

October 2015

Wealth Matters (A Lot)

BY MARK ZANDI, BRIAN POI AND SCOTT HOYT

Abstract

U.S. consumers are once again driving the economic train. They aren't spending with the abandon displayed prior to the Great Recession, but they are doing more than their part to power the economy's growth.

A better job market, record low debt burdens, lower gasoline prices, and cheap and more available credit are all helping. Not as well appreciated is how important the bull market in stocks and rebound in house prices have been to the revival of the American consumer.

This study, based on new data on consumer spending and household financial and housing wealth across states and metropolitan areas, shows that the so-called wealth effect – the impact on consumer spending of changes in household wealth – has been instrumental to the economy's gains since the recession.

The stock wealth effect has been especially potent since the recession. Housing wealth matters, but about as little as it has in the past quarter century, particularly in areas of the country where house prices have yet to fully recover from the crash. Indeed, for the first time ever, the stock wealth effect is larger than the housing wealth effect.

There are many implications of these results. Most obvious, the wealth effect has been a vital support to the economic recovery, accounting for more than one-fifth of real GDP growth since the recession. This suggests that the Federal Reserve's quantitative easing policy, which served to lift asset prices including stocks and housing, has been highly successful supporting the economy.

The importance of the wealth effect highlights the threat to the economy from the recent correction in the stock market, especially if it presages the start of a bear market. It also highlights the economic upside from continued expected solid gains in house prices, especially as prices rise above their pre-crash peaks in more areas.

Wealth Matters (A Lot)

BY MARK ZANDI, BRIAN POI AND SCOTT HOYT

U.S. consumers are once again driving the economic train. They aren't spending with the abandon displayed prior to the Great Recession, but they are doing more than their part to power the economy's growth.

A better job market, record low debt burdens, lower gasoline prices, and cheap and more available credit are all helping. Not as well appreciated is how important the bull market in stocks and rebound in house prices have been to the revival of the American consumer.

This study, based on new data on consumer spending and household financial and housing wealth across states and metropolitan areas, shows that the so-called wealth effect – the impact on consumer spending of changes in household wealth – has been instrumental to the economy's gains since the recession.

The stock wealth effect has been especially potent since the recession. Housing wealth matters, but about as little as it has in the past quarter century, particularly in areas of the country where house prices have yet to fully recover from the crash. Indeed, for the first time ever, the stock wealth effect is larger than the housing wealth effect.

There are many implications of these results. Most obvious, the wealth effect has been a vital support to the economic recovery, accounting for more than one-fifth of real GDP growth since the recession. This suggests that the Federal Reserve's quantitative easing policy, which served to lift asset prices including stocks and housing, has been highly successful supporting the economy.

The importance of the wealth effect highlights the threat to the economy from the recent correction in the stock market,

especially if it presages the start of a bear market. It also highlights the economic upside from continued expected solid gains in house prices, especially as prices rise above their pre-crash peaks in more areas.

Consumer revival

U.S. consumers are finally spending again with some gusto. Vehicle sales have never been stronger, save for brief periods when auto dealers resorted to aggressive price discounting and easy financing. The airlines are operating at capacity, hotels are full, and restaurants are busy. Real consumer spending is increasing at a consistent annualized pace of more than 3%. This is not comparable to the boom times of the late 1990s, but it is strong by most historical standards.

The quickly improving job market has been critical to the consumer revival. The economy has created nearly 3 million jobs during the past year alone. This is about as good as it gets. Job growth has slowed a bit in recent months primarily because of the slide in oil prices and the resulting job losses in the energy industry, but nearly every other industry is adding strongly to payrolls. And the jobs created today are across all pay scales, unlike earlier in the recovery when most of the jobs created were lower-paying.

The unemployed and underemployed are quickly getting back to work. To absorb the growth in the working-age population, the economy needs to generate about 1.3 million net new jobs each year. The economy will thus soon be at full employment.

Indeed, if the current pace of job growth is sustained, anyone who wants work will have it by summer 2016.

As the economy approaches full employment, long-dormant wage growth should pick up. It is not too surprising that wage growth has barely kept pace with inflation in recent years. There have simply been too many unemployed for workers to have the negotiating power to demand bigger pay increases. However, this is changing. Workers are quitting their jobs at a higher rate, suggesting the labor market is tightening. Businesses should respond soon by raising wages more quickly in an effort to hold on to workers. The stronger pace of wage growth should lift the spirits of consumers, many of whom are still skeptical about the recovery's staying power, and thus their spending.

Households have deleveraged. The proportion of after-tax income households must use to make payments and remain current on their debts has never been lower in the 35 years of available data.¹ This is reflected in nearly pristine credit conditions; auto and credit card delinquency rates are at record lows and mortgage delinquencies are falling quickly. And most households have insulated themselves from higher interest rates by refinancing into long-term fixed-rate mortgages. A record low one-fifth of household debt has an interest rate that adjusts within a year of a change in market rates.

Credit is flowing more freely. Auto credit is notably ample, and credit- and retail-card lending is back to normal. Even home-equity lending has come back to life, as higher

house prices have increased homeowners' equity and lenders are more comfortable extending loans given much-improved credit quality. Originations of household credit, excluding first mortgages, are back to prerecession levels. There is also evidence that it is a bit easier to qualify for a first mortgage loan to purchase a home.

Wealth matters

Consumer spending has also received a big boost from rising household wealth. National house prices are almost back to where they were before they crashed, and stock prices have soared since their recession lows, the recent correction notwithstanding.² Combined with lower debt loads, this has caused household net worth—the difference between what households own and owe—to surge. Net worth is close to a record 6.4 times household disposable income (see Chart 1).

Since the impact of changes in household wealth on consumer spending cannot be observed directly but must be estimated econometrically, just how much the increase in wealth has boosted spending is a matter of much debate. Most estimates of this wealth effect are relatively small; somewhere between 1 and 5 cents. That is, for every \$1 change in household wealth, consumer spending changes by less than a nickel over a period of up to two years. Most studies have found the stock wealth effect to be no more than a couple of pennies and the housing wealth effect to be about a nickel.

Of course, given that stock wealth has risen by \$12 trillion since its recession bottom and housing wealth has risen by almost \$6 trillion since its nadir, even a wealth effect of a few pennies can add up to lots of additional consumer spending. Indeed, a simple back-of-the-envelope calculation assuming the wealth effect across stocks and housing is 2 cents would suggest that the increase in household wealth during the recovery has lifted real GDP growth by approximately 25 basis points per annum.

While that is consequential, this study strongly suggests that the wealth effect is even larger. This is primarily because the stock wealth effect has become much more

potent on this side of the Great Recession, and although the housing wealth effect has faded in importance, the total wealth effect is larger than conventional wisdom holds.

The importance of the wealth effect has not been fully recognized, likely in part because the personal saving rate has not fallen all that much since the recession. A positive wealth effect means that wealthier households are spending more out of their current income, or saving less. The saving rate has declined from close to 6% during the recession to 5% more recently, but it ostensibly should have fallen even more if the wealth effect were so potent.

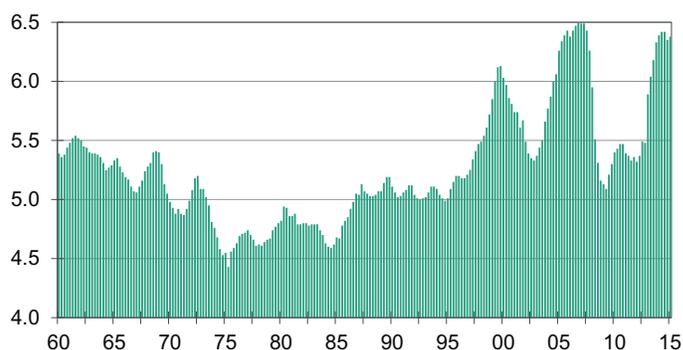
Masking the potency of the wealth effect is that most of the benefit of rising stock (and even housing) wealth has accrued to the very well-off. Those in the top 5% of the income distribution own the bulk of stocks, and they have significantly reduced their saving rate in this recovery as anticipated by a strong wealth effect (see Table 1).³ But the saving rate for all other households, who own much less stock and have been forced to deleverage, has risen. Thus across all households, the savings rate has fallen only modestly. As shown in the table, it is very unusual for the saving behavior of one income group to differ from the other groups.⁴

Consumption function

Given these crosscurrents, the only way to reasonably tease out the size of the wealth effect and how it has changed since the financial crisis is to use econometric analysis. There have been many attempts at this and there is a large academic literature. The Congressional Budget Office (2007) provides a useful survey of this literature with an emphasis on the U.S. experience. Results vary based on the estimation methodology, the time period covered, whether national or state-level

Chart 1: Household Net Worth Surges

Ratio of household net worth to disposable income



Sources: Federal Reserve, BEA, Moody's Analytics

data are used, the country being studied, and other factors.

The approach we have taken in our econometric analysis is most closely related to the state-level analysis in Case, Quigley and Shiller (2001), but we expand their analysis in several dimensions. With more recent data we are able to examine how wealth effects have changed since the Great Recession. We are also able to use more accurate estimates of stock and other household financial wealth at a state and metro level. Our estimates of consumption at a regional level are also more refined given the increased availability of government source data since the Case et al. (2001) analysis.

We follow the majority of wealth effect studies that posit a consumption function that results from a standard life-cycle/permanent income hypothesis model of consumption (see for example, Dvornak and Kohler (2003) for a derivation).⁵ The consumption function takes the form:

$$(1) \quad C_{it} = \beta_0 + \beta_F F_{it} + \beta_H H_{it} + \beta_Y Y_{it} + u_i + \epsilon_{it}$$

where i indexes regions, t indexes time, C_{it} is a measure of consumption, F_{it} is a measure of financial or stock market wealth, H_{it} is a measure of housing wealth, Y_{it} is a measure of personal income or household cash flow, β_0 , β_F , β_H , and β_Y are parameters to be estimated, u_i is a geography-specific unobserved component, and ϵ_{it} is an idiosyncratic error. Consumption, wealth and income all exhibit trends, so

Table 1: Highest-Income Group Has Reduced Its Saving Rate During the Recovery

	Personal saving rate, %				
	Pre-bubbles 1990-94	Stock bubble 1995-99	Housing bubble 2000-07	Great Recession 2008-2009Q2	Recovery 2009Q2-2015Q1
Total population	10.2	7.1	3.0	9.9	8.6
Part of the income distribution:					
Income: 0% - 39.9%	5.7	6.7	3.0	3.8	4.9
Income: 40% - 59.9%	4.6	3.0	-0.3	2.5	5.7
Income: 60% - 79.9%	6.1	3.3	-0.0	2.9	6.5
Income: 80% - 94.9%	10.1	6.4	1.7	7.3	9.8
Income: 95% - 100%	17.5	12.4	6.7	19.2	10.8

	Change in the personal saving rate, ppt			
	1995-99 vs. 1990-94	2000-07 vs. 1995-99	2008-2009Q2 vs. 2000-07	2009Q2-2015Q1 vs. 2008-2009Q2
Total population	-3.0	-4.2	7.0	-1.3
Part of the income distribution:				
Income: 0% - 39.9%	1.0	-3.8	0.8	1.2
Income: 40% - 59.9%	-1.6	-3.3	2.8	3.3
Income: 60% - 79.9%	-2.8	-3.3	3.0	3.5
Income: 80% - 94.9%	-3.7	-4.7	5.6	2.5
Income: 95% - 100%	-5.2	-5.6	12.4	-8.4

Note: A description of the methodology used to construct estimates of the personal saving rate by income is available upon request.

Sources: Federal Reserve, Moody's Analytics

following Case et al. we convert them to log real (inflation-adjusted) per-household variables before estimating the equation.

To estimate this consumption function we use a fixed-effects estimator since we strongly suspect that our measures of wealth and income may be correlated with u_i ; preliminary Hausman-type tests of a fixed- versus random-effects specification supported our suspicion. We compute cluster-robust standard errors that are robust to arbitrary within-panel correlation, including autocorrelation.

Estimating this consumption function to determine the wealth effect requires a significant amount of data that we construct from a wide range of sources. There is a host of measurement issues, particularly at the state and metro level. Wilcox (1992) discusses how, even at the national level, consumption is mismeasured because of sampling error, product classification error, and other factors. More recently, Manski (2014) discusses how survey nonresponse contaminates virtually all official statistics. Given these limitations, we carefully describe the data construction in the discussion that follows.

Measuring consumer spending

We use two measures of consumer spending in this study. The first is personal consumption expenditures at a state level, recently made available from the Bureau of Economic Analysis. Unfortunately, these data are available only at an annual frequency and only from 1997 through 2012.

To overcome these limitations, we also use estimates of retail sales for states and metro areas that we construct by combining the quinquennial Census of Retail Trade, the Advance Monthly Retail Trade and Food Services survey, and data on retail employment. These retail sales estimates are available monthly from 1970 through mid-2015, though we use the data at a quarterly frequency in our analysis.⁶

Nationwide, retail sales account for just under half of personal consumption expenditures. Retail sales include goods and services purchased at retail outlets, while PCE is more comprehensive and includes spending on things such as housing, healthcare, utilities, education and financial services. Retail sales include spending on home improvements, as those purchases are often made at building supply stores.

Since home improvement spending is classified by the BEA as residential investment, it is not included as part of PCE.

The retail sales share of PCE varies significantly across states. In Massachusetts and New York, retail sales are less than 38% of consumption (in 2012), while they represent 55% in Utah and New Hampshire and 57% in Nevada. The PCE data are based on the location of the consumer while the retail sales data are based on the location of the store at which the purchase is made. Thus, states that rely heavily on tourism, such as Nevada, have a higher retail sales share of PCE, as do states with no sales tax, such as New Hampshire.

Measuring financial wealth

Financial wealth at a state and metro level is computed in two ways. First, we have partnered with the IXI Services division of Equifax to use its MarketMix dataset of household financial wealth. IXI collects anonymous account-level data from the nation's largest financial firms through which IXI measures about \$13 trillion in assets and uses these data to project the total \$30 trillion in financial wealth of all U.S. households.

The IXI data are available on a semi-annual basis from the second half of 2008 to the second half of 2014, and are provided at the ZIP code level and for 12 categories of financial assets, including annuities, bonds, mutual funds and money market accounts, stocks, and various types of bank accounts. The data include IRAs, but exclude 401k and 403b accounts and business assets. We aggregated these data to obtain state- and metro-level per-household measures of financial wealth.

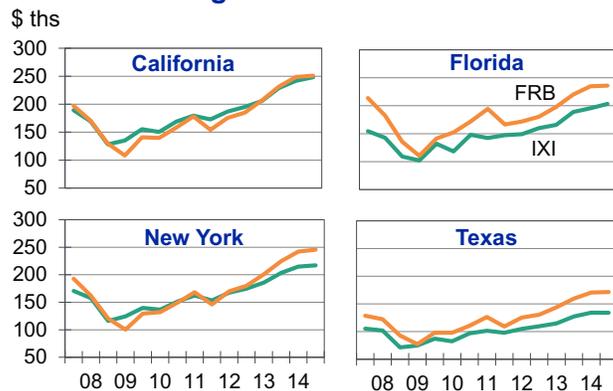
To extend the financial wealth data further back in history, we construct a second measure of financial wealth that combines quarterly state-level and annual metro-level data on income from dividends, interest and rent with national quarterly Federal Reserve Board Financial Accounts data on household stock holdings. We assume that each state's and metro area's share of total stock holdings is equal to that region's share of national income from dividends, interest and rent. Since the metro income data are available only annually, we use the same share for all four quarters in each calendar year for metro data.

Our regional-level measure of stock wealth is imperfect since it assumes the average portfolio in one state has the same composition of stocks, bonds, and income-

producing real estate as the average portfolio in another state. Some regions have more retirees than others, for example, and portfolios in those states may hold proportionally more bonds than other regions. The Federal Reserve reports both the value of equities held directly by households and the value of equities held indirectly by households through mutual funds and similar accounts that are important savings vehicles for many households.

A good check on the accuracy of our financial wealth estimates derived from the Financial Accounts is to compare them with the IXI data that become available beginning in the second half of 2008. The measures are close, particularly for the nation's largest states (see Chart 2). This supports our approach of deriving estimates of state and metro area stockholdings by sharing out national stockholdings available from the Financial Accounts stockholdings using state and metro area data on dividends, interest and rental income.

Chart 2: Average Stock Wealth Per Household



Sources: IXI MarketMix, Federal Reserve, Census Bureau, Moody's Analytics

Measuring housing wealth

Two measures of housing wealth are also used in our analysis. The first measure is simply a proxy for the value of the housing stock derived by the product of house prices and housing stock. Our quarterly house price estimates at the state and metro area level are based on the median sales prices of existing single-family homes from the National Association of Realtors and the Office of Federal Housing Enterprise Oversight repeat sales indexes, and benchmarked to median occupied home values reported in the decennial census. The housing stock data for states and metro areas are provided by the Bureau of Census through 2014.⁷

A second measure of housing wealth is homeowners' equity, which equals the value of the housing stock less the mortgage debt owed by homeowners. First mortgage and home equity debt outstanding is available for states and metro areas on a quarterly basis back to 2005 based on aggregating credit files for all borrowers made available by credit bureau Equifax.⁸ We are unaware of any other studies of the wealth effect that use homeowners' equity in their analysis.

Other data

Personal income is measured by state- and metro-level total personal income as reported by the Bureau of Economic Analysis. All the variables in the consumption function are on a real (after-inflation) per-household basis. The national deflator for personal consumption expenditures is used to put everything on a real basis, and we

Table 2: Wealth Effect Based on Financial Accounts, Value of Housing Stock, States

Lagged consumption	Simple model		State-specific time trends	
	Pre-2008	Post-2007	Pre-2008	Post-2007
Stock wealth	0.030 (2.59)	0.116 (15.19)	0.039 (3.90)	0.139 (24.99)
Value of housing stock	0.081 (5.49)	0.041 (3.24)	0.120 (6.89)	0.022 (1.75)
Income	0.625 (10.37)	0.562 (11.59)	0.783 (10.13)	0.793 (12.55)
Constant	2.061 (4.32)	2.221 (3.98)	-0.152 (-0.24)	-0.232 (-0.36)
N	5508	1428	5508	1428
Within-state R2	89.5%	72.4%	93.4%	84.0%

The pre-2008 sample spans 1980Q1 through 2007Q4.

The post-2007 sample spans 2008Q1 through 2014Q4.

All specifications have 51 panels (including Washington DC).

T-statistics are in parentheses and are robust to arbitrary within-state correlation.

All variables are in log real per-household units.

Source: Moody's Analytics

Table 3: Wealth Effect Based on Financial Accounts, Value of Housing Stock, Metro Areas

Lagged consumption	Simple model		Metro-specific time trends	
	Pre-2008	Post-2007	Pre-2008	Post-2007
Stock wealth	0.016 (4.26)	0.117 (22.46)	0.036 (10.90)	0.140 (53.20)
Value of housing stock	0.092 (9.91)	0.051 (6.08)	0.126 (14.79)	0.053 (6.52)
Income	0.523 (14.03)	0.591 (7.41)	0.119 (3.07)	0.603 (12.76)
Constant	8.851 (24.68)	7.341 (8.13)	12.704 (28.34)	7.023 (14.03)
N	12448	10500	12448	10500
Within-metro R2	48.8%	60.2%	84.0%	77.5%

The pre-2008 sample spans 2000Q1 through 2007Q4.

The post-2007 sample spans 2008Q1 through 2014Q3.

All specifications have 389 metropolitan areas (panels).

T statistics are in parentheses and are robust to arbitrary within-state correlation.

All variables are in log real per-household units.

Source: Moody's Analytics

use estimates of the number of households within each state and metro area that we construct based on various data available from the Census Bureau.

Wealth effect using Fed's Financial Accounts

The first consumption function we estimate is based on retail sales, stock wealth estimated using the Fed's Financial Accounts, and housing wealth as measured by the value of the housing stock.

The first column of Table 2 contains our parameter estimates of the consumption function using state-level data from the first quarter of 1980 through the fourth quarter of 2007 prior to the financial crisis and Great Recession, and the second contains the estimates using data from the first quarter of 2008 through the fourth quarter of 2014 after the crisis had struck.

Because all of our variables are in logarithms, the coefficients can be interpreted as elasticities. Prior to 2008 when the financial crisis struck, the elasticity of stock market wealth was relatively low at 3 cents, but statistically significant and in line with results in Case et al. and other studies. The elasticity of housing wealth was much higher at 8.1 cents, and also in line with the existing literature.

However, the estimated wealth effects change dramatically after the financial crisis. The stock wealth effect increases to a very large 11.6 cents, about four times as large as it was before the crisis. Conversely, the housing wealth effect is cut in half to only 4.1 cents.⁹

As a robustness check of these results we included state-specific time trends to account for rising living standards and per-household consumption over time.

Making the time trends state specific allows us to control for changes in demographics and other characteristics that might affect some states more than others. Those results are in columns 3 and 4 of Table 2. The elasticities of stock market wealth are little changed from those of the simpler model; the estimates based on the post-2007 sample are

again four times as high. With this specification, the estimated wealth effect from housing falls from 12 to 2.2 cents as we switch from the pre- and post-crisis periods.

The consumption function estimated with metro-level data is very similar, providing even greater confidence in the conclusion that the stock and housing wealth effects have traded places since the financial crisis (see Table 3).

Wealth effects on retail sales vs. PCE

The wealth effects on retail sales are expected to be larger than for personal consumption expenditures. The empirical results, while limited, confirm this. Estimating the consumption function based on state-level PCE data available from the BEA on an annual basis from 2007-2012 results in stock and housing wealth effects that are approximately half as large as they are for retail sales. The stock wealth effect is 5.3 cents and the housing wealth effect is 2.1 cents (see Table 4). Given the limited availability of the PCE data, the estimation results in the rest of this paper are based on retail sales.

Wealth effects using IXI financial wealth data

Tables 5 and 6 show the estimated wealth effects when we use the IXI-based measures of financial wealth for state and metro areas, respectively, for the post-crisis

Table 4: PCE Wealth Effect Based on Financial Accounts, Value of Housing Stock, States
Annual data, 2008-2012

Stock wealth	0.053 (5.03)
Value of housing stock	0.021 (1.85)
Income	0.516 (9.76)
Constant	4.551 (8.33)
N	255
Within-state R2	80.5%

T-statistics are in parentheses and are robust to arbitrary within-state correlation. All variables are in log real per-household units.

Source: Moody's Analytics

period. The results are similar to those using the Fed's Financial Accounts whether we consider financial wealth broadly, including stocks, bonds and mutual funds, or just stocks. The financial wealth effects are generally at least twice as large as the housing wealth effects, which in these regressions are measured using the value of the housing stock.

Value of housing stock vs. homeowners' equity

To test whether the estimated housing wealth effects differ depending on whether they are measured by the value of the housing stock or homeowners' equity, the previous IXI-based regression is re-estimated using homeowners' equity.

As shown in Tables 7 and 8 for state and metro areas, respectively, using homeowners' equity rather than the value of the housing stock cuts the housing wealth effect in half. At the state level, the housing wealth effect in the post-crisis period declines from 5.4 cents using the value of the housing stock to 2.6 cents when using homeowners' equity.

Although not shown, this is true whether we consider the period before the financial crisis or the one after it and whether we use the IXI or Fed's Financial Accounts data to measure financial wealth. Estimates of financial wealth effects remain large post-crisis, though they are a penny or so lower at the state level when we use homeowners' equity rather than the value of the housing stock.

It seems more appropriate to measure housing wealth using homeowners' equity rather than the value of the housing stock when considering the impact of changes in housing wealth on consumption. Consider that a homeowner could increase the value of her home by doing a kitchen renovation financed with a home equity loan. Is the homeowner any wealthier? Probably not, given that homeowners generally will not recoup the full cost of a home improvement.

Wealth effects vary

Our results strongly point to a role reversal between financial and housing wealth effects after the financial crisis. Prior to the Great Recession, housing wealth played a much

Table 5: Wealth Effects Based on IXI, Value of Housing Stock, States

	Financial	Total equities	Direct equities	Mutual funds
Stock wealth	0.135 (11.49)	0.119 (11.74)	0.105 (12.26)	0.127 (10.80)
Value of housing stock	0.054 (3.96)	0.055 (4.19)	0.045 (3.35)	0.065 (4.97)
Income	0.716 (12.33)	0.700 (12.62)	0.707 (14.83)	0.709 (10.87)
Constant	0.077 (0.12)	0.445 (0.72)	0.738 (1.34)	0.197 (0.28)
N	714	714	714	714
Within-state R2	73.2%	73.6%	74.3%	72.6%

The sample spans 2008H1 through 2014H2 (14 periods).
All specifications have 51 panels (including Washington DC).
T statistics are in parentheses and are robust to arbitrary within-state correlation.
All variables are in log real per-household units.

Source: Moody's Analytics

Table 6: Wealth Effects Based on IXI, Value of the Housing Stock, Metro Areas

	Financial	Total equities	Direct equities	Mutual funds
Stock wealth	0.107 (12.79)	0.100 (13.30)	0.093 (13.36)	0.101 (12.93)
Value of the housing stock	0.052 (5.73)	0.054 (5.95)	0.048 (5.28)	0.058 (6.35)
Income	0.761 (8.73)	0.747 (8.38)	0.747 (8.00)	0.755 (9.01)
Constant	5.489 (5.78)	5.731 (5.86)	5.951 (5.74)	5.630 (6.14)
N	5248	5248	5248	5248
Within-metro R2	58.5%	59.3%	60.2%	58.1%

The sample spans 2008H1 through 2014H2 (14 periods).
All specifications have 375 metropolitan areas (panels).
T statistics are in parentheses and are robust to arbitrary within-metro correlation.
All variables are in log real per-household units.

Source: Moody's Analytics

greater role in determining consumption than financial wealth. Since the Great Recession, the role of housing wealth has diminished by more than half, whereas the role of financial wealth has more than doubled in most of our regressions.

One reasonable criticism is that our division of the data into pre- and post-crisis periods using the end of 2007 as our cutoff is arbitrary. House prices peaked in early 2006, while the full brunt of the financial

crisis did not strike until mid-2008. To address that criticism, we performed a rolling regression of the consumption function.

We first fit the consumption function using retail sales, the Fed's Financial Accounts, and the value of the housing stock from the first quarter of 1980 through the fourth quarter of 1986, a span of 28 quarters, and recorded the estimated wealth effects for that period. We then shifted our window by one quarter, using data from

the second quarter of 1981 through the first quarter of 1987 and again recorded the wealth effects. Proceeding in this fashion produces Chart 3.

Rolling regression analyses are dependent on the length of the window chosen; too small a window results in noisy estimates that do not span enough time to accurately reflect consumer behavior; too large a window results in overly smoothed estimates that do not allow us to identify shorter-term (potential) changes in behavior. We chose 28 quarters as that is the length of time since the Great Recession in the current cycle, and it is about the length of the previous business cycle in the mid-2000s.

Prior to the Great Recession, the housing wealth effect was always greater than the stock wealth effect, save for a very brief period at the height of the technology stock bubble in the late 1990s. In recent years, the stock wealth effect has been as large as it has ever been and meaningfully larger than the housing wealth effect. In contrast, the housing wealth effect is currently as low as it has been since the early 1990s.

It is incongruous that the stock wealth effect was negative throughout the early 1990s in these rolling regressions. This may reflect the poorer quality of the data in this earlier period, particularly our estimates of stock wealth across states and metro areas. However, the 1987 stock market crash is likely playing a role. The crash was especially hard on the psyche of stockholders, who remained very cautious in their consumer spending given

Table 7: Wealth Effects Based on IXI, Homeowners' Equity, States

	Financial	Total equities	Direct equities	Mutual funds
Stock wealth	0.114 (11.09)	0.100 (11.25)	0.091 (11.76)	0.104 (10.18)
Homeowners' equity	0.026 (6.44)	0.026 (6.36)	0.023 (6.01)	0.028 (6.70)
Income	0.735 (14.48)	0.724 (14.87)	0.723 (17.44)	0.738 (12.83)
Constant	0.477 (0.83)	0.782 (1.40)	1.001 (2.03)	0.606 (0.95)
N	710	710	710	710
Within-state R2	74.7%	75.0%	75.6%	74.1%

The sample spans 2008H1 through 2014H2 (14 periods).

All specifications have 51 panels (including Washington DC).

T-statistics are in parentheses and are robust to arbitrary within-state correlation.

All variables are in log real per-household units.

Source: Moody's Analytics

Table 8: Wealth Effects Based on IXI, Homeowners' Equity, Metro Areas

	Financial	Total equities	Direct equities	Mutual funds
Stock wealth	0.106 (14.04)	0.098 (14.76)	0.091 (15.89)	0.099 (13.26)
Homeowners' equity	0.016 (5.98)	0.015 (5.83)	0.014 (5.36)	0.017 (6.34)
Income	0.816 (17.90)	0.799 (17.78)	0.780 (17.30)	0.826 (18.32)
Constant	5.216 (10.09)	5.535 (10.88)	5.919 (11.61)	5.247 (10.24)
N	2746	2746	2746	2746
Within-metro R2	61.4%	62.3%	63.2%	61.0%

The sample spans 2008H1 through 2014H2 (14 periods).

All specifications have 199 metropolitan areas (panels).

T statistics are in parentheses and are robust to arbitrary within-metro correlation.

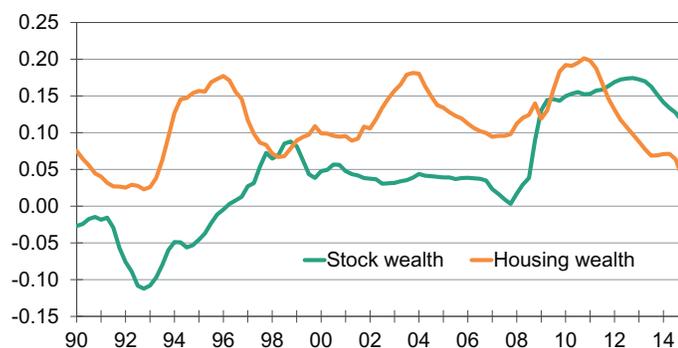
All variables are in log real per-household units.

Real per-household equity is negative for 40 observations.

Source: Moody's Analytics

Chart 3: The Wealth Effect Varies Significantly

Based on 28-qtr rolling regressions on retail sales



Sources: IXI MarketMix, Federal Reserve, Census Bureau, Moody's Analytics

their heightened uncertainty regarding the value of their stocks, even well after stock prices had recovered.

The total wealth effect, derived by weighting stock and housing wealth effects by households' stock and housing

wealth, has fluctuated significantly since the Great Recession. At its peak in late 2010, the total wealth effect reached 18 cents (see Chart 4). This includes the 28-quarter period beginning in early 2004 and encompasses the housing bubble and crash in house and stock prices. The total wealth effect has since receded, and is currently just under 8 cents, approximately equal to that in the decade prior to the housing bubble.

Housing bubble and bust regions

The housing boom, bubble and bust played out very differently across the

country. Some states experienced unprecedented house price gains during the boom, and suffered debilitating contractions in the bust. The most notable include California, Nevada, Arizona and Florida. The median house price in these states fell by more than 50% peak to trough during the bust. Other states, such as Iowa, Texas, Oklahoma and Louisiana experienced very modest ups and downs in their house prices.

To determine whether the wealth effects differed between the bubble-bust regions and the rest of the country, we divided the states into two groups, one with the 24 states (and the District of Columbia) with the largest peak-to-trough declines in housing wealth and the other with the remaining states.

Somewhat surprisingly, there was no material difference in the housing or stock wealth effects between the two groups of states (see Table 9). If anything the housing wealth effect precrisis was higher for the states that did not experience as substantial a boom and bust in house prices. The wild swings in house prices and wealth did have a larger impact on consumption and the economy in the bubble-bust states, but only because prices and wealth swung more wildly, and not

because the relationship between housing wealth and consumption was larger in those states.

There is some evidence that the housing wealth effect may only be temporarily depressed. This can be seen by dividing metro areas into those whose median house prices have risen above their prerecession peaks and areas where house prices have yet to fully recover. There are 78 metro areas in the former group and 121 metro areas in the later.¹⁰

The housing wealth effect as measured by homeowners' equity for metro areas in which house prices have fully recovered is 3.4 cents compared with only 1.4 cents for those in which house prices have not made it all the way back (see Table 10). With house prices fast recovering, house prices in more and more metro areas will soon rise above their prerecession peaks, and the housing wealth effect should thus increase.

Chart 4: Aggregate Wealth Effect

Based on 28-qtr rolling regressions on retail sales



Sources: IXL MarketMix, Federal Reserve, Census Bureau, Moody's Analytics

What does it all mean?

Our analysis strongly suggests that the financial crisis significantly changed the wealth effect. Most clearly, the stock and housing wealth effects have traded places. Prior to the crisis, the housing wealth effect dominated the stock wealth effect. Post-crisis, the housing wealth effect has faded and the stock wealth effect has been large. Indeed, conventional wisdom regarding the stock wealth effect is much too low.

The regression results suggest that the stock wealth effect on retail sales has increased from 3 cents before the crisis to nearly 12 cents since then. In contrast, the housing wealth effect as measured by the value of the housing stock on retail sales has declined from about 8 cents before the crisis to 4 cents afterward.

The wealth effects on personal consumption expenditures post-crisis are about half the size. The stock wealth effect is closer to 6 cents and the housing wealth effect as measured by the value of the housing stock is about 2 cents. The overall wealth effect, weighting stock and housing wealth effects appropriately, is currently just under 4 cents.

Given that the stock wealth has increased by close to \$12 trillion since its bottom during the recession, and housing wealth has increased by \$6 trillion, the wealth effect has lifted consumer spending by more than \$800 billion during the economic recovery. An impressive almost one-third of the increase in consumer spending during the recovery is due to the wealth effect.

Table 9: Wealth Effects Based on Financial Accounts, Value of the Housing Stock, State Level

	Housing bubble-bust states		Other states	
	Pre-2008	Post-2007	Pre-2008	Post-2007
Stock wealth	0.018 (0.89)	0.126 (11.81)	0.041 (2.79)	0.102 (9.55)
Value of the housing stock	0.081 (2.96)	0.041 (3.24)	0.106 (4.37)	0.018 (0.47)
Income	0.626 (5.00)	0.680 (7.26)	0.610 (9.92)	0.539 (17.06)
Constant	2.147 (2.25)	0.707 (0.69)	1.851 (4.31)	2.965 (5.66)
N	2700	700	2808	728
Within-state R2	89.1%	75.2%	90.6%	71.3%

The Pre 2008 sample spans 1980Q1 through 2007Q4.

The Post 2007 sample spans 2008Q1 through 2014Q4.

T statistics are in parentheses and are robust to arbitrary within-state correlation.

All variables are in log real per-household units.

Source: Moody's Analytics

Table 10: Wealth Effects Based on IXI, Homeowners' Equity, Post-2007, Metro Areas

	Metro areas with HPI above prerecession peak (78 metro areas)	Other metro areas (121 metro areas)
Stock wealth	0.107 (9.18)	0.104 (10.08)
Homeowners' equity	0.034 (2.36)	0.014 (5.06)
Income	0.699 (13.20)	0.913 (12.82)
Constant	6.397 (10.61)	4.111 (5.11)
N	1092	1654
Within-metro R2	60.7%	62.4%

The sample spans 2008H1 through 2014H2 (14 periods).

All specifications have 199 metropolitan areas (panels).

T statistics are in parentheses and are robust to arbitrary within-metro correlation.

All variables are in log real per-household units.

Real per-household equity is negative for 40 observations.

Source: Moody's Analytics

The wealth effect's contribution to overall GDP growth has thus been significant. Real GDP has expanded at just under a 2.2% per annum pace during the six years of the economic recovery. Of this growth, almost half a percentage point per annum is due to the wealth effect alone, according to our analysis.

This highlights the importance of the Federal Reserve's quantitative easing program. One of the principal channels through which QE impacts the real

economy is higher asset values and the resulting wealth effects. Based on other analysis that we have done, QE has increased stock values by an estimated 16% and housing values by 8% since QE was first announced in late 2008 (Lafakis and Sweet, 2013). Doing the arithmetic, the Fed's QE policy has lifted real GDP growth via the wealth effect by 12.7 basis points per annum and 76 basis points on a cumulative basis through the second quarter of 2015. This is not quite three-quarters of

the total estimated increase in real GDP due to the Fed's QE programs.

A significant and persistent decline in stock prices would also be a significant weight on the economic recovery. A once-and-for-all decline in stock prices of 10% would ultimately reduce real GDP by some 70 basis points. For context, abstracting from the daily ups and downs in the stock market, stock prices are off closer to 5% from their peak in the current correction. Of course, the market remains fragile and could drop further. A 10% decline in stock prices would be consistent with a typical garden-variety stock market correction.

While it is clear that the wealth effect varies over time and across assets, it also appears relatively stable across regions of the country. State and metro area economies have gone through very different experiences in recent years, yet the stock and housing wealth effects across regions do not appear to vary all that much. Perhaps this goes in part to the national financial and banking systems.

The American consumer is key to the U.S. and global economic recoveries. Fortunately, she is enjoying significant tailwinds from a stronger job market to low debt loads and easier credit. However, it is critical that stock and housing values hold their own. The wealth effect is powerful, and declining stock or housing prices could quickly overwhelm all the positives now powering consumer spending. This is not the most likely outlook, but it bears close watching.

References

C. D. Carroll, M. Otsuka, and J. Slacalek, "How Large Are Housing and Financial Wealth Effects? A New Approach," *Journal of Money, Credit, and Banking* Vol. 43 (January 2011): 55-79.

K. E. Case, J. M. Quigley, and R. J. Shiller, "Comparing Wealth Effects: The Stock Market Versus the Housing Market." Cowles Foundation, Yale University, Discussion Paper #1335, 2001.

Congressional Budget Office, "Housing Wealth and Consumer Spending," Background Paper series, January 2007.

N. Dvornak and M. Kohler, "Housing Wealth, Stock Market Wealth and Consumption: A Panel Analysis for Australia," Reserve Bank of Australia Discussion Paper #23, July 2003.

C. Lafakis and R. Sweet, "The Federal Reserve's Quantitative Easing: Weighing the Cost-Benefit Trade-Off," *Regional Financial Review* (May 2013).

C. F. Manski, "Credible Interval Estimates for Official Statistics With Survey Nonresponse," Manuscript, Department of Economics, Northwestern University, June 2014.

M. Sommer, "Habits, Sentiment and Predictable Income in the Dynamics of Aggregate Consumption," Manuscript, International Monetary Fund, October 2003.

D. W. Wilcox, "The Construction of U.S. Consumption Data: Some Facts and Their Implications for Empirical Work," *American Economic Review* Vol. 82 (September 1992): 922-941.

Endnotes

- 1 This is based on the Federal Reserve's measure of household debt service burdens, which is available from 1980.
- 2 Based on the CoreLogic Case-Shiller house price index, national house prices are 8% below their prerecession record peaks as of the first quarter of 2015.
- 3 According to the Federal Reserve's Survey of Consumer Finance, those in the top 5% of the income distribution held more than one-third of the stock wealth outstanding when the survey was last conducted in 2013.
- 4 The saving rate data by income group shown in Table 1 are constructed using the Federal Reserve's Financial Accounts and the Survey of Consumer Finance. The methodology used in its construction is available upon request.
- 5 Carroll, Otsuka and Slacalek (2011), building on Sommer (2003), develop an estimator that accounts for habit formation in consumption and allows one to estimate both short- and long-run changes in consumption due to changes in wealth. They also note that equation (1) assumes a constant relationship among consumption, wealth and income, which we address by fitting equation (1) to data before and after the Great Recession and a series of moving windows.
- 6 It is noteworthy that Case et al. (2001) used an early version of our retail sales estimates in their study of the wealth effect.
- 7 The housing stock data are for the total housing stock, including single- and multifamily units. This is of course not ideal, but we do not feel it significantly biases the results.
- 8 These data are available from CreditForecast.com, a joint venture between Moody's Analytics and Equifax.
- 9 A Wald test shows that the two estimates of the financial wealth effect are significantly different at all common significance levels. A Wald test of the two estimates of the housing wealth effect shows they are significantly different at the 10% level but not the 5% level.
- 10 Only 19 states have exceeded their prerecession housing wealth peaks. Cluster-robust statistical inference works better with more clusters, so we chose to divide the states by prerecession decline and have a sample with 25 clusters rather than 19. Point estimates are similar regardless of whether we divide by median decline or above-versus-below peak prices.

About the Authors

Mark Zandi

Mark M. Zandi is chief economist of Moody's Analytics, where he directs economic research. Moody's Analytics, a subsidiary of Moody's Corp., is a leading provider of economic research, data and analytical tools. Dr. Zandi is a cofounder of Economy.com, which Moody's purchased in 2005.

Dr. Zandi's broad research interests encompass macroeconomics, financial markets and public policy. His recent research has focused on mortgage finance reform and the determinants of mortgage foreclosure and personal bankruptcy. He has analyzed the economic impact of various tax and government spending policies and assessed the appropriate monetary policy response to bubbles in asset markets.

A trusted adviser to policymakers and an influential source of economic analysis for businesses, journalists and the public, Dr. Zandi frequently testifies before Congress on topics including the economic outlook, the nation's daunting fiscal challenges, the merits of fiscal stimulus, financial regulatory reform, and foreclosure mitigation.

Dr. Zandi conducts regular briefings on the economy for corporate boards, trade associations and policymakers at all levels. He is on the board of directors of MGIC, the nation's largest private mortgage insurance company, and The Reinvestment Fund, a large CDFI that makes investments in disadvantaged neighborhoods. He is often quoted in national and global publications and interviewed by major news media outlets, and is a frequent guest on CNBC, NPR, Meet the Press, CNN, and various other national networks and news programs.

Dr. Zandi is the author of *Paying the Price: Ending the Great Recession and Beginning a New American Century*, which provides an assessment of the monetary and fiscal policy response to the Great Recession. His other book, *Financial Shock: A 360° Look at the Subprime Mortgage Implosion*, and *How to Avoid the Next Financial Crisis*, is described by the *New York Times* as the "clearest guide" to the financial crisis.

Dr. Zandi earned his BS from the Wharton School at the University of Pennsylvania and his PhD at the University of Pennsylvania. He lives with his wife and three children in the suburbs of Philadelphia.

Brian Poi

Brian Poi is a director of Consumer Credit Analytics at Moody's Analytics in West Chester PA, where he develops a variety of credit loss, credit origination and deposit account models for use in both strategic planning and CCAR/DFAST environments. He is equally adept at developing primary models as well as playing the role of validator for models developed elsewhere. Dr. Poi also provides thought leadership and guidance on the use of advanced statistical and econometric methods in economic forecasting applications. Before joining Moody's Analytics, Dr. Poi was an econometric developer and director of professional services at StataCorp LP, a leading provider of statistical analysis software. He received his PhD and MA in economics from the University of Michigan after graduating magna cum laude from Indiana University.

Scott Hoyt

Scott Hoyt is senior director of consumer economics for Moody's Analytics. He is responsible for the firm's consumer forecasts and analysis, assists in the production of its U.S. economic forecast, and is a regular contributor to the *Dismal Scientist* web site and a regular speaker at our client conferences. He is a lead analyst for CreditForecast.com.

Before joining Moody's Analytics, Dr. Hoyt spent five years as an economist for J.C. Penney, where he did extensive work in the company's credit department. He received his PhD and MA in economics from the University of Pennsylvania and his BA summa cum laude from Bates College.

MOODY'S ANALYTICS

Moody's Analytics helps capital markets and risk management professionals worldwide respond to an evolving marketplace with confidence. The company offers unique tools and best practices for measuring and managing risk through expertise and experience in credit analysis, economic research and financial risk management. By providing leading-edge software, advisory services, and research, including the proprietary analysis of Moody's Investors Service, Moody's Analytics integrates and customizes its offerings to address specific business challenges. Moody's Analytics is a subsidiary of Moody's Corporation (NYSE: MCO), which reported revenue of \$3 billion in 2013, employs approximately 8,400 people worldwide and maintains a presence in 31 countries. Visit our website at moodysanalytics.com to learn more.

EQUIFAX®

For over 20 years, IXI™ Services, a division of Equifax, has helped the nation's leading financial services and consumer marketing firms optimize omni-channel marketing efforts, identify growth markets, and enhance practice and performance management.

Equifax is a global leader in consumer, commercial and workforce information solutions that provides businesses of all sizes and consumers with insight and information they can trust. Equifax organizes and assimilates data on more than 600 million consumers and 81 million businesses worldwide. The company's significant investments in differentiated data, its expertise in advanced analytics to explore and develop new multi-source data solutions, and its leading-edge proprietary technology enables it to create and deliver unparalleled customized insights that enrich both the performance of businesses and the lives of consumers.

Headquartered in Atlanta, Equifax operates or has investments in 19 countries and is a member of Standard & Poor's (S&P) 500® Index. Its common stock is traded on the New York Stock Exchange (NYSE) under the symbol EFX. In 2014, Equifax was nominated as a Bloomberg BusinessWeek Top 50 company; its CIO was listed as one of the top 100 by CIO magazine; and the company was named to the Fintech 100 list, was recognized as a top 20 company to work for by the Atlanta Journal-Constitution, and was named a 2014 InformationWeek Elite 100 Winner. For more information, please visit www.equifax.com.

© 2015, Equifax Inc. ("Equifax") and Moody's Analytics, Inc. ("Moody's") and/or its licensors. All rights reserved. The information and materials contained herein are protected by United States copyright, trade secret, and/or trademark law, as well as other state, national, and international laws and regulations. Except and to the extent as otherwise expressly agreed to, such information and materials are for the exclusive use of CreditForecast.com subscribers, and may not be copied, reproduced, repackaged, further transmitted, transferred, disseminated, redistributed or resold, or stored for subsequent use for any purpose, in whole or in part. All information has been obtained from sources believed to be reliable. Because of the possibility of human and mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. UNDER NO CIRCUMSTANCES SHALL EQUIFAX OR MOODY'S BE LIABLE TO YOU OR ANY OTHER PERSON IN ANY MANNER FOR ANY LOSS OR DAMAGE CAUSED BY, RESULTING FROM, OR RELATING TO, IN WHOLE OR IN PART, ERRORS OR DEFICIENCIES CONTAINED IN THE INFORMATION PROVIDED, INCLUDING BUT NOT LIMITED TO ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES HOWEVER THEY ARISE. The financial reporting, analysis, projections, observations, and other information contained herein are statements of opinion and not statements of fact or recommendations to purchase, sell, or hold any securities. Each opinion must be weighed solely as one factor in any investment decision made by or on behalf of any user of the information contained herein.

CONTACT US

For further information contact us at a location below:

U.S./CANADA

+1.866.275.3266

EMEA

+44.20.7772.5454 London
+420.224.222.929 Prague

ASIA/PACIFIC

+852.3551.3077

OTHER LOCATIONS

+1.610.235.5299

Email us: help@economy.com

Or visit us: www.economy.com