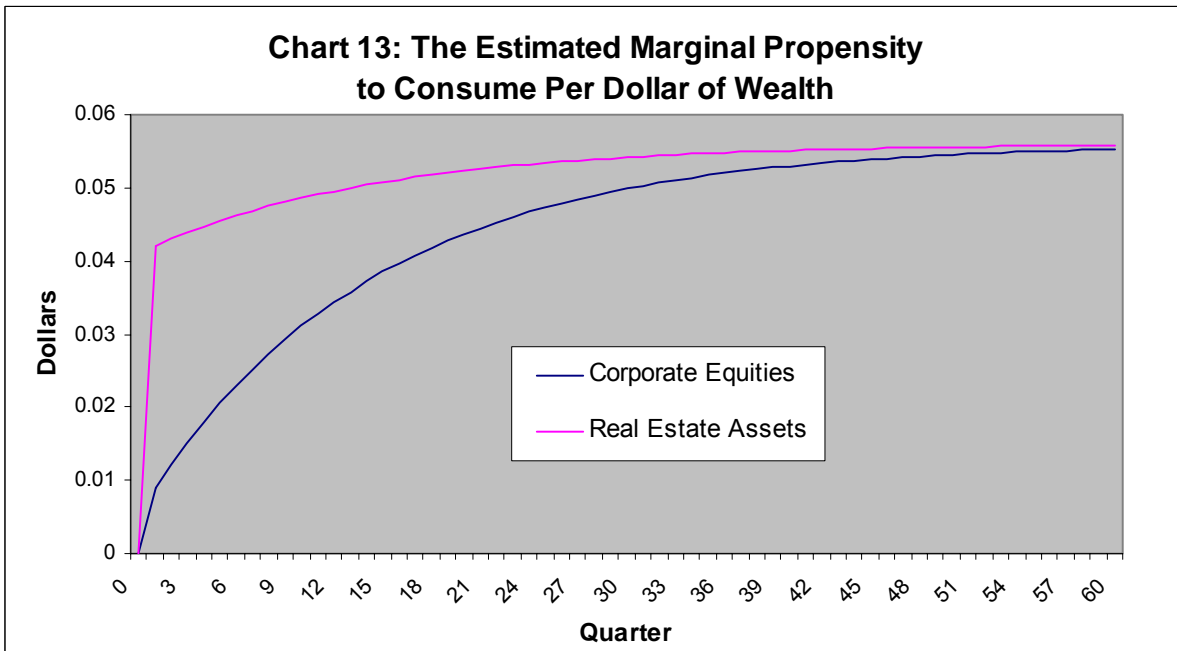
Source: Macroeconomic Advisors, LLC.

Within one year, 80 percent of the long-run housing wealth effect—or about 4 1/2 cents—is realized. In contrast, it takes nearly five years for stock wealth to approach 80 percent of its long-run impact. This is consistent with the view that stock wealth gains are considered more transitory and uncertain than housing wealth gains so consumers are slower to alter their lifestyles.[15] It also means that sharp increases in home prices more rapidly trigger additional consumption than stocks.

There is also evidence, albeit less compelling statistically, that, *ceteris paribus*, an acceleration of the pace at which home equity is liquidated temporarily boosts consumer spending. We estimate that a one-dollar increase in the pace of such liquidations temporarily boosts consumption by about five cents. Home equity withdrawals, however, are volatile and their contributions to changes in consumer spending tend to cycle. They add to consumer spending on the upswing and subtract from it on the downswing.

This figure is considerably smaller than that sometimes inferred from consumer surveys of the disposition of liquified home equity, which suggests a marginal propensity to consume as high as 25 cents.[16] We view this discrepancy as arising from the failure of surveys to distinguish between the fundamental economic determinants of consumer spending on the one hand, and the means of financing that spending on the other.

The difference of 20 cents between the two estimates likely reflects spending that would have occurred anyway but would have been financed some other way than by home equity borrowing. This distinction is important because it means there is less risk to the economy when refinancing booms wind down than is suggested by consumer survey responses to how proceeds from home equity loans and lines of credit and cash-out refinances are used. In other words, rather than losing 25 cents in consumer spending over the course of a year for every dollar reduction in home equity borrowing, the economy loses a much smaller five cents.

Finally, we find some evidence that liquidity provided by the flow of realized capital gains on housing also has a temporary but volatile impact on consumer spending. However, given the surge in home sales and home prices since 2000, realized capital gains have made

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[15] When other housing related effects on spending are introduced into the model, the short-run dynamic effect of gains in housing wealth appear to be less rapid. But this is because house prices drive increases in housing wealth levels as well as realized capital gains and to some extent equity withdrawals also. Therefore, the model has difficulty untangling the contributions of the three to consumer spending.
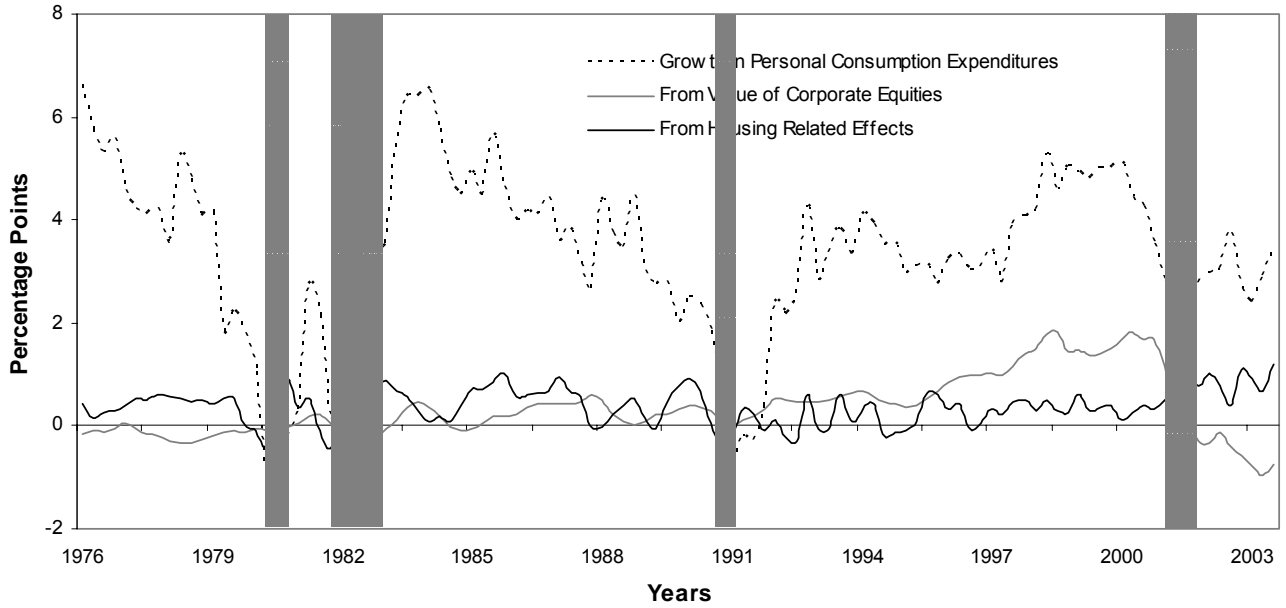
[16] Both the Greenspan testimony and the Merrill Lynch (2003) commentary cite an impact as large as 50 cents; this however includes the effect not only on PCE, but also on residential construction.

important contributions to consumer spending. The reverse has also been the case. When home sales plummeted and prices softened during the double-dip recession of the early 1980s and the recession of 1991, the contraction of realized capital gains acted as a significant drag on consumer spending.
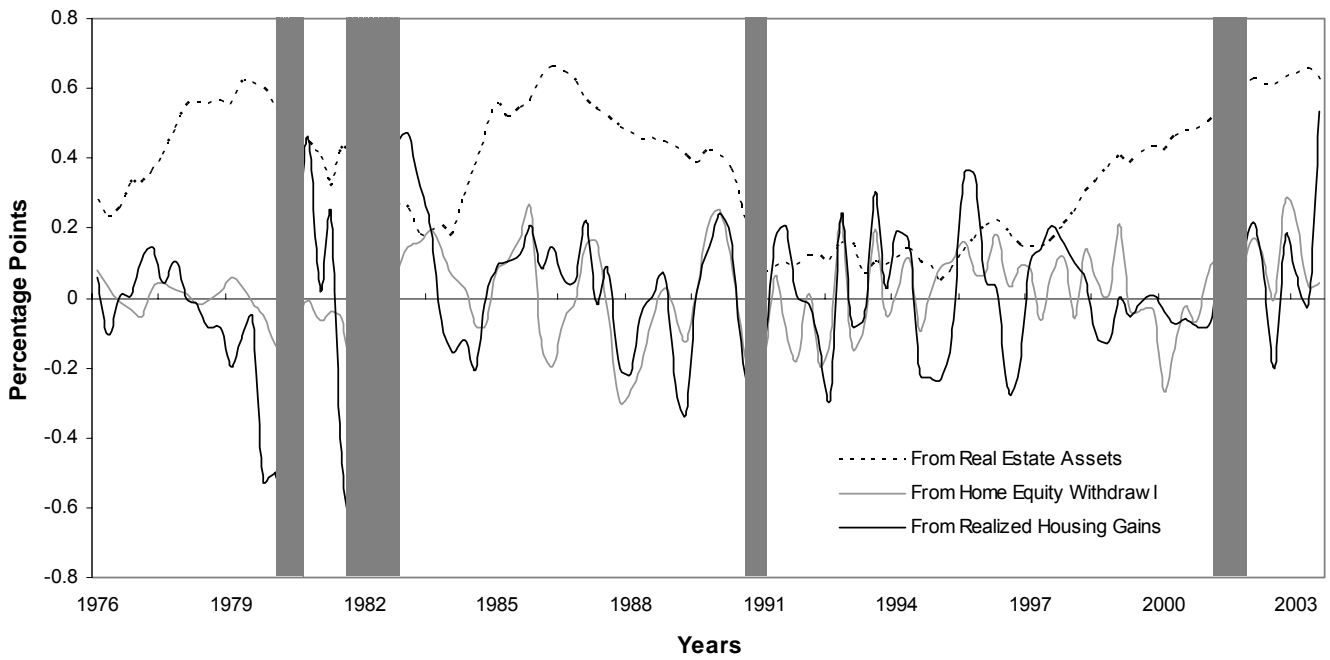
When other housing-related effects on spending are introduced into the model and the separate results for service consumption and durable goods spending are combined, the all-in effects of housing on personal consumption expenditures can be estimated. Starting in 1995, the contribution to the four-quarter growth rate of personal consumption expenditures emanating from all housing related factors (i.e., the traditional housing wealth effect, the liquidity effect, and the capital gains effect) climbed steadily from near zero to 1.2 percentage points by the third quarter of 2003 (Chart 14). Half of this contribution (0.6 percentage point) is accounted for by the traditional wealth effect associated with the sharp acceleration of real estate values during the second half of the 1990s (Chart 15). However, since 2000 the contribution to growth in consumer spending emanating from liquified home equity rose steadily to almost 0.3 percentage points in early 2003—the strongest ever recorded. It faded later in the year because the next wave of refinancings that occurred in the summer of 2003 did not drive spending again until the fourth quarter of 2003 and the first quarter of 2004. In addition, the realization of capital gains on housing added another 0.5 percentage point to growth of personal consumption expenditures during the third quarter of 2003.

Chart 14: Housing and Corporate Equity-Related Contributions to Four-Quarter Growth of Personal Consumption Expenditures

Legend:
- Growth in Personal Consumption Expenditures
- From Value of Corporate Equities
- From Housing Related Effects

Y-axis: Percentage Points
X-axis: Years (1976, 1979, 1982, 1985, 1988, 1991, 1994, 1997, 2000, 2003)

Source: Macroeconomic Advisors, LLC.
Note: Shaded bars are recessions.

Chart 15: The Components of Housing-Related Contributions to Four-Quarter Growth of Personal Consumption Expenditures

Legend:
- From Real Estate Assets
- From Home Equity Withdraw l
- From Realized Housing Gains

Y-axis: Percentage Points
X-axis: Years (1976, 1979, 1982, 1985, 1988, 1991, 1994, 1997, 2000, 2003)

Source: Macroeconomic Advisors, LLC.
Note: Shaded bars are recessions.

All this occurred as the contribution to growth in personal consumption expenditures emanating from the value of corporate equities fell from 1.8 percentage points in mid-2000 to nearly -1.0 percentage point by the fall of 2003. Hence, there is empirical support for the contention that developments in housing and mortgage markets cushioned consumer spending from the adverse wealth effects that were the legacy of the bursting stock market bubble in early 2000. However, the offset has been only partial. The combined contribution to growth of personal consumption expenditures from the value of corporate equities and all the housing-related effects fell from over two percentage points in 2000 to roughly zero during much of 2003.

Over the past several years, housing-related effects on personal consumption expenditures have been driven by the combination of rapidly rising home prices, which generated traditional wealth effects, and historically low mortgage rates, which encouraged the refinancing of mortgage debt that gave rise to record liquidations of home equity. The impact of housing wealth effects on future spending will depend on the course of home prices and interest rates. The recent period, seen in historical perspective, is unusual. While it is common for home prices to increase in the aggregate at the national level, giving rise to traditional housing wealth effects, the heady pace of cash-out refinancings and home equity borrowing are likely attributable to the combination of sharp declines in interest rates and rapidly rising house prices. Therefore, liquidity effects make a much smaller contribution to personal consumption expenditures during more typical periods.

Conclusions

Long-run housing and corporate equity wealth effects are comparable. This result is consistent with theory. Although the older average age and lower average income of homeowners relative to stock owners argue for a slightly higher wealth effect for homes than stocks, there is little in the theory that would suggest there should be the kind of large differences reported in other studies.

Wealth effects of real estate plainly ramp up to their long-run effects much faster than the wealth effects resulting from gains in corporate equities. The likely reason is the lower volatility of home values than stock values. Households feel more confident of gains in housing wealth and thus spend more readily and quickly when they occur. This is consistent with findings that the wealth effects arising from gains in volatile technology stocks take longer to reach their long-run impacts than wealth effects from other types of stocks (Edison and Slok 2001).

Wealth effects from home equity withdrawals and realized gains occur even more quickly but fade without producing lasting impacts on long-run consumption. During periods when withdrawals peak and gains surge, these effects can contribute materially to consumer spending. The period from 2001-2003 is such an example. Interest rate reductions spurred record amounts of cash-out refinancings and helped keep homebuyers in the market despite weakened consumer confidence and job losses. These rate cuts also combined with productivity gains (which kept personal income per capita growing despite the recession) to drive gains in aggregate housing wealth. When the impact of traditional wealth effects from home value gains are summed with the short-term stimulus provided by realized capital gains and home equity withdrawals, housing contributed more than one quarter of the gains in personal consumption during each of those years. About half of that boost was attributable to equity withdrawals and realized capital gains on housing, confirming that housing did indeed prop up the economy.

Taken together, these findings suggest that expansionary monetary policy at the first signs of weakness after an economic expansion can give the economy a significant lift under the right circumstances. Falling rates spark refinancings and home sales. These in turn trigger a spurt of consumer spending in the short run. Conversely, tightening can slow home sales and reduce home equity borrowing. These in turn quickly act as drags on consumer spending and slow economic growth. Given that consumer spending amounts to about two thirds of total economic activity, monetary policy that contributes to it by stimulating short-term spending in response to

greater realized capital gains, higher property values, and accelerated liquidation of home equity can make the difference during periods of economic weakness between a steep recession and a soft landing.

Appendix 1: Housing Wealth Data

This appendix describes the datasets used to measure housing wealth. There are four primary sources of information; three are based on household surveys and the fourth is based on a variety of industry and other data inputs. The three household surveys that measure wealth are the Survey of Consumer Finance (SCF), the Survey of Income and Program Participation (SIPP), and the Panel Study of Income Dynamics (PSID). The fourth, the Flow of Funds, is not based on a household survey.

Each of the three household surveys contains detailed demographic information that allows the distribution of wealth among households to be observed directly. Of the three household surveys, the SCF asks the most detailed questions about household balance sheets. It is also the only one of the three household surveys to over-sample for wealthier households. In the SCF corporate equities held by households in mutual funds, defined contribution (401k and 403b) retirement accounts, IRAs and Keoghs, and other managed assets are imputed for each household based on their responses to questions about those investments. However, no effort is made to impute implicit stock holdings associated with household interests in defined benefit pension plans.

The SCF is generally viewed as the best dataset to examine wealth holdings of individual households (Holloway (1991)). Nonetheless, it is not without its drawbacks. The primary disadvantages of the SCF are that it is based on a relatively small sample of about 4,500 households and its aggregate wealth totals do not match those used in the Flow of Funds. The survey, which is done every three years, typically underestimates household wealth, but the 2001 survey overestimated it. Respondents to the 2001 survey grossly overestimated their stock-related wealth. While market indices showed a modest decline between 1998 and 2001, as did the Flow of Funds, the SCF showed dramatic growth. The likely reason for the discrepancy is that households failed in the early days of the stock slide to track the extent to which their wealth had fallen. As a result, estimates of home equity as a share of total wealth in 2001 understate its true share relative to stocks. Thus, the SCF supplies conservative estimates of the importance of home equity to household balance sheets that year.

The PSID and SIPP both have the advantage of being panel datasets: wealth of individual households can be tracked over time. In principal, these datasets could be used to trace the importance of home equity to individual households and to compare how households with

similar characteristics that rented and invested elsewhere did over comparable holding periods. However, these datasets have not been used extensively for this purpose.[17] Furthermore, SIPP is designed to track households that have participated in federal programs. Therefore, it over-samples low-income households, and hence does a poor job of measuring wealth across the full income distribution. The PSID, on the other hand, uses a representative sample. By not over-sampling the wealthy, it reduces the chances that a statistically significant number of them will be interviewed.

The PSID is conducted by the Survey Research Center at the University of Michigan. Begun in 1968, the survey was conducted annually until 1997 after which it was conducted biennially. The sample size grows organically with the families initially sampled. It has grown from 4,800 families in 1968 to more than 7,000 families in 2001. Supplemental information on household wealth has only been collected intermittently. Household wealth information was collected in 1984, 1989, 1994, 1999, 2001 and 2003. Furthermore, only a handful of questions about wealth are asked. However, they are sufficient to estimate net wealth, stock wealth, home equity, and housing value at the household level.

The Census Bureau has administered the SIPP since 1984. As its name indicates, SIPP is used to track entry into and exit from participation in various federal social programs. Although it is a longitudinal survey, almost every year a new panel is introduced and the same households are interviewed every four months over a period of 2 1/2 to four years. Therefore, it lacks long-term measurements over a core group of respondents that the PSID contains. It has a sample size ranging from 14,000 to 36,000 households. Wealth questions in this survey are also extensive but not as detailed as in the SCF.

The Flow of Funds presents information on stocks and flows of assets and debt. Estimates reported in the Flow of Funds are carefully constructed by the staff of the Board of Governors of the Federal Reserve. They are generally considered the most reliable estimates of aggregate wealth and debt trends. Nevertheless, because the household sector is calculated as a residual after other sector holdings are subtracted from account line totals, household estimates are still subject to measurement error. One complication associated with using the Flow of Funds

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[17] Though not used extensively to examine home equity, several papers and books have drawn on these datasets to do so. For SIPP, these include Oliver and Shapiro (1997). For PSID, these include Erik Hurst et al. (1998), Flavin and Yamashita (1998), Quigley (2001) and Charles and Hurst (2002).

data to examine household stock wealth is it only reports on corporate equities that are directly held by households. Corporate equities owned as part of stock or stock/bond mutual funds are not separable from household mutual fund totals. Corporate equities held on behalf of individuals by defined benefit retirement plans also are not broken out from overall plan assets. A final limitation of the data set is that it contains aggregate estimates only. Therefore, it has no value for examining the distribution of wealth among households.

A number of other surveys contain valuable information for an investigation of the wealth effects of housing or the impact of home sales on spending. One is the Consumer Expenditure Survey, which can be used to examine the spending patterns of homebuyers after they move and before they sell a home. The survey is conducted by the Bureau of Labor Statistics and used to construct the Consumer Price Index. It contains few wealth variables.

Another useful data source is the American Housing Survey (AHS). This is the nation's principal source of detailed housing information and is conducted by the Census Bureau on behalf of the U.S. Department of Housing and Urban Development. Its sample of homeowners numbers about 30,000. Begun in 1973, conducted annually until 1983 and biennially thereafter, the AHS contains information on remodeling expenditures, mortgage debt, and home equity borrowing of homeowners. Thus, the remodeling spending of owners who tapped into home equity can be compared to the spending of owners who did not. It also contains information that allows the remodeling spending of recent trade-up homebuyers who may have realized capital gains on a prior sale to be compared to the spending of other owners.

Other useful sources of information on home equity withdrawals are the surveys that have been commissioned periodically since the mid-1970s by the Federal Reserve Board on refinancing activity and home equity borrowing. The most recent survey was conducted in June 2002 and contains information on the nature of refinance activity and the reported use of home equity extracted in the process. The sample size of these surveys is generally less than 2,000. Finally, the National Association of REALTORS® Homeowners Survey of 2001 queried 500 homeowners as to whether they had ever realized capital gains on the sale of a home and, if so, how they used them. It is the only household survey that has looked at the disposition of realized capital gains.

<u>Appendix 2: Data Considerations and Model Specifications</u>

  The specific housing variables introduced into the models of consumer spending estimated for this report are described below as are the models themselves. Additional information on data issues and precise definitions of all the variables used in the models are contained in Macroeconomics Advisers *Special Analysis on Equity Wealth, Housing Wealth, and Personal Consumption Expenditures* (2004) available at www.macroadvisers.com.

Variable Construction and Implications

  Several aspects of the data we use to estimate wealth effects are worth highlighting. First, we constructed our own service and durable goods measures of consumption from the information contained in the National Income and Product Accounts (NIPA) and Flow of Funds. This is accomplished by excluding durable goods from personal consumption expenditures and including the imputed flow of services derived from the stock of durable goods. The latter is the durable goods consumption measure. It has two components: the real return on the stock of durable goods at the beginning of the period, and the depreciation of that stock. The change in the stock of durable goods over the period is the difference between personal consumption expenditures on durable goods and depreciation of the stock of durable goods held at the beginning of the period.

  Second, we took our measures of housing and corporate wealth held by consumers from the Flow of Funds accounts. In both cases, we used assets held by households, nonprofit institutions, and personal trusts as the definition of assets held by households because quarterly data are not broken out separately in the Flow of Funds. We used corporate equities owned both directly and indirectly in mutual funds, pension and life insurance reserves, and personal trusts at banks.

  Third, we constructed a proxy for home equity withdrawals. This variable is the net change in the value of all household's mortgage debt over the period less households' expenditures on new residential construction. Hence, home equity withdrawals represent the flow of net new funds borrowed in the mortgage market that are not invested in housing and so could be used to support consumer expenditures.

  Finally, we constructed a proxy for capital gains realized upon the sale of homes. To do this, we multiplied existing home sales reported by the National Association of REALTORS®

by the inflation-adjusted appreciation of home prices over the average of seven years we assumed that owners remain in the same residence.

Methods and Models

We used an error correction approach to model both service consumption and durable goods spending. The results of the models were combined to estimate the impact of housing-related variables and stock wealth on personal consumption expenditures. The detailed model specifications follow. The glossary of the short hand notation used to signify variables and coefficients in the model is included at the end of this section.

Consumption

We began by estimating equations that co-integrate consumption with its fundamental determinants. Such equations can be thought of as identifying the "long-run" or "desired" level of consumption, while deviations of actual consumption from the desired level are then viewed as dynamical responses to random shocks or to perturbations in variables that have only temporary impacts on consumer spending. The basic specification of the long-run relationship is:

$$\textbf{Equation 1. Basic Specifications of the Long Run Consumption Function}$$

$$\frac{CON_t - YTRANS_t}{zyl_tYLABOR_t} = a + b \; \frac{zw_tYASSET_t}{zyl_tYLABOR_t} + c \; \frac{zw_tWE_t}{zyl_tYLABOR_t} + d \; \frac{zw_t(WH_t + WO_t)}{zyl_tYLABOR_t}$$

Some features of the model are worth pointing out. First, the equation has been normalized through division by after-tax labor income[18] in order to reduce the potential for heteroscedasticity in the residuals. This means that the intercept term in the equation (i.e., the coefficient a) is interpreted as the marginal propensity to consume (MPC) out of labor income. Second, labor income is everywhere pre-multiplied by zyl_t. This variable has a mean unitary value in the regression sample but is designed to adjust the MPC out of labor income for changes

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[18] Nominal pre-tax labor income is wages and salaries, fringe benefits (i.e., employers' pension and insurance contributions), and unemployment benefits; the latter are included here (rather than in transfer income) to reduce the cyclical variability of labor income. Taxes on labor income are assumed to move proportionately with all personal income taxes. Real after-tax labor income is computed though deflation by the chain-type price index for consumption.

through time in the age-distribution of the population.[19] Third, the MPC on transfer payments[20] is constrained to unity. When freely estimated, this coefficient was not well defined and, in many experiments, assumed values implausibly larger than unity. To circumvent the problem, a unitary value was imposed.[21] Fourth, real asset income, $YASSET_t$, is included in the equation. The rationale for its inclusion is that an underlying utility function would suggest the MPC out of wealth is a function of the rate of return. A linearization of that relationship implies an empirical specification in which wealth appears with a fixed coefficient but asset income (which is the product of wealth and the rate of return) is also included; a positive coefficient on asset income implies a low value of the inter-temporal elasticity of substitution. Fifth, real household net worth is divided into three components: the value of corporate equities, WE_t,[22] whether held directly or indirectly; the value of all owner-occupied real estate assets, WH_t; and a residual or "other" component, WO_t.[23]

Initially housing and "other" wealth was assumed to have a common MPC that can differ from the MPC out of corporate equities. Key results are summarized in column (a) through (c) in Equation 2. The time period over which the model was estimated runs from the third quarter of 1960 through the third quarter of 2003. Standard errors are in parentheses. The estimation assumed no deterministic trend in the co-integrating relationship.

One cannot reject the hypothesis of a common long-run MPC out of all forms of wealth

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[19] This was computed by using fixed life-cycle profiles of the MPC out of labor income and the relative age distribution of labor income, and then normalized to a mean value of unity during the regression sample. A similar approach was used to adjust the MPCs out of wealth for the shifting age of the population. For additional details see Prakken, (1980).

[20] Real transfer income is nominal personal transfer payments other than unemployment benefits deflated by the chain-type price index for consumption.

[21] It has long been recognized that the MPC out of transfer income might exceed unity. For example, Brayton and Mauskopf (1985) wrote "…if it is assumed that transfer income is expected to remain constant only for those currently receiving it, and that those without current transfer income expect to receive some in the future, the theoretical MPC out of aggregate transfer income is greater than one."

[22] In early experiments we decomposed corporate equities into those directly held by households and the rest indirectly held in retirement plans and personal trusts. At issue is whether there is a differential effect arising from direct ownership; the LCH suggests there shouldn't be. These two series proved so co-linear that it proved impossible to disentangle separate effects, and we abandoned the effort.

[23] In yet another set of initial regressions, we decomposed the value of real estate assets into homeowners' equity and mortgage debt; again, the issue is whether there is a differential effect arising from direct ownership of real estate. We also experimented with consolidating the indirectly owned portion into the "other" or residual component of wealth. Some of these regressions did suggest a stronger and faster response of consumption to the indirectly held portion of housing wealth. While admittedly lacking good information on the relative ages of the direct and indirect owners of real estate, we nevertheless found this result to be counterintuitive. In addition, it was only marginally significant in our full sample and not robust across different, shorter samples. In the end, we decided the best specification included total real estate assets, with no attempt at distinguishing between forms of ownership.

— just as suggested by stylized theory.[24] Column (b) shows the co-integrating equation with that restriction applied. The estimated common MPC out of wealth is 0.056 while the MPC out of asset income rises to 0.244 and becomes marginally significant. The MPC out of labor income remains just below 70 cents. Finally, column (c) shows the results of including in the relationship both real home equity withdrawals and our proxy for realized housing gains; because the history of housing gains is relatively short, in this instance the sample had to be shortened to begin at the first quarter of 1973. These variables, reflecting housing market liquidity, prove insignificant in the co-integrating relationship. Furthermore, their presence renders nonsensical the implied MPCs on labor and asset income. We accept this as evidence that housing-related liquidity has no long-run impact on consumption.

Equation 2. Co-Integrating Equations for Life-Cycle Model of Consumption			
Variable	(a)	(b)	(c)
$CON_t - YTRANS_t$ $zyl_tYLABOR_t$	1.000	1.000	1.000
CONSTANT	-0.695 (0.108)	-0.675 (0.041)	2.447 (9.090)
$zw_tYASSET_t / (zyl_tYLABOR_t)$	-0.147 (0.322)	-0.244 (0.129)	-8.263 (23.060)
$zw_tWE_t / (zyl_tYLABOR_t)$	-0.051 (0.007)		
$zw_t (WH_t + WO_t) / (zyl_tYLABOR_t)$	-0.058 (0.035)		
$zw_tW_t / (zyl_tYLABOR_t)$		-0.056 (0.007)	-0.027 (0.097)
$NEW_t / (zyl_tYLABOR_t)$			19.500 (56.930)
$HCG_t / (zyl_tYLABOR_t)$			-26.450 (77.290)
Sample	1960.3-2003.3	1960.3-2003.3	1973.1-2003.3

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[24] The weighted-average long-run MPC across all three components of wealth is 0.055.

After considering initial results of co-integrating equations, we settled on the following formulation of the long-run "desired" level of consumption, CON_t^*. When normalized, it becomes:

Equation 3. Chosen Long Run Consumption Function

$$CON_t^* = 0.675zyl_tYLABOR_t + 0.244zw_tYASSET_t + YTRANS_t + 0.056zw_tW_t$$

Deviations of actual consumption away from the desired level can be thought of as arising from the short-run response of consumption to either random shocks or to changes in variables that have only transitory effects on consumer spending. Following such perturbations, however, consumption should tend to gravitate back towards the long-run level. Such dynamics can be captured in an "error correction model", our initial estimate of which is shown in the results accompanying Equation 4.

In Equation 4, F is the filter $F(X_t) = \Delta X_t - 0.0081X_{t-1}$ and 0.0081 is the estimated trend quarterly growth of consumption; that is, when X_t grows at the trend rate of consumption, $F(X_t) = 0$. Hence, if labor income and wealth are growing at this common trend, and lagged actual consumption equals lagged desired consumption, then actual consumption also grows at trend.

Equation 4. Error Correction Model for Consumption: No Housing Liquidity Effects

$$F(CON_t) = -0.068\ (CON_{t-1} - CON_{t-1}^*) + 0.271\ F(zyl_tYLABOR_t)$$
$$\quad\quad (0.020) \quad\quad\quad\quad\quad\quad (0.066)$$

$$+\ 0.009\ F(zw_t\,WE_t) + 0.042\ F(zw_t\,WH_t + zw_t\,WO_t) + \varepsilon_t$$
$$\quad (0.002) \quad\quad\quad\quad (0.012)$$

Sample: 1960.3 - 2003.3 $R^2 = 0.374$ Durbin-Watson = 2.04

Otherwise, deviations of consumption from the trend rate reflect the partial elimination (at 0.068 per quarter) of any inherited difference between actual and desired consumption as well as unusual perturbations to labor income and wealth.

The presence of perturbations of income and wealth in Equation 4 allows for the possibility of differential dynamical responses of consumption to those fundamental determinants. That these perturbations are statistically significant, and also significantly different from each other, suggests that the differential dynamics are indeed important. In particular, the equation implies that consumption responds considerably faster to a change in housing wealth than to a change in the value of corporate equities. The long-run response in each case is the common 5.6 cents estimated in the co-integrating equation. However, in the case of housing wealth, 80% of that response (or roughly 4.5 cents) occurs within a year, whereas in the case of corporate equities, that same response takes about five years. These results support the earlier hypothesis that consumers appreciate the volatile nature of corporate equity wealth, and so are cautious about making changes in life-style based on near-term movements in stock prices that could well prove unsustainable.

While housing liquidity appears not to have a long-run impact on consumption, perturbations in such liquidity could have a transitory effect on spending. To test for this, the dynamical Equation 4 was expanded to include perturbations in home equity withdrawal and the current and lagged values of our proxy for realized housing gains. The results are shown in Equation 5. The terms in liquidity are positive and significant, implying a transitory relationship between perturbations in housing-related liquidity and consumption. Note, however, that these terms compete with perturbations in the non-equity component of wealth, reducing the coefficient on the latter from 0.042 in Equation 4 to 0.023 here. Intuitively, this result is easy to grasp. Home equity withdrawal and realized housing gains are driven importantly by rising house prices, just as are changes in the value of real estate assets. Little surprise then, that the equation has some difficulty untangling the separate dynamical effects. Still, Equation 5 fits the data more closely than Equation 4, and we're inclined to prefer it.

Equation 5. Error Correction Model for Consumption: With Housing Liquidity Effects

$$F(CON_t) = -0.089 \; (CON_{t-1} - CON^*_{t-1}) + 0.265 \; F(zyl_t YLABOR_t)$$
$$\quad\quad\quad\; (0.019) \quad\quad\quad\quad\quad\quad\quad\quad (0.064)$$

$$+ \; 0.008 \; F(zw_t WE_t) + 0.023 \; F(zw_t WH_t + zw_t WO_t)$$
$$\quad (0.002) \quad\quad\quad\quad\quad (0.012)$$

$$+ \; 0.046 \; F(NEW_t) + 0.385 \; F(HCG_t) + 0.240 \; F(HCG_{t-1})$$
$$\quad (0.023) \quad\quad\quad\quad (0.118) \quad\quad\quad\quad (0.130)$$

Sample: 1973.3 - 2003.3 $R^2 = 0.458$ Durbin-Watson = 2.06

The contributions to growth of consumption emanating from the value of corporate equities can be solved analytically from Equation 5 as Equation 6:

Equation 6. Contribution of Corporate Equities to Growth of Consumption

$$g_t(CON,WE) = \sum_{n\geq0} \left\{ (1 - 0.089 + 0.0081)^n \left(0.089 \cdot 0.056 \; \frac{\Delta WE_{t-n}}{CON_{t-1}} + 0.008 \; \frac{\Delta WE_{t-n}}{CON_{t-1}} \right) \right\}$$

A useful empirical value for Equation 6 can be computed by defining n as a finite number large enough to reduce to a tolerable degree any error in a dynamic initialization of g_t in the distant past. Corresponding contributions can be derived for the other variables in the equation; in addition, the calculation can be modified easily to compute contributions to the four-quarter growth of consumption. We find this calculation preferable because it smoothes out some of the quarterly volatility in the numbers. Note that the resulting calculations can be arithmetically summed towards an explanation of the predicted growth of consumption.

Expenditures on Durable Goods

We began by estimating a co-integrating equation for the stock of durable goods in terms of disposable income, the rental equivalent price of durables, and equity wealth. Other components of wealth proved statistically insignificant and so were excluded from the specification. However, unlike the case of consumption, here the levels of both home equity withdrawal and realized housing gains proved highly significant, and so were kept in the final

co-integrating equation. These appear linearly (rather than in logs) because both take on negative values during the sample period, which runs from the second quarter of 1973 through the third quarter of 2003. The final results are shown in Equation 7 (standard errors in parentheses).

Equation 7. Co-integrating Equation for the Stock of Consumer's Durable Goods

$$\ln(KCD_t) - 1.25 \ln(YPD_t) + 0.124 \ln(RCD_t) - 0.097 \ln(WE_t)$$
$$\quad\quad (0.034) \quad\quad\quad (0.032) \quad\quad\quad (0.013)$$

$$- 0.000488 NEW_t - 0.000315 HCG_t + 4.146$$
$$\quad (0.00006) \quad\quad (0.00008) \quad\quad (0.00551)$$

Sample: 1973.2 - 2003.3

Next we estimated an error correction model for the stock of durables. These results are shown in Equation 8. The equation implies that roughly 11 percent of any inherited deviation of the actual stock from the desired level is eliminated every quarter.

Equation 8. Error Correction Model For Stock of Consumer's Durable Goods

$$\Delta \ln(KCDt) \approx 0.25 (ECDt / KCDt\text{-}1 - \delta_t) = -0.111 \ln(KCDt\text{-}1) / KCD^*t\text{-}1)$$
$$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (0.008)$$

$$+0.0000253 \Delta NEW_t + 0.0000925 \Delta HCG_t + 0.012$$
$$\quad (0.00000678) \quad\quad\quad (0.\,0000324) \quad\quad\quad (0.000358)$$

Sample: 1973.2 - 2003.3 R^2=0.616   Durbin- Watson = 1.454

It is useful to compute the respective contributions of equity wealth and housing-related liquidity to growth in expenditures on durable goods. This proceeds in two steps. Begin by noting that Equations 7 and 8 together imply that the relationship between the level of the end-of-period stock of durable goods and current and past values of equity wealth can be represented as:

**Equation 9. Contribution of Corporate Equities to
End-of-Period Stock of Durable Goods**

$$\ln KCD_t \;=\; A_t + \sum_{n\geq 0}\left\{\,(1 - 0.110704)^n\,(0.110704*0.0966740)\ln WE_{t\text{-}n\text{-}1}\right\}$$

The term At encompasses all other factors, i.e., income, the rental price, and housing-market liquidity. From Equation 9 it follows that the contribution of corporate equity to the growth in the stock of durable goods is approximately:

**Equation 10. Contribution of Corporate Equities to
Growth in the Stock of Durable Goods**

$$g_t(KCD,WE) \approx \sum_{n\geq 0}\left\{\,(1 - 0.110704)^n\,(0.110704*0.0966740)\Delta\ln WE_{t\text{-}n\text{-}1}\right\}$$

It can be shown that the contribution of corporate equity to the growth of expenditures is approximately:

Equation 11. Contribution of Corporate Equities to growth in Expenditures

$$g_t(ECD,WE) \approx g_t(KCD,WE)\ \frac{KCD_{t\text{-}1}}{ECD_{t\text{-}1}}\ (1\text{-}\delta_t)\ g_{t\text{-}1}(KCD,WE)\ \frac{KCD_{t\text{-}2}}{ECD_{t\text{-}1}}$$

Personal Consumption Expenditures

      Popular attention, of course, focuses on personal consumption expenditure (PCE), which, to most people, is what is meant by "consumer spending". Fortunately, it is now easy to combine previous results to compute the contribution to the four-quarter growth of PCE emanating from the various determinants of consumption and expenditures on durable goods. For example, contribution to growth in PCE from the value of corporate equities is given by:

**Equation 12. Contribution of Corporate Equities to
Growth in Personal Consumption Expenditures**

$$g_t(EC,WE) = \left(\frac{CON\$_{t-1}}{EC\$_{t-1}} \right) g_t(CON,WE) + \left(\frac{ECD\$_{t-1}}{EC\$_{t-1}} \right) g_t(ECD,WE) - \left(\frac{CONCD\$_{t-1}}{EC\$_{t-1}} \right) g_{t-1}(KCD,WE)$$

      The right-hand terms in the first row of Equation 12 are the contributions of corporate equity to growth in consumption and to growth in expenditures on durable goods. Each is weighted by its lagged share in nominal PCE. The term in the second line subtracts from the overall calculation the contribution of the value of corporate equities growth in the stock of durable goods, weighted by the lagged share in nominal PCE of the consumption of durable goods. Corresponding calculations can be made for the contributions of housing-related factors to growth in PCE.

Glossary of Terms

CON_t Real consumption, service concept

$CON\$_t$ Nominal consumption, service concept

$CONCD_t$ Real consumption of consumer durable goods

$CONCD\$_t$ Nominal consumption of consumer durable goods

EC_t Real personal consumption expenditures

$EC\$_t$ Nominal personal consumption expenditures

ECD_t Real expenditures on consumer durable goods

$ECD\$_t$ Nominal expenditures on consumer durable goods

HCG_t Proxy for real realized housing capital gains

KCD_t Real stock of durable goods, end of quarter

NEW_t Real net equity withdrawal

RCD_t User cost of consumer durable goods Wt Real household net worth, beginning of quarter

WE_t Real value of corporate equities, beginning of quarter

WH_t Real value of real estate assets, beginning of quarter

WO_t Real value of all other household net worth, beginning of quarter

$YASSET_t$ Real disposable asset income

$YLABOR_t$ Real disposable labor income

YPD_t Real personal disposable income

$YTRANS_t$ Real personal transfer payments

zw_t Demographic adjustment to the marginal propensity to consume out of wealth

zyl_t Demographic adjustment to the marginal propensity to consume out of labor income

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