

WP/14/225

# IMF Working Paper

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## The Rich and the Great Recession

*Bas B. Bakker and Joshua Felman*

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INTERNATIONAL MONETARY FUND

## **IMF Working Paper**

European and Research Departments

### **The Rich and the Great Recession**

**Prepared by Bas B. Bakker and Joshua Felman<sup>1</sup>**

December 2014

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#### **Abstract**

Most papers explaining the macro causes of the U.S. Great Recession focus on the behavior of the middle class: how its saving rate declined in the pre-crisis years, then surged following the crisis. This paper argues that the saving rate of the rich followed a similar pattern, the result of wealth effects associated with a boom-bust in asset prices. Indeed, the swings in saving by the rich must actually have played the most important role in the consumption boom-bust, since since the top 10 percent account for almost half of income and two-thirds of wealth. In other words, the rich played a critical role in the Great Recession.

Classification Numbers: E12, E21, E32, E52, N12

Keywords: Income inequality; wealth inequality; wealth; business cycles; consumption

Author's E-Mail Addresses: [bbakker@imf.org](mailto:bbakker@imf.org); [jfelman@imf.org](mailto:jfelman@imf.org)

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<sup>1</sup> We would like to thank Fernando Morán Arce and Solange de Moraes Rego for editorial assistance, and George Akerlof, Andrew Berg, Helge Berger, Olivier Blanchard, Kotaro Ishi, Russell Kincaid, Christoph Klengen, Frank Lakwijk, Ruy Lama, Mark Lewis, Leslie Lipschitz, and Siegfried Steinlein for discussions and helpful comments. All remaining errors are ours.

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## EXECUTIVE SUMMARY

Two main macro explanations have been offered for the Great Recession in the US: the inequality and the wealth narratives. The inequality narrative focuses on the middle class, arguing that they reacted to stagnant wages by overborrowing the excess saving of the rich, whose incomes were booming. Meanwhile, the wealth narrative ignores distribution, arguing that the consumption boom-bust can be explained simply by the dramatic swings in asset prices.

This paper argues that both narratives are flawed, because they ignore or mischaracterize the role of the rich during the boom-bust. In particular, the rich were not merely passive spectators, generating “excess saving”. Such a hypothesis cannot explain why aggregate household saving rate declined sharply during the pre-crisis years, why there has been a *negative* link between the income share of the rich and the household saving rate, or why the debt of the rich increased as rapidly as that of the bottom 90 percent.

To the contrary, it seems much more likely that the rich were active participants in the consumption boom-bust cycle. The paper estimates a model in which aggregate consumption depends on the income and wealth of the top 10 percent and the bottom 90 percent. It finds that the saving rate of the rich actually went through a similar cycle as that of the middle class, as rising wealth first spurred their consumption and then falling wealth restrained it. Moreover, since the rich accounted for such a large share of aggregate income, this cycle had a profound impact on overall consumption. Indeed the model implies something truly striking: between 1993 and 2003, about 55 percent of the increase in consumption came from the rich; over the last ten years, the share was even larger (71 percent).

In short, the paper argues that the rich need to be placed at the center of the macro explanation of the boom-bust that ended in the Great Recession.

### I. THE INEQUALITY AND WEALTH NARRATIVES

It is now more than a decade since the U.S. subprime housing market started to boom. And it is now six years since Lehman Brothers failed and the Global Financial Crisis erupted, leaving the advanced economies mired in difficulty. Ever since, economists have been sifting through the wreckage, searching for clues that could explain what has happened.

Over the years, two competing explanations have been offered for macro causes of the crisis: the inequality and wealth narratives.<sup>2</sup>

- *The inequality narrative centers on the behavior of the middle class.* This narrative, which has been expounded most notably by Mian and Sufi (2014) and Rajan (2010), centers on the shifts in the distribution of income, and goes something like this: Starting

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<sup>2</sup> We recognize that there were of course also important financial developments. But like Mian and Sufi (2014) and Rajan (2010) this paper focuses on the *macro* factors.

in the 1980s, incomes of the of the high-saving rich soared, while those of the middle class stagnated. So the rich lent their extra savings to the middle class, who used the funds to maintain their consumption growth and speculate in real estate. Initially, all was well, as the real estate boom propelled a construction-based expansion. But by 2007, the music stopped. The middle class became overextended and ceased buying houses, causing prices to collapse so sharply that many homeowners were plunged “underwater” on their mortgages. Some defaulted, while others rapidly increased their saving rates so they could pay down their debts. All in all, households found themselves in no financial position to consume, making for a feeble economic recovery.

- *The wealth narrative centers on the effects of the dramatic swings in asset prices.*<sup>3</sup> Asset prices surged during the boom years, boosting consumption and fueling a drop in the saving rate. When asset prices collapsed during the crisis, wealth effects went into reverse, leading to drop in consumption.

Both stories are compelling, and have data to support them:

- *In the pre-crisis years, there was indeed a sharp rise in income inequality and a sharp increase in middle class household debt.* The income share of the rich, defined in this paper as the top 10 percent, rose from 33 percent in 1982 to 46 percent in 2007 (Figure 1.1). Median incomes stagnated from 2000 to 2007, while household debt increased from about 90 percent of disposable income to 126 percent, an extraordinary increase in such a short span of time. And of course the remarkable rise and fall in housing prices and the subsequent increase in the loan delinquency rate, to more than 10 percent of loans at the peak, are well known.
- *At the same time, there has also been a close link between the household saving rate and the wealth-disposable income ratio.* Between the early 1990s and 2007, the wealth ratio rose from 510 percent to 671 percent and the saving rate fell (Figure 1.2). When the crisis came, and wealth dropped sharply, the household saving rate surged, reaching 6.1 percent in 2009. When wealth recovered, the saving rate dropped again and by 2013 was back down to 4.5 percent.

In addition, the inequality and wealth narratives agree on a number of elements:

- *They concur that the housing price boom played an important role.* In the inequality narrative, this is because rising housing prices allowed middle class families to borrow and thus to raise consumption in the face of stagnant wages. In the wealth narrative, this is because the boom-bust in housing prices had important wealth effects on consumption.
- *They agree that the saving rate of the middle class went down during the boom and up thereafter.* In the inequality narrative, this was because borrowing allowed to them to

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<sup>3</sup> See, for example, Case, Quigley and Shiller (2011).

increase consumption in the face of stagnant wages; in the wealth narrative it declined because wealth rose.

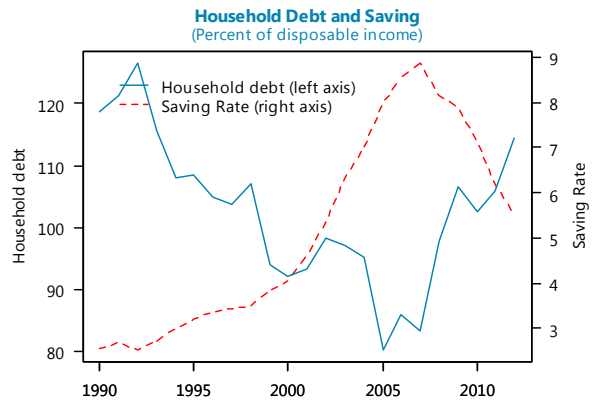
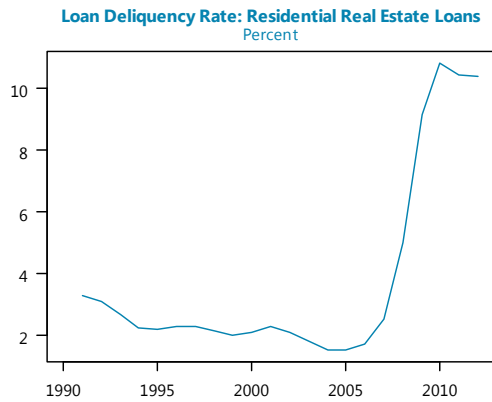
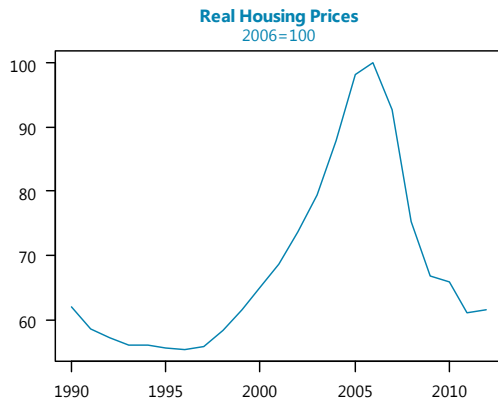
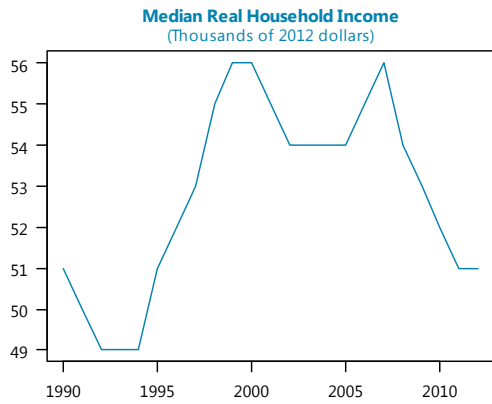
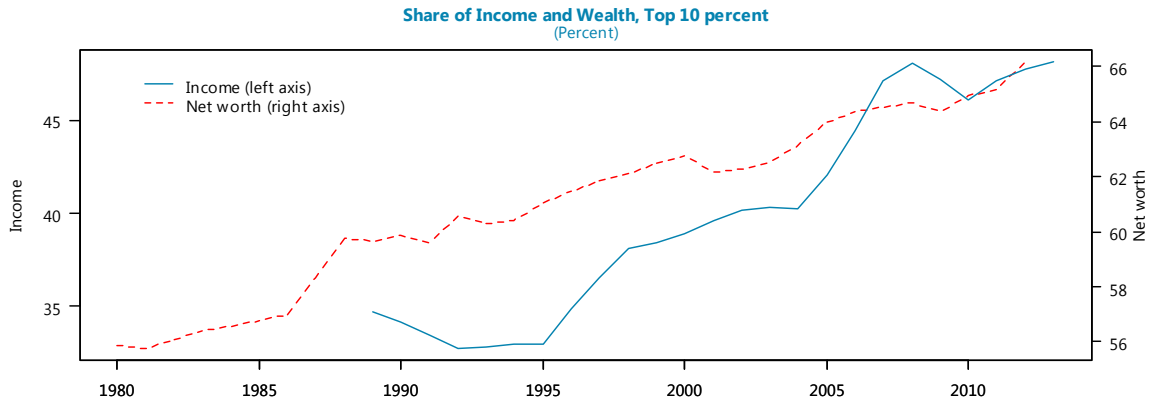
The narratives differ, however, in two important ways. First, they have very different views regarding the role of non-housing wealth.

- *The inequality story focuses on the role of net housing assets.* The inequality narrative justifies this focus by arguing that housing assets are special. And in some important ways they are. Acquisition of real estate, unlike purchases of financial assets, is largely funded by borrowing.<sup>4</sup> Consequently, when housing prices decline, some households fall “underwater” on their mortgages, forcing them to cut back spending to pay down debt. Mian and Sufi (2014) have argued that this effect explains why the Great Recession was so much more severe than the dotcom bust, even though the housing market losses in the former were about the same as the stock market losses in the latter.

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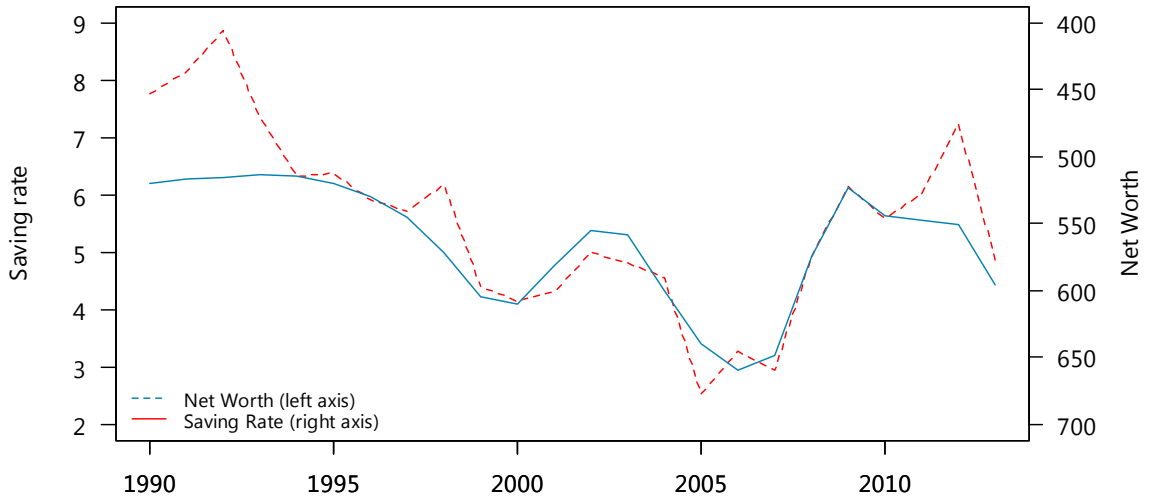
<sup>4</sup> Of course, in 2008 the decline in housing prices was special in another way: it precipitated a collapse in the banking system, which then had ramifications for the broader macro economy. We ignore the financial side of the crisis in this paper, in order to focus on the macro side of events.

**Figure 1.1. United States: The Inequality Narrative**

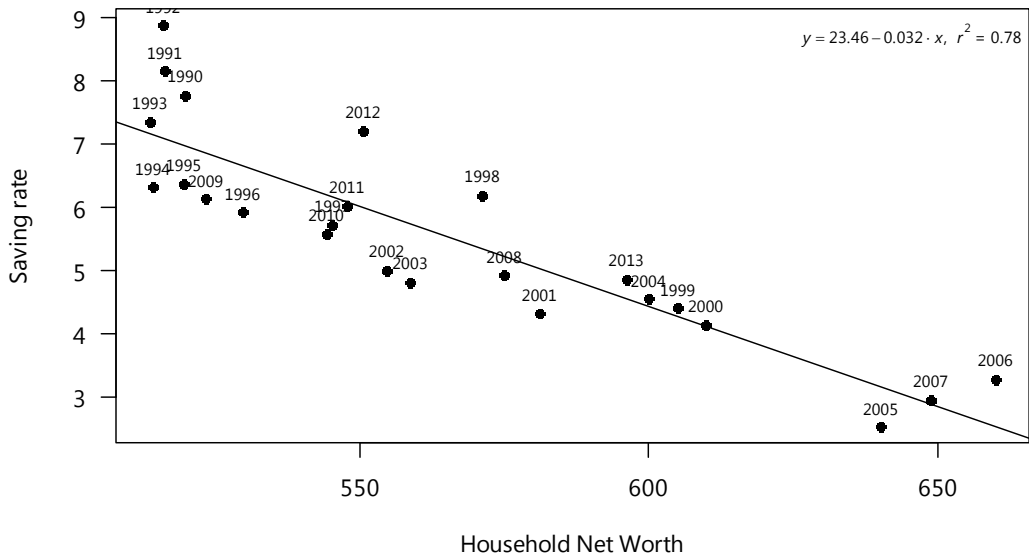


**Figure 1.2 United States: The Net Worth Narrative**  
(Percent of disposable income)

**Household Net Worth and Saving Rate**



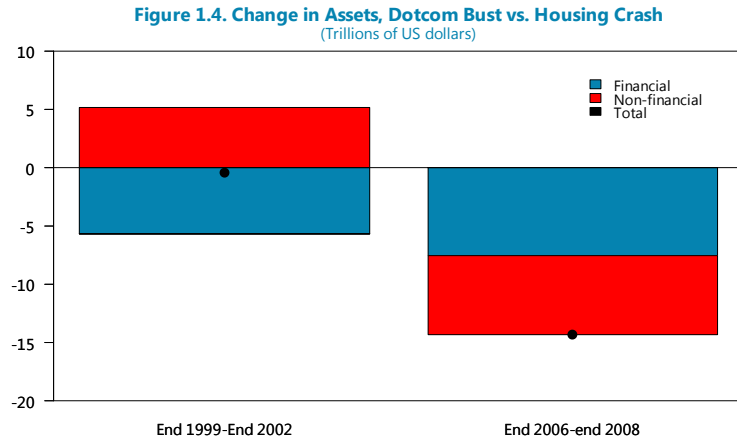
**Household Net Worth vs Saving**



Note: In this figure, net worth in year t is the average of net worth at the end of year t-1 and the end of year t.



- The wealth narrative argues that other forms of wealth mattered as well.* Financial assets are much larger than real estate, and have also seen large fluctuations (Figure 1.3). In the wealth narrative, it was not just the decline in housing prices that reduced consumption, but also the drop in financial prices, which actually accounted for \$8 trillion of the \$13 trillion in peak-to-trough losses in wealth. The wealth narrative has a different explanation as to why the impact of the dotcom bust was less than the housing market crash. It argues that the dotcom bust was *mitigated* by an increase in nonfinancial assets (mostly housing) while the housing market crash was *exacerbated* by stock market losses (Figure 1.4)

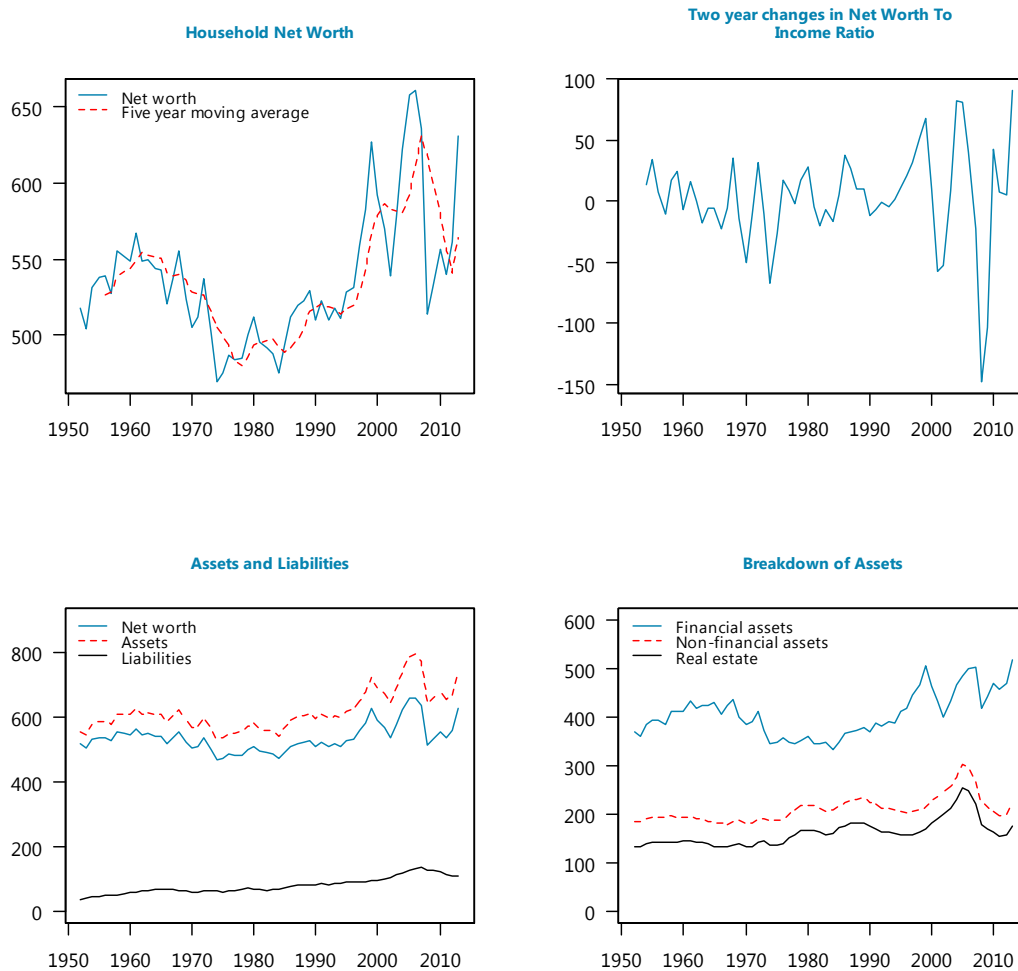


Second, the two narratives have different views regarding the role of the rich.

- The inequality viewpoint largely focuses on the role of the middle class.* In this narrative, the rich did not play much of a *direct* role in the boom-bust, as they saved much of their income gains. They did play an indirect role, by lending their savings to the middle class, which then boosted its consumption.
- The wealth narrative does not explicitly focus on the respective roles of the rich and the middle class.* Implicitly, however, it suggests that the rich may have played an important role as well, as they hold the bulk of the wealth and were the primary beneficiaries of the tremendous wealth gains during the boom years.<sup>5</sup>

<sup>5</sup> Some empirical papers have documented a sharp decline in the saving of rich during asset price booms. In 2001, Maki and Palumbo carefully examined disaggregated data from the Flow of Funds and the Survey of Consumer Finances. They found that the decline in the aggregate saving rate during the 1990s could be attributed almost entirely to a sharp reduction in the saving rates of the families who experienced the largest capital gains (the top 20 percent). By the end of the decade, the saving rate of this group had actually become negative, in marked distinction to the bottom 40 percent, whose saving rates exceeded 7 percent of disposable income

**Figure 1.3. US Household Net Worth, 1952-2013**  
(Percent of disposable income)



## II. IMPLICATIONS FOR THE HOUSEHOLD SAVING RATE

As a result of these differences, the two hypotheses have very different implications for the household saving rate in the pre-crisis years.

- The inequality narrative suggests that the aggregate household saving rate *increased*. According to this story, the shift in income distribution toward the rich created excess saving, because the rich had a higher propensity to save than the middle class. That pushed down interest rates, which then encouraged the middle class to borrow. In terms of textbook saving-investment curves, this sequence of events implies that the aggregate saving curve shifted out to the right, which was followed by an equilibrating

move along the curve, as the fall in interest rates encouraged some borrowing and some additional investment. The net effect would be an increase in saving.<sup>6</sup>

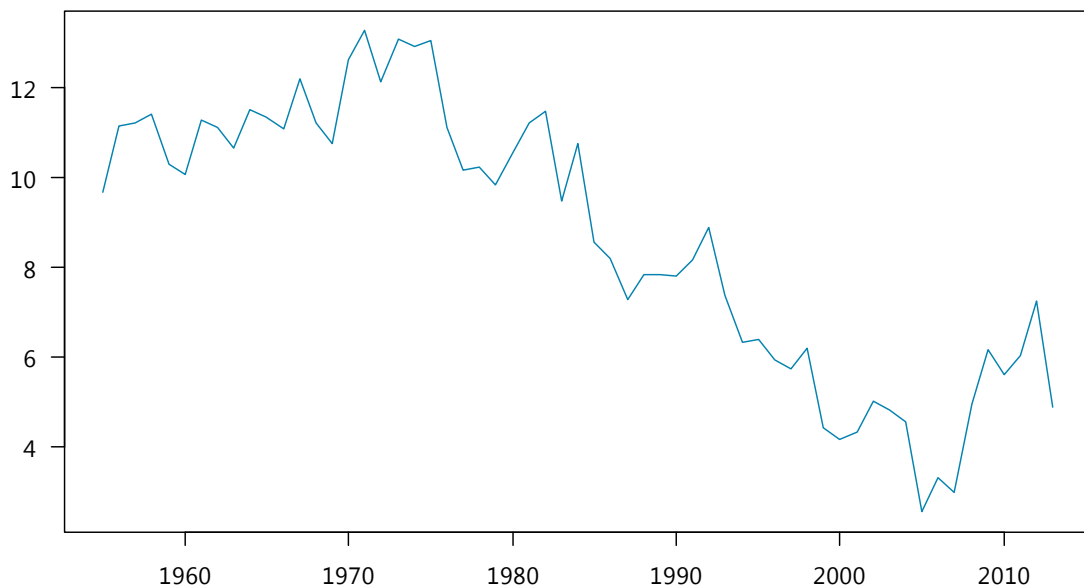
- In the wealth narrative, the household saving rate *went down*, as large wealth gains boosted consumption.

In principle, then, it should be relatively simple to adjudicate between these two hypotheses: one simply needs to look at the saving data. In practice, however, doing this is far from straightforward, since different data sources and definitions give very different answers.

### A. Data Sources

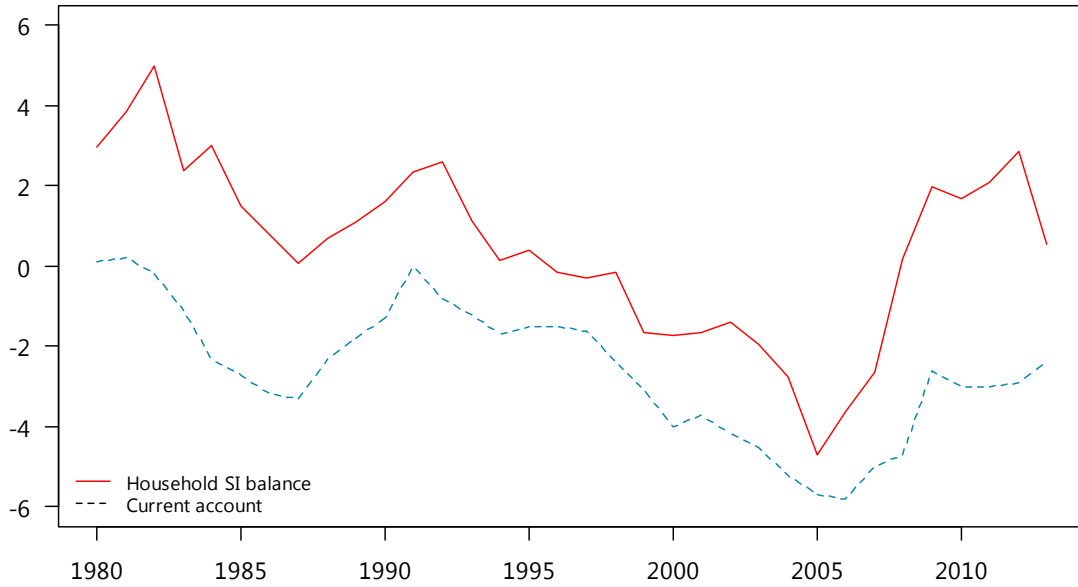
The standard source for saving data is of course the National Income and Product Accounts (NIPA). This source shows unambiguously that household saving rates plummeted before the crisis, from 8.9 percent in 1992 to 2.5 percent in 2005, a deterioration that was mirrored in the current account deficit (Figures 2.1 and 2.2). NIPA data, however, is limited in one crucial aspect: it does not provide a breakdown of consumption or saving by income group. So, it cannot shed any additional light on the critical issue at hand, namely the behavior of the rich and middle class in the run-up to the crisis.

**Figure 2.1. Household Saving Rate: National Accounts**  
(Percent of disposable income)

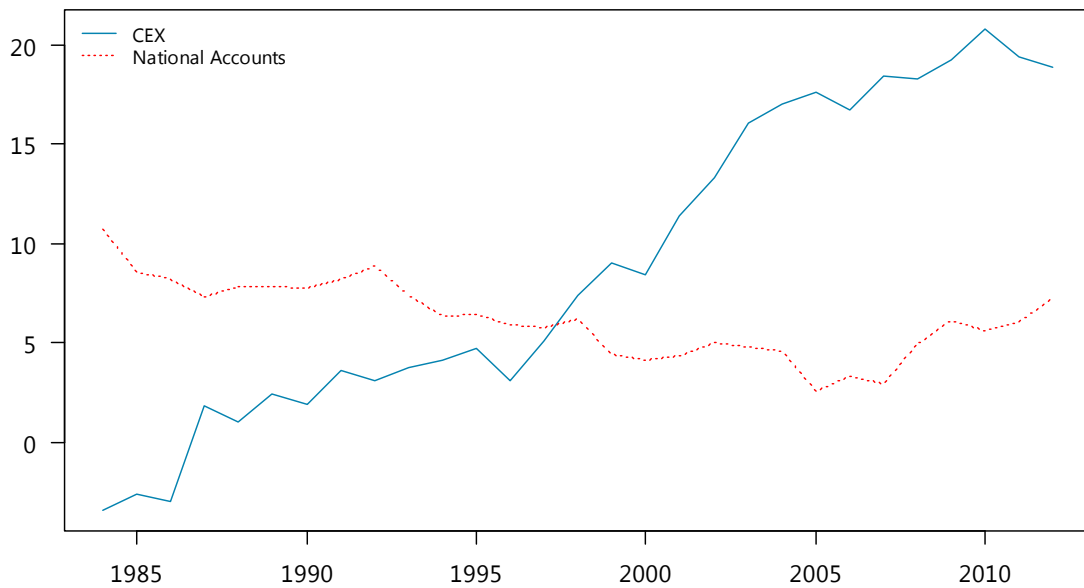


<sup>6</sup>A theoretical model is set out in Kumhof, Ranciere, and Winant (2013).

**Figure 2.2 Current Account and Household Saving-Investment-Balance**  
(Percent of GDP)



**Figure 2.3. Household Saving Rate: National Accounts vs CEX**  
(Percent of disposable income)

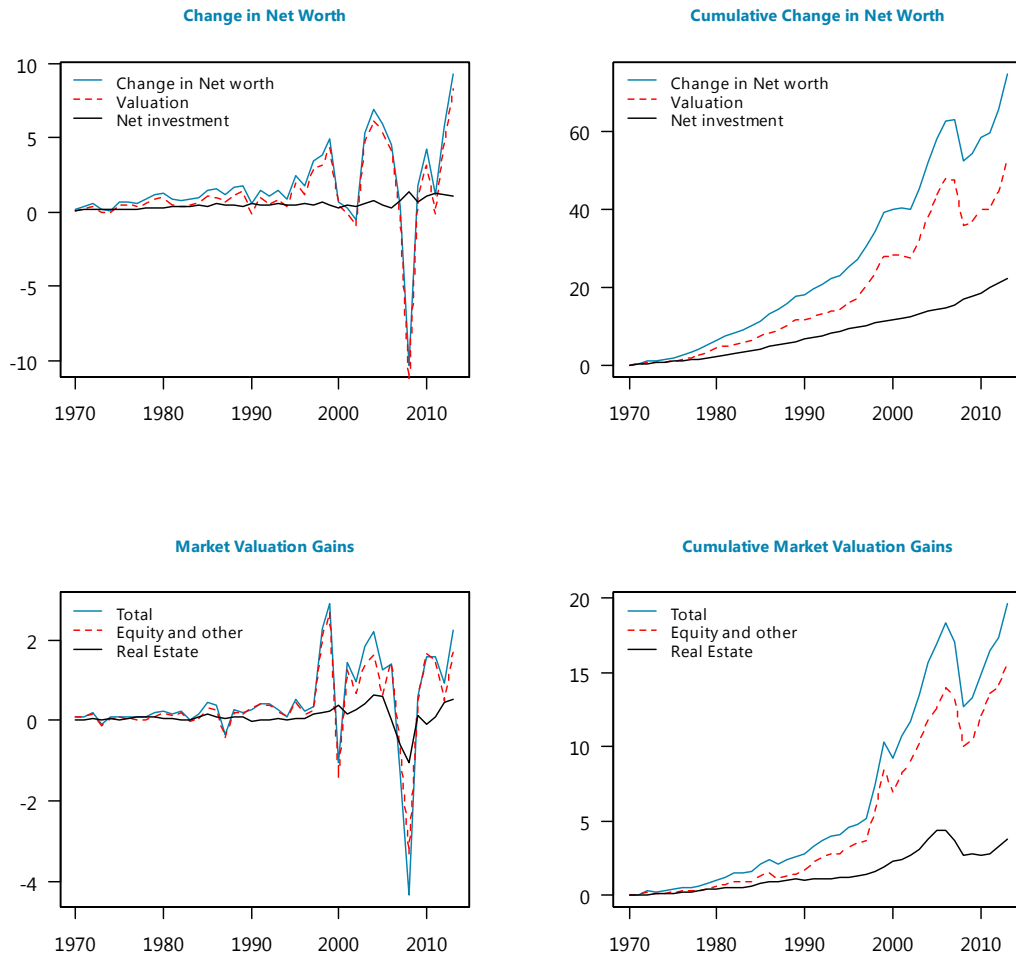


For this type of analysis, the standard source is the Consumer Expenditure Survey (CEX). This survey has considerable advantages, in that it provides a rich set of micro data that one can use it to track all the key aspects of household behavior, broken down by income group.

That is why it is used in most of the standard works on the subject, including Mian and Sufi (2014). Strikingly, this source provides a completely different answer than the NIA data. On an aggregate basis, the CEX suggests that the household saving rate actually *increased* before the crisis, by a considerable amount (Figure 2.3).

But it seems unlikely that saving increased, for several reasons. To begin with, it is well-known in the literature that (i) the CEX data underreports consumption, particularly among the well-off; and (ii) this underreporting has increased over time. As a result, the apparent rise in the saving rate may simply represent an increased underreporting of consumption. Moreover, rising saving is inconsistent with the overall portrait of the US economy painted by the NIPA. For example, if household saving actually soared during the decade before the crisis, it is hard to understand why the current account deficit increased so sharply.

**Figure 2.4. Drivers of Net Worth**  
(Trillions of US dollars)



## B. Data Definitions

Partly for these reasons, some authors employ evidence from the Survey of Consumer Finances (SCF). The problem with using the SCF, however, is that it does not have data on saving *per se*. Rather, it only has data on changes in wealth. These two concepts may seem similar, but they are actually quite different. Wealth can certainly change because households save a part of their income and acquire new assets. But it can also change because households receive capital gains as the price of their existing assets rises. And, as an empirical matter, the second factor has proved far more important. Figure 2.4 shows that capital gains explain the vast bulk of the changes in household wealth over the past three decades, with saving playing only a minor role. As a result, saving and wealth changes may not move in tandem.

Indeed, *positive* changes in net wealth can be associated with *negative* saving. Consider a simple example. Say that a family normally saves 10 percent of its income of \$400,000, or \$40,000 per year. But let's say that a run up in the stock market doubles its wealth from \$1 million to \$2 million. It may well consume a small portion of those capital gains, say \$50,000. In that case, its consumption exceeds its income by \$10,000—i.e., it is dissaving. So, much of the reported “saving” by the rich (i.e., changes in their wealth) may not have reflected any true saving, but rather large capital gains on their portfolios.

## C. Assessment

For these reasons, it is critically important to decide whether to focus on saving or changes in wealth. Practices vary, depending on the precise question that needs to be answered. For example, if households may have target wealth ratios, and are indifferent to whether they achieve these target through saving or capital gains, then it might make sense to look at changes in wealth when investigating the “saving” behavior of different income groups, as indeed Dynan *et al* (2004) did.<sup>7</sup> But for the present purposes, where the aim is to explain the macro aggregates, it makes more sense to define saving according to the NIPA methodology. In other words, we will assume that the household saving rate indeed went down before the crisis.

## III. WHY DID THE SAVING RATE FALL?

If we accept that the aggregate household saving rate declined in the pre-crisis years, we then have to explain why this happened, even as there was a shift in income distribution towards the (presumably) high-saving rich. The standard explanation, from the inequality narrative, is that the reduction in saving by the middle class outweighed the rise in the saving of the rich. In our view, the more likely explanation was that the reduction in middle class saving was accompanied by a decline in the saving rate of the rich.

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<sup>7</sup> Dynan *et al* (2004), using both the CEX and SCF databases, found that the rich did indeed have extraordinarily high “saving” rates, by as much as 24 percent on some measures.

### A. Saving Rate Arithmetic

There are several reasons why it is problematic to attribute the fall in aggregate saving rate entirely to the behavior of the middle class. For a start, there is a timing problem: one would need to explain why the middle class reduced its saving in the decades *before* housing boomed and borrowing took off. More fundamentally, the arithmetic seems implausible. Simply put, the rich now accounts for such a large share of income that it is now very difficult for their saving rate to deviate too far from the overall average.

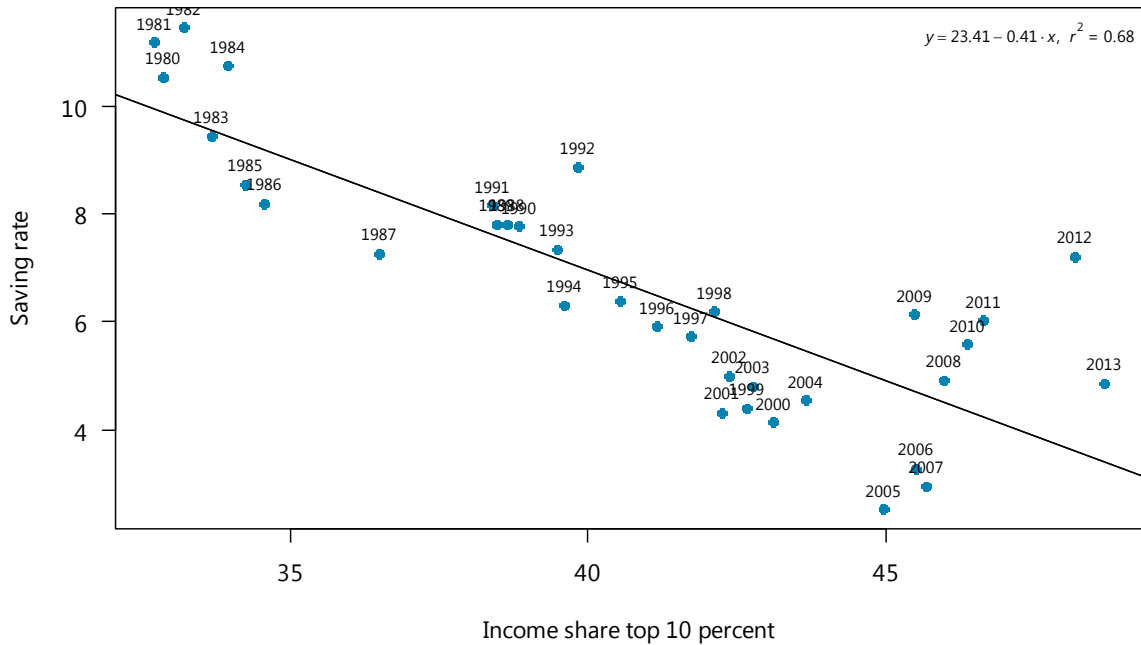
To see this point, consider the following. In the early 1980s the overall saving rate was around 10 percent, and the income share of the rich was about one-third. By 2010, the aggregate saving rate had fallen to around 5 percent while the income share of the rich had increased to around one-half.

- It is unlikely that the saving rate of the middle class (as we shall term the bottom 90 percent) was above 10 percent in 1980 or below 0 percent in 2010.<sup>8</sup> If it was above 10 percent in 1980, then the saving rate of the rich must have been less than 10 percent—i.e., lower than that of the middle class. The saving rate of the middle class is unlikely to have been negative in 2010, given that this group was paying down debt.
- Given these constraints, the only scenario in which the decline in the saving rate was solely driven by the middle class is one in which saving rate of the rich remained constant at 10 percent, and that of the middle class declined from 10 percent to 0 percent.
- But this implies that in the early 1980s the saving rate of the rich was the same as that of the middle class—which violates a key assumption of the traditional inequality narrative.
- If we assume instead that the saving rate of the rich was well above that of the middle class in 1980, then it follows that the saving rate of the rich must have declined as well between 1980 and 2010. As a numerical example, let's assume that in 1980 the saving rate of the middle class was 6 percent and that of the rich was 18 percent. If in 2010, the saving rate of the middle class was 0 percent, it follows that the saving rate of the rich must have fallen to 10 percent—i.e., even more than that of the middle class.

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<sup>8</sup> Scenarios are necessary because NIPA does not provide saving or consumption by income group.

**Figure 3.1. Income Share Top 10 Percent and Household Saving Rate**



Relatedly, if the saving rate of the rich had remained constant, it is difficult to explain why the correlation between distribution and (NIPA-measured) saving *over* the past three decades has been strongly *negative*—the greater the income share of the rich, the lower aggregate saving (Figure 3.1). By contrast, if the saving rate of the rich has trended down, this could have offset the impact of the shift in income toward the rich on the aggregate saving rate.

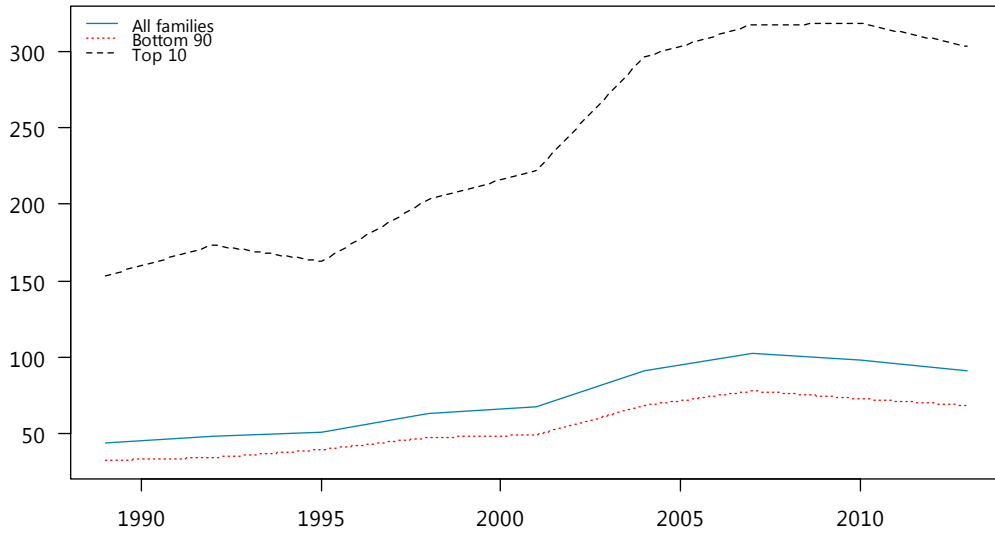
## B. Empirical Evidence

Empirical studies that have tried to quantify middle class behavior have found that it explains only a portion of the changes in the saving rate. For example, Belabed *et al* (2013) find that “top-down consumption spillover effects”, that is to say the attempt of middle class households to compensate for the fact that median incomes were growing so slowly, reduced middle class saving by around 3 percent by the mid-2000s. But this would account for only a small share of the roughly 10 percentage point decline in aggregate saving from the early 1970s to the mid-2000s, especially since the middle class accounts for only a portion of overall saving. Bertrand and Morse (2011) find larger effects, which explain up to one-quarter of the decline in the saving rate over the last three decades. But that still leaves three-quarters of the decline unexplained.

At the same time, available data suggests that the saving rate of the rich may have indeed declined during the boom years. In particular, the Flow of Funds shows that before the crisis the debt of the rich actually increased as rapidly as that of the middle class (Figure 3.2).



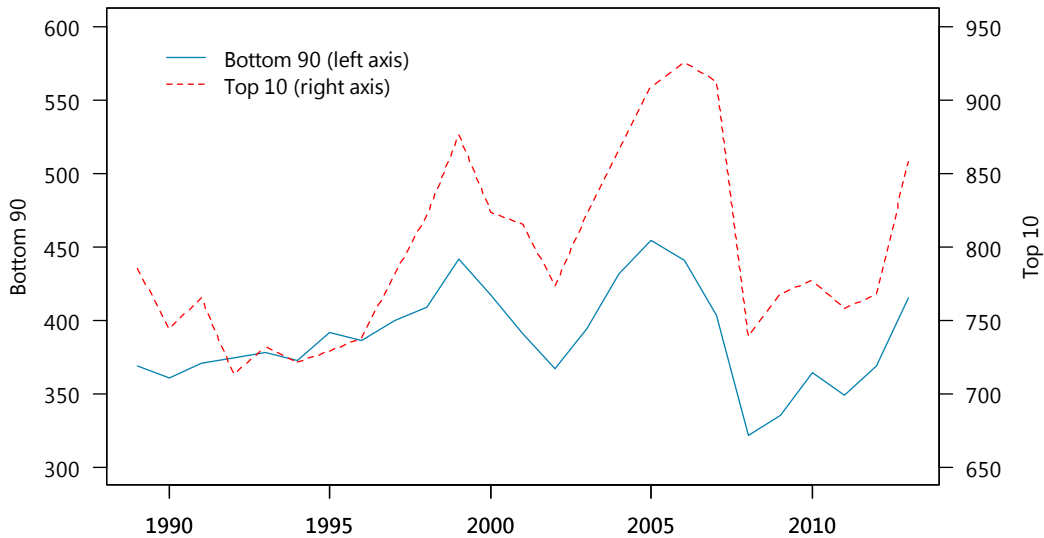
**Figure 3.2. US: Average Household Debt**  
(Thousands of US dollars)



**C. Wealth Effects**

But why would the rich have reduced their saving rate, even at a time when their incomes were rising rapidly? The wealth narrative offers a plausible explanation: they were responding to the surge in their wealth. The wealth to income ratio of the top 10 percent soared from 721 percent in 1994 to 912 percent in 2007. By contrast, the wealth to income ratio of the bottom 90 percent increased from 373 to 404 percent only (Figure 3.3).

**Figure 3.3. Wealth to Income Ratios Top 10 and Bottom 90**  
(Percent of disposable income)



To see the impact of the wealth increase on the saving rate, consider a typical consumption function, where consumption ( $C$ ) depends on income ( $Y$ ) and wealth ( $W$ ):

$$C = \beta Y + \gamma W \quad (1)$$

In this case,  $\beta$  is the marginal propensity to consume (MPC) out of income and  $\gamma$  is the marginal propensity to consume out of wealth. Since saving ( $S$ ) is income less consumption, the equation can also be written:

$$\frac{S}{Y} = (1 - \beta) - \gamma \frac{W}{Y} \quad (2)$$

Assuming the marginal propensity to consume out of income remained constant for the top 10 and the bottom 90, we can then calculate the impact of rising wealth on the saving rate:

- The wealth to income ratio of the top 10 percent soared by about 200 percentage points between 1994 and 2007 (Figure 3.3).<sup>9</sup> Assuming standard estimates for the elasticity of consumption with respect to wealth of 2–6 percent, this would suggest that the saving rate of the rich fell by 4–12 percentage points.
- By contrast, the wealth to income ratio of the bottom 90 percent increased by about 30 percentage points only. Assuming the same elasticities of consumption with respect to wealth, this would suggest that the saving rate of the bottom 90 fell by 0.6–1.8 percentage points only.

#### IV. A NEW SYNTHESIS

In sum, explaining the Great Recession requires elements of both narratives. Without doubt, as the inequality narrative stresses, the middle class overborrowed before the crisis, perhaps in response to stagnating incomes. But the saving rate of the rich must also have fallen, the result of tremendous wealth effects. Indeed, there's an important point that neither narrative stresses: if the saving rate of the rich followed the same cycle as that of the middle class, then rich must have played a key role in driving the consumption boom-bust because they were the group that received the bulk of the income and wealth gains during this period (Figure 4.1).

To demonstrate this empirically, we use a consumption function that incorporates elements of both the inequality and the wealth narratives. In line with the inequality narrative, we assume that the MPC out of income for the rich is lower than that of the poor. At the same time, we assume that consumption also depends on wealth.

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<sup>9</sup> This increase was far sharper than that for the middle class (from 341 percent to 398 percent).

We specify the consumption function in log terms:

$$\text{LOG}(C_t) = \alpha + \beta^r \text{LOG}(Y_t^r) + \beta^m \text{LOG}(Y_t^m) + \gamma \text{LOG}(W_t) \quad (4)$$

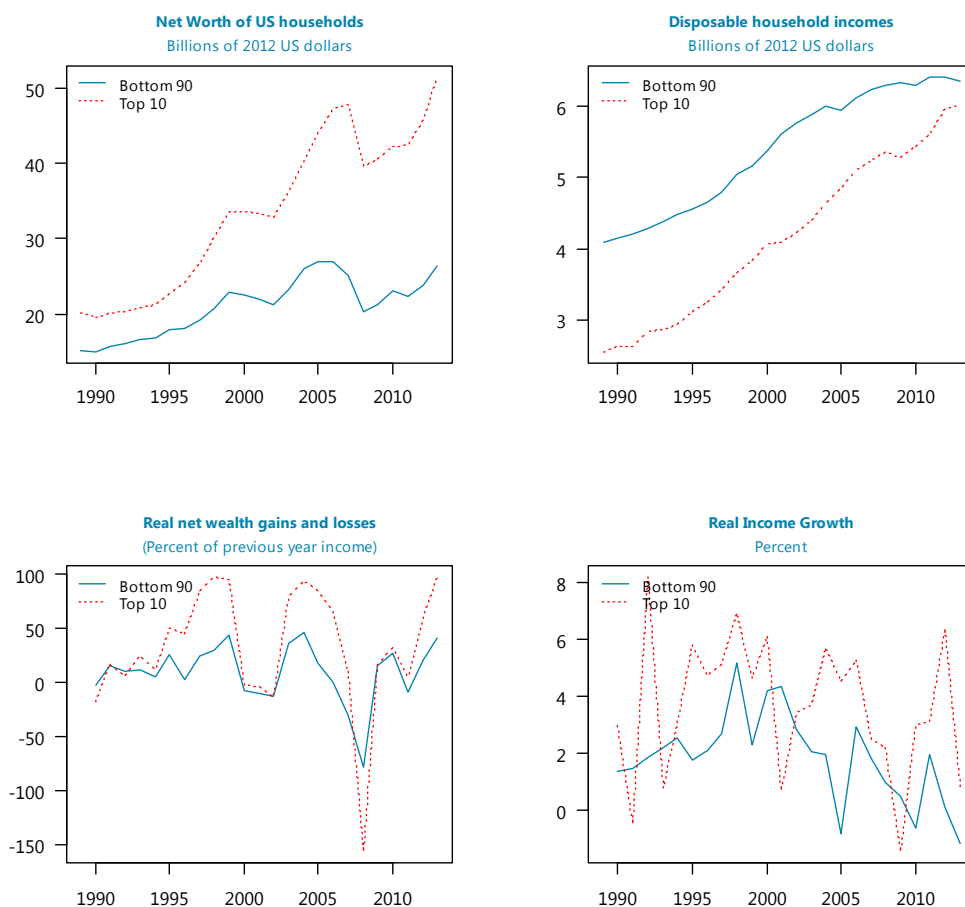
We allow the rich and the middle class to have different marginal propensities to consume out of income. In contrast, we assume that the marginal propensity to consume out of *wealth* is the same for both groups.<sup>10</sup>

Of course, this model leaves out many features that have played an important role in the Great Recession. For example, it does not take into account the serious ramifications for households whose house prices have “gone underwater”, as stressed by many authors, including Mian and Sufi (2014). Nor does it allow for financial constraints, which can impair households’ ability to consume out of their wealth, especially during recessions. Nor does it allow for dynamics, that is to say lags between changes in wealth and consumption.

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<sup>10</sup> We assume that the marginal propensities are constant throughout the estimation period. Without data on consumption of the two groups it is impossible to test this hypothesis, but the fact that the model fits well (see below) suggests that the assumption is reasonable.

**Figure 4.1. US: Net Worth and Income of Bottom 90 and Top 10**



As discussed in Section II, there is no single official dataset that tracks consumption, income and wealth by income group *and* is consistent with macro data. Accordingly, we employ the following data strategy (for details, see Annex):

- US aggregate consumption and income data are taken from the National Income and Product Accounts, while aggregate wealth data comes from the Flow of Funds.
- Wealth distribution is calculated using the tri-annual Survey of Consumer Finances.<sup>11</sup>

<sup>11</sup> We calculated the share of financial assets, nonfinancial assets and debt held by the top 10 percent and bottom 90 percent for the years 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010 and 2013, using the 2013 version of Federal Reserve Board's triennial "Survey of Consumer Finances" ([http://www.federalreserve.gov/econresdata/scf/scf\\_2010.htm](http://www.federalreserve.gov/econresdata/scf/scf_2010.htm)). We interpolated the shares for intermediate years. We applied these shares to the total financial assets, nonfinancial assets and liabilities in the "Balance Sheet of Households and Nonprofit Organizations" (Table B100) from the Federal Reserve "Financial

(continued...)

- The income distribution data comes from the Saez and Piketty (2014) database.

We employ fully modified least squares (FMOLS), a technique designed to provide optimal estimates of cointegrating equations. The method modifies least squares to account for serial correlation effects and for the endogeneity in the regressors that results from the existence of a cointegrating relationship.

Dependent Variable: LCR  
Method: Fully Modified Least Squares (FMOLS)  
Date: 09/19/14 Time: 12:12  
Sample (adjusted): 1991 2013  
Included observations: 23 after adjustments  
Cointegrating equation deterministics: C  
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth  
= 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
gamma	0.142347	0.025758	5.526349	0.0000
Beta_m	0.582020	0.067588	8.611323	0.0000
Beta_r	0.326260	0.038224	8.535361	0.0000
alpha	-0.200752	0.255109	-0.786925	0.4410
R-squared	0.999040	Mean dependent var		9.076191
Adjusted R-squared	0.998888	S.D. dependent var		0.206309
S.E. of regression	0.006880	Sum squared resid		0.000899
Durbin-Watson stat	1.437242	Long-run variance		5.44E-05

The estimated model fits the data well. The top panel shows of Figure 4.2 shows that the consumption to income rate implied by the model closely tracks the actual consumption rate, particularly after the mid-1990s. The bottom panel compares the growth rate implied by the model with the actual growth rate of consumption. Once again, the fit is close. Strikingly, in both cases, the model has no difficulty explaining even the crisis period after 2008.

As a further encouraging sign, the estimated parameters are broadly in line with the literature:

- The elasticity of (total) consumption with respect to middle class income is 0.58. Given an average consumption/income ratio of about 0.90 and an average income share of the middle class of about 0.55 this implies a marginal propensity to consume of 95 percent.<sup>12</sup>

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Accounts of the United States” (<http://www.federalreserve.gov/RELEASES/z1/Current/>), and used these to calculate net worth for the top 10 percent and bottom 90 percent.

<sup>12</sup> Assume aggregate disposable income is 100 (55 is by the middle class, and 45 by the rich); and consumption is 90. A ten percent increase of middle class income (5.5) will raise consumption by 5.8 percent (5.2), implying a MPC of 95 percent (5.2/5.5).

- The elasticity of consumption to the income of the rich is 0.33, which translates to an MPC of 65 percent.<sup>13</sup> As expected, this is much lower than that for the middle class.
- Other papers using very different approaches get similar results. For example, Davis and Palumbo (2001) estimate a life cycle model using the Stock-Watson procedure, and find that the MPC out of income is 0.83, for the rich and middle class combined.
- Finally, the implied marginal propensity to consume out of wealth is 2.2 percent,<sup>14</sup> compared to standard estimates ranging from 2 to 6 percent.<sup>15</sup>

Summarizing, the empirical model performs relatively well. Moreover, the estimated parameter for the marginal propensity to consume out of wealth is at the lower end of what is found in the literature, which means that it could be underestimating wealth effects. This seems a suitably conservative approach. So, let's draw out the implications of these results.

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<sup>13</sup> Continuing the example in the previous footnote, a 10 percent increase in the income of the rich (4.5) will raise consumption by 3.2 percent (2.9), implying a MPC of 65 percent (2.9/4.5).

<sup>14</sup> The average wealth to income ratio over the time period is about 575 percent. Continuing from the previous footnotes, if wealth increases by 10 percent (57.5), consumption increases by 1.42 percent (1.28), implying a MPC of 2.2 percent (1.28/57.5).

<sup>15</sup> See Lettau and Ludvigson (2004) for a literature review.

**Figure 4.2.US: Fit of the Model**

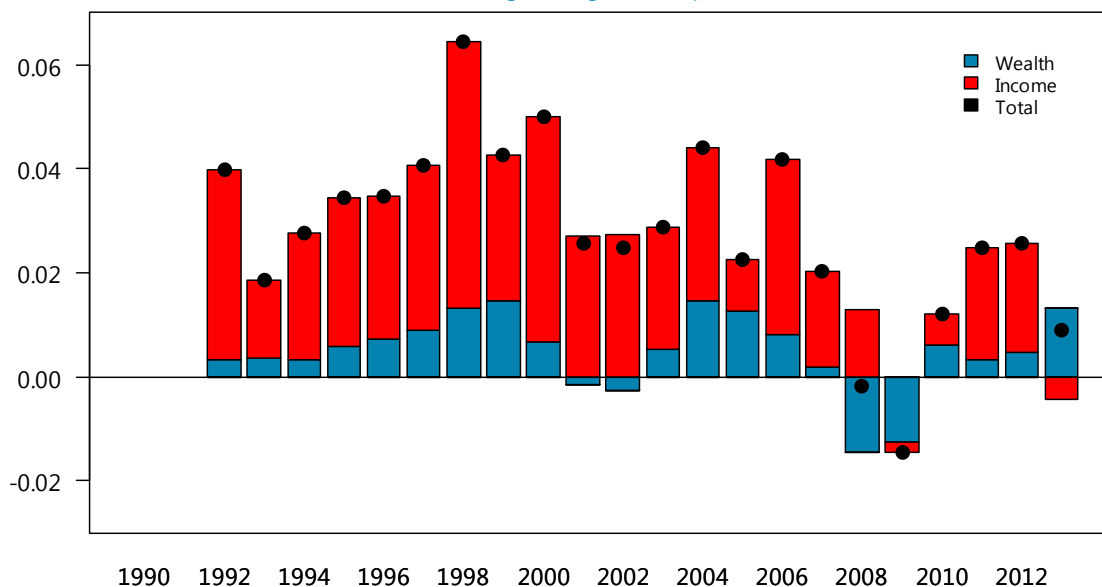
## V. EXPLAINING THE GREAT RECESSION

This model can shed considerable light on the US boom-bust that ended in the Great Recession, notably with respect to the roles played by wealth effects and the rich.

### A. Role of Wealth

The model results confirm the important role of wealth changes in the business cycle. Figure 5.1 shows that most of the time consumption is determined mainly by income (red bars). But the picture changes markedly around cyclical peaks and at the outset of downturns. During booms such as the late 1990s and mid-2000s, asset prices rise, driving an increase in wealth which then spurs a further increase in consumption, intensifying the boom. During slumps, wealth falls and saving rises, intensifying the slump. In fact, the results suggest that during 2009–10 the fall in wealth accounted for nearly all of the drop in consumption.

**Figure 5.1. Consumption Growth: Contribution Wealth and Income**  
(Change in Log(Consumption))



### B. Role of the Rich

Next, we use the model to calculate the role of the rich in driving consumption. We would expect a significant role, simply because their income and wealth gains have been so much larger than of the middle class (Figure 4.1).

- Between 1993 and 2013, the real income of the rich increased by \$2.5 trillion compared with \$1.7 trillion for the middle class. In the second half of this period (the last decade) the difference became even more pronounced—\$1.7 trillion for the top 10 percent and \$1.0 trillion for the middle class.

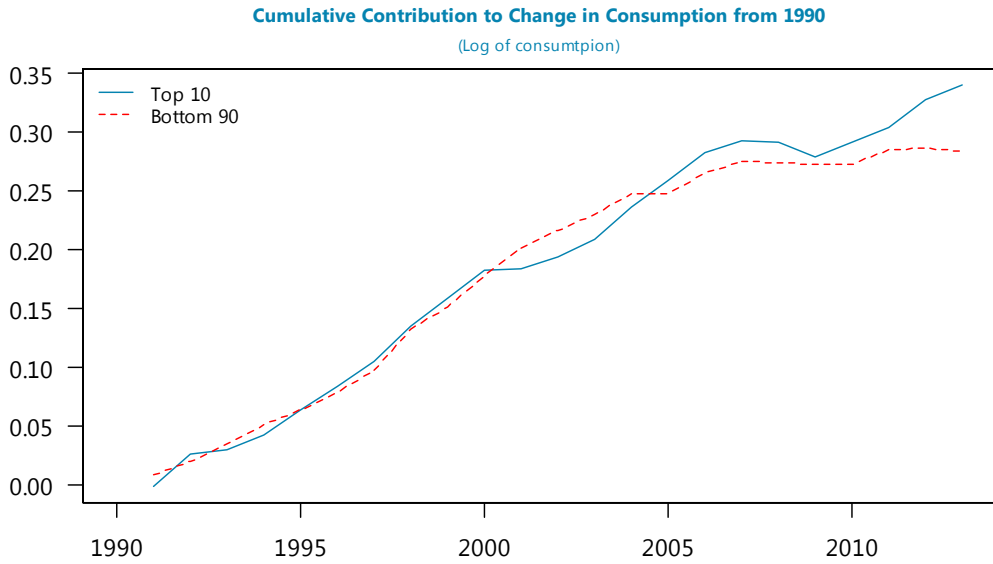
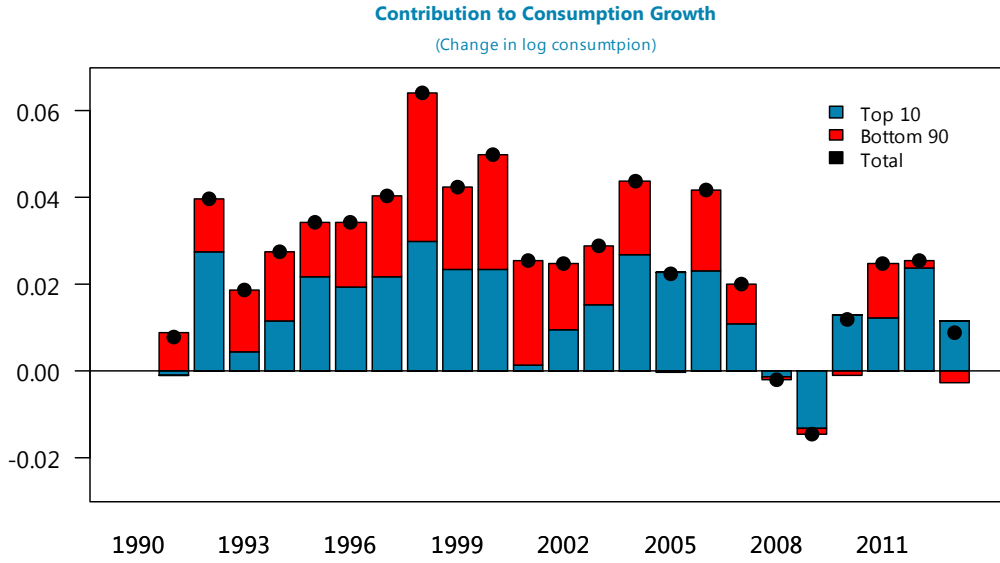


- Between 1993 and 2013, the real wealth of the rich increased by \$30.7 trillion, triple the \$9.8 trillion accrued by the middle class.
- As a result, the wealth to income ratio of the rich soared from 660 percent in 1994 to 900 percent in 2007, despite the rapid increase in their income. By contrast, the ratio for the middle class increased much more modestly, from 341 percent to 398 percent.

The model suggests something truly striking: the top decile explains the *bulk* of overall consumption growth (Figure 5.2).

- Between 1993 and 2003, about 55 percent of the increase in consumption came from the rich. In the last ten years, the share was even larger (71 percent).
- Much of the slowdown in consumption between 2006 and 2009 was the result of a drop in consumption of the rich. The rich also played a key role in the subsequent recovery.

**Figure 5.2. Consumption: The Role of the Top 10**



## VI. HOW ROBUST ARE THE RESULTS?

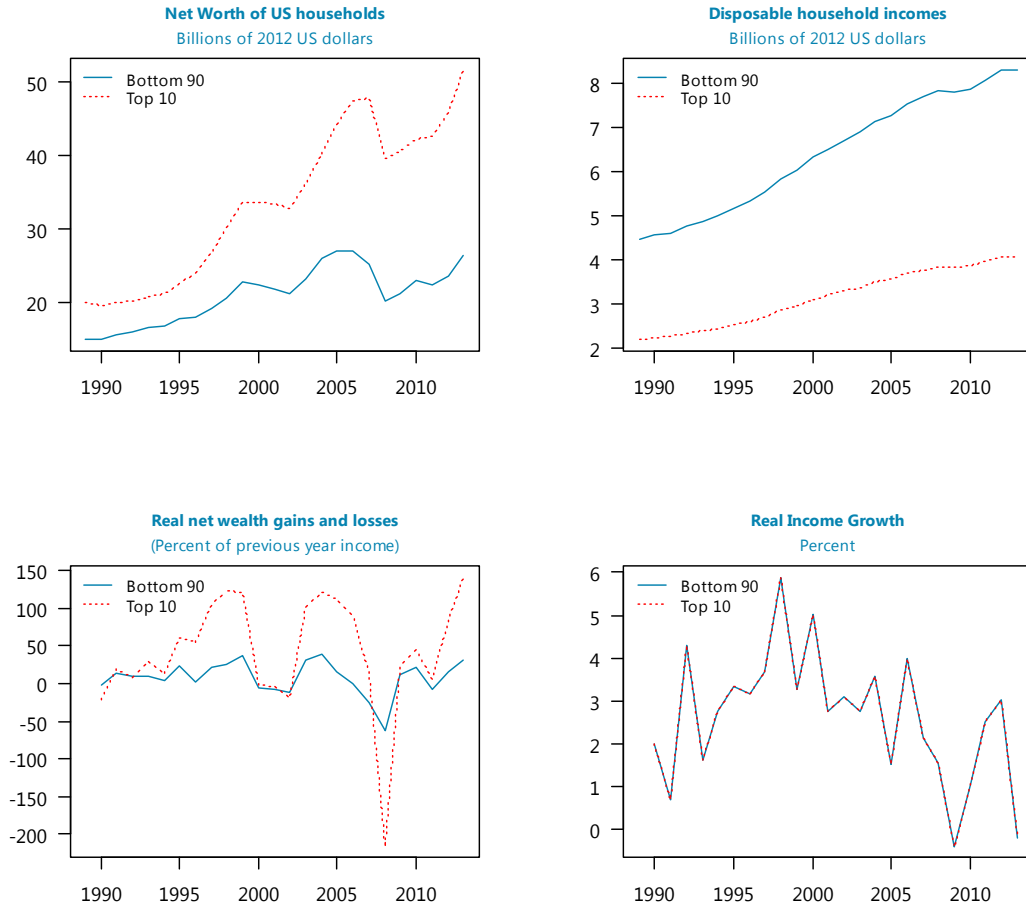
An important question that needs to be considered is the extent to which the results are robust. In fact, the finding that the rich played a large role in the boom and bust depends very little on the precise functional form of the consumption function employed, or on the precise parameters employed. Any standard form or parameters taken from the literature will do. That's because the results are driven mainly by the vastly different trends in the exogenous variables -- the remarkable changes in the fortunes of the rich, and the stagnation of the middle class.

As a result, the validity of the results hinges on the robustness of the distributional data. As noted above, the wealth distribution data comes from the official Flow of Funds accounts, and is widely considered to be authoritative. The income distribution data, however, comes not from official sources but from the Saez and Piketty (2014) database. This is the best and most comprehensive database available. But it has also proved controversial. It is based largely on tax records, and reported income is not quite the same thing as actual income. For example, some of the apparent increase in the earnings of the rich may merely reflect a decision by business owners to shift income from their firms, in response to the reduction in personal income tax rates since the early 1980s. The size of this effect (or other tax avoidance effects) has not yet been quantified, and may not in fact be large. But it remains true that the database is too new for its reliability to have been assessed rigorously.

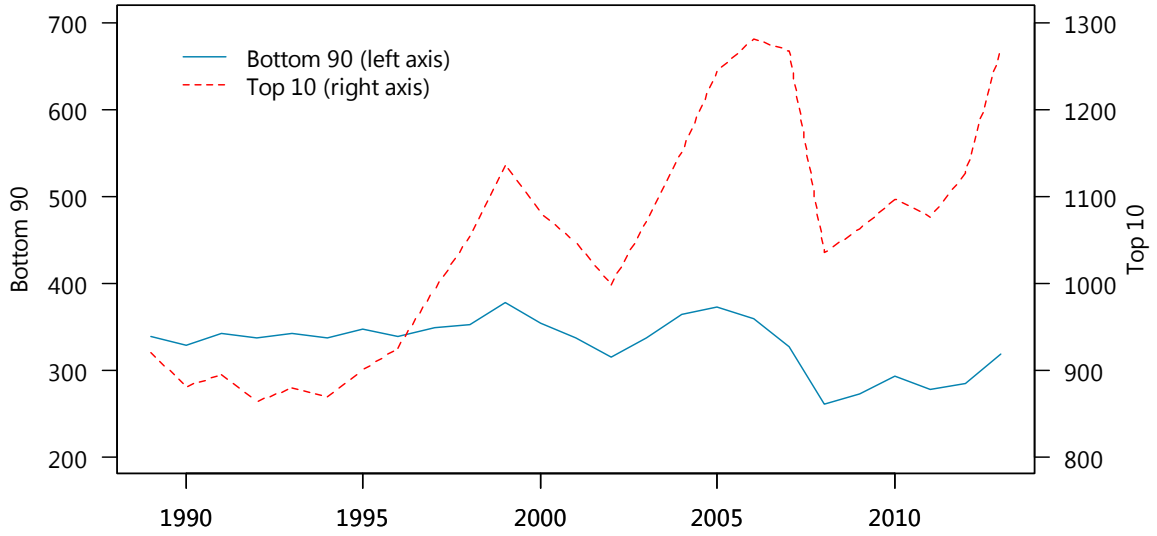
For this reason, it is worth examining the sensitivity of the results to the Saez-Piketty data. As a polar case, consider the possibility that their fundamental claim is incorrect and that there has actually been no change in income inequality since 1980. In that case, income growth for the rich would have been the same as that for the middle class. However, the behavior of their wealth-income ratios would have been very different. The wealth-income ratio of the rich would have risen sharply during the boom and fallen precipitously during the bust (by much more than in the base case, since the large movements in the numerator would be unchanged while the relatively stable denominator would be smaller). Meanwhile, the wealth-income ratio of the middle class would actually have *declined* during the boom period (since the denominator would increase). As a result, wealth effects would have reduced the saving rate of the rich in the run-up to the Great Recession, while boosting the saving rate of the middle class.

Consequently, even in this extreme case, the conclusion would stand: the rich must have played an outsized role in the boom-bust. That's because the results, in fact, are driven mainly by the remarkable rise and fall (and rise) of the *wealth* of the rich. *Incomes* of the rich increased sharply as well, but this is more important for explaining secular trends, not for explaining the boom-bust. In other words, the key lies not so much in what has happened to income over the past three decades, but rather in what has happened to the distribution of wealth.

**Figure 6.1. US: Net Worth and Income of Bottom 90 and Top 10, Assuming Unchanged Income Distribution**



**Figure 6.2. Wealth to Income Ratios Top 10 and Bottom 90, Assuming Unchanged Income Distribution**  
 (Percent of disposable income)



## VII. CONCLUSION

More than six years after Lehman's collapse, the standard narratives of the crisis now seem well entrenched. But they have some serious limitations. The wealth narrative ignores the role of the rich. The inequality mischaracterizes it, and so cannot explain why overall saving fell steadily in the years before the crisis.

This paper has argued that the story is more complex than either narrative allows. Housing played a role, but so did non-financial assets, which actually accounted for the bulk of the loss in wealth. The middle class played a role, but so did the rich. In fact, the rich now account for such a large share of the economy, and their wealth has become so large and volatile, that wealth effects on their consumption have started to have a significant impact on the macroeconomy. Indeed, the rich may have accounted for the bulk of the swings in aggregate consumption during the boom-bust.

This conclusion stands in stark contrast to the conventional narrative, which emphasizes the role of the middle class. A few other studies, however, have similarly found that the rich played a large role in the US boom-bust.

- In a 2005 Citigroup study Kapur, MacLeod and Singh argued that the US, the UK and Canada were “Plutonomies”—economies that were powered by the wealthy.<sup>16</sup> They suggested that wealth effects explained why the saving rate had dropped, despite the sharp rise in income going to the rich: “Feeling wealthier, the rich decide to consume a part of their capital gains right away. In other words, they save less from their income, the well known wealth effect. The key point though is that this new lower savings rate is applied to their newer massive income.”
- In 2006, Mark Zandi, former chief economist of Moody's Economy.com, estimated the savings rate for the top 5 percent—households with an average real income of around 275,000 US dollars. He found that the proportion of after-tax income saved in this group fell from 13.6 percent in 1990 to 6.2 percent in the first quarter of 2006. He attributed this to the wealth effect, which was inducing less saving and more consumption by almost everyone, including those at the very top.<sup>17</sup>

A few popular books have struck the same themes. For example, Frank (2011, p. 157) concludes that “We know then that the wealthy have become the dominant spenders in the U.S. consumer economy, which itself accounts for two-thirds of GDP. And we also know that the spending of the wealthy has become more manic due to their fast-changing fortunes and frivolous splurges during booms. The result is that America's dependence on the rich plus great volatility among the rich equals a more volatile America.”

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<sup>16</sup> By contrast, Continental Europe (ex-Italy) and Japan were in the egalitarian bloc.

<sup>17</sup> Source: [http://www.nytimes.com/2006/08/06/business/yourmoney/06view.html?fta=y&\\_r=0](http://www.nytimes.com/2006/08/06/business/yourmoney/06view.html?fta=y&_r=0).

To be sure, the simple model of consumption behavior employed in this paper should not be taken literally. It is not possible for two simple variables to explain the size of the boom, or why the bust thereafter was so painful. In particular, financial constraints on consumption are entirely absent, even though they might seem to be at the heart of the story. A more complete model would also need to take into account the fact that wealth is not truly exogenous, but rather depends on the expected future course of the economy itself.

Further work is needed on the empirical side as well. The paper employs Fully Modified Ordinary Least Squares, which provides consistent estimates of the parameters. But this estimation technique does not allow for some likely aspects of the link between consumption and wealth, such as lagged effects or differences between short-run and long-run behavior.

In addition, better data is needed. This paper traced out wealth effects by estimating parameters, and applying them to wealth and income distributions coming from different databases. Ideally, consistent, official sources of data should be developed, which directly measure consumption, saving, and wealth by income decile. Until this happens, economists will need rely on independent databases on income distribution, such as that of Saez and Piketty. Consequently, an immediately priority would be to assess the reliability of this database. Once there is a consensus, more sophisticated econometrics could be employed to establish rigorously the relationships amongst consumption, wealth, and inequality.

Given these qualifications, the specific results from this paper need to be seen as suggestive rather than definitive, proposing rather than disposing. Still, as long as the basic income and wealth data are correct, the paper's basic finding must surely be robust: the rich cannot be relegated to the periphery of explanations of the Great Recession; they need to be placed at the center of the story.

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## ANNEX. DATA SOURCES

Figure	Variable	Description	Haver code/database code	Source
1.1	Income share top 10 percent	Income share top 10 percent		Edward Saez and Thomas Piketty (2003), with tables and figures updated to 2012 at <a href="http://elsa.berkeley.edu/~saez/TabFig2012prel.xls">http://elsa.berkeley.edu/~saez/TabFig2012prel.xls</a> . Table A1: Top fractiles income shares (excluding capital gains) in the United States. For 2013, we assumed a further increase in the share of 0.5 percentage points—the average of the previous 3 years.
	Wealth share top 10 percent	Wealth share top 10 percent		We calculated the share of financial assets, nonfinancial assets and debt held by the top 10 and bottom 90 percent for the years 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010, and 2013, using the 2013 version of Federal Reserve Board's triennial "Survey of Consumer Finances" ( <a href="http://www.federalreserve.gov/econresdata/scf/scfindex.htm">http://www.federalreserve.gov/econresdata/scf/scfindex.htm</a> ). We interpolated the shares for intermediate years. We applied these shares to the financial assets, nonfinancial assets and liabilities in the "Balance Sheet of Households and Nonprofit Organizations" (Table B100) from the Federal Reserve "Financial Accounts of the United States" ( <a href="http://www.federalreserve.gov/RELEASES/z1/Current/">http://www.federalreserve.gov/RELEASES/z1/Current/</a> ), and used these to calculate net worth for the top 10 and bottom 90 percent.
	Median household income	Median household income, in thousands of 2012 dollars		U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, <a href="http://www.census.gov/hhes/www/income/data/historical/household/H08_2012.xls">http://www.census.gov/hhes/www/income/data/historical/household/H08_2012.xls</a>
	Loan delinquency rate	Loan Delinquency Rate: Residential Real Estate Loans: All Comm Bank (SA,%)	DQRR@USECON	Federal Reserve Board
	Household saving rate	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board
	Household debt	US: Ratio of Household & Nonprofit Debt to SAAR Gross Disposable Income (%)	USADHI@USECON	Federal Reserve Board
1.2	Household saving rate	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board
	Household net worth to disposable income	Households & Nonprofit Org: Net Worth as a % of Disposable Personal Income (%)	RWTHDSPA@FFUNDS	Federal Reserve Board/Haver Analytics
1.3	Net worth	Households and Nonprofit Organizations: Net Worth (NSA, Bil.\$)	PA15CDA5@FFUNDS	Federal Reserve Board
	Assets	Households and Nonprofit Organizations: Assets (NSA, Bil.\$)	PA15TAA5@FFUNDS	Federal Reserve Board
	Liabilities	Households and Nonprofit Organizations: Liabilities (NSA, Bil.\$)	PL15TAO5@FFUNDS	Federal Reserve Board
	Financial assets	Households and Nonprofit Organizations: Financial Assets (NSA, Bil.\$)	PA15TAO5@FFUNDS	Federal Reserve Board
	Nonfinancial assets	Households and Nonprofit Organizations: Nonfinancial Assets (NSA, Bil.\$)	PA15TAN5@FFUNDS	Federal Reserve Board
	Real estate	Households & Nonprofit Organizations: Total Real Estate Holdings (NSA, Bil.\$)	PA15TTR5@FFUNDS	Federal Reserve Board
1.4	Financial assets	Households and Nonprofit Organizations: Financial Assets (NSA, Bil.\$)	PA15TAO5@FFUNDS	Federal Reserve Board
	Nonfinancial assets	Households and Nonprofit Organizations: Nonfinancial Assets (NSA, Bil.\$)	PA15TAN5@FFUNDS	Federal Reserve Board
2.1	Household saving rate	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board
2.2	Current account	IMF, WEO Database		IMF, WEO Database
	Household saving rate	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board

## ANNEX. DATA SOURCES (concluded)

2.3	Household saving rate, NIPA	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board
	Household saving rate, CEX	Calculated as 100*(after tax income-expenditure)/after tax income After tax income Expenditure	CXUTOTALEXPLB0101M CXUINCAFTTXLB0101M	Bureau of Labor Statistics, <a href="http://www.bls.gov/cex/#data">http://www.bls.gov/cex/#data</a> Bureau of Labor Statistics, <a href="http://www.bls.gov/cex/#data">http://www.bls.gov/cex/#data</a>
2.4	Change in net worth	Households, Nonprofit Organizations: Change in Net Worth (NSA, Bil.S)	ND15CDA5@FFUNDS	Federal Reserve Board
	Net investment	Households: Net Investment Flow, Balance Sheet Basis (NSA, Bil.S)	NA15NDS5@FFUNDS	Federal Reserve Board
	Valuation	Calculated as difference between change in net worth and net investment		
	Market valuation gains, total	Chg in Net Worth of HH & Nonprofits: Holding Gains on Assets at Mkt Val(NSA,Bil\$)	NC15FRT5@FFUNDS	Federal Reserve Board
	Market valuation gains, real estate	Change in Net Worth of Households and Nonprofits: Holding Gains on Assets at Mkt Val: Real Estate (NSA, Bil\$)	NC15KUM5@FFUNDS	Federal Reserve Board
	Market valuation gains, equity and other	Calculated as difference between total valuation gains and gains on real estate		
3.1	Household saving rate	Personal Saving as % of Disposable Pers Inc[NIPA concept/NIPA data](SA, %)	FQ15ACY6@FFUNDS	Federal Reserve Board
	Income share top 10 percent	Income share top 10 percent		Edward Saez and Thomas Piketty (2003), with tables and figures updated to 2012 at <a href="http://elsa.berkeley.edu/~saez/TabFig2012prel.xls">http://elsa.berkeley.edu/~saez/TabFig2012prel.xls</a> . Table A1: Top fractiles income shares (excluding capital gains) in the United States
3.2	Household debt	Household debt for bottom 90 and top 10 percent		We calculated the share of debt held by the top 10 and bottom 90 percent for the years 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010, and 2013, using the 2013 version of Federal Reserve Board's triennial "Survey of Consumer Finances" ( <a href="http://www.federalreserve.gov/econresdata/scf/scfindex.htm">http://www.federalreserve.gov/econresdata/scf/scfindex.htm</a> ). We interpolated the shares for intermediate years.
3.3	Net worth	Net worth, bottom 90 and top 10		We calculated the share of financial assets, nonfinancial assets and debt held by the top 10 and bottom 90 percent for the years 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010, and 2013, using the 2013 version of Federal Reserve Board's triennial "Survey of Consumer Finances" ( <a href="http://www.federalreserve.gov/econresdata/scf/scfindex.htm">http://www.federalreserve.gov/econresdata/scf/scfindex.htm</a> ). We interpolated the shares for intermediate years. We applied these shares to the financial assets, nonfinancial assets and liabilities in the "Balance Sheet of Households and Nonprofit Organizations" (Table B100) from the Federal Reserve "Financial Accounts of the United States" ( <a href="http://www.federalreserve.gov/RELEASES/z1/Current/">http://www.federalreserve.gov/RELEASES/z1/Current/</a> ), and used these to calculate net worth for the top 10 and bottom 90 percent.
	Income	Income top 10 and bottom 90		We used the income share of the top 10 percent from Edward Saez and Thomas Piketty (2003), with tables and figures updated to 2012 at <a href="http://elsa.berkeley.edu/~saez/TabFig2012prel.xls">http://elsa.berkeley.edu/~saez/TabFig2012prel.xls</a> . For 2013, we assumed a further increase in the share of 0.5 percentage points--the average of the previous 3 years. We applied these shares to US household disposable income, deflated by
4.1	Real income	Real income top 10 and bottom 90		Income: We used the income share of the top 10 percent from Edward Saez and Thomas Piketty (2003), with tables and figures updated to 2012 at <a href="http://elsa.berkeley.edu/~saez/TabFig2012prel.xls">http://elsa.berkeley.edu/~saez/TabFig2012prel.xls</a> . We applied these shares to US household disposable income, deflated by
	Price deflator	Personal Consumption Expenditures: Chain Price Index (2009=100)	JAC@USECON	Bureau of Economic Analysis
	Household disposable income	Households & Nonprofit Organizations: Disposable Personal Income (SAAR, Bil.S)	NB15DSP5@FFUNDS	Federal Reserve Board
	Net worth	Households and Nonprofit Organizations: Net Worth (NSA, Bil.S)	PA15CDA5@FFUNDS	Federal Reserve Board
	Real net worth	Real net worth, bottom 90 and top 10		We calculated the share of financial assets, nonfinancial assets and debt held by the top 10 and bottom 90 percent for the years 1989, 1992, 1995, 1998, 2001, 2004, 2007 and 2010, using the 2010 version of Federal Reserve Board's triennial "Survey of Consumer Finances" ( <a href="http://www.federalreserve.gov/econresdata/scf/scf_2010.htm">http://www.federalreserve.gov/econresdata/scf/scf_2010.htm</a> ). We interpolated the shares for intermediate years, and assume share are constant for years after 2010. We applied these shares to the financial assets, nonfinancial assets and liabilities in the "Balance Sheet of Households and Nonprofit Organizations" (Table B100) from the Federal Reserve "Financial Accounts of the United States" ( <a href="http://www.federalreserve.gov/RELEASES/z1/Current/">http://www.federalreserve.gov/RELEASES/z1/Current/</a> ), and used these to calculate net worth for the top 10 and bottom 90 percent.