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GLOBAL MACRO MATTERS

The Surprisingly Restrained U.S. Consumer: A Source of Stability for the Global Economy?

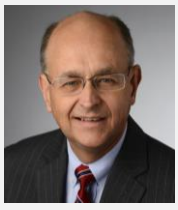
With the recent 10-year anniversary of Lehman Brothers' failure, it's useful to step back and assess how the global economy and financial system are different than they were a decade ago. In this paper, we examine a difference that has powerful implications for economic performance. ***Specifically, one seismic shift since the crisis has been a sustained retrenchment by U.S. consumers. Many of the imbalances before the crisis have been reversed.***

We also document that in recent years the U.S. household saving rate has been higher than historical relationships suggest, and household indebtedness has been significantly lower. In the years immediately following the financial crisis, households deleveraged and cleaned up their balance sheets. A new paradigm with lower debt levels and more saving has emerged. ***The upshot is that U.S. consumption has grown at a solid pace, but unlike many previous cycles, has not boomed. This relatively disciplined performance has contributed to the moderate pace of overall GDP growth during this expansion and the longevity of the cycle.***

In assessing these results, one concern is that consumers may ultimately revert to previous spending patterns. This raises the question of what is driving the more restrained performance? Some broad forces are at work. First, consumers seem to have internalized lessons from the financial crisis and are managing their balance sheets more cautiously. Second, in the face of intensified regulatory scrutiny, financial institutions have pulled back on credit availability. One prominent risk is that key stakeholders—households, financial institutions, and regulators—eventually forget the lessons of the crisis. Even so, we are encouraged that, to date, the shift in consumer performance has persisted.

Another concern, which we consider in detail below, is that the aggregate data mask meaningful inequalities—and thus potential vulnerabilities—within the household sector. On average consumers look strong, but many of them face challenges. For example, the bottom 40% of households command only 10-11% of total earnings. The balance sheet strengthening that has been observed over the past decade is particularly concentrated among the top 10-20%. Weaknesses in the lower portions of the income distribution could pose risks to economic growth and financial stability over the medium term.

These issues notwithstanding, for now, we see the more restrained U.S. consumer as a source of stability and resilience for the global economy. With U.S. household disposable income at over $15 trillion, nearly 75% of U.S. GDP and 20% of global GDP, these observations are of first-order importance for the rest of the world as well.



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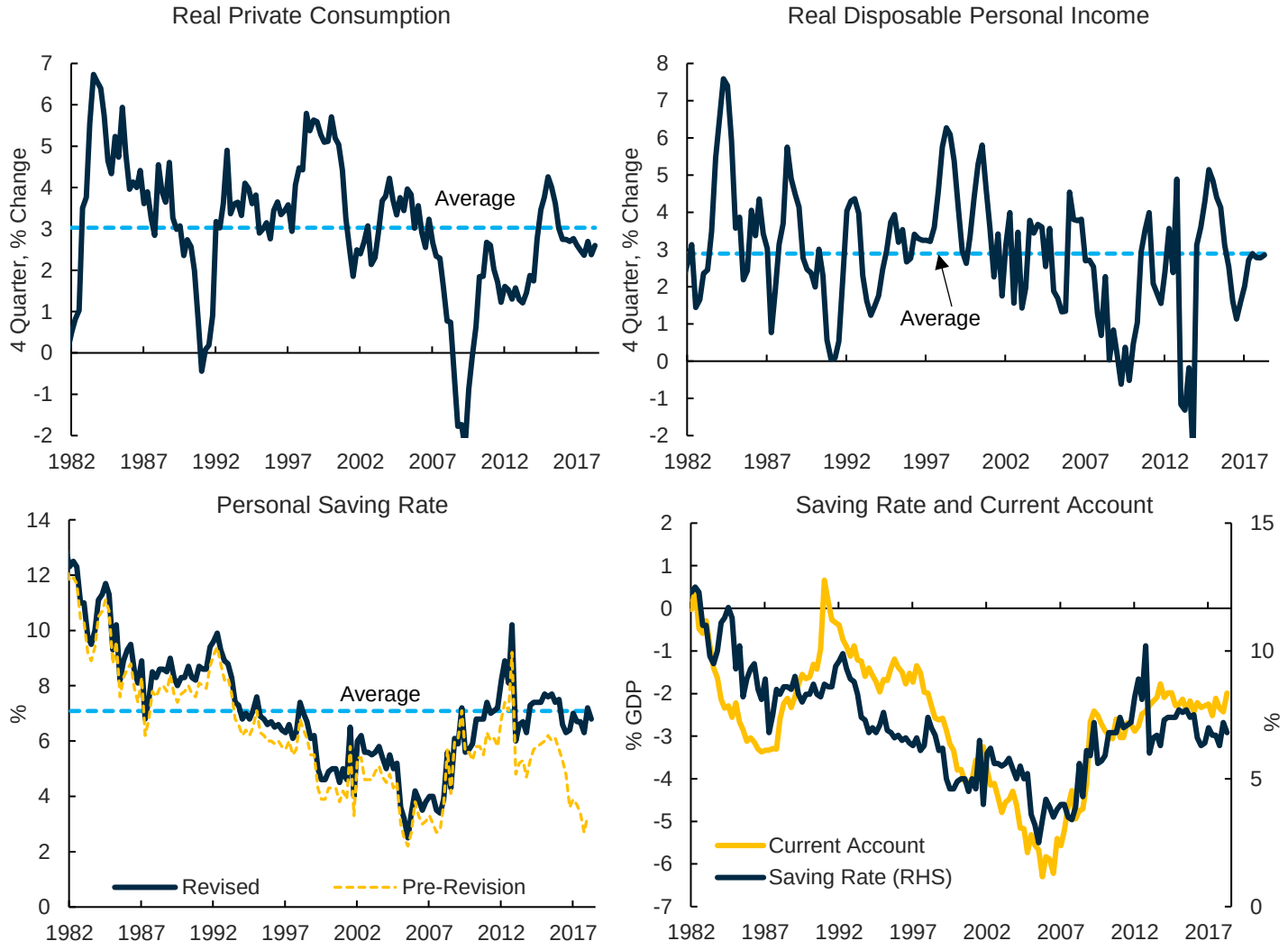
Aggregate Performance of U.S. Consumption and Saving

The pace of household consumption in recent years has been solid, and, at the same time, the personal saving rate has remained elevated. As shown in the upper left panel of Figure 1, real consumption growth over the past few years has hovered just under 3%, a bit below its 35-year average. This year, consumption growth has been well supported by surging consumer sentiment, the continued improvement in the labor market, and the enactment of household tax cuts. Disposable income has also performed solidly in recent years. After dipping in 2016, it has expanded at a pace similar to that of consumption, fueled by the healing of the labor market.

Notably, the saving rate, after falling precipitously in the years before the financial crisis, has stabilized around 7%, substantially above its pre-crisis level. As shown in the lower-left panel, a large portion of this saving was "discovered" in the Bureau of Economic Analysis' annual revisions of the national income accounts, which significantly revised up the saving rate in recent years. Estimates of household saving tend to move around a fair amount during such revisions, but the current data seem better aligned with other indicators of saving than the previous estimates (lower right).[1]

FIGURE 1: HOUSEHOLD CONSUMPTION AND SAVING

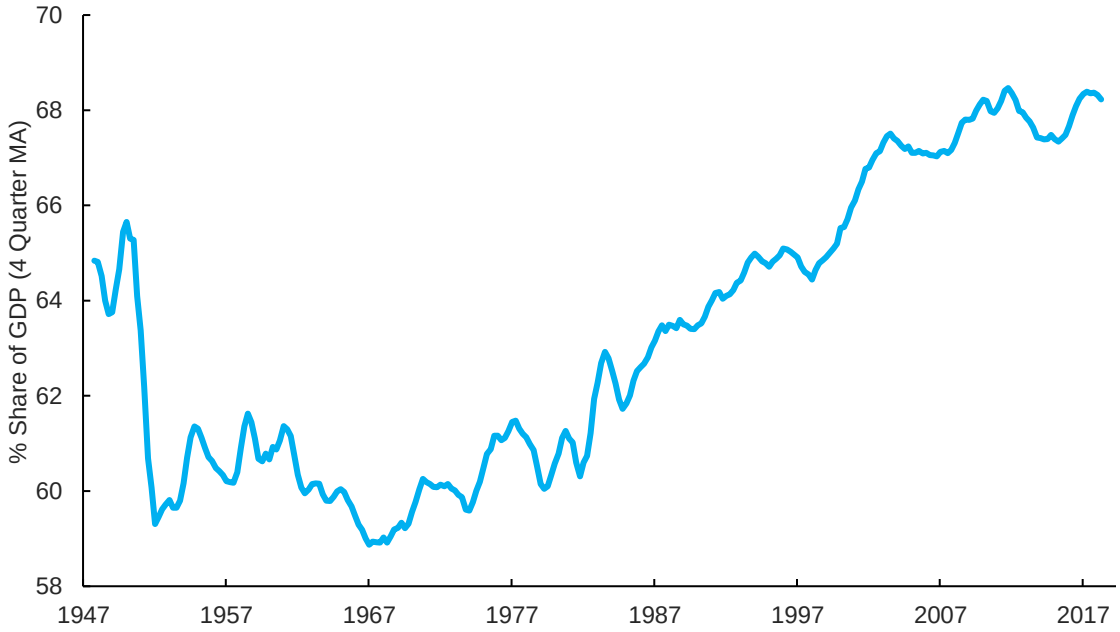


Source: Source: Bureau of Economic Analysis, Haver Analytics

[1] The correlation between the saving rate and the current account balance arises in the national accounts because net exports are equal to the private saving-investment balance plus the government's budget surplus. The current account is closely related to net exports, and household saving is a major factor determining the private saving-investment balance.

Figure 2, which shows consumption as a share of GDP, puts recent performance into a longer-term perspective. In the late 1940s, consumer spending boomed as pent-up demand coming out of World War II lifted expenditure. By the early 1950s, this impulse had moderated, and consumption as a share of GDP ran at roughly 60% through the late 1970s. **Thereafter, over the next 20 years, a combination of increasing access to consumer credit, along with declining debt-service costs, fueled a further rise in consumption's share of GDP to nearly 68%, where it has hovered in recent years.**

FIGURE 2: PRIVATE CONSUMPTION

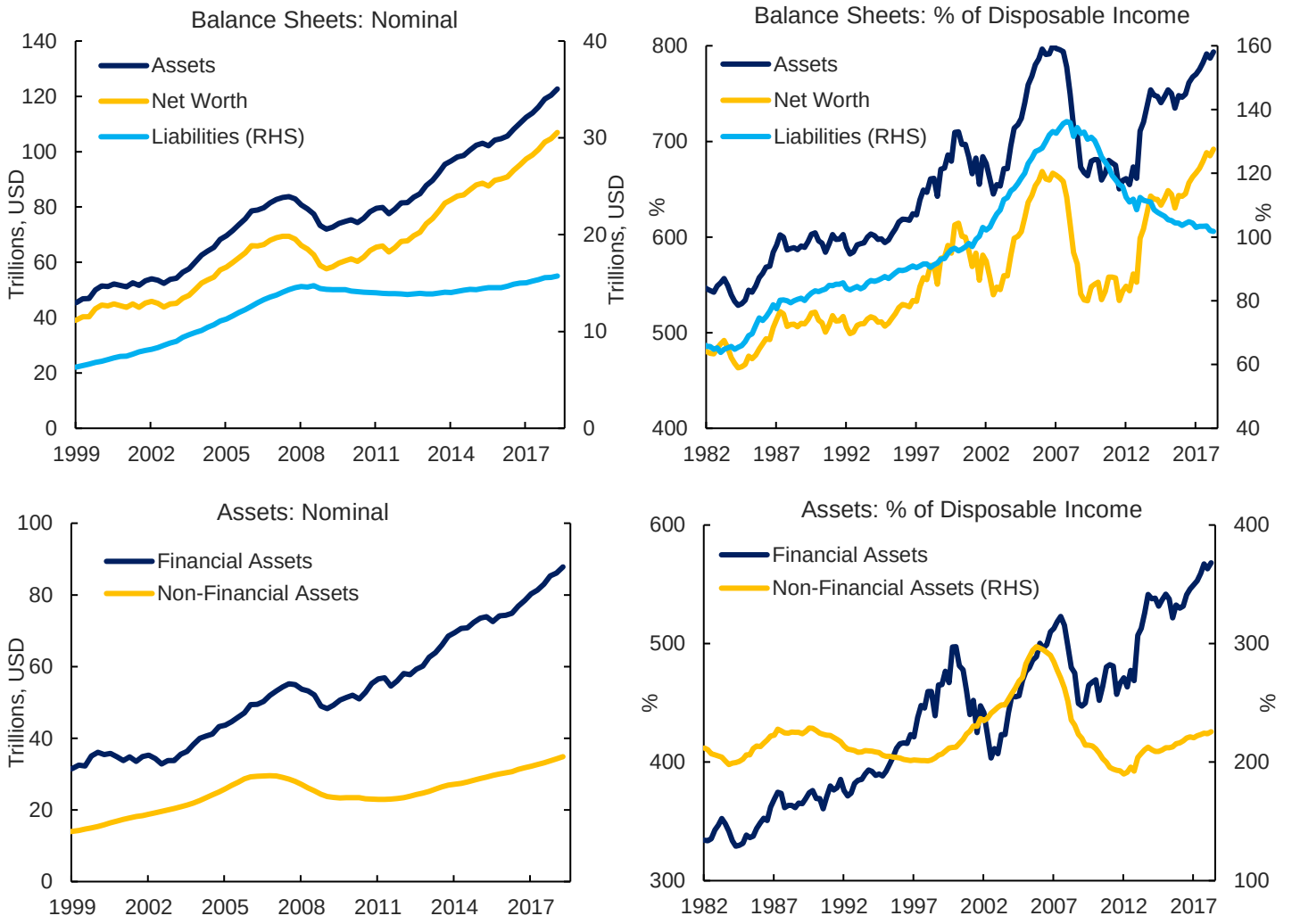


Source: Bureau of Economic Analysis, Haver Analytics, PGIM Fixed Income

The Evolution of U.S. Household Balance Sheets and Debt Service

Over the past two decades, U.S. nominal household net worth has moved up from about $40 trillion to $100 trillion (Figure 3), as nominal asset values have surged and liabilities have essentially plateaued since the financial crisis. The right panel scales these quantities by disposable income, which allows us to compare performance over a longer horizon. From the early 1980s, aggregate household assets grew from about 550% of disposable income to nearly 800% at the onset of the financial crisis. Asset values dropped sharply during the crisis, by roughly 150% of disposable income, as both housing prices and equity prices plunged. Since the crisis, assets have recovered to their pre-crisis peak. **In contrast, liabilities roughly doubled to over 130% of disposable income between the early 1980s and 2007, but have since retreated, stabilizing at slightly above 100% of disposable income. Accordingly, aggregate net worth is now comfortably above its 2007 level.**

FIGURE 3: HOUSEHOLD BALANCE SHEETS

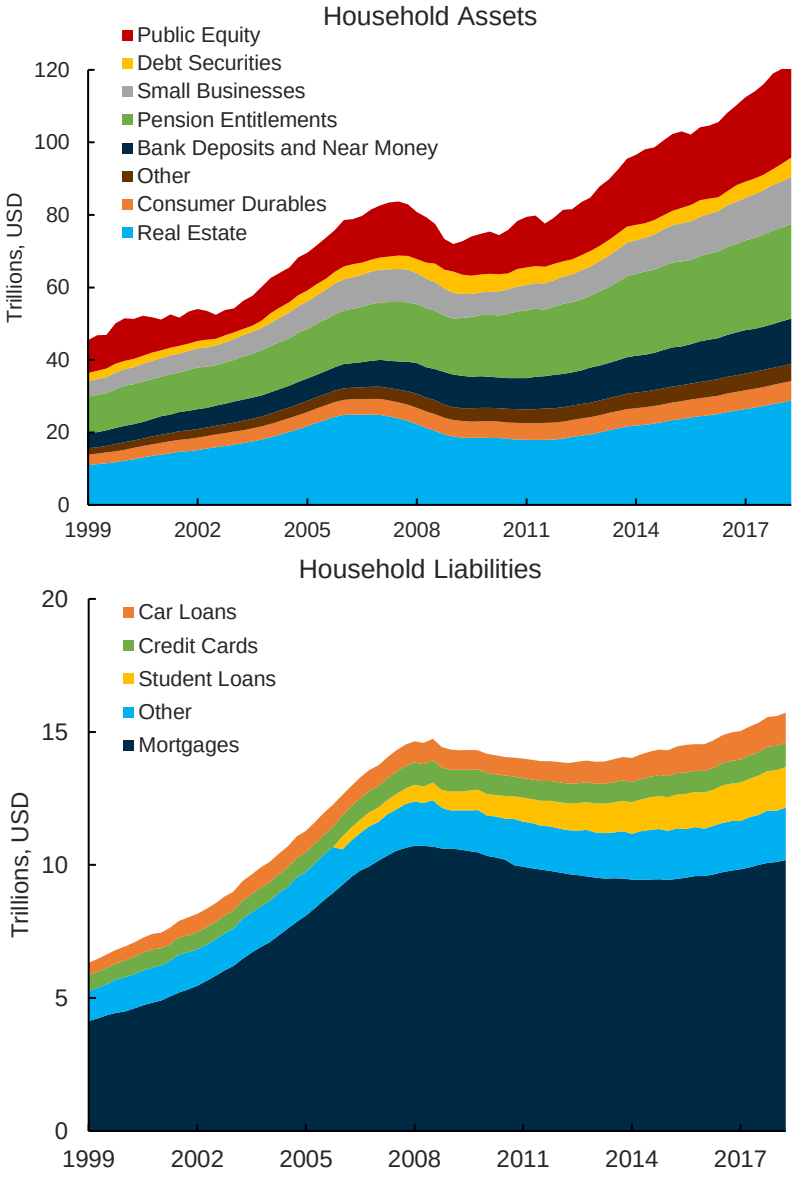


Source: Bureau of Economic Analysis, Haver Analytics, PGIM Fixed Income

The lower panels divide total assets into financial assets and non-financial assets. In nominal terms, financial assets have far outstripped their 2007 peak, and non-financial assets are now also several trillion dollars over their previous peak. Notably, scaled by disposable income, the surge in non-financial assets before the crisis is more marked and the subsequent rebound much less impressive. This ratio has remained substantially below its 2007 peak and at a level broadly similar to the decades before the crisis. In contrast, financial assets—after correcting sharply during the financial crisis—have climbed back to over 500% of disposable income, well above the previous peak. **The upshot is that financial assets are now a larger share of household net worth than was the case a decade ago.** Our work below examines some implications of this feature of balance sheets in more detail.

Figure 4 provides a complementary look at the recent evolution of household balance sheets, emphasizing the composition of assets and liabilities. On the asset side, total holdings now stand at $122.7 trillion (six times GDP). **Of this, financial assets account for $87.8 trillion, or roughly 70%.** These financial assets include $26.9 trillion of publicly traded equities and $26.1 trillion of pension claims. The value of equities on household balance sheets has risen steeply in recent years, and pension claims have grown steadily. Finally, ownership stakes in small businesses amount to $13.0 trillion, while holdings of bank deposits and debt securities total $17.7 trillion. **On the non-financial side, real estate is the key element (80% of the total), and its nominal value has climbed back to roughly the pre-crisis level. Real estate accounted for about a third of household assets before the crisis, but today its share has fallen to a little less than a quarter.**

FIGURE 4: HOUSEHOLD ASSETS AND LIABILITIES



Household Assets (2018 Q2, Trillions USD)	
Total Assets	**122.7**
Financial Assets	**87.8**
Bank Deposits / Near Money	12.4
Debt Securities	5.3
Public Equity	26.9
Pension Entitlements	26.1
Small Business	13.0
Other	4.1
Non-financial Assets	**34.9**
Real Estate	28.8
Consumer Durables	5.4
Other	0.6

Household Liabilities (2018 Q2, Trillions USD)	
Liabilities	**15.7**
Mortgages	10.2
Credit Cards	0.9
Student Loans	1.5
Car Loans	1.1
Other	2.0

Source: Federal Reserve Board. Note: student loan data are reported as part of other liabilities prior to 2006.

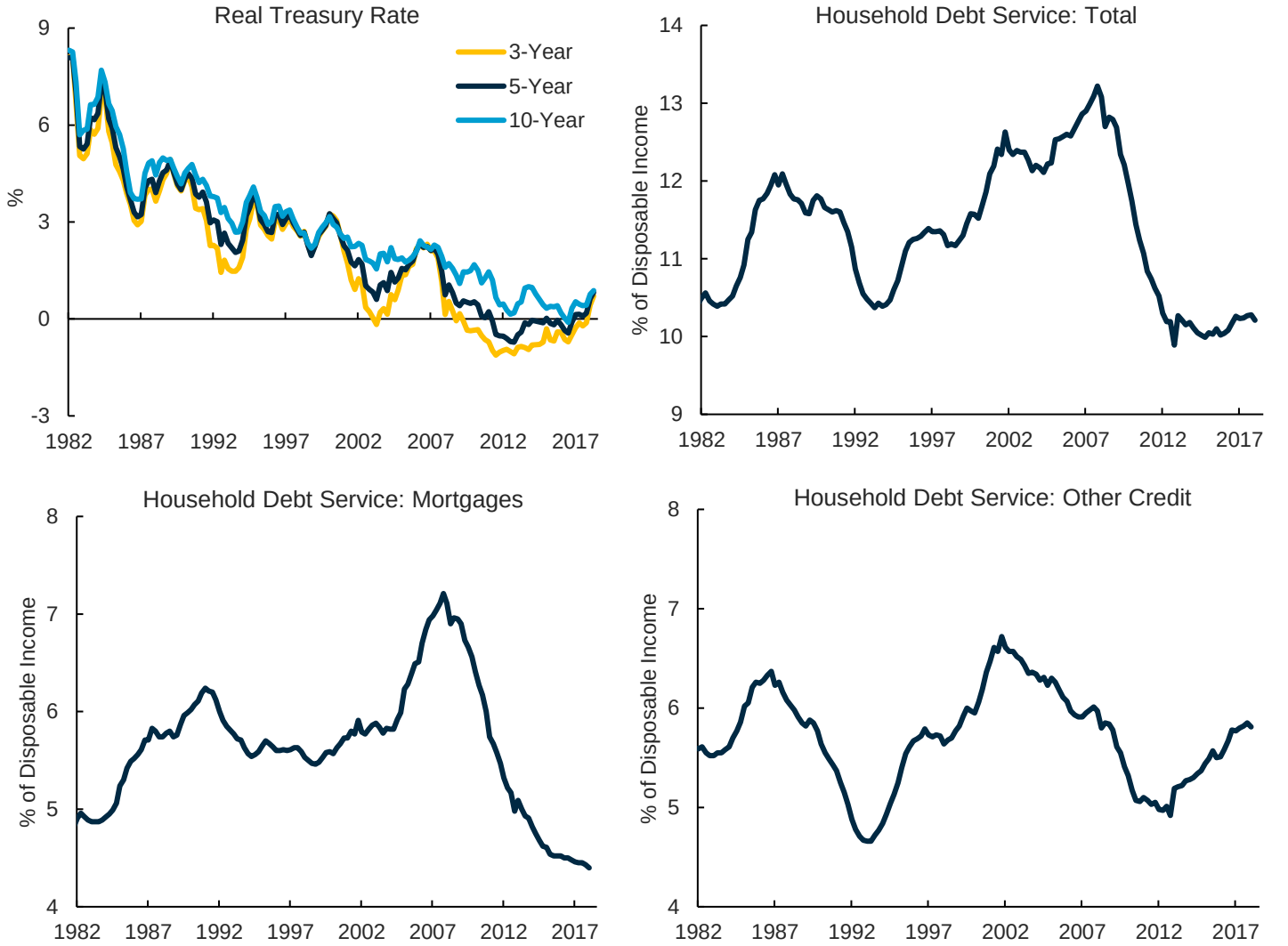
On the liability side, total claims on households are $15.7 trillion, more than half of which is mortgages. Consumer credit—including credit cards, student loans, and car loans—amounts to another $3.5 trillion. Since the financial crisis, nominal mortgage debt has declined a bit,[2] while consumer credit and other obligations have expanded. Viewed in the context of the overall balance sheet, widely cited challenges for the consumer sector, such as indebtedness related to student loans and auto financing, seem manageable. That said, this observation shouldn't be pushed too far, since such exposures are no doubt creating challenges for certain households (we will return to this issue in the final section).

A closely related issue is the evolution of household debt service (Figure 5), which depends on both interest rates and the level of debt outstanding.

[2] *The Federal Reserve estimates that the financial system wrote-off $1 trillion of home mortgages during the crisis and the years immediately afterwards. (See James Kennedy, et al., "Accounting for Mortgage Charge-offs in the Financial Accounts of the United States," October 31, 2014, Federal Reserve Board.)*

As a measure of the real interest rate, we use the yield on five-year Treasuries less a measure of five-year inflation expectations. We choose the five-year rate, i.e., the belly of the yield curve, because we believe that rates all along the curve are material for consumers, and this approach strikes us as a middle ground. Moreover, as also shown, the corresponding measures of the three-year and 10-year real yields have behaved in a roughly comparable way. Notably, our measure of the real interest rate has recorded a sustained secular decline since the early 1980s, from roughly 6% to 8% at the beginning of the period to near zero, or slightly negative, in recent years. Only over the past months has the real rate again edged up into positive territory.

FIGURE 5: DEBT SERVICE



Source: Federal Reserve Bank of Cleveland, Federal Reserve Board, Haver Analytics, PGIM Fixed Income

In line with low real interest rates and disciplined indebtedness, household debt service has hovered near 10% of disposable income. As shown in the lower panels, mortgage debt service has remained at historically low levels, as homeowners have refinanced into low fixed-rate mortgages or defaulted on their mortgages. In contrast, debt service on other consumer borrowing has risen back to near historical averages, and at present, exceeds the debt service on mortgages.

A Look at the Drivers of Indebtedness and Saving

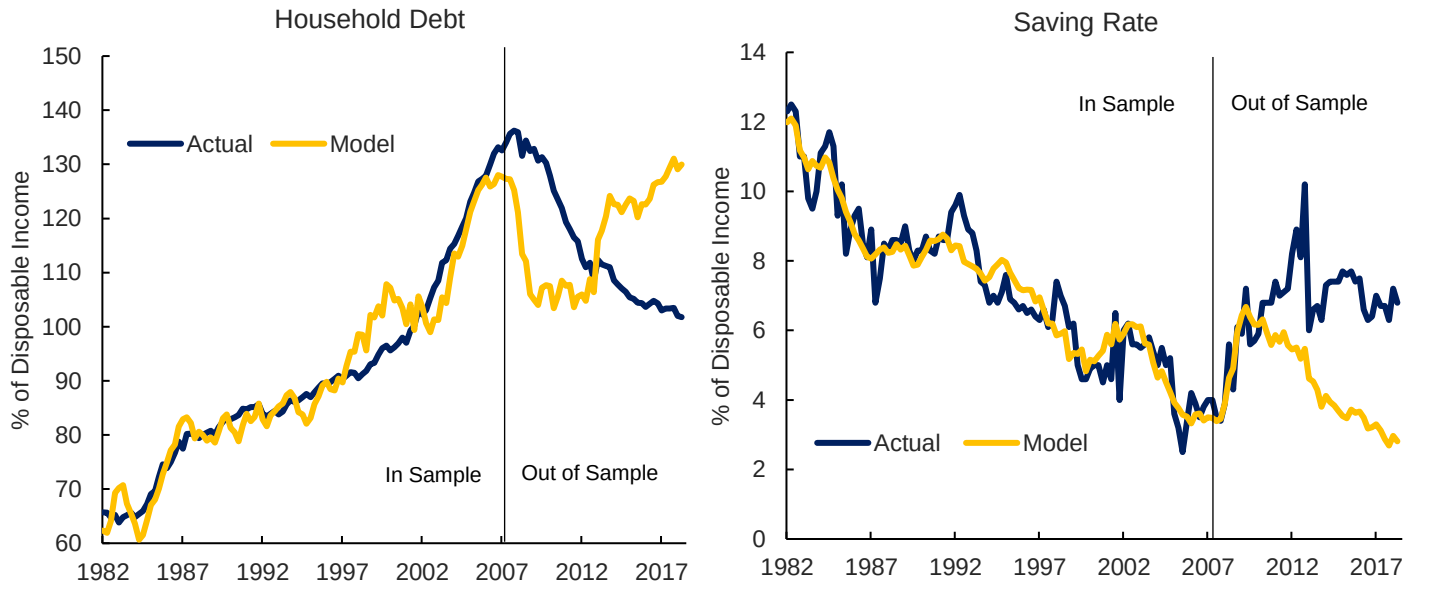
We now turn to an empirical examination of household debt and saving, two key factors that influence the sustainability of consumer spending. A feature of the years before the financial crisis was that these two variables deviated significantly from their historical trends—debt levels spiked and saving rates declined. What can be said about the recent performance of these variables?

Our work indicates that U.S. households are substantially more restrained than before the financial crisis. They have taken on less debt relative to their assets and are more inclined to save than in the previous decade.[3] Accordingly, we find that empirical relationships that had previously been quite stable have now gone off track. In other words, U.S. households are managing their balance sheets and borrowing much more conservatively than before the crisis.

The details of our models are laid out in the Appendix, but in a nutshell, we use the evolution of households' assets and the five-year real interest rate to explain moves in indebtedness. As shown in the left panel of Figure 6, when this framework is estimated through the pre-crisis period (2007 Q2), it nicely tracks the run-up in debt that occurred. Indebtedness was rising in line with stronger household balance asset positions and still-moderate real interest rates. However, the model goes significantly off-tack in the post-crisis period. **Given the sustained rise in asset values and the low-rate environment that has prevailed, the model expects a much higher level of indebtedness.**

The results for the saving rate are similar in spirit. As shown in the right panel, our saving rate model (which relies on the same two explanatory variables) closely follows the decline in saving through the pre-crisis period, but the model calls for a renewed decline in saving over the past five years in line with the recovery in asset holdings. **The deviation between actual saving and the model's prediction is a gaping 4 percentage points at present.**

FIGURE 6: HOUSEHOLD DEBT AND SAVING RATE



Source: Bureau of Economic Analysis, Federal Reserve Board, Haver Analytics, PGIM Fixed Income

[3] *In February 2010, Arvind Rajan and Ellen Gaske reviewed the prospects for the U.S. consumer sector and accurately concluded that structural factors would keep the saving rate at relatively high levels going forward. Click the link to read "The Fate of the U.S. Consumer."*

The parallel moves in household indebtedness and saving are striking. We show in the Appendix that for both of these variables households have acted as if the recent gains in financial assets had not occurred. An important result that emerges from the econometrics is that the sensitivity of indebtedness and saving to moves in non-financial assets (particularly housing) is much greater than the sensitivity to financial assets. And, unlike the years before the financial crisis, the recent rise in net worth has been primarily driven by financial assets.

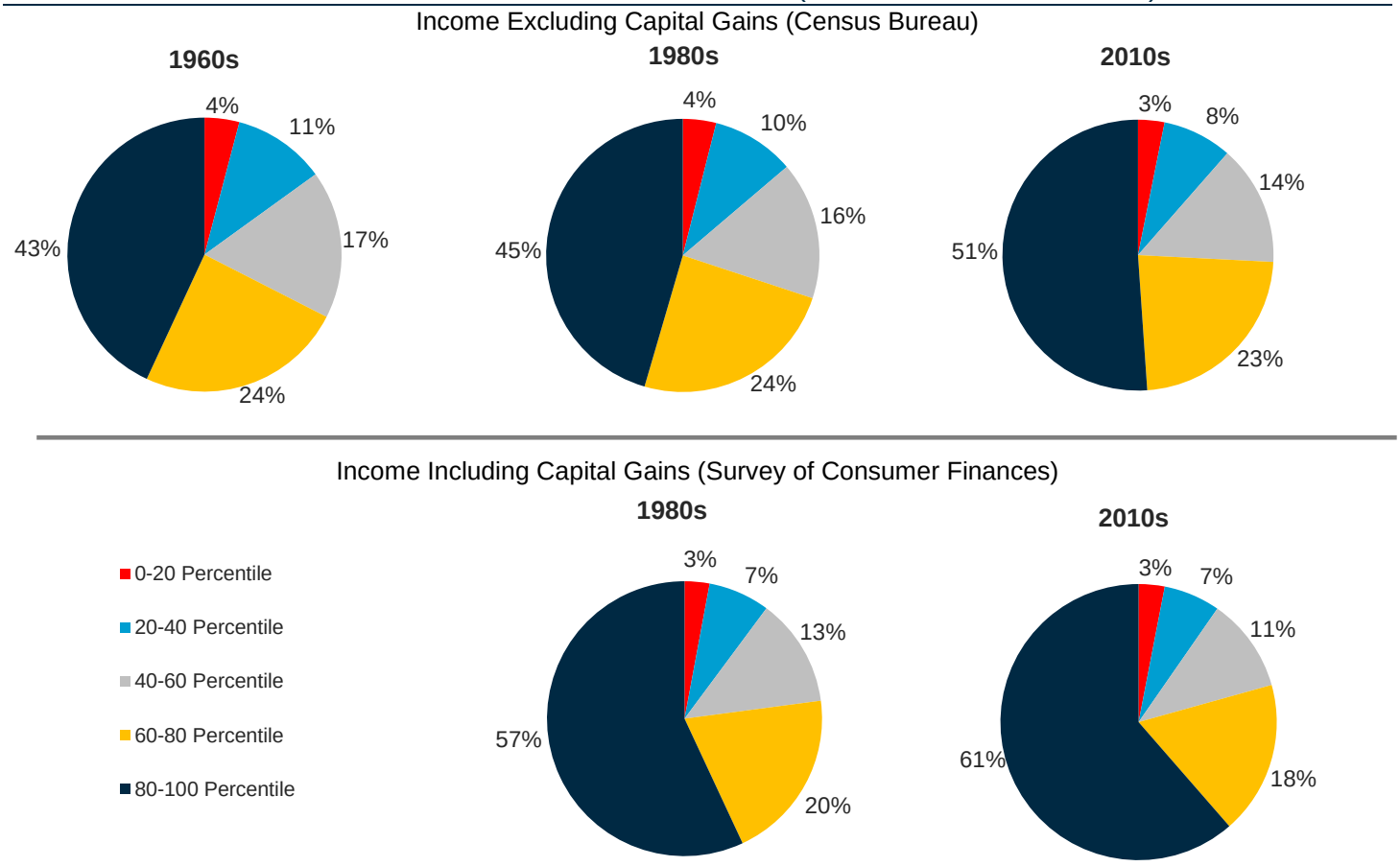
As a related point, we see the stubbornly high household saving rate as indicating that U.S. consumers learned lessons during the financial crisis and are now more disciplined. The symmetric behavior of indebtedness reinforces this conclusion. In addition, a tightening regulatory environment has constrained credit availability, and this has likely been another factor weighing on household borrowing and expenditure in recent years.

Some Implications of Rising Income Inequality

The discussion so far has painted a picture of a more restrained U.S. household sector. Based on the aggregate macro data, we find that consumption has expanded at a solid pace in recent years, but the saving rate has stayed high and debt levels have stabilized at levels much lower than before the financial crisis. The bottom line is that the consumer sector has been well-supported by income growth, and consumption seems favorably positioned to continue to expand.

But a deeper concern about the household sector is the reality of rising inequality. As shown in Figure 7, looking at household income data from the Census Bureau, we find that since the 1960s, the income share of the top 20% of households gradually increased from 43% in the 1960s to 45% in the 1980s and to 51% during this decade. Over the same period, the share of the bottom 60% of households shrank from 32% in the 1960s to just 25% this decade.

FIGURE 7: SHARE OF AGGREGATE HOUSEHOLD INCOME (BY INCOME PERCENTILE)



Source: Census Bureau, Federal Reserve Board (Survey of Consumer Finances), Haver, PGIM Fixed Income

These Census data, however, fail to capture income from capital gains, which are an important source of earnings, especially for high-income households. Thus, we turn to the Fed's triennial Survey of Consumer Finances, which starts in the 1980s. These data indicate that the top 20% of households are now capturing a whopping 61% of all income, up from 57% in the 1980s. The share of the bottom 60% is just 21%, down from 23% in the 1980s, entirely reflecting compression of those in the 40-60 percentile, i.e., the middle class**. Taken together, these data suggest that the top quintile of earners now enjoys an average per capita income six to eight times higher than that for the bottom three quintiles.**[4]

Notably, the inclusion of capital gains drives up the income share of the top 20% by a full 10 percentage points for the most recent period. This rise is largely at the expense of earners in the 40-80 percentile, which have seen their share fall by 8 percentage points. The share of the bottom 40% is stable at near 10% of total income. This result reflects that the bottom 40% of earners, including many retirees, have amassed assets during their working years and earn capital gains on those assets. In contrast, the data suggest that households in the 40-80 percentile are largely dependent on labor income.

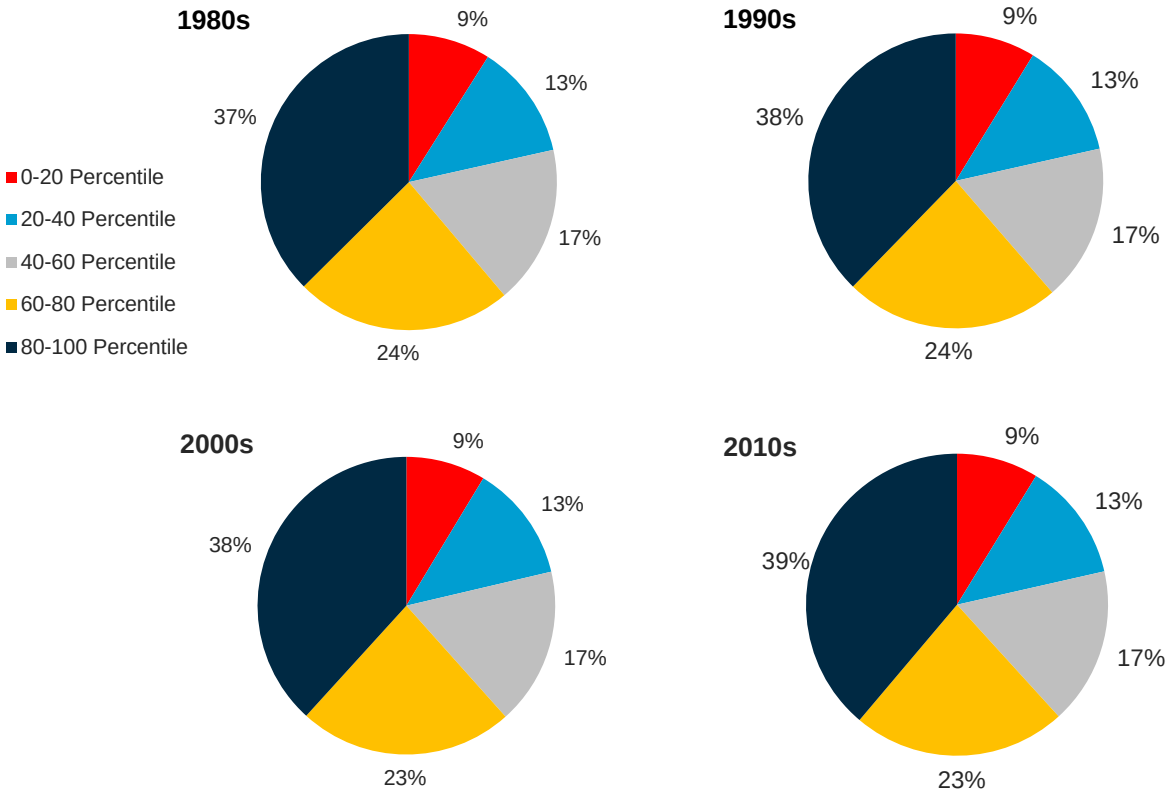
Does the reality of rising inequality in the household sector have important implications for the performance of the overall economy? If the economic mass of households in the lower parts of the income distribution is sufficiently small, any tensions from these households may not be enough to upend an otherwise strong economy. With this issue in mind, we consider two channels through which the lower swathes of the income distribution might impact aggregate performance. First, to the extent that the consumers in the bottom 40% or 60% account for a disproportionate share of expenditure relative to their incomes (i.e., have relatively high marginal propensities to consume), stress in that portion of the income distribution could have more of an impact on spending than the income data would suggest. Second, the observed improvement in aggregate balance sheets may mask a deterioration of balance sheets within some parts of the income distribution, with consequent threats to broader financial stability.

We briefly consider each of these two possibilities. Given the complexity of these issues, our treatment will be very selective. For example, we focus only on inequality in terms of income and will not venture into the related issue of wealth inequality.

The data in Figure 8 shed light on the importance of various parts of the income distribution for consumer expenditures. Here, there is greater balance across the quintiles than is the case for income. The top 20% of households and those in the 40-80 percentile both account for 40% of consumption, while the bottom 40% consume 20% of the total. In other words, the top 20% are consuming about four times more per capita than the bottom 40% and twice as much as the next 40%.

[4] A related point is that many U.S. households reportedly don't have sufficient saving to cover a $500 emergency. See, for example, Maggie McGraith, Forbes, January 6, 2016.

FIGURE 8: SHARE OF AGGREGATE EXPENDITURES (BY INCOME PERCENTILE)



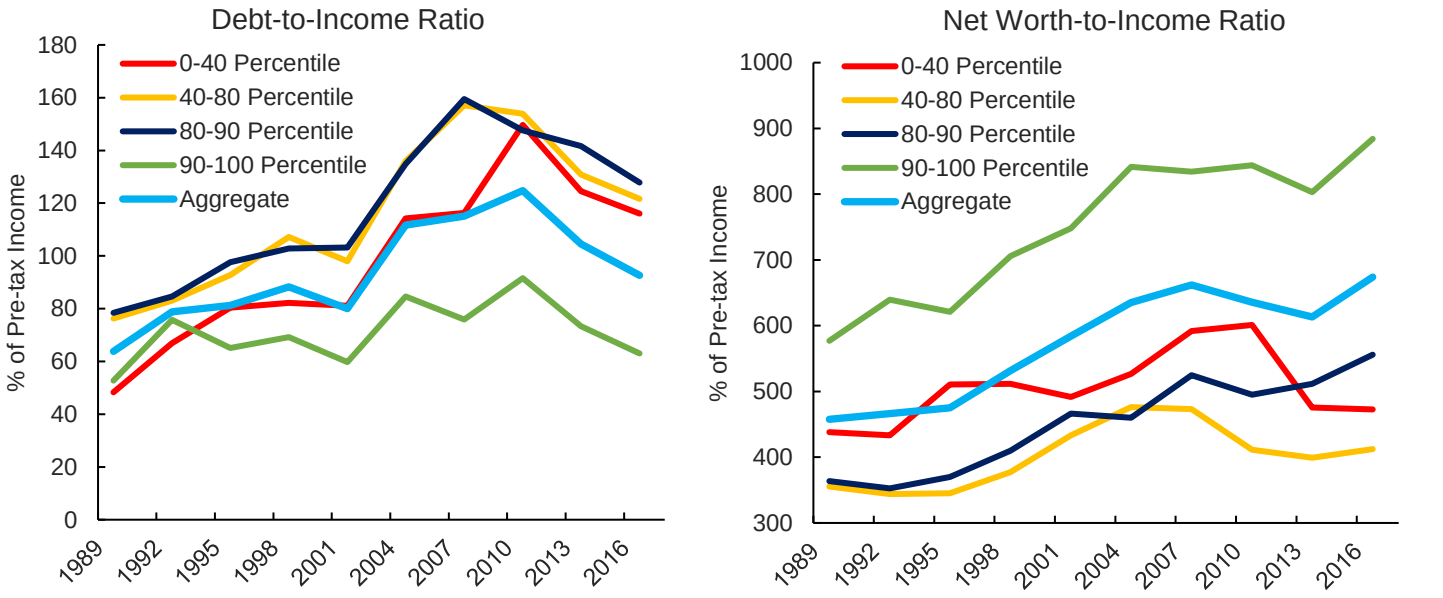
Source: BLS (Consumer Expenditure Survey), Haver Analytics, PGIM Fixed Income

One conclusion is that the top tier of earners accounts for a hefty share of overall consumption, but a somewhat smaller share than for income. **As such, the economy would probably not be immune to a marked deterioration of performance in the lower tiers of the income distribution.** If the bottom 40% reduced their consumption by 5%, this would cut aggregate consumption by a full percentage point. If the contraction also affected those in the 40-60 percentile, the total effect would be an almost 2 percentage point drop in aggregate. By our reckoning, a drop of this magnitude would most plausibly occur in the context of a tightening in labor market conditions and, especially, sharply rising unemployment. Notably, however, labor market conditions at present are exceptionally good, with no signs of trouble anywhere in sight.

A related risk is a weakening of household balance sheets at the lower end of the income distribution. Drawing on the Survey of Consumer Finances, which includes capital gains, we are able to calculate debt-to-income ratios for various cohorts of the income distribution (shown in Figure 9). Notably, this ratio tends to rise somewhat across the tiers of the income distribution, with the top 10% of households a marked exception. As incomes rise, consumers have increased capacity to borrow, which reflects both greater ability to service debt and increased availability of collateral. However, at the same time, rising income also raises the scope for households to make purchases without taking on debt or, to the extent that they do, allowing the debt to be quickly extinguished. The data suggest that the first effect dominates up through the 90th percentile of the income distribution—more income is associated with a rising debt-to-income ratio. **However, the top 10% of households manifests a sharply lower debt-to-income ratio. Stated bluntly, many of these folks don't need to borrow. Thus, to the extent that economic forces drive a further rise in the income share of the top parts of the distribution, this could bring with it some additional declines in the aggregate debt-to-income ratio.**[5]

[5] *We investigated the importance of this "redistribution effect" effect in explaining the drop in the aggregate debt-to-income ratio in the years since the financial crisis, but we found that this was not an appreciable driver. The deleveraging that has occurred mainly reflects changes within income cohorts, as documented in the next paragraph.*

FIGURE 9: HOUSEHOLD RATIOS (BY INCOME PERCENTILE)



Source: FRB (Survey of Consumer Finances), Haver Analytics, PGIM Fixed Income

The decline in the debt-to-income ratio since the crisis, which we observed in the aggregate data, is also seen across these cohorts. Since 2010, all parts of the income distribution have achieved some deleveraging, with the aggregate liabilities-to-income ratio falling by roughly 30 percentage points. This suggests that the retrenchment and deleveraging that we have documented elsewhere in the paper is broadly based across the income distribution. But a related observation also merits attention. **Debt-to-disposable income ratios for all the cohorts, except the top 10%, are still notably above the levels observed in the early 2000s, before the imbalances that drove the crisis emerged.** This observation may shed light on the results presented elsewhere in the paper. **To the extent that wide swathes of the income distribution are still feeling a pinch from the financial crisis, this may help explain why aggregate saving has not declined as our empirical model predicts and why aggregate debt ratios have not risen.**

These results highlight two further thoughts. First, if many households are implicitly targeting still lower debt-to-disposable income ratios, this might be a restraining factor for consumption—and, hence, for GDP growth—for some time to come. The good news from a growth perspective is that the top 10% have already normalized their debt ratios back to levels that prevailed in the early 2000s, and the ratios are low in any event; these households seem well positioned to spend in the years ahead. **Second, the apparently still-elevated debt-to-income ratios for some segments of the income distribution suggest an increased vulnerability to shocks, including an upward spike in interest rates or a decline in income.** Some mitigating factors are that much consumer debt is now locked in at low rates, and income growth is well supported by the strong labor market.

The right panel provides complementary data on net worth across tiers of the income distribution. In aggregate, net worth relative to income is now higher than before the financial crisis. But notably, this ratio is down markedly for households in the 0-40 percentile and more moderately for those in the 40-80 percetile as well. [6] The gains since the financial crisis have been

[6] *Somewhat surprisingly, the net worth-to-income ratio for the bottom 40% of households (ranked by income) is uniformly above that for the 40-80 percentiles and, through most of the period, also higher than for the 80-90 percentiles. This reflects that the bottom tiers of the income distribution include many retired households, which earn relatively modest incomes, but may also hold relatively sizable assets accumulated over their lifetimes.*

concentrated entirely in the top 20% of households. **Taken together, the data in Figure 9 suggest that the balance sheet strengthening that we have observed in aggregate is primarily concentrated in the top 10-20% of households.**

Some Concluding Thoughts

In this paper, we have found that the U.S. consumer sector—in aggregate—is much more balanced and restrained than before the financial crisis. Debt ratios are down. Saving is up. Consumption has grown at a solid but sustainable pace. Our dive into the disaggregated data, and the resulting evidence of gaping financial inequality across households, has unearthed some caveats and highlighted some medium-term risks. But it has not overturned our overall positive assessment, especially given the momentum of the labor market. **Thus, we conclude that the U.S. consumer is likely to be a source of resilience and stability for the U.S. economy—and the global economy—through the foreseeable future.**

Even so, our work has only scratched the surface of a broad array of deeper issues. **For example, how much of the observed strengthening of balance sheets is being driven by shifting demographics, as many households prepare for retirement?** We did some empirical exercises seeking to tease out an answer to this question; however, we have not yet been successful. But demographics are likely at work to some extent. **Similarly, how much of the observed shift in consumer performance reflects a change in underlying preferences toward greater discipline versus credit constraints imposed on households by a more cautious financial sector?** The answer to this question will be material in assessing vulnerabilities in the future.

The discussion of inequality also raises many rich issues. **A leading question is how to generate economic gains that are broadly shared and less concentrated at the top of the income distribution.** Strong economic growth is clearly necessary—it is important that the overall pie continues to grow. However, growth alone has not proved sufficient. **We must also consider how the resulting gains accrue across society. At a minimum, this requires careful reflection on the effectiveness of education, worker training (and retraining), and the social safety net. As a related matter, recent years have shown that inequality, and the resulting frustrations of large parts of society, can manifest themselves in political outcomes (e.g., Brexit) that shape and, perhaps, even disrupt the economic and business environment. Thus, over and above any other considerations, inequality may leave its imprint on economic performance through political channels. These are issues for economists, policymakers, and politicians to wrestle with in the years ahead.**

Appendix

As discussed above, we have developed some simple empirical models to examine the underlying drivers of household indebtedness and saving. In this Appendix, we present these models and our results in somewhat greater detail. We begin with indebtedness and then move on to the saving rate.

Our model of U.S. household debt relates the debt-to-disposable-income ratio to the following two variables:

- Gross assets relative to disposable income. As assets rise, the capacity to borrow increases, both because of the increased availability of collateral and because overall financial resources have increased. We also estimate a version of the model that differentiates between financial assets and non-financial assets, given that such assets may differ in the degree of their liquidity and the ability of households to use them as collateral. In addition, housing wealth is more diffusely held in the economy and hence may support a broader increase in borrowing. Households may view a run-up in real estate prices as more likely to be permanent than a similar move in financial assets given the frequent volatility in asset prices.

- The ex ante five-year real interest rate. A higher real interest rate should discourage borrowing, holding all else equal. The regression draws on the Cleveland Fed measure shown in the upper-left panel of Figure 5.

We estimate this model for two periods. First, we consider a sample running from 1982 Q1 to 2018 Q2. Second, to assess how the financial crisis and the events over the past decade have influenced behavior, we also estimate the model from 1982 Q1 to the onset of the financial crisis in 2007 Q2. In particular, we look at whether the model estimated with data before the crisis explains behavior in the years thereafter.

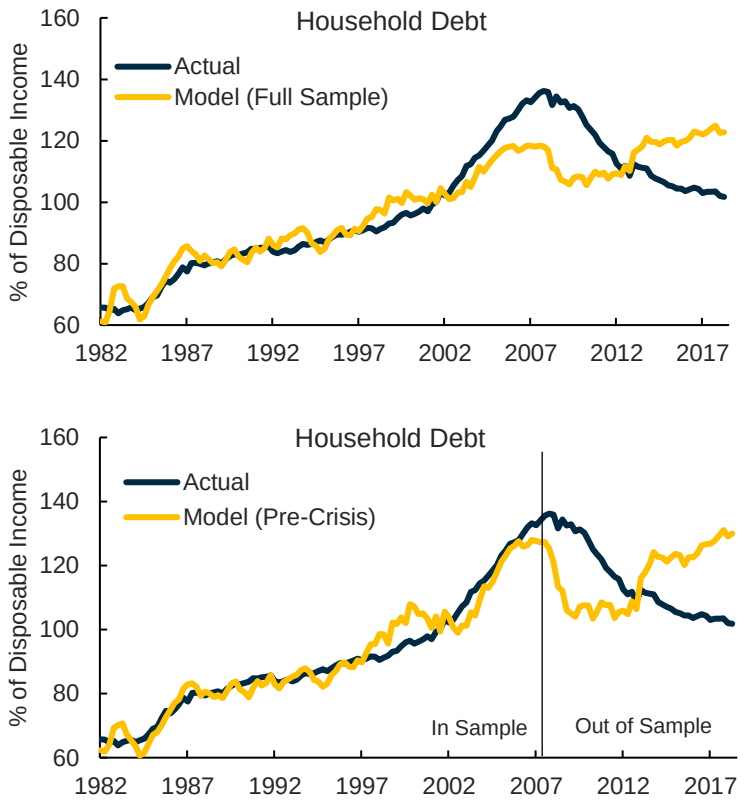
The results from this estimation are displayed in the upper-left panel of Figure 10. First, for both estimation periods, the results show that a 10 percentage point increase in the ratio of gross assets to disposable income is associated with roughly a 1 to 2 percentage point increase in debt to disposable income, with the estimated coefficient larger and more significant for the years before the crisis. An increase in asset values brings with it an increase in borrowing power that households typically exploit.

FIGURE 10

Household Debt Model

	Full Sample	Until Crisis
Assets/DI	**0.139**	**0.205**
	8.4	*24.2*
Financial Assets/DI		
Non-financial Assets/DI		
5-Year Real Interest Rate	**-4.057**	**-2.317**
	-6.7	*-6.2*
Number of Observations	146	102
Adjusted R-squared	0.739	0.945
Date Range	82Q1-18Q2	82Q1-07Q2

Note: All regressions include an unreported constant; DI is disposable income; bold indicates t-statistic (reported underneath coefficient) significance at the 5% level.



Source: Bureau of Economic Analysis, Federal Reserve Board, Haver Analytics, PGIM Fixed Income

Second, a 100 basis point decrease in the real interest raises debt levels by 2.3 percentage points during the period before the financial crisis and by 4 percentage points when the last decade is included as well. These results indicate that debt holdings are relatively insensitive to small, high-frequency moves in interest rates. However, the results also indicate that a large secular decline in rates, such as that recorded since the 1980s, can substantially increase households' willingness to carry debt.

The upper-right panel shows the evolution of the actual data versus the predictions of the model estimated through 2018 Q2. Notably, debt during the financial crisis substantially overshot the model's predictions. By 2012, however, actual debt levels were back down to those predicted by the model. Thereafter, the model expected that rising asset values, along with continued low real rates, would prompt households to begin to relever and debt levels to rise. Notably, U.S. households have moved exactly in the opposite direction—they have continued their deleveraging efforts. Actual debt has now fallen about as much below the model as it was above the model in 2007.

The results for the model estimated through 2007 Q2 are qualitatively similar. This model better tracks debt as it approaches its peak but misses badly in the out-of-sample period, as it also anticipates a rebound in indebtedness. Thus, judged by the standards of pre-crisis behavior, recent muted debt levels—and the caution of U.S. households that this implies—is puzzling. It is also striking that extending the regression to include the period since 2007 Q2 meaningfully lowers the model's overall explanatory power. Stated bluntly, the model struggles to explain the evolution of consumer borrowing since the crisis.

Figure 11 replicates this exercise differentiating between financial and nonfinancial assets. Notably, over both sample periods, debt levels show much greater sensitivity to real assets than to financial assets. **This result may help explain the differing behavior of the consumer before and after the financial crisis. In the years before the crisis, the run-up in wealth was**

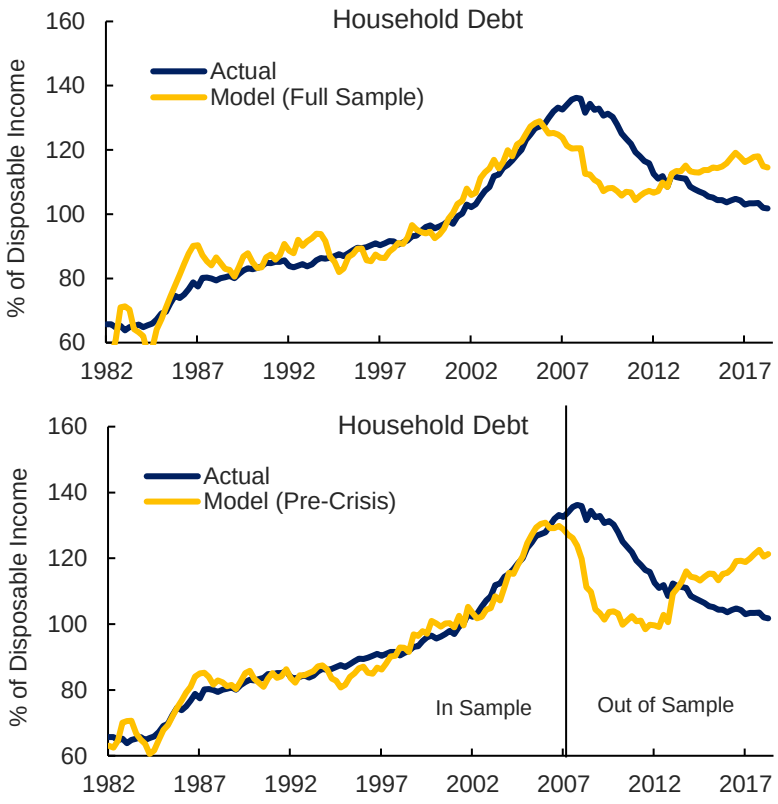
driven significantly by the housing boom and was associated with markedly rising debt ratios. In the latest cycle, real asset prices have been solid, but the run-up in financial asset prices has been more pronounced.

FIGURE 11

Household Debt Model

	Full Sample	Until Crisis
Assets/DI		
Financial Assets/DI	**0.044** *2.2*	**0.143** *15.3*
Non-financial Assets/DI	**0.330** *10.6*	**0.324** *22.0*
5-Year Real Interest Rate	**-6.010** *-9.4*	**-2.787** *-9.9*
Number of Observations	146	102
Adjusted R-squared	0.803	0.970
Date Range	82Q1-18Q2	82Q1-07Q2

Note: All regressions include an unreported constant; DI is disposable income; bold indicates t-statistic (reported underneath coefficient) significance at the 5% level.



Source: Bureau of Economic Analysis, Federal Reserve Board, Haver Analytics, PGIM Fixed Income

We now turn to our model of U.S. household saving behavior, which is broadly similar in spirit. As before, the ratio of household assets to disposable income and the real interest rate are key variables. **The inclusion of assets reflects that as asset values rise, consumers gain comfort in spending more and saving a little less of their flow income. The real interest rate is a proxy for the rate of return on saving.** Equivalently, as the real interest rate rises, household are being paid more to forego consumption, and saving should plausibly rise. As a third variable, we also include a measure of the U.S. output gap produced by the Congressional Budget Office (CBO). This variable accounts for cyclical conditions in the economy, which may appreciably affect the path of saving over time.

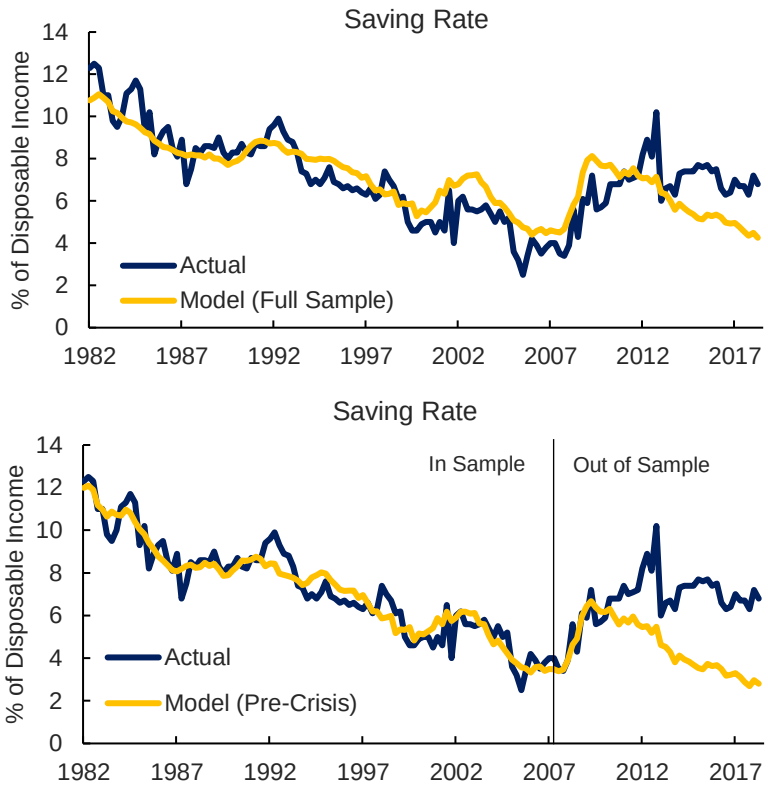
Figure 12 displays our results. One headline observation is that the adjusted R2 of the model falls sharply once the period since the global financial crisis is included. Also, the t-values on all three variables fall, and the magnitude of the coefficient on the real interest rate declines sharply. **The bottom line is that to perhaps an even greater extent than with household debt, the model struggles to explain the behavior of saving through the post-crisis period. With balance sheets strengthening and real interest rates falling, the model expects saving to fall. Instead, the saving rate has remained conspicuously high, at around 7%.**

FIGURE 12

Saving Rate Model

	Full Sample	Until Crisis
Assets/DI	**-0.014**	**-0.018**
	-6.1	*-11.8*
Financial Assets/DI		
Non-financial Assets/DI		
5-Year Real Interest Rate	**0.171**	**0.466**
	2.0	*7.7*
Output Gap	**-0.301**	**-0.246**
	-5.1	*-5.9*
Number of Observations	146	102
Adjusted R-squared	0.635	0.908
Date Range	82Q1-18Q2	82Q1-07Q2

Note: All regressions include an unreported constant; DI is disposable income; bold indicates t-statistic (reported underneath coefficient) significance at the 5% level.



Source: Bureau of Economic Analysis, Haver Analytics, PGIM Fixed Income

While the model estimated through 2007 Q2 nails the decline in saving before the financial crisis and shortly thereafter, it goes off track starting around 2012, and the gap widens significantly thereafter. The model estimated through 2018 Q2 splits the difference, missing some of the decline in saving before the crisis, but performing a little better in recent years.

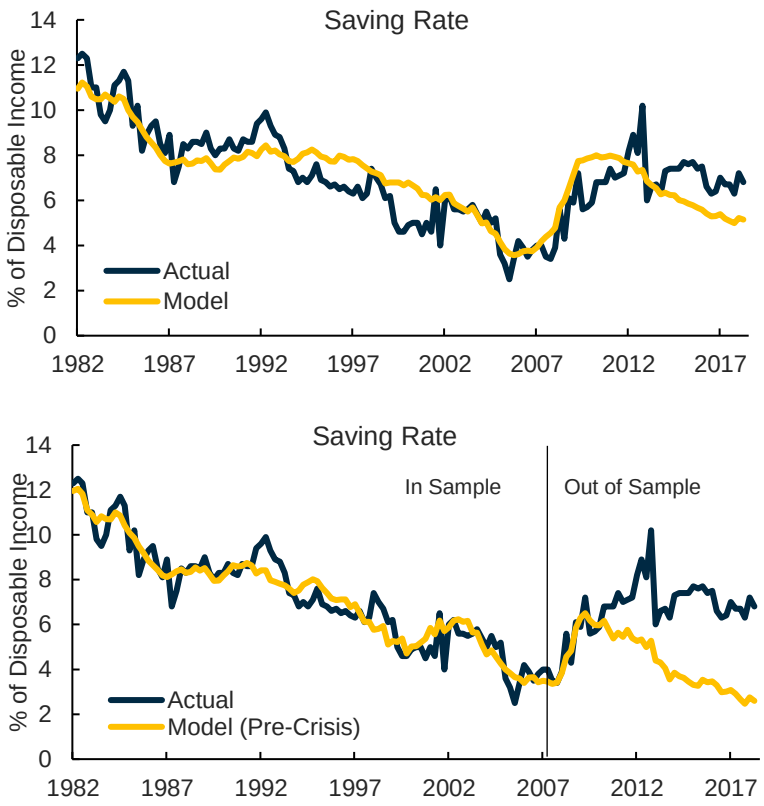
Figure 13 allows financial and non-financial assets to enter the regression separately. Compared with the previous figure, the model estimated through 2007 Q2 is essentially unchanged, with nearly identical coefficients on financial and non-financial assets and other coefficients that are similar to Figure 12. In contrast, the performance of the model estimated through 2018 Q2 improves. The model achieves this outcome by putting substantially more weight on non-financial assets. Indeed, the coefficient on financial assets falls to near zero and is no longer statistically significant. Even so, this model still under predicts saving in recent years.

FIGURE 13

Saving Rate Model

	Full Sample	Until Crisis
Assets/DI		
Financial Assets/DI	-0.004 *-1.7*	**-0.019** *-7.6*
Non-financial Assets/DI	**-0.036** *-8.6*	**-0.015** *-4.5*
5-Year Real Interest Rate	**0.424** *4.8*	**0.456** *7.3*
Output Gap	**0.349** *5.0*	**-0.227** *-4.7*
Number of Observations	146	102
Adjusted R-squared	0.701	0.908
Date Range	82Q1-18Q2	82Q1-07Q2

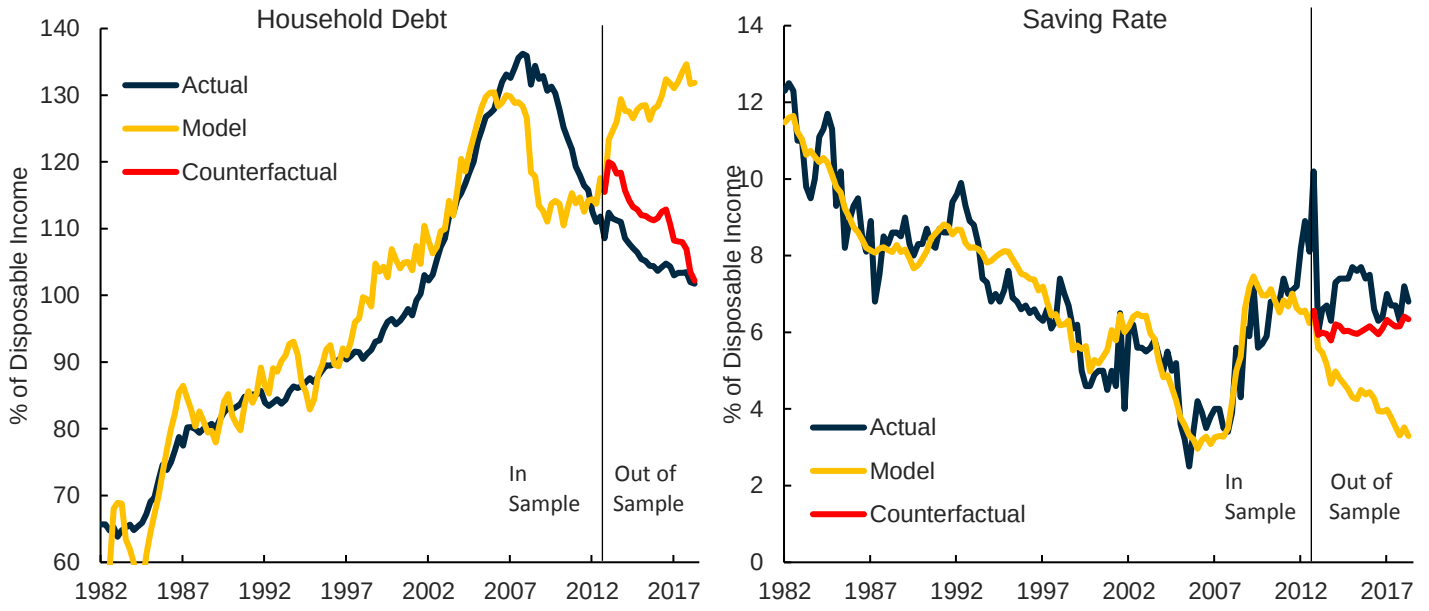
Note: All regressions include an unreported constant; DI is disposable income; bold indicates t-statistic (reported underneath coefficient) significance at the 5% level.



Source: Bureau of Economic Analysis, Haver Analytics, PGIM Fixed Income

Another way to interpret our econometric results—for both debt and saving—is that households are skeptical that the asset gains seen in recent years are sustainable. And, in any event, those holding these assets are not inclined to use them to again lever up. With this in mind, Figure 14 addresses the following question: Assuming that the relationships estimated until the onset of the financial crisis were still intact, what level of household assets would be sufficient to achieve the paths of debt and saving seen in recent years? In some important respects, households are acting as if this counterfactual path had actually materialized.

FIGURE 14



Source: Bureau of Economic Analysis, Federal Reserve Board, Haver Analytics, PGIM Fixed Income

Accordingly, our counterfactual holds the nominal value of financial assets constant at its 2012 Q4 level, erasing the sizable market gains of the past six years. Applying this path to the models that we estimated above yields the red lines in the two panels. Notably, the trajectory of the red lines is broadly consistent with the observed path of debt and saving. **Thus, on their decisions about indebtedness and saving, households have acted as if the value of their financial assets had remained flat during the last six years. As a more general statement, the symmetry in the behavior of debt and saving is striking. It again underscores the restraint that has guided households since the financial crisis.**

NOTICE: IMPORTANT INFORMATION

Source(s) of data (unless otherwise noted): PGIM Fixed Income as of November 2018

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