The American Consumer: Reforming, Or Just Resting?

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Abstract

American households have been hit by a triple dose of bad news since the beginning of the current recession: The greatest collapse in asset values since the Great Depression, a sharp tightening in credit availability, and a large increase in unemployment risk. We present measures of the size of these shocks and discuss what a benchmark theory says about their consequences. We then provide a forecast based on a simple empirical model that captures the effects of wealth shocks and unemployment fears. Our short-term forecast calls for somewhat weaker spending, and somewhat higher saving rates, than the Consensus survey of macroeconomic forecasters. Over the longer term, our best guess is that the personal saving rate will eventually approach the levels that preceded period of financial liberalization that began in the late 1970s.

Keywords Consumption/Saving Forecast, Credit Crunch, Financial Crisis
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1 Introduction

Economists and pundits have complained for years that Americans do not save enough. Economists, in keeping with our reputation, have tended to use bland words like "unsustainable" or "problematic"; pundits, preferring more colorful language, have called the American saving rate "dismal" and "pathetic."

As economists, we lean toward the bland terminology. But, to quote former Council of Economic Advisors chair Herbert Stein, "Unsustainable trends, sooner or later, come to an end."

That end appears now to be coming, much more suddenly than anyone expected. Indeed, the collapse in household spending over the past six months is a principal source of the gloom currently emanating from macroeconomic forecasters.

After so much lamentation about low saving, it may be a bit hard for the public to stomach our profession's new worries about a drop in spending. In our defense, the contradiction can be understood by analogy to the prayer of Saint Augustine, who after a youth spent in debauchery decided to convert to Christianity to preserve his mortal soul. But he was still enjoying his sinful ways when he made that fateful decision, so his first prayer was "Lord, make me chaste – but not quite yet."

Saint Augustine may not have had a good excuse for gradualism, but economists do: The costs of adjustment to a permanently higher saving rate would likely be substantially smaller if that increase were spread out over the course of several years than if it happens all at once. (This is part of the motivation behind several items in the recently passed stimulus bill that aimed to revive near-term consumer spending, especially on durable goods like automobiles.)

Optimal or not, our best guess (illustrated below by forecasts from a simple model) is that the drop in overall consumption spending will not be speedily reversed; indeed, we project that the saving rate will rise a bit further from current levels before stabilizing somewhere not far below the saving rates that prevailed before the era of financial liberalization that started in the late 1970s. But we would not be greatly surprised if the saving rate ultimately rises even more than in our most extreme projection. In answer to the question in our title, our view is that American consumers are not merely resting from their former role as the world's champion consumers, they are permanently reforming their spending patterns, in response to the end of the period of ever-more-available credit that fueled the unsustainably high spending of recent years.

2 Theory and Data

2.1 A Simple Model

Figure 1 depicts a consumption function c(m) that relates a stylized consumer's optimal spending-to-labor-income ratio c to the monetary-resources-to-labor-income ratio m; the consumer is assumed to be behaving according to a simple buffer-stock saving model like that of Carroll (2009). This consumer is impatient: In the absence of uncertainty, spending would exceed the amount consistent with wealth maintenance. For such a consumer, precautionary motives are the only reason to hold any positive wealth. (The consumption function is concave because at lower and lower levels of wealth the consumer's precautionary motive gets stronger and stronger).

The shallowly sloped line plots, for each level of wealth, the level of spending that is "sustainable" in the sense that, at that level of spending, expected m_{t+1} in the next period will be unchanged from the current level of m_t. (Sustainable spending is simply the sum of expected labor income and expected interest income; it is upward sloping because with more assets, the consumer expects to earn more interest income).

The target $\check{m}$ is the level of m at which the consumer will choose the sustainable level of consumption.

2.2 A Wealth Shock

Our first experiment with the model is motivated by the historic shock to household wealth depicted in figure 2. Estimates of the magnitude of the wealth shock range as high as $13 trillion (Baily, Lund, and Atkins (2009)); this is certainly the largest collapse in asset values since the Great Depression.

Leading up to the period t when the wealth shock occurs, our consumer is assumed to have been holding the target amount of wealth $\check{m}$; the consumer's pre-shock position is indicated by the black dot at the point $\{\check{m}, \check{c}\}$. In period t, wealth drops to m_t, inducing a corresponding drop in consumption to c_t, indicated by the red dot at $\{m_t, c_t\}$. The subsequent evolution of consumption and wealth are represented by the series of red dots leading back toward $\{\check{m}, \check{c}\}$.

The next figure shows the path of the consumer's saving rate. Before the shock, saving was constant at the level necessary to maintain the wealth-to-income ratio at its target. When the wealth shock hits, the saving rate jumps up substantially (this is the 'wealth effect' in this model). Subsequently, as wealth builds back up toward its target, the saving rate subsides toward its equilibrium value.

2.3 A Rise In Unemployment Expectations

Figure 5 shows the history of our favorite measure of consumer sentiment: The University of Michigan's index of unemployment expectations. In prior work, we have found that this indicator has substantial predictive power for consumption spending. And, as the figure shows, the recent survey results show consumers exhibiting near-record pessimism about future job market conditions.

Our next experiment, in figure 6, examines the consequences of an increase in unemployment expectations in the model.

Beginning from the same original consumption function as before, the new consumption function corresponding to the state of heightened fear is labelled "c(m) after unemployment rate increase." Starting, again, from the original steady state, consumption drops sharply, then as precautionary wealth builds up spending gradually recovers. The saving path follows the same pattern as in figure 4: A sudden rise followed by a gradual subsidence. (The pattern of consumption after the shock is again indicated by dots. We show only 5 periods of evolution because presumably unemployment expectations will not remain elevated longer than five years; when unemployment expectations return to normal, consumption would jump back to the original consumption function. Of course, real-world changes in expectations are not likely to be one-off events like those we simulate, so the changes in spending would not be expected to be so sharp).

While unemployment expectations will likely return to more normal levels within a few years, it is possible that the crisis will have a long-lasting residual effect on consumers' generalized degree of uncertainty. After the "Great Moderation" period of relative macroeconomic stability of the prior twenty years, households' perceptions of the degree of economic risk that they were subject to may have fallen substantially. Lingering memories of the current crisis could therefore have a very long-lasting effect in boosting the saving rate (and reducing consumers' appetite for borrowing).

This leads us to a discussion of the final element of the crisis: Developments in the credit market.

2.4 A Relaxation of Borrowing Constraints

Our final experiment with the model is motivated by the literature that attributes the runup in consumer debt depicted as the bottom line in figure 2 to a relaxation of borrowing constraints. The rapid pace of credit expansion, especially over the past few years, is evident in figure 7. Since the borrowing outcome depends on both credit demand and credit supply, the rapid pace of debt growth over this period is not *prima facie* proof of relaxing credit conditions; but plenty of evidence suggests that increasing credit availability was the main driver of credit

growth (cf., for example, Mian and Sufi (2008) and the references therein; see also Dynan and Kohn (2007), who argue that the increase in house prices was partly responsible for the relaxation of credit).

The function labelled "Orig c(m)" in figure 8 reflects an assumed initial situation in which borrowing is prohibited. The function "New c(m)" shows how the consumption function changes if a financial liberalization suddenly makes borrowing easier. The effect is intuitive: For any given level of monetary assets m, the consumer with greater access to credit spends more. Rather than needing to rely on personal saving as a buffer against uncertainty, the consumer plans to use his credit line in case of emergencies, so there is less need for direct wealth holding.

Before the relaxation of borrowing constraints, we assume that the consumer was at the target level of m, as signalized by the black dot at the intersection of the 'sustainable c' line and the consumption function. The rightmost (highest) red dot on the "New c(m)" function shows the point to which consumption jumps when easier borrowing is allowed; the remaining dots on the new consumption function show the path by which consumption evolves downward as wealth falls toward its new, lower target.

The consumer in our example is so impatient, and the availability of credit (post liberalization) is so generous, that the new target level of wealth is negative; in the new equilibrium, the consumer relies upon his borrowing ability to provide the buffering capacity that was previously provided by his wealth stock.

The path of the saving rate following the liberalization is shown in figure 9. The initial upward leap in spending corresponds to a sharp decline in the saving rate. Subsequently, the saving rate gradually increases, but never fully recovers to its pre-liberalization level (the lower level of target wealth permitted by increased borrowing does not require as high a saving rate in order to be sustained).

This figure underpins our interpretation of the effects of the credit boom of the past few decades. We view that history as an ongoing sequence of modest relaxations of borrowing constraints, rather than a giant one-time event. Every year, credit conditions got slightly easier (with only a few backward steps). Each particular increase in credit availability would, by itself, have resulted in a saving response like the one implicit in our figure (sharp decline followed by gradual recovery); but in each case borrowing constraints were subsequently further relaxed before the saving rate could recover. Since credit availability cannot get easier forever (that would be unsustainable!), the saving rate should stop being depressed whenever credit-easing ends.

The period of ever-looser credit has certainly now come to an end. Perhaps the best way to measure changes in the supply of credit is through the Federal Reserve's ongoing Senior Loan Officer Opinion Survey, which reports the fraction of loan officers who say conditions are tightening minus the proportion who say

they are easing. (This only measures conditions at banks, and since much of the increase in credit supply in the last decade came from nonbank lenders, the survey is an imperfect measure).

Figure 10, which shows the results of that survey, should remove any doubt that in the period since the crisis began, credit conditions have tightened sharply.

The effects of a credit cutback, in the model, are simply the inverse of the effects of an expansion: Consumption drops, the saving rate rises, and there is gradual adjustment toward a new equilibrium in which even impatient consumers find it prudent to hold a larger buffer stock of wealth than before.

Everyone agrees that much of the credit tightening is necessary and permanent (the days of No Income, No Job, No Assets (NINJA) mortgage loans will not return). But the demand for credit has surely fallen also, as fearful consumers refrain from borrowing even when credit is available to them. Some combination of reduced demand and tightening supply accounts for the impressive collapse in net borrowing ('deleveraging') shown at the end of figure 7.

A key question for the longer-term outlook is how long this period of deleveraging will last, and how much lower the 'target' level of leverage is than its current (still-elevated) level. These are difficult questions with no clear answer; but we are in the camp that believes that the long-run equilibrium level of household debt will be substantially lower than the levels of the past few years, as a result both of consumers' newfound fears of overindebtedness and as a result of financial markets' presumably greater prudence in offering credit going forward.

3 Consumption So Far

Wealth has cratered; credit availability has tightened sharply; and consumer confidence has collapsed.

The effect of these events on household spending is best measured using the BEA's index of retail sales, which is more timely and less subject to revision than more comprehensive measures of spending like Personal Consumption Expenditures (PCE). Figure 11 shows the level of retail sales over the period since the beginning of the recession (in December 2007, according to the National Bureau of Economic Research), along with the pattern of retail sales spending following the other business cycle peaks in the postwar period. (The level of sales is indexed to 100 at the beginning of each business cycle peak). The gray interval in the diagram shows, for each month after the recession peak, the minimum and maximum levels of relative retail sales across all previous postwar recessions.

Given the magnitude of the shocks, it is no surprise that the figure shows that the decline in retail sales in the current recession is considerably larger than in any previous postwar recession. In the latest data available at this writing, retail

sales in April 2009 were estimated to be about 10 percent lower than when the recession began. In contrast, by this time after previous recessions peaks, retail sales had on average fully recovered to their peak level.

Other indicators yield similar conclusions; for example, the decline in consumption spending in the fourth quarter of 2008 was the sharpest drop in the past 50 years; a Rockefeller Institute report by Boyd and Dadayan (2009) finds that state-level data for sales taxes (presumably, an indicator of sales) showed the sharpest drop in 50 years in the fourth quarter of 2008. Automobile sales have dropped by around 50 percent. And so on.

4 Our Forecast

The path of consumer spending is famously difficult to forecast. Conveniently, Robert Hall (1978) provided economists with a good excuse for our forecasting failures by proving that standard consumption theory implies that forecasting changes in consumption *should* be mathematically *impossible*.

A subsequent literature has nevertheless found some reasonably predictable patterns in consumption growth. For example, Carroll, Sommer, and Slacalek (2008) (henceforth, CSS) find that, across a set of 13 developed economies for which sufficient time series data are available, behavior deviates from the random walk theory in a simple way: After correcting for measurement error, consumption *growth* has a substantial degree of serial correlation, or 'momentum.'

Concretely, CSS estimate an equation of the form

$$\partial \boldsymbol{C}_{t+1} \quad = \quad \varsigma + \chi \mathbb{E}_{t-2}[\partial \boldsymbol{C}_t] + \epsilon_{t+1} \tag{1}$$

where the expectation of lagged consumption growth is constructed using data available at date $t-2$ (the lag is necessary to correct for measurement error and time aggregation in the consumption data). At a quarterly frequency, the serial correlation coefficient for the predictable component of consumption growth in most countries (including the U.S.) is about $\chi = 0.75$.

(We neglect here the conceptually important distinction between spending on durable goods, nondurables, and services. Although theory suggests that this distinction should be important, and evidence does show that spending on durables is much more variable than that on nondurables or services, we find that the aggregate forecasting equation that lumps all spending components together works about as well as what we are able to get by disaggregating.)

For our projections here, we rely on an extension of the CSS methodology designed to permit the measurement of wealth effects on consumption, developed in Carroll, Otsuka, and Slacalek (2009) (henceforth, COS).

In addition to the above equation, COS estimate a simple relation between consumption and wealth:

$$\partial \boldsymbol{C}_t \;=\; \alpha_0 + \alpha \partial \boldsymbol{B}_{t-1} + \alpha_{\mathrm{MU}} \mathrm{MU}_{t-1} + \alpha_{\mathrm{FF}} \mathrm{FF}_{t-1} + \eta_t, \tag{2}$$

where $\boldsymbol{C}$ denotes aggregate consumption, $\boldsymbol{B}$ aggregate wealth, MU unemployment expectations (measured by the Michigan survey), FF the Federal funds rate, $\partial \boldsymbol{C}_t = \Delta \boldsymbol{C}_t / \boldsymbol{C}_{t-5}$ and $\partial \boldsymbol{B}_{t-1} = \Delta \boldsymbol{B}_{t-1} / \boldsymbol{C}_{t-5}$. Parameter α is the immediate (next-quarter) marginal propensity to consume out of wealth. Because consumption responds slowly to shocks ($\chi \gg 0$), the eventual marginal propensity to consume $\bar{\kappa}$ is substantially larger: $\bar{\kappa} = \frac{\alpha}{\chi(1-\chi)}$.

Estimates of the immediate and eventual marginal propensities to consume for the most recent sample (1960Q1–2008Q4) are shown in Tables 1 and 2 respectively. Our preferred model implies that the eventual effect on consumption of a $1 dollar increase in wealth is about 6 cents. The effect of an increase in housing wealth—9 cents—is substantially larger than that of financial wealth—4 cents.[1]

We use the COS model to investigate future consumption paths implied by three alternative scenarios for the future dynamics of house prices as described in Table 3 and shown in Figure 12. The baseline scenario is motivated by the assumptions of the recent stress test of major banks undertaken by the Federal Reserve, Office of the Comptroller of the Currency, and Federal Deposit Insurance Corporation. That scenario assumes that house prices fall by 14 percent and 4 percent in 2009 and 2010 respectively, in nominal terms, which implies a 14.4 percent fall for per capita real housing wealth this year and 6.7 percent fall next year.[2]

The second, "pessimistic" scenario mirrors the adverse scenario in the stress tests by imposing a 22 percent nominal house price fall in 2009 followed by a 7 percent fall in 2010 (22.4 and 9.7 percent respectively, in real per capita terms).

The last, "optimistic" scenario is the mirror image of the pessimistic scenario around the baseline. It imposes a 6 percent fall in nominal house prices in 2009

[1] In addition to any direct causation from an unanticipated change in wealth to resulting changes in consumption, our measured 'effects' likely capture the influence of other economic circumstances that are correlated with the lagged changes in wealth. For example, an increase in credit availability might allow the bidding-up of asset prices as well as a faster-than-normal increase in spending. The chief argument for the simplistic approach we adopt here, in which all such influences are combined, is that we are not persuaded that there is a reliable method to disentangle the various plausible influences. Our view is that a simple summary of past history of the kind embodied in our estimates may be more useful and less fragile than a more ambitious approach which would attempt to decompose the 'effect' into more primitive sources.

[2] The document describing the stress test does not specify projected paths beyond next year (Board of Governors of the Federal Reserve System (2009)). We assumed the growth rate of real per capita housing wealth will return to 2.1 percent (its post-1960 mean).

and a 1 percent fall in 2010.

In all three scenarios we assume that consumers form unemployment expectations by updating slowly from experts' unemployment expectations as in Carroll (2003). (Motivated by the stress test assumptions, experts' unemployment expectations vary across scenarios as given in Table 3.) Finally, we use the expectations of economic forecasters reported by the Consensus Economics survey (`http://www.consensuseconomics.com/`) as our best guess about the future Fed funds rate.

Figure 13 shows the projected consumption expenditure paths under the three scenarios (of Table 3) and the two models—with total net worth, and with wealth decomposed into separate housing and financial components (Tables 1 and 2). We compare the six paths with the consumption forecasts reported by Consensus Economics survey. Qualitatively, the more pessimistic the scenario, the lower is consumption expenditure. In addition, consumption projections of the disaggregated wealth model (in which housing and financial wealth enter separately as independent variables) are lower than those of the aggregate model because the estimated MPC out of housing wealth is considerably larger than the MPC out of financial wealth. Quantitatively, our models imply that per capita spending will decrease from its current (2009Q4) level of $26,800 (in year 2000 dollars) by 0.6–1.5 percent before it starts to grow later this year or in 2010.

Figure 14 compares the saving rates with the benchmark saving rate implied by the Consensus Economics survey.[3] Because of lower consumption paths our models generally predict higher saving rates than the Consensus forecast. After the initial dip in 2009Q4 (caused by a substantial fall in disposable income—3.5 percent in real per capita terms) the saving rate typically tends to remain close to the current level of 4 percent but in the most pessimistic scenario could increase to as much as 5.4 percent by the end of 2011.

A more optimistic view is that the sluggishness in consumption growth in historical data reflects the slow transmission of macroeconomic news to the consumers' consciousness; inattentive consumers are normally slow to react to macroeconomic news because it takes them a while to notice it. This is the optimistic interpretation of our empirical model's results, because it would be hard to argue that consumers have not noticed the current economic crisis. Their adjustment may therefore have occurred much more quickly than usual, so that the remaining degree of negative 'momentum' may be negligible.

A further possibility worth mentioning is that spending on durable goods may post sharp gains later this year; as Lawrence Summers has pointed out, recent levels of automobile purchases are far below even the level required merely to

[3]In all 7 scenarios we assume that disposable income will grow as expected by the experts interviewed by Consensus Economics.

replace the stock that is depreciating due to wear-and-tear or accidents. Indeed, a variety of measures from the recently passed stimulus bill designed to encourage spending on durable goods may make themselves felt later in the year and boost spending on those categories.

But as noted above, the aggregate forecasting equation has tended to work about as well for aggregate spending as for its components; we take this as suggesting that spending on nondurable goods is likely to continue to be quite weak even if durable goods spending recovers sharply. (In this case, one could argue that consumers have indeed been 'resting' in their purchases of durable goods).

Even if durables recover and nondurables stabilize in the near term, we are inclined to believe that the end of the recent period of rapid credit expansion portends a substantially higher saving rate two or three years hence than has prevailed over the past few years. Returning to our remark in the introduction, this would be the most favorable plausible scenario, because it would reflect a path of Augustinian gradualism on the way to long-term reform. Such a scenario would probably be the best outcome that can reasonably be hoped for.

5 Conclusion

Since household spending has traditionally accounted for more than 2/3 of GDP, consumer behavior always ends up being a decisive factor in macroeconomic outcomes. But the degree of uncertainty about the spending outlook is even greater now than usual. While our forecast is for slightly weaker spending growth than called for by the Consensus survey of macroeconomic forecasters, we would be remiss if we did not admit that the range of plausible outcomes is very wide. No professional forecaster would be shocked if the saving rate by the end of next year were as high as 8 percent (as assumed in a pessimistic scenario in a recent report by Baily, Lund, and Atkins (2009) of the McKinsey Global Institute) or as low as 2 percent.

Over the longer term, our best guess is that the gut-wrenching economic uncertainty experienced in the current crisis will leave a lasting impression on consumers' attitudes toward debt; the combination of greater household uncertainty and less adventurous credit supply by lenders, along with households' need to rebuild retirement and other wealth stocks devastated by the crisis, will produce an eventual personal saving rate that is much higher than it has been in many years.

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Table 1 Immediate Effect of Wealth on Consumption

$$\partial \boldsymbol{C}_t = \alpha_0 + \alpha_1 \bar{\partial} \boldsymbol{B}_{t-1} + \alpha_2 \bar{\partial} \boldsymbol{B}^f_{t-1} + \alpha_3 \bar{\partial} \boldsymbol{B}^h_{t-1} + \alpha_4 \mathrm{MU}_{t-1} + \alpha_5 \mathrm{FF}_{t-1}$$

Next-Quarter Effect of $1 Change in Wealth			Extra Variables			
Total $\bar{\partial} \boldsymbol{B}_{t-1}$	Financial $\bar{\partial} \boldsymbol{B}^f_{t-1}$	Housing $\bar{\partial} \boldsymbol{B}^h_{t-1}$	Unemp Exp MU_{t-1}	Fed Fund FF_{t-1}	Test of $\bar{\partial} \boldsymbol{B}^f = \bar{\partial} \boldsymbol{B}^h$	$\bar{\mathsf{R}}^2$
0.008***			0.101***	−0.298		0.249
(0.003)			(0.032)	(0.213)		
	0.007***	0.013**	0.099***	−0.314	0.371	0.250
	(0.003)	(0.007)	(0.033)	(0.215)		

Notes: Sample period is 1960Q1–2008Q4. Standard errors in parentheses. {*,**,***}=Statistical significance at {10, 5, 1} percent. Coefficients on wealth variables reflect MPCs in the quarter following a wealth change. The wealth variables are from the Flow of Funds balance sheets for the household sector. MU is the fraction of consumers who expect the unemployment rate to decline over the next year minus the fraction who expect it to increase. FF is the nominal Fed funds rate. The wealth and consumption variables were normalized by the level of consumption expenditures at $t-4$ to correct for the long-term trends in consumption and wealth. The equations without the extra variables exhibited serial correlation and so standard errors for those equations are corrected for serial correlation using the Newey–West procedure with 4 lags.

Table 2 Consumption Growth Momentum and the Eventual MPC

$$\partial \boldsymbol{C}_{t+1} = c_0 + \chi \mathbb{E}_{t-1} \partial \boldsymbol{C}_t + \varepsilon_{t+1}$$

Variables used to forecast	Consumption Growth Momentum Coefficient	Implied Eventual MPC out of		
$\mathbb{E}_{t-1}\partial \boldsymbol{C}_t$	χ	Total $\boldsymbol{B}$	Financial $\boldsymbol{B}^f$	Housing $\boldsymbol{B}^h$
$\boldsymbol{B}$, MU, FF	0.84^{***}	0.061		
	(0.14)			
$\boldsymbol{B}^f, \boldsymbol{B}^h$, MU, FF	0.81^{***}		0.049	0.088
	(0.14)			

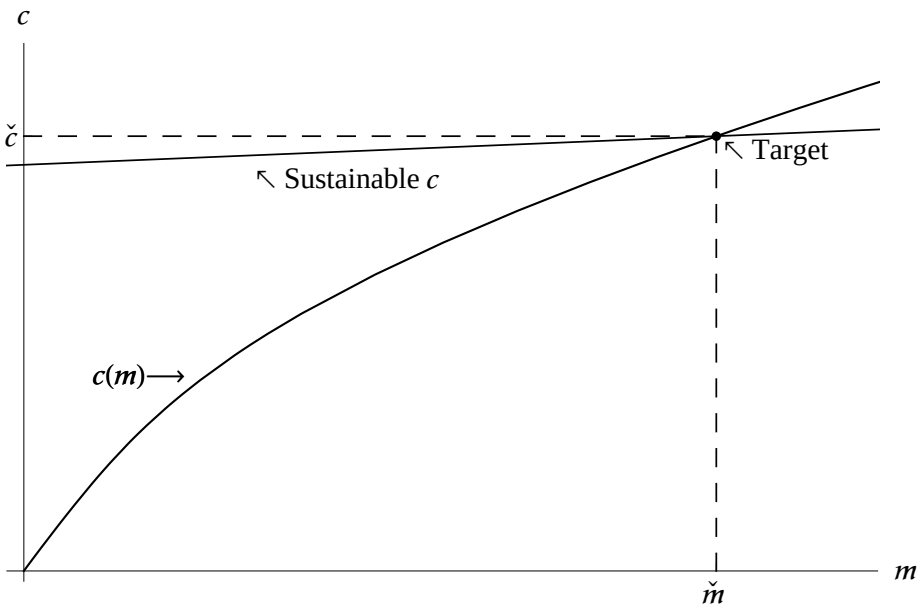
Notes: Sample period is 1960Q1–2008Q4. Standard errors are in parentheses. {*,**,***} = Statistical significance at $\{10, 5, 1\}$ percent. The eventual MPCs are calculated from the formula $\alpha_j/\chi(1-\chi)$ where α_j is the corresponding next-quarter MPC estimated in table 1. Standard errors for all equations are heteroskedasticity and serial-correlation robust. When more instruments are used to forecast $\partial \boldsymbol{C}_t$ (for example, interest rate spread and the change in unemployment over the previous year), the estimate of χ tends to rise further and the standard error falls further. The measure of the change in wealth used for the regressions is the $\partial \boldsymbol{B}$ measure defined in the text, as this can be measured without an estimate of χ, unlike the $\bar{\partial} \boldsymbol{B}$ measures used in the previous table.

Table 3 Economic Scenarios: The Good, the Baseline and the Ugly

Scenario	Variable	2009	2010	2011	2012
Baseline	House Prices	−14	−4	–	–
	Unemployment Rate	8.4	8.8	7.9	6.8
	Disposable Income (Per Capita)	−3.8	0.7	2.4	2.6
	Fed Funds Rate‡	0.3	0.9	0.9	0.9
	Inflation	−0.7	1.6	2.2	2.2
	Population	1.1	1.1	1.1	1.1
	Implied Per Capita Real Housing Wealth	−14.4	−6.7	2.1*	2.1*
Pessimistic	House Prices	−22	−7	–	–
	Unemployment Rate	8.9	10.3	9.1	8.2
	Disposable Income (Per Capita)	−3.8	0.7	2.4	2.6
	Fed Funds Rate‡	0.3	0.9	0.9	0.9
	Inflation	−0.7	1.6	2.2	2.2
	Population	1.1	1.1	1.1	1.1
	Implied Per Capita Real Housing Wealth	−22.4	−9.7	2.1*	2.1*
Optimistic	House Prices	−6	−1	–	–
	Unemployment Rate	7.9	7.3	6.7	5.4
	Disposable Income (Per Capita)	−3.8	0.7	2.4	2.6
	Fed Funds Rate‡	0.3	0.9	0.9	0.9
	Inflation	−0.7	1.6	2.2	2.2
	Population	1.1	1.1	1.1	1.1
	Implied Per Capita Real Housing Wealth	−6.4	−3.7	2.1*	2.1*

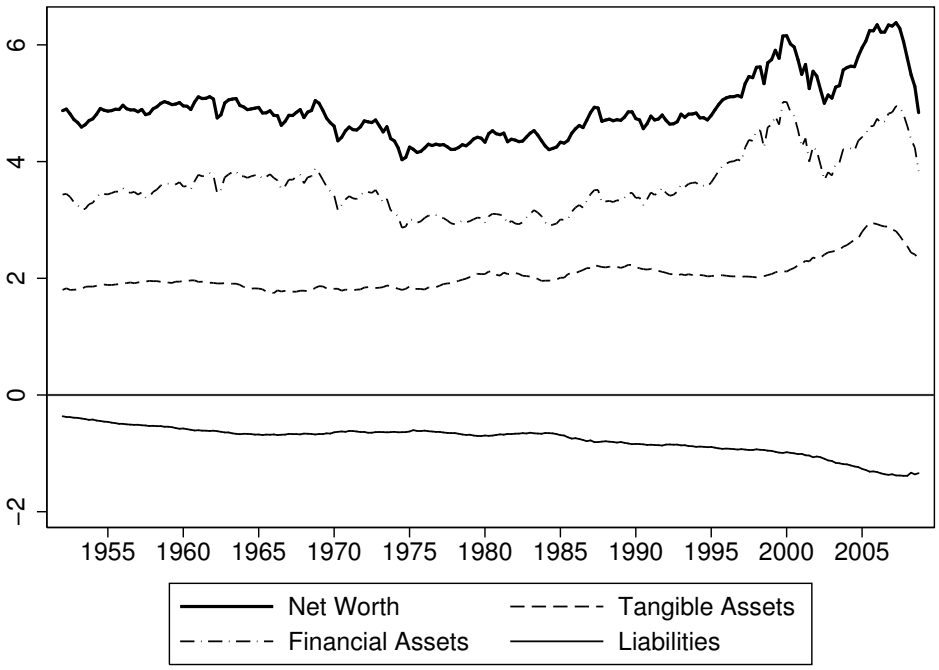
Note: *: Mean growth of housing wealth, ‡: Fed funds rate is approximated with Consensus forecasts of three-month Treasury Bill rate.

Figure 1 Consumption Function and Target Wealth Ratio



Source: Calculations by the authors using the model of Carroll (2009)

Figure 2 Household net worth and its components (ratio to disposable income)



Source: Federal Reserve Flow of Funds accounts

Figure 3 Effect on Consumption of a Negative Shock to Wealth

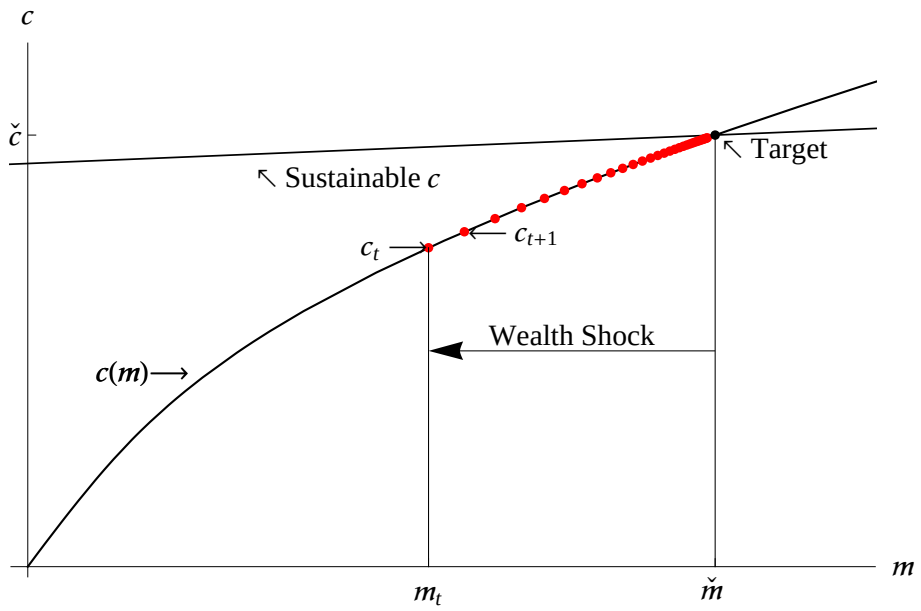


Figure 4 Saving Rate Before and After the Adverse Wealth Shock

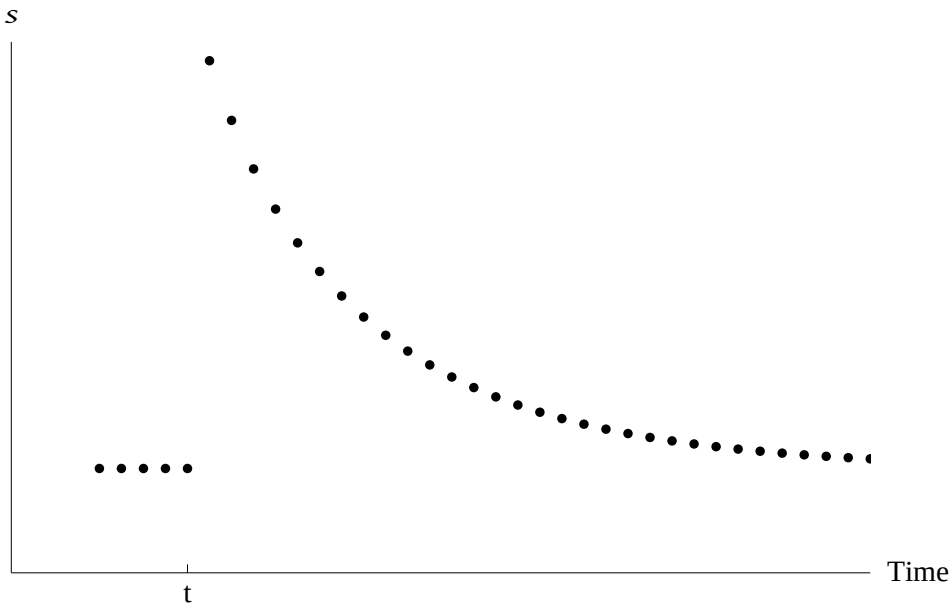
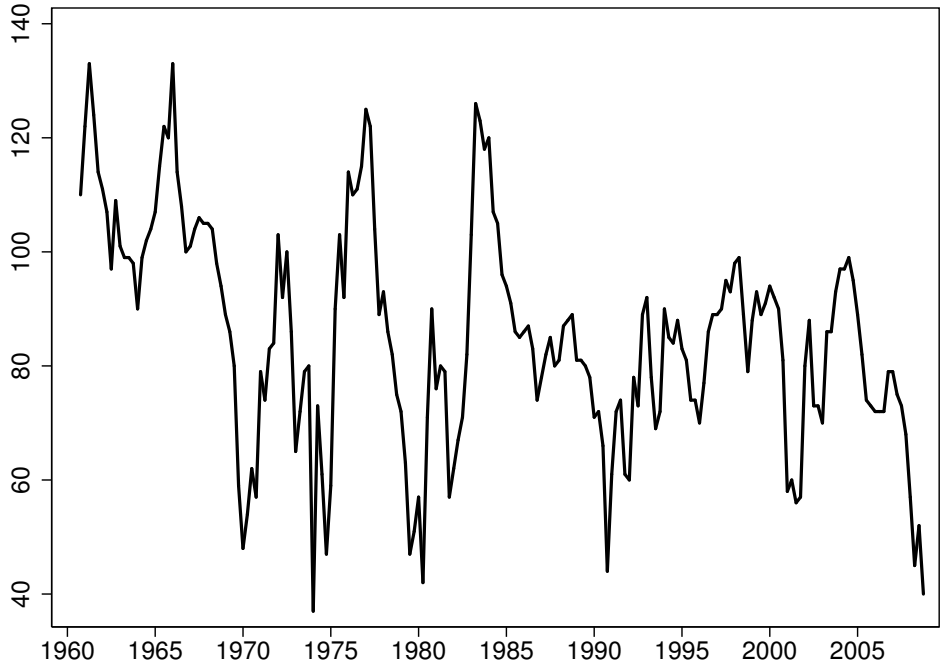


Figure 5 Household Expectations that Employment Situation Will Improve



Source: University of Michigan Survey of Consumers. Index is $100 - (U \uparrow - U \downarrow)$, where $U \uparrow$ and $U \downarrow$ denote the fractions of households expecting the unemployment rate to rise and fall respectively.

Figure 6 Consumption Function Drops When u Risk Rises

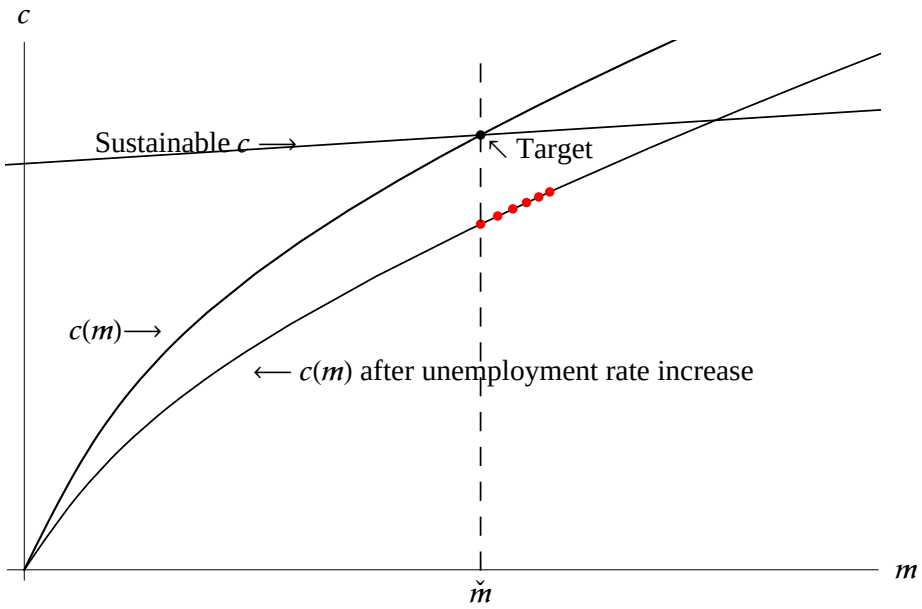
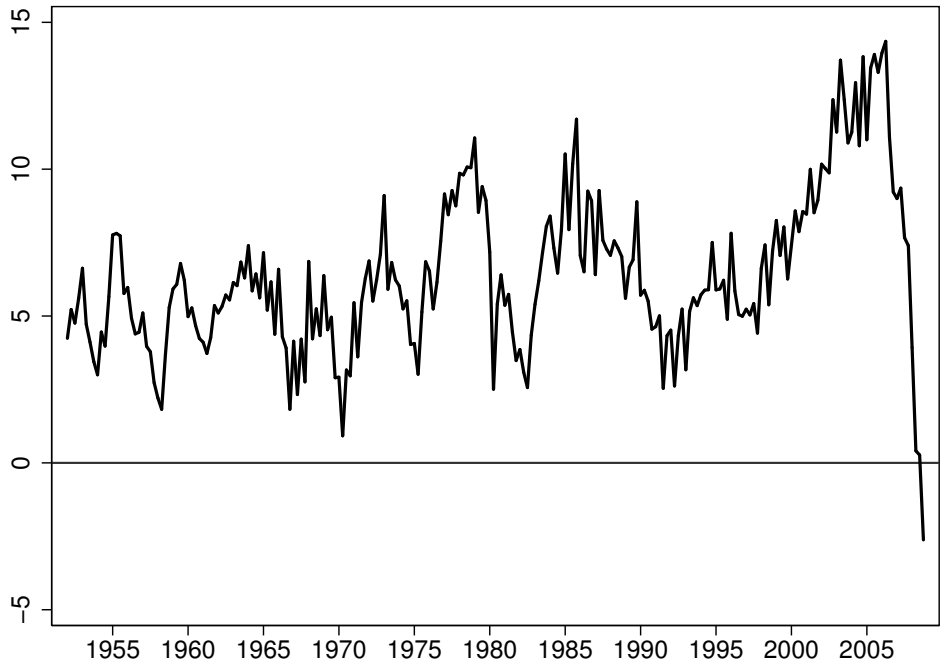


Figure 7 Growth of Household Net Borrowing (as a % disposable income)



Source: Federal Reserve Flow of Funds accounts

Figure 8 Effect on Consumption of a Relaxation of Borrowing Constraints

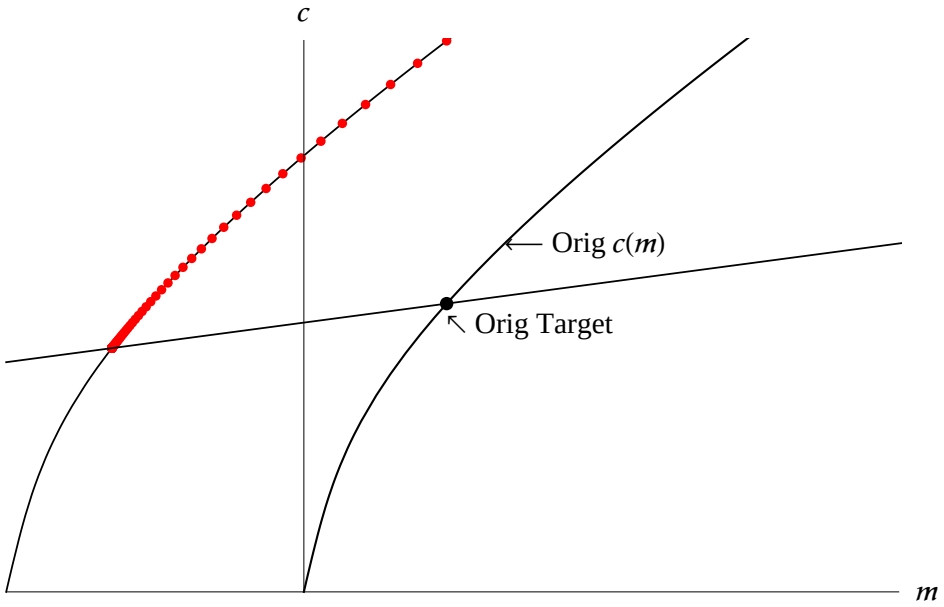


Figure 9 Path of Saving Rate After Credit Relaxation

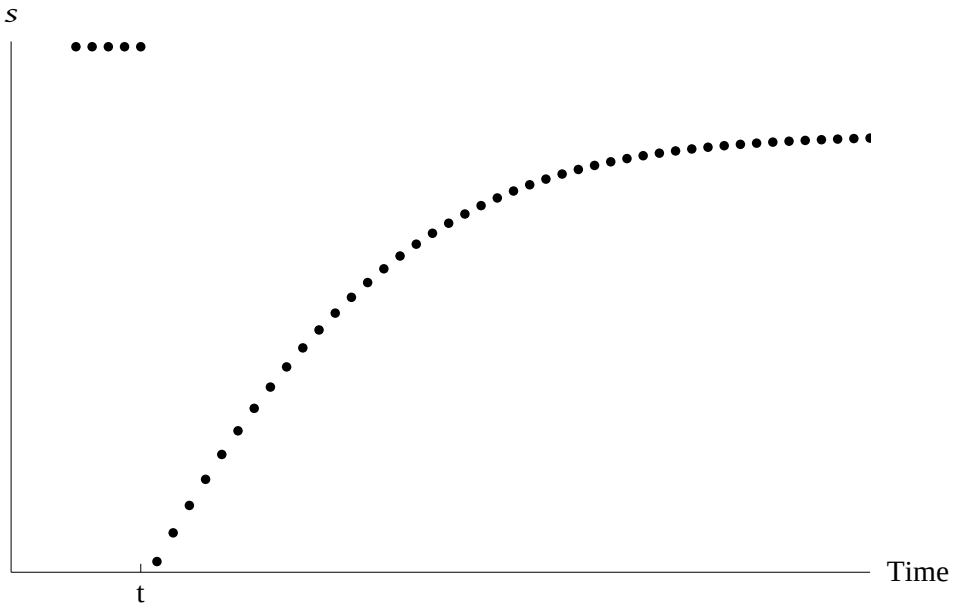
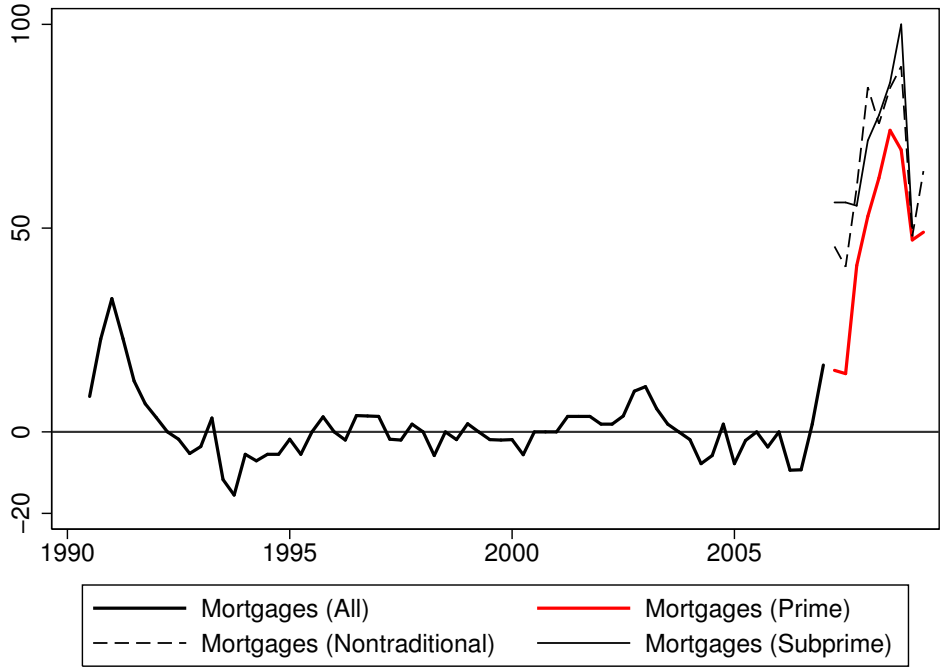
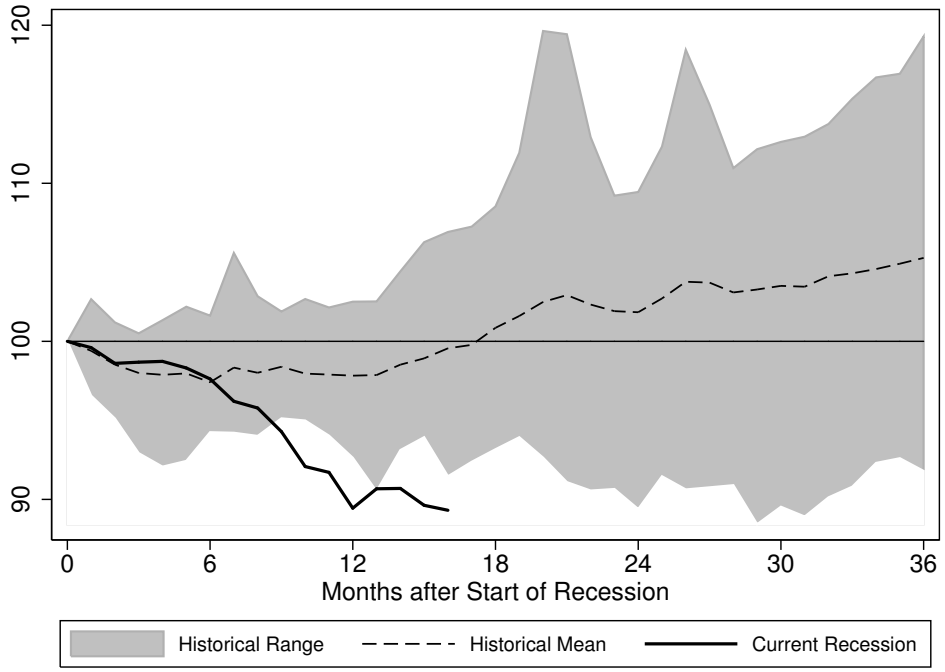


Figure 10 Fraction of Banks Tightening Mortgage Lending Terms



Source: Federal Reserve Survey of Senior Loan Officers
http://www.federalreserve.gov/boarddocs/snloansurvey/200905/default.htm

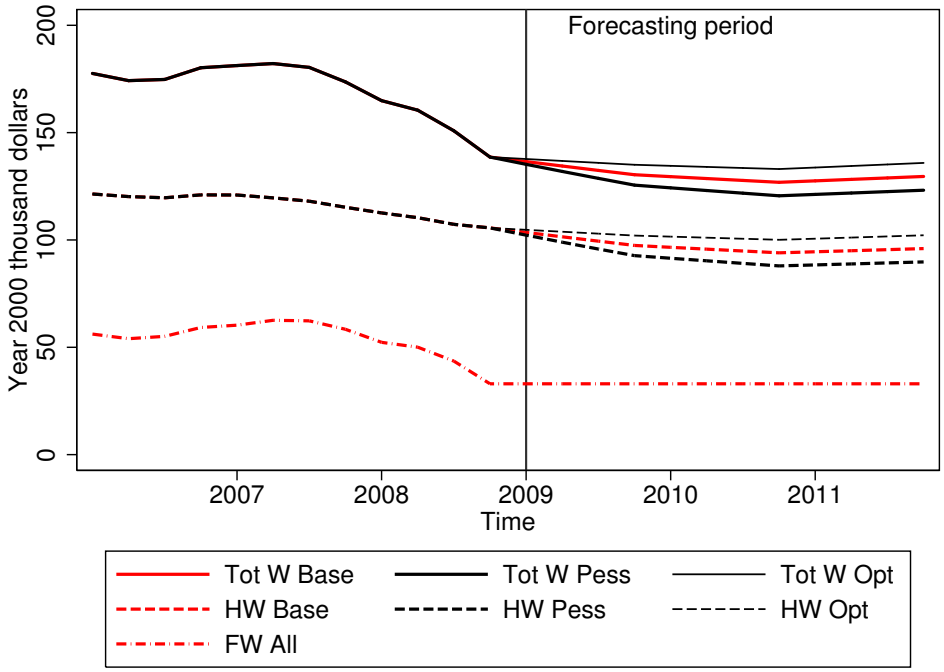
Figure 11 Retail Sales, Current and Previous Recessions



Note: Historical Range includes all recessions since November 1948

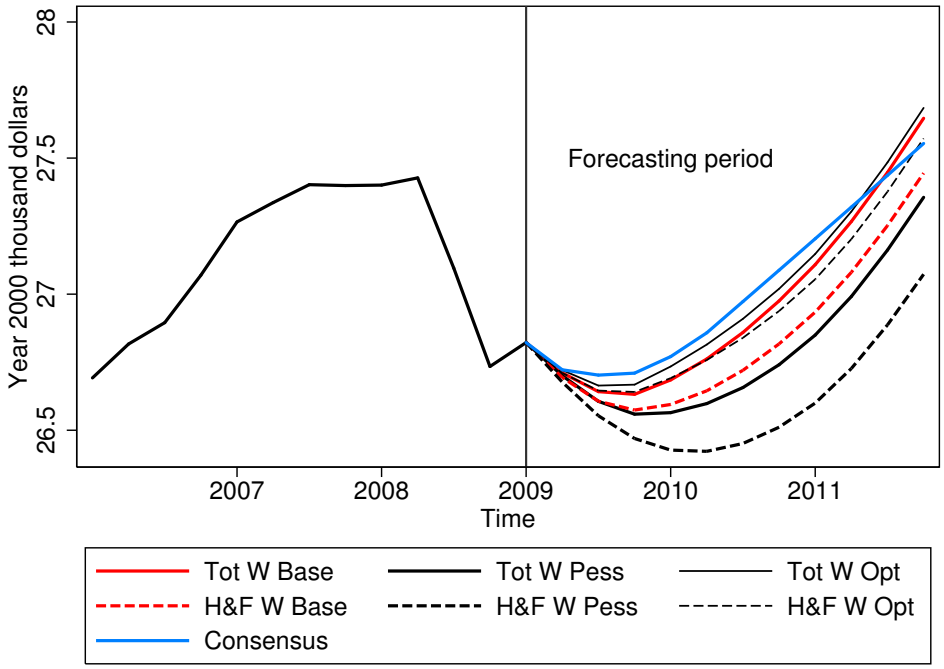
Sources: U.S. Bureau of the Census (retail sales); Bureau of Labor Statistics (Consumer Price Index); National Bureau of Economic Research Business Cycle Dating Committee (recession peak dates)

Figure 12 Wealth Counterfactuals



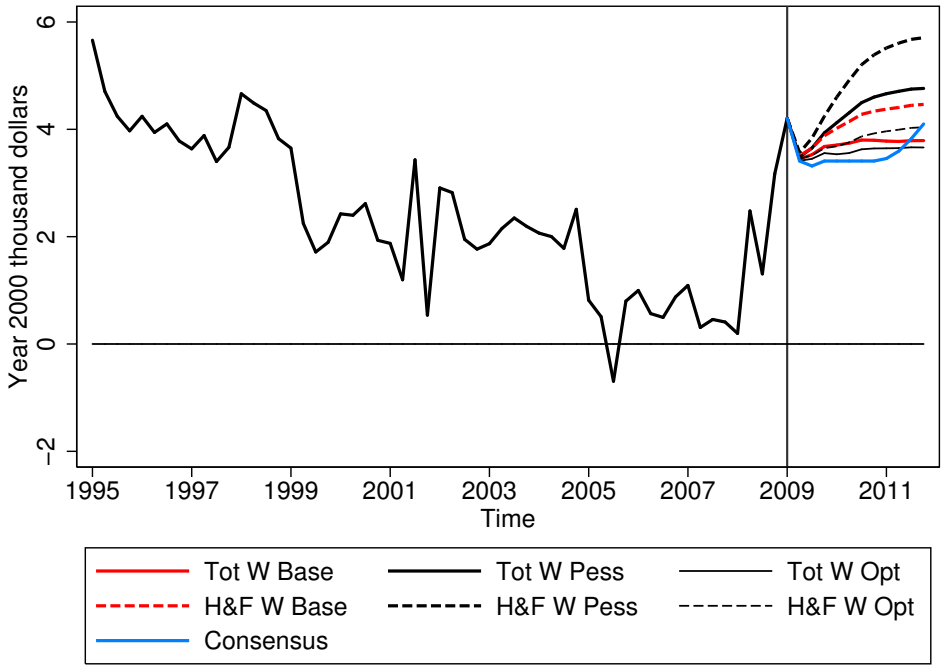
Note: "Tot W" means total net worth; "HW" means housing wealth; "FW" means "Financial Wealth"; "Base" refers to the baseline scenario described in the text; "Pess" reflects the pessimistic scenario; "Opt" reflects the optimistic scenario.

Figure 13 Consumption Counterfactuals



Note: "Tot W" simulations use coefficient estimates from a model where housing and financial wealth are not distinguished; "H&F" signifies the case where housing and financial wealth are allowed to have different coefficients; "Base" refers to the baseline scenario described in the text; "Pess" reflects the pessimistic scenario; "Opt" reflects the optimistic scenario; "Consensus" shows the Consensus forecast referenced in the text.

Figure 14 Saving Rates (Percent)



Note: "Tot W" simulations use coefficient estimates from a model where housing and financial wealth are not distinguished; "H&F" signifies the case where housing and financial wealth are allowed to have different coefficients; "Base" refers to the baseline scenario described in the text; "Pess" reflects the pessimistic scenario; "Opt" reflects the optimistic scenario; "Consensus" shows the Consensus forecast referenced in the text.