



# ***Strategic Analysis***

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## **IS RISING INEQUALITY A HINDRANCE TO THE US ECONOMIC RECOVERY?**

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### **Introduction**

The US economy has been expanding moderately since the official end of the Great Recession in 2009. The budget deficit has been steadily decreasing, inflation has remained in check, and the unemployment rate (as of March 2014) has fallen from 9.8 percent to 6.7 percent. The restrictive fiscal policy stance of the past three years has exerted a negative influence on aggregate demand and growth, which has been offset by rising domestic private demand; net exports have had a negligible (positive) effect on growth.

As detailed below, the Congressional Budget Office (CBO 2014) is projecting a further decrease in the federal budget deficit in the next two years and stabilization for the period after that. At the same time, the CBO is forecasting an acceleration in the rate of growth: 3.1 percent in 2014 and 3.4 percent in 2015 and 2016. The projected growth of output, should it be realized, would keep unemployment on a downward trend.

Moreover, the latest announcements from Janet Yellen, the new Federal Reserve chair, and other members of the Board indicate that the Fed's low-interest-rate policy will most likely remain intact for at least another year, or until the excess slack in the labor markets is significantly reduced.

As Wynne Godley noted 15 years ago, in the very first publication in the Strategic Analysis series, the apt question to ask is "whether the present stance of . . . policy is structurally appropriate looking to the medium- and long-term future" (1999, 3). Examining the sources and trajectory of US economic growth, Godley identified seven unsustainable processes associated with it.

The gist of Godley’s argument is simple. If an economy faces “sluggish net export demand” and fiscal policy is restrictive, economic growth becomes “dependent on rising private borrowing”—on the private sector’s continuing to spend in excess of its income. However, this continuous excess—the persistent increase in the private sector debt-to-income ratio—is not sustainable in the medium and long run. Therefore,

if spending were to stop rising relative to income without there being either a fiscal relaxation or a sharp recovery in net exports, the impetus that has driven the expansion so far would evaporate and output would not grow fast enough to stop unemployment from rising. If, as seems likely, private expenditure at some stage reverts to its normal relationship with income, there will be, given present [restrictive] fiscal plans, a severe and unusually protracted recession with a large rise in unemployment. (Godley 1999, 3)

Moreover, because growth is so dependent on “rising private borrowing,” the real economy “is at the mercy of the stock market to an unusual extent.”

Godley’s analysis turned out to be correct. The crisis of 2001 and the Great Recession of 2007–09 confirmed his conclusions.

Fifteen years later, the US economy appears to be going down the same road again. Foreign demand is still weak—as we mentioned above, exports have had only a marginal effect on the recovery over the last three years—and the government is consolidating its budget. Once again, the recovery predicted by the CBO relies on excessive private sector borrowing; and once again, it is at the mercy of the stock market.

This picture becomes even more alarming when we take into account the distribution of household income. Economic research has demonstrated convincingly that the distribution of income has become more unequal over the last three and a half decades. Households at the top of the distribution have been earning an increasing share of national income, while the rest have had to borrow more in order to maintain their consumption standards.

For this reason, we identify the path of income distribution over the last three and a half decades as an eighth unsustainable

process that public policy has allowed to go unchecked, and that threatens the sustainability of the US economic recovery.<sup>1</sup>

Given the weak foreign demand, high income inequality, and fiscal conservatism, the United States faces the choice between two undesirable outcomes: a prolonged period of low growth—secular stagnation—or a bubble-fueled expansion that will end with a serious financial and economic crisis. This dilemma is rooted in the aforementioned structural characteristics of the US economy, and goes much deeper than explanations such as the zero lower bound of the nominal interest rate.

As is our practice in these reports, we make no short-term forecasts. Instead, our perspective is a strategic one, in that we are concerned with developments over the next few years. In concert with our long-established practice, we begin with a baseline that simulates the projections in the CBO’s annual *Budget and Economic Outlook*. We then proceed and discuss the issues related to the distribution of income from the analytical perspective of our macro model.

### The Baseline Scenario

To form our baseline scenario we draw from the assumptions detailed in *The Budget and Economic Outlook: 2014–2024* issued by the CBO (2014). A summary of the CBO’s projections is shown in Table 1. The federal budget deficit, as a percentage of GDP, is projected to decrease from 4.1 percent in fiscal year 2013 to 3 percent in FY 2014, and then fall further, to 2.6 percent, in FY 2015. In fiscal years 2016 and 2017, however, the CBO projects a slight increase in the deficit, to 2.8 percent and 2.9 percent, respectively. At the same time, real GDP will increase by 3.1 percent in 2014 and by 3.4 percent in 2015 and 2016, and then fall to 2.7 percent in 2017.<sup>2</sup>

**Table 1 CBO Baseline Budget Projections, 2013–17**

	2013	2014	2015	2016	2017
Revenues (% GDP)	16.7	17.5	18.2	18.2	18.1
Outlays (% GDP)	20.8	20.5	20.9	21.1	21.0
Deficit (% GDP)	–4.1	–3.0	–2.6	–2.8	–2.9
Real GDP growth rate (%)	2.1	3.1	3.4	3.4	2.7

Source: CBO (2014)

The question we ask is, what would the expense behavior of the private sector need to be for the CBO projections to be realized? We assume a mild increase in the price level and stock market and a constant real exchange rate; the growth rates of US trading partners are taken from the International Monetary Fund's *World Economic Outlook* (IMF 2013). One characteristic of the postcrisis period is that nonfinancial corporations have been accumulating (gross) debt. In line with this, we assume that this trend will continue at the same pace over our 2014–17 projection period.

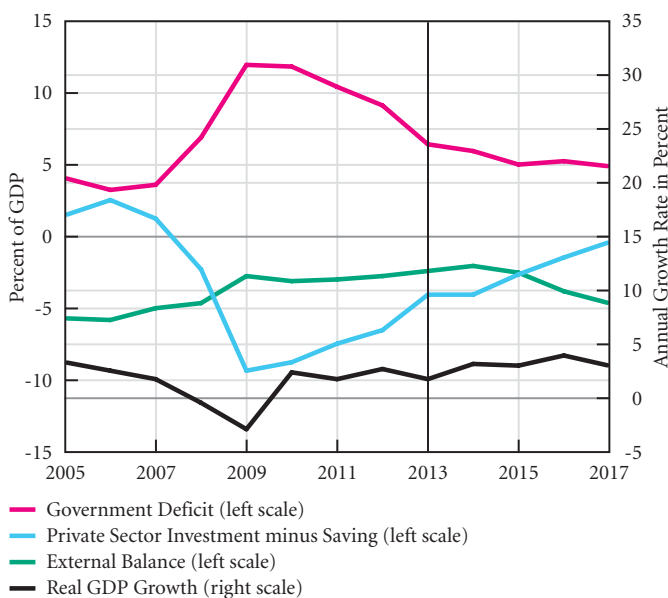
Our baseline simulations are summarized in Figure 1. Two things stand out. The first is the sharp deterioration in the external position of the US economy: according to our projections, net foreign borrowing converges toward 4.5 percent of GDP by the end of the simulation period. The higher growth rates in the United States, combined with the anemic growth rates of its trading partners, lead to this condition.

The United States' persistently high external deficit has repeatedly been the subject of the Levy Institute's Strategic Analysis reports, beginning with Godley's in 1999. Simple accounting dictates that these high foreign deficits must be mirrored by domestic deficits, both public and private. In

turn, the continuous accumulation of these domestic deficits, especially on behalf of the private sector, becomes an unsustainable process that sooner or later leads to a crisis. The dominance of fiscal conservatism makes matter worse; it means that the "burden" of borrowing falls on the private sector, which is much more vulnerable to the accumulation of liabilities, especially in a country like the US. It was precisely this process of high private expenditure through borrowing that led to the 2001 and 2007 recessions. What we are, unfortunately, beginning to observe are signs that the US economy is again moving down the same path.

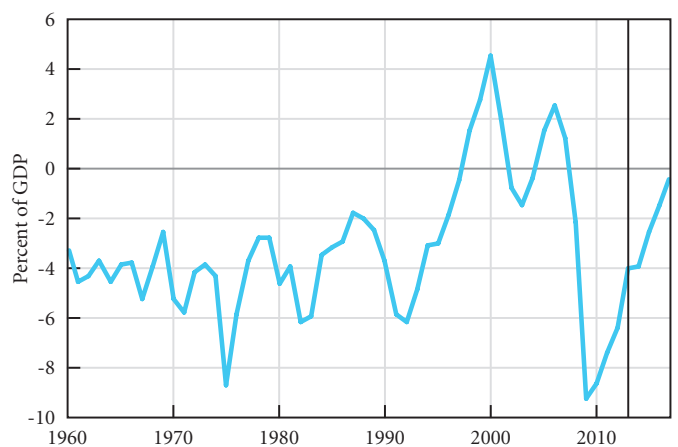
This brings us to the second observation: in order for the CBO projections to materialize, net private sector lending—saving minus investment—will have to fall, and converge to almost zero by the end of 2017. Historically, the private sector was a net lender, as illustrated in Figure 2; its balance fluctuated around 4 percent of GDP until the mid-1990s. In the late 1990s, the rapid increase in foreign deficits, together with the fiscal policy stance of the time, meant that the private sector had to incur large deficits. Indeed, as the figure shows, the private sector deficit peaked at 4.5 percent of GDP in 2000. After the crisis of 2001, the same pattern of increasing deficits

**Figure 1** Baseline Scenario: US Main Sector Balances and Real GDP Growth, Actual and Projected, 2005–17



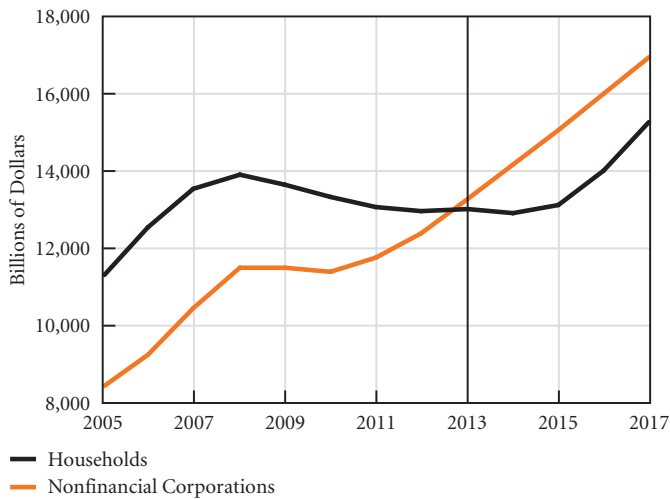
Sources: BEA; authors' calculations

**Figure 2** Private Sector Investment minus Saving, Actual and Projected, 1960–2017



Sources: Federal Reserve; authors' calculations

**Figure 3** Gross Debt of Nonfinancial Corporations and Households, Actual and Projected, 2005–17



Sources: Federal Reserve; authors' calculations

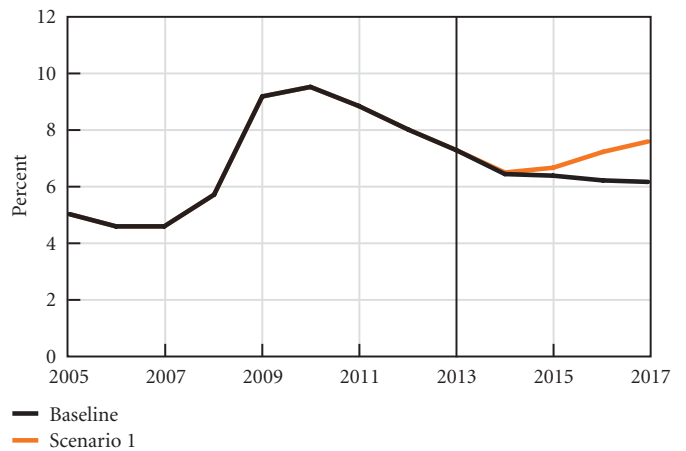
was repeated, although on a smaller scale; net borrowing peaked in 2006 at 2.6 percent. And since the large drop in net borrowing in 2009, the private sector has again been moving in the same direction. The experience of the last two recessions, however, proves that this path is unsustainable.

A similar picture emerges in Figure 3. On the nonfinancial corporation side, we note the increase in liabilities that began soon after the crisis ended in 2009, and assume it will continue apace, adding another \$4 trillion of debt by the end of the projection period. On the other hand, as the figure shows, 2013 was the first year postcrisis in which there was an increase in the debt of households, albeit smaller than that of the corporate sector. In our baseline scenario, private sector debt stabilizes in 2014 and, after a small increase in 2015, increases rapidly in the last two years of our projection period.

Note that the government balance shown in Figure 1 refers to that of the general government, which includes federal, state, and local government. For the purposes of our analysis, we assume that the fiscal stance of state and local government will remain unchanged. If, however, there is a fiscal consolidation of state and local finances, achieving the CBO growth rates will require even higher net borrowing by the private sector.

The discussion above implies that a prerequisite for sustainable growth in the United States is the necessity of

**Figure 4** Unemployment Rate, Actual and Projected, 2005–17



Sources: BLS; authors' calculations

correcting the *twin* problem of private and foreign sector deficits. Previous Strategic Analysis reports (e.g., Papadimitriou et al. 2013) have dealt extensively with viable options for reducing the foreign sector deficit without jeopardizing the macroeconomic performance of the US economy.

Finally, with regard to unemployment, Figure 4 shows that under our baseline scenario the rate of unemployment will converge to 6 percent by the end of the simulation period, in line with the CBO forecast.

One further note is in order here. Lately, there have been many reports in the economic and financial press about a revival of US manufacturing related to increasing labor costs in emerging markets, new technologies that increase labor productivity, and lower energy costs in the United States due to the exploitation of new shale gas reserves. The evidence shown in the National Income and Product Accounts tables does indeed indicate a substantial decrease in the import of petroleum products in real terms—a drop that has, however, been more than offset by the increase in imports in other categories. To be sure, the revival of manufacturing would be welcome news, with beneficial effects on the foreign position of the United States. Although this seems entirely plausible, the macroeconomic data have provided scant evidence so far, and do not show a significant shift in the position of the foreign sector as a whole.

## Inequality: Another Unsustainable Process

The biggest obstacle to a sustainable recovery of the US economy is the inequality in the distribution of income. As we mentioned at the beginning of this report, we have identified the path of income distribution as an eighth unsustainable process, in addition to the seven processes identified by Godley in 1999. The extreme inequality in the distribution of income is illustrated in Figures 5 and 6, which present the shares of income of the top 1 and 10 percent of the US population. The data, originally tabulated by Piketty and Saez (2003) from tax-return microdata, were retrieved from the World Top Incomes Database (Alvaredo et al. 2014). The figures demonstrate that, starting in the early 1980s, there has been an alarming increase in the share of income earned by the richest segment of the population. In the years leading up to the Great Recession, the income share of the top 1 and 10 percent reached the levels they had achieved in the years before 1929 and the Great Depression. However, unlike in the 1930s, the top income shares bounced back after the crisis, and have continued to increase.

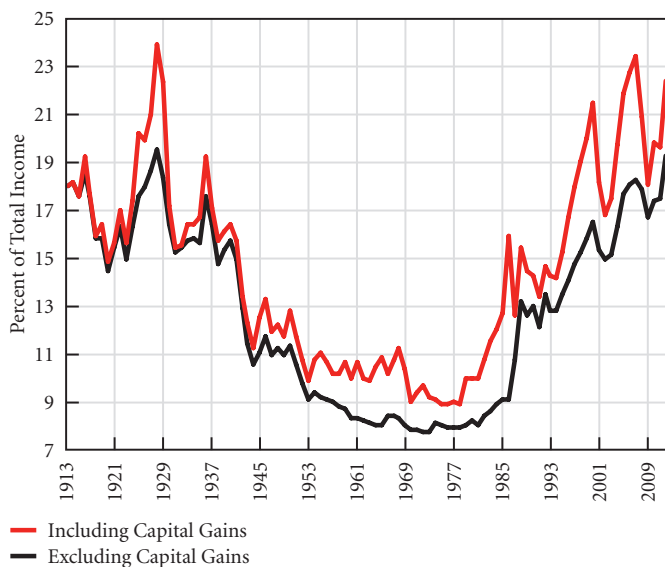
Seen from another perspective, these developments mean that between 1980 and 2012 the real income of the top 1 and 10 percent increased by more than \$2 trillion and close to \$5 trillion in 2012 dollars, respectively. Given that the saving

rates of these segments of the population are high, their increasing income implies a spectacular increase in liquidity for these households that naturally found its way to the financial markets. Not coincidentally, as shown in Figure 7, the share of income of the top 10 percent correlates remarkably well with their share of total financial assets as a percent of GDP over the postwar period. In particular, both series are stationary until the late 1970s and increase in tandem thereafter.<sup>3</sup> Thus the evolution of the unequal distribution of income has been one of the major causes behind the financial instability of the recent period. The continuation of this trend, after the recent crisis, is a reason for concern.<sup>4</sup>

The increasing share of the income of the richest segment of the population meant that the total income of the remaining part of the population stagnated. An index of the real average income of the bottom 90 percent is shown in Figure 8. The average income for this group increased in the first three decades after World War II but has stagnated since then. In fact, the real average income of the bottom 90 percent of the distribution was lower in 2012 compared to 40 years earlier.

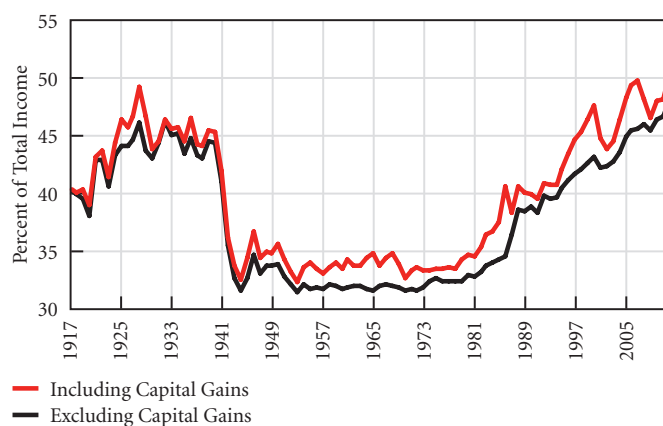
In the same figure we present an index of average real consumption over the same period. (Note that, due to lack of data, “average consumption” refers to the total population.)

**Figure 5 Top 1 Percent Income Share, 1913–2012**



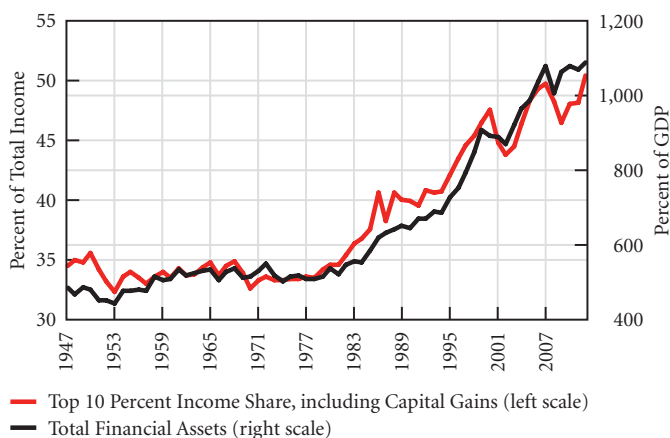
Source: Alvaredo et al. (2014)

**Figure 6 Top 10 Percent Income Share, 1917–2012**



Source: Alvaredo et al. (2014)

**Figure 7 Top 10 Percent Income Share and Total Financial Assets, 1947–2012**

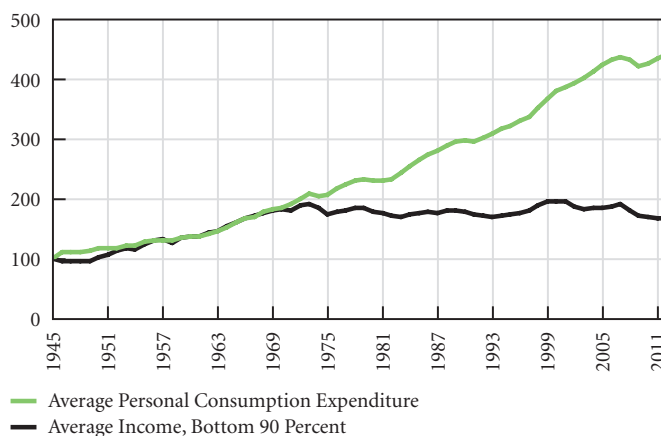


Sources: Alvaredo et al. (2014); Federal Reserve; BEA; authors' calculations

Unlike the average income of the bottom 90 percent, the pace of the increase in average consumption has remained the same for the entire postwar period. In the first three decades after World War II, the real average income of the bottom 90 percent increased at the same pace as average consumption. However, as average income stagnated after the mid-1970s, a continuously increasing gap between the two was formed. To the extent that the increase in average consumption was not supported by the top 10 percent, the gap had to be bridged with increased borrowing by the bottom 90 percent. This is precisely what happened: the increasing supply of liquidity from the top 10 percent was mirrored by the increasing demand for liquidity by the bottom 90 percent in order to sustain its consumption levels.

A similar picture can be drawn if we approach the issue from the standpoint of stocks rather than flows. In Figure 9 we report data from Wolff (2012) on debt as a percentage of income and equity for the three middle income quintiles, for selected years between 1983 and 2010. Over this period the debt-to-income ratio rose sharply, from 67 percent in 1983 to an extraordinary 157 percent in 2007, before falling to 135 percent in 2010. Similarly, the debt-to-equity ratio almost doubled, from 37.4 percent in 1983 to 71.5 percent in 2010. Notice that despite the valiant deleveraging efforts of households after 2007, the ratio of debt to equity continued its upward trend,

**Figure 8 Index of Personal Consumption Expenditure per Capita and Average Income of the Bottom 90 Percent, 1945–2012**



Sources: Alvaredo et al. (2014); BEA; US Census; authors' calculations

primarily because of the drop in the value of their assets. Over the same period, the debt-to-equity ratio of the top 1 percent dropped from 5.9 percent to 3.5 percent, while the debt-to-income ratio fell from 86.8 percent to 60.6 percent.

To a large extent, Figure 9 is another representation of Figure 8. The American “middle class” increased its debt to cover the gap between its stagnating income and high consumption standards. Wolff (2012) examines the composition of the balance sheets of the middle class, and asks, “Where did the borrowing go?”

Some have asserted that it went to invest in stocks. However, if this were the case, then stocks as a share of total assets would have increased over this period, which it did not. . . . Moreover, they did not go into other assets. In fact, the rise in housing prices almost fully explains the increase in the net worth of the middle class. . . . *Instead, it appears that middle class households, experiencing stagnating incomes, expanded their debt in order to finance consumption expenditures [emphasis added].* (23)

These debt dynamics led to the crisis of 2007. The unsustainability of the borrowing frenzy became apparent with the housing market crash in 2007, when many households

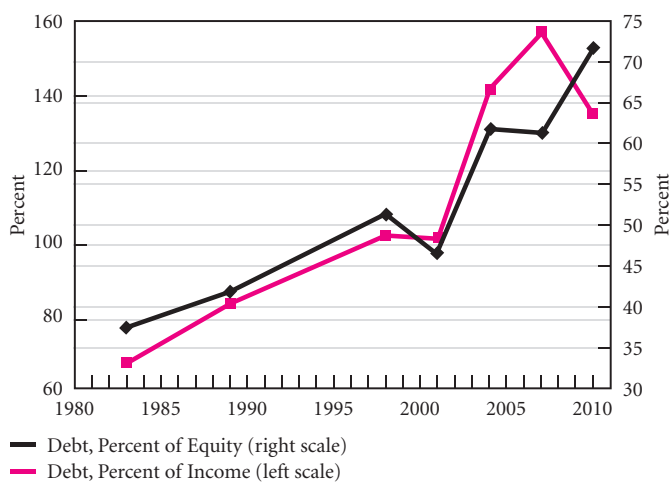
found themselves overextended and their assets “underwater.” The asset deflation, together with the slowdown in income growth due to the recession (Figure 8), led to the extraordinary number of foreclosures, putting pressure on the value of mortgage-backed securities and setting the stage for the financial meltdown. Note that the numbers in Figure 9 are for the three middle-income quintiles only—the “middle class.” The picture would be even more alarming if we were to include those in the bottom income quintile—the poorest segment of the population—and the subprime loans sold to them.<sup>5</sup>

Another way to see this point is presented in Figure 10. On the left scale, the ratio of disposable income of the top 10 percent over the bottom 90 percent is plotted for the period 1986–2012. The increasing inequality is manifested with the increase of this ratio from around 0.6 in the mid-1980s to 0.9 in 2012. On the right scale, the ratio of gross debt held by the bottom 90 percent over that held by the top 10 percent is shown for the years 1982, 1989, 1995, 2000, 2007, and 2010. Clearly, over that period the gross debt of the bottom 90 percent increased disproportionately compared to that of the richest 10 percent.

In other words, over the last 30 years not only was there a sharp increase in the level of household debt but a disproportionate share of this debt was incurred by the middle class and the poorest American households. Moreover, there seems to be a strong correlation between the two variables: as the disposable income of the top 10 percent of the population increased relative to the disposable income of the bottom 90 percent, the gross debt of the latter rose relative to the debt of the former.

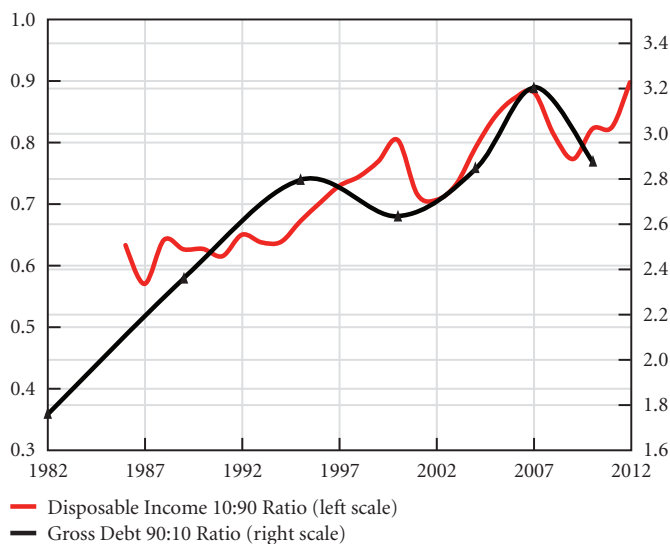
Another stock that was naturally affected by these changes was household wealth. In Table 2 we can see that the average wealth of the wealthiest 1 percent rose by almost \$7 million—or 71.3 percent—over the period 1983–2010. The average wealth of the next 4 percent increased by \$1.5 million (or 101.1 percent), while the bottom 5 percent of the wealthiest decile increased its average wealth by \$570,000 (or 83 percent). In total, the wealthiest decile gained 90 percent of the total wealth that was created in this period. This comes in sharp contrast to what happened at the middle and bottom of the income distribution: the average wealth of the third quintile *decreased* by 17.9 percent, and the bottom 40 percent

**Figure 9 Debt-to-Income and Debt-to-Equity Ratios of the Middle Class, 1983–2010**



Source: Wolff (2012)

**Figure 10 Ratios of the Disposable Income of the Top 10 Percent over the Bottom 90 Percent and the Gross Debt of the Bottom 90 Percent over the Top 10 Percent, 1982–2012**



Sources: Taylor et al. (2013); Federal Reserve; Alvaredo et al. (2014); authors' calculations



**Table 2 Mean Net Worth by Wealth Class, 1983 and 2010 (in thousands of 2010 dollars)**

	Top 1 Percent	Next 4 Percent	Next 5 Percent	Next 10 Percent	Top 20 Percent	4th 20 Percent	3rd 20 Percent	Bottom 40 Percent	All
1983	9,599	1,588	690.5	372.9	1,156.5	178.7	74.2	6.3	284.4
2010	16,439.4	3,192.5	1,263.4	567.0	2,061.6	216.9	61.0	-10.6	463.8
Percent change	71.3	101.1	83.0	52.1	78.3	21.4	-17.9	-269.7	63.1
Percent gain	38.1	35.8	16.0	10.8	100.7	4.3	-1.5	-3.8	100.0

Source: Wolff (2012)

experienced a 270 percent *decrease* in its average wealth over the same period. In other words, not only did the wealthiest households appropriate all of the wealth that was created between 1983 and 2010, but the lower middle class and the poorest households also lost ground in absolute terms.

### Distribution and the Baseline Scenario

The stock-flow consistent methodology of the Levy Institute’s macro model provides a natural way to examine the relation between the distribution of income and the macroeconomic performance of the economy.

As discussed earlier, the CBO’s projections rely on households beginning to borrow again and increasing their debt and debt-to-income ratio. If we decompose the household sector into households in the bottom 90 percent and the top 10 percent, we can gain some further insights into the possible repercussions of such an increase of debt. Given that the income distribution has worsened since the crisis (see Figures 5 and 6), the burden of indebtedness will again fall disproportionately on the middle class and the poor.

The results of this decomposition are presented in Figure 11. The figure illustrates the stock of household debt and its distribution between the bottom 90 percent and the top 10 percent of the population. The series was calculated by applying the ratio of gross debt from Figure 10 to the actual data and the projections for gross household debt derived from our model. For the calculations, we assumed that the debt ratio would increase again and reach its 2007 level by the end of the simulation period.<sup>6</sup> The result of this decomposition shows that, in order for the CBO projections to materialize, households in the bottom 90 percent would have

to start accumulating debt again in line with the trend of the last 30 years while the stock of debt of the top 10 percent remained at its present level.

Figure 12 shows the household sector debt-to-disposable-income ratios for the bottom 90 percent and the top 10 percent. For this calculation we assumed that the income inequality—and thus the disposable income ratios—would remain at 2012 levels.<sup>7</sup> Based on these assumptions, the debt of the top 10 percent relative to disposable income would decrease by the end of the projection period, while, conversely, the ratio of the bottom 90 percent would begin increasing again after 2015.

Clearly, this process is *unsustainable*.

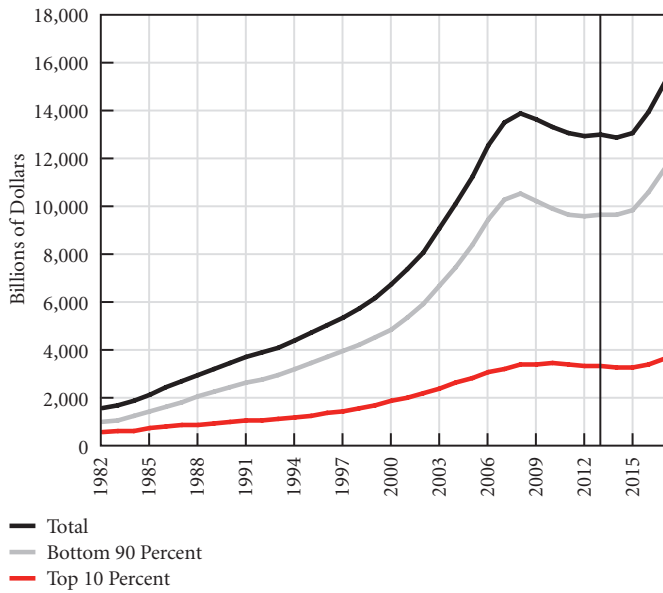
### Scenario 1: The Bottom 90 Percent Continues to Deleverage

Given the path of the distribution of income, the unequal accumulation of debt and the speculative bubbles that supported it (first the stock market and then the housing market) were necessary for the “normal” increase of consumption and aggregate demand during the precrisis period. Absent the increase in indebtedness of the bottom 90 percent during the 1990s and 2000s, the macroeconomic performance of the United States would have suffered dramatically. To paraphrase Voltaire, even if bubbles and debt did not exist, it would be necessary to invent them—and so we did.

Looking into the future, if the distribution of income remains as is, the US economy will face the prospect of either secular stagnation, due to the bottom 90 percent’s low levels of debt and stagnating demand; or a repeat of the pre-2007 condition of debt-led growth, based on increased borrowing

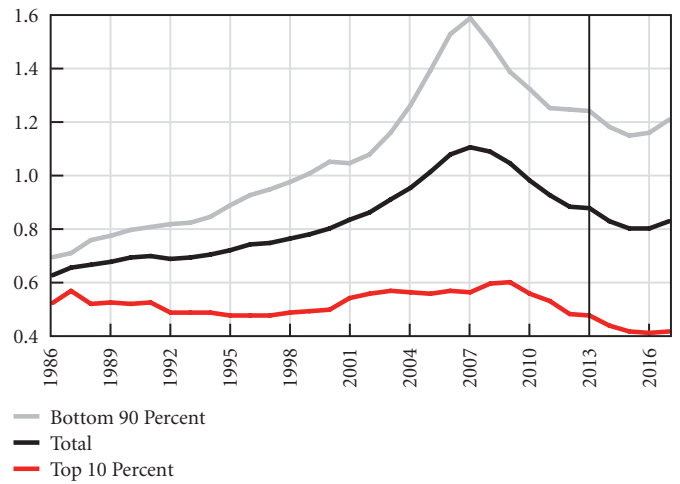


**Figure 11 Baseline Scenario: Decomposition of Household Debt, Actual and Projected, 1982–2017**



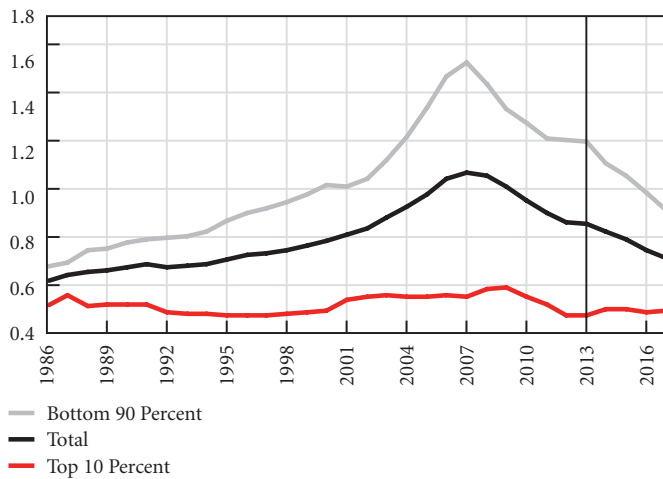
Sources: Federal Reserve; authors' calculations

**Figure 12 Baseline Scenario: Debt-to-Disposable-Income Ratios, Actual and Projected, 1986–2017**



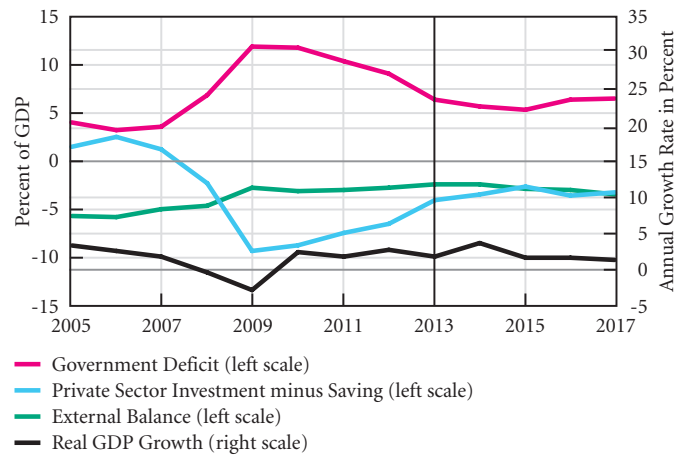
Sources: Taylor et al. (2013); Federal Reserve; Alvaredo et al. (2014); BEA; authors' calculations

**Figure 13 Scenario 1: Debt-to-Disposable-Income Ratios, Actual and Projected, 1986–2017**



Sources: Taylor et al. (2013); Federal Reserve; Alvaredo et al. (2014); BEA; authors' calculations

**Figure 14 Scenario 1: US Main Sector Balances and Real GDP Growth, Actual and Projected, 2005–17**



Sources: BEA; authors' calculations

and debt and a new sort of speculative bubble. The only way out of this dilemma is a reversal of the trend toward greater income inequality. A change in the income distribution is a necessary condition for sustainable growth in the future.

To make this point clearer, we develop one more scenario, in which we examine what would happen to the economy should the bottom 90 percent of the population continue to deleverage along its postcrisis trend while the top 10 percent maintained its debt-to-disposable-income ratio at current levels, as shown in Figure 13.

The results of this exercise are presented in Figure 14. The important observation here is that the economy does not manage to recover, save for a brief uptick in growth in 2014. By the end of the simulation period, the growth rate converges to 1.7 percent—lower than it has been in the postrecession years—with unemployment reaching 7.6 percent by 2017, a rate higher than in our baseline (see Figure 4).

Finally, the paths of the three balances in Figure 14 show that (1) the continuous deleveraging of households increases the positive financial balance of the private sector as a whole relative to the baseline scenario, and (2) the slower growth leads to a smaller current account deficit and a higher government deficit.

## Conclusions

The main conclusion of this report is that if the United States maintains its restrictive fiscal policy stance, as seems likely, it will take many more years for high growth to resume and unemployment to fall significantly—unless the economy reenters an era of excessive private sector borrowing reminiscent of the late 1990s and mid-2000s, with the known subsequent effects. If a growth rate higher than the rate assumed in the latest CBO report is to occur and unemployment is to decrease faster, it will become necessary to relax the fiscal policy stance and increase net export demand by investing public funds in basic research and development in sectors that will support exports (Papadimitriou et al. 2013).

We have also identified an unsustainable process relating to rising inequality in the United States. The income of the bottom 90 percent of households has stagnated over the last three and a half decades, and consumption growth had to be financed by excessive borrowing as a result. The ongoing

process of balance sheet deleveraging (primarily by the bottom 90 percent) sharply constrains the group's spending, which helps explain the slow recovery in the aftermath of the 2007–09 recession. According to the Levy Institute's macro model simulations, the rise in inequality is unsustainable, and if it is allowed to continue, will lead to an era of anemic growth and high unemployment.

*The authors would like to thank Ajit Zacharias and Fernando Rios-Avila for useful discussions and for help with the data on the decomposition of household debt.*

## Notes

1. The unsustainability of the trajectory of the income distribution within the analytical framework of the Levy Institute macro model was first made in Zezza (2011).
2. The projections for the budget refer to *fiscal years*, while the projections for the growth rate refer to *fourth-quarter-to-fourth-quarter percentage changes*. In our simulations we take into account these differences in timing. However, in our graphs we present the results for *calendar years*, which explains some minor discrepancies between our simulations and the projections of the CBO.
3. We get a similar picture whether we include or exclude capital gains, or whether we use the share of the top 1 percent or the top 10 percent.
4. For a more detailed exposition of this argument, see Palma (2009, 842–43).
5. A related discussion is provided by Cynamon and Fazzari (2014).
6. If  $D_T$  is the debt of the household sector as a whole,  $D_{10}$  is the debt of the top 10 percent and  $D_{90}$  the debt of the bottom 90 percent, and  $\lambda$  is the ratio of the debt of the bottom 90 percent over the top 10 percent ( $\lambda = D_{90}/D_{10}$ ), then it is easy to decompose  $D_T$  into  $D_{10}$  and  $D_{90}$  if we know the value of  $\lambda$ . It is not hard to see that  $D_{10} = D_T / (1 + \lambda)$ , while  $D_{90} = D_T * \lambda / (1 + \lambda)$ .
7. As in the previous note, if  $Y_T^d$  is the disposable income of the household sector as a whole,  $Y_{10}^d$  is the disposable income of the top 10 percent and  $Y_{90}^d$  the disposable income of the bottom 90 percent, and  $r$  is the ratio of the disposable income of the top 10 percent over the bottom

90 percent ( $r = Y_{10}^d / Y_{90}^d$ ), then it is easy to decompose  $Y_T^d$  into  $Y_{10}^d$  and  $Y_{90}^d$  if we know the value of  $r$ . In this case,  $Y_{90}^d = Y_T^d / (1 + r)$ , while  $Y_{10}^d = Y_T^d * r / (1 + r)$ .

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