American Economic Journal: Macroeconomics 2014, 6(3): 214–234
http://dx.doi.org/10.1257/mac.6.3.214

"Fisher Dynamics" in US Household Debt, 1929–2011[†]

By J. W. Mason and Arjun Jayadev*

The evolution of debt-income ratios over time depends on income growth, inflation, and interest rates, independent of any changes in borrowing. We examine the effect of these "Fisher dynamics" on household debt-income ratios in the United States over the period 1929–2011. Adapting a standard decomposition of public debt to household sector debt, we show that these factors explain, in accounting terms, a large fraction of the changes in household debt-income ratios observed historically. More recently, debt defaults have also been important. Changes in household debt-income ratios over time cannot be straightforwardly interpreted as reflecting shifts in the supply and demand of household credit. (*JEL* D14, E21, E31, E43, H63, N32)

I. Accounting for Leverage

In the wake of the financial crisis of 2007–2008 and ensuing recession, there is increasing recognition that changes in both public and private leverage—that is, in the ratio of debt to some measure of debt-service capacity—may have important macroeconomic implications. In most of this discussion, it is assumed, often implicitly, that changes in leverage are driven primarily by changes in the supply and/or demand for credit. But when there are existing large stocks of debt, changes in income growth and inflation and nominal interest rates affect the evolution of debt-income ratios independently of the decisions of lenders and borrowers.

In this paper, we offer an alternative accounting for the evolution of household debt-income ratios, or leverage. We decompose leverage into the net borrowing of the household sector on one hand, and the effects of nominal interest rates, inflation, and real income growth on the other. We call attention to the ways in which variation in those latter three variables produce a divergence between changes in debt-income ratios and changes in borrowing behavior. In particular, our accounting implies that the rise in household debt-income ratios after 1980 is best interpreted as primarily reflecting the effects of disinflation and higher nominal interest rates on the existing household debt stock, rather than increased household borrowing. Our focus is on

* Mason: Department of Economics, Roosevelt University, 430 S Michigan Ave., Chicago, IL 60605 (e-mail: jmason06@roosevelt.edu); Jayadev: Department of Economics, University of Massachusetts at Boston, Wheatley Building, 100 Morrissey Blvd., Boston, MA 02125 and Azim Premji University, Bangalore (e-mail: arjun.jayadev@umb.edu). We would like to thank Arindrajit Dube, Ethan Kaplan, Anton Korinek, Iren Levina, Perry Mehrling, Suresh Naidu, Peter Skott, Steve Randy Waldman, and two anonymous referees for comments on earlier drafts.

[†] Go to http://dx.doi.org/10.1257/mac.6.3.214 to visit the article page for additional materials and author disclosure statement(s) or to comment in the online discussion forum.

the household sector's debt-income ratio—that is, on gross credit-market liabilities rather than net wealth or savings. Because we are concerned with gross liabilities, we do not subtract net asset purchases—real and financial—from debt changes, but combine household purchases of assets with consumption, referring to both categories of spending together as "expenditure."

It is widely recognized in discussions of the evolution of public debt-GDP ratios that income growth, inflation, and interest rates have important mechanical effects on the evolution of leverage independent of the government fiscal position. We apply this same insight to the evolution of private leverage, showing how observed debt-income ratios reflect changes in income growth, inflation, and interest rates, as distinct from the effects of these variables on the supply and demand for credit. For example, an acceleration in income growth may raise or lower desired borrowing, but in either case it will directly reduce the ratio of debt to current income. Historically, these mechanical effects have often been large, so changing debt ratios gives a misleading impression of the evolution of borrowing. One might expect that periods with more rapidly rising debt-income ratios will be those with higher levels of expenditure in excess of income. But in several important cases this turns out to be false.

Our accounting decomposition allows us to show how changes in interest and growth rates distort the relationship between the intertemporal allocation of expenditure through credit markets on the one hand, and observed debt-income ratios, on the other. Further, it allows us to quantify this divergence across time. We apply a modified version of the standard public-debt decomposition, and find that the mechanical effects of changes in growth inflation and interest rates have been responsible for a large part of observed changes in household leverage from 1929 to 2011. It is necessary to correct for these "Fisher dynamics"—the mechanical effects of changes in these three variables on household debt-income ratios independent of borrowing behavior—to form an accurate picture of the evolution of household leverage. For the most recent period, it is also necessary to take account of defaults.

An important finding is that the rise in household leverage during the 1980s and early 1990s is not explained by any increased in credit-financed expenditure by households, but instead by the combination of high nominal interest rates and disinflation from 1980 to the late 1990s. Contrary to popular perceptions, the 1980s did not see a rise in household borrowing relative to income, but rather a fall in new borrowing that was, however, insufficient to offset the rise in debt service payments. Our accounting also suggests a striking similarity between the behavior of household balances during the the Great Recession and the Great Depression. In both periods, there was a sharp reduction in new borrowing by households, but this reduction was insufficient to significantly reduce household debt-income ratios because it was offset by decelerations in inflation and household income, combined with persistently positive nominal interest rates. Accounting for defaults—possible only for the most recent period—strengthens the case for the importance of Fisher dynamics. While net new borrowing by households turned sharply negative after 2007, these household surpluses were insufficient to offset the increase in debt from continued real interest rates well above growth rates. There would have been no household deleveraging since 2007 in the absence of a sharply higher rate of defaults.

II. Motivation: The Importance of Private Leverage

A. *Gross Debt versus Saving*

Traditionally, economists have attributed only a minor role to private sector leverage for the behavior of economic aggregates. While a minority of economists going back at least to Irving Fisher have seen leverage as an important factor influencing aggregate demand, the more common assumption is that debt matters only to the extent that it is reflected in household net wealth (Benito et al. 2007). Our premise is that in some cases changes in debt, and not just savings or net wealth, are economically important. In particular, an interest in leverage is usually motivated by the idea that economic units may sometimes have difficulty meeting the cash commitments arising from previous borrowing. When there is the possibility of default, both debtors and creditors will be concerned with debtors' capacity to service existing debt. If units face constraints on new borrowing and assets are illiquid, debt service commitments must be met out of current income flows. The greater current debt is, the larger the contractually fixed debt-service payments will be, and the more likely the unit is to face difficulties meeting them. So leverage matters in any situation where credit constraints and illiquid assets may prevent agents from achieving their preferred allocation of income across periods (Tirole 2011). These constraints are likely to be most important in financial crises and recessions. But they also matter to the extent that the possibility of default limits access to credit even in periods of financial stability.

Leverage is normally defined as the ratio of debt to either income (a flow) or assets or wealth (a stock). For businesses, where future earnings both depend on assets and should be capitalized into net worth, defining leverage as the ratio of debt to some measure of wealth is generally appropriate; for households, which receive mainly labor income and whose future income is not captured by any stock with an observable market value, measuring leverage as the ratio of debt to income is more appropriate. We use the ratio of debt to income.

B. *Leverage Trends in the United States, 1929–2010*

Figure 1, drawn from the Flow of Funds, shows private and public debt to GDP ratios for the three main nonfinancial sectors since 1929.[1] The large increases in household and business debt relative to GDP between 1929 and 1933 are especially striking since the nominal value of debt fell substantially for both of those sectors. The leverage increases during this period are due to the fall in nominal GDP, which in turn is due in about equal parts to deflation and the fall in real output. In more recent decades we see a long-term upward trend in all three sectors' debt. This trend is common to most OECD countries (Cecchetti, Mohanty, and Zampolli 2010). While the rise in public debt is responsible for the largest part of the increase

[1] The pre-1950 figures of business debt are from Goldsmith (1955), which gives figures only for selected years. Since Goldsmith does not provide a category strictly equivalent to credit market liabilities as reported in the Flow of Funds, we use the sum of payables to financial intermediaries, mortgages, and bonds.

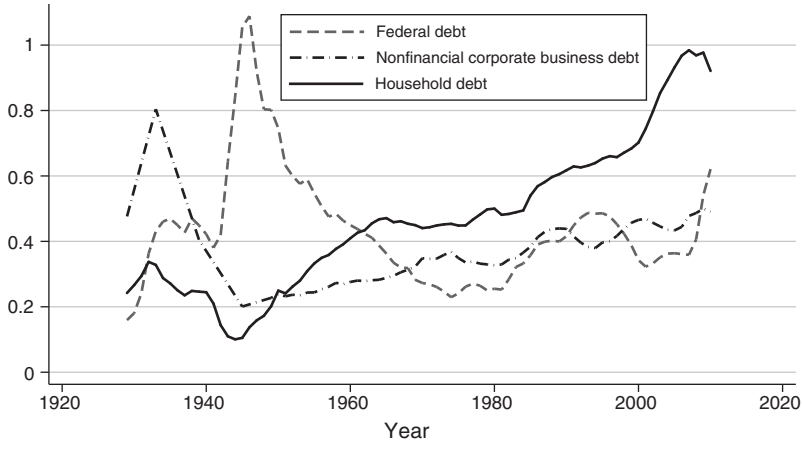

FIGURE 1. NONFINANCIAL LEVERAGE, 1929–2011

Notes: The lines show the gross nominal debt of the three domestic nonfinancial sectors relative to nominal GDP. For nonfinancial businesses, pre-1945 data is taken from Goldsmith (1955), which includes estimates only for selected years.

in nonfinancial debt over the past five years, over the past three decades increases in business and, especially, household debt have been more important.

C. *Leverage and Financial Crises*

Leverage is most likely to matter in the context of a financial or banking crisis, since that is when credit constraints are most likely to bind and when the operation of the financial system may be impaired, rendering normally liquid assets illiquid. The ratio of debt to income is one obvious indicator for the extent to which debt commitments will continue to be honored in such a crisis. Leverage may also play a role both in precipitating a crisis—since high leverage makes any interruption in debt payments more likely to propagate across units—and in determining the degree to which a financial crisis impairs coordination in the nonfinancial economy. This view is particularly associated with Hyman Minsky (Minsky 1982), but has also been developed by Paul Volcker (Volcker 1979), and others. The financial disarray of the late 1980s—the last period before the recession of 2008–2009 of sharply tightening credit constraints and widespread defaults—gave rise to a number of papers exploring the importance of the liability side of household balance sheets (Caskey and Fazzari 1989; Jarsulic 1989; Palley 1994).

Recent theoretical and empirical work has revived this line of inquiry, seeking to show that the accumulation of debt in the household sector, and the subsequent behavioral adjustment of heterogeneous households to shocks in household balance sheets, might help explain the prolonged state of depressed demand observed currently in the United States and elsewhere (Hall 2011a, b; Eggertson and Krugman 2010; Guerrieri and Lorenzoni 2011; Philippon and Midrigan 2011). Similar analysis has been applied to the Great Depression and the Japanese "lost decades" (Olney 1999; Mishkin 1978; Koo 2008). In these models, heavily indebted households cut

back consumption in the face of a shock to assets (such as a fall in house values), but less indebted households do not increase consumption in similar proportion for various reasons (financial frictions, zero lower bounds), thereby causing a recession that cannot easily be remedied by traditional policy instruments. Mian, Rao, and Sufi (2011) provide empirical evidence that household debt accumulated in the mid-2000s contributed to depressed consumption in the recession of 2007–2009. These papers support the view that gross household debt, or leverage, is a legitimate object of inquiry independent of net saving.

An important early attempt to understand the macroeconomic implications of the interaction of changes in income, interest rates, and the price level with existing stocks of debt was Irving Fisher's debt-deflation theory of depressions (Fisher 1933). The starting point in his analysis was that even as households reduced borrowing after 1929, falling prices and incomes led to rising debt burdens. Fisher argued that the increase in current debt-income ratios resulting from falling prices and incomes was an important part of the explanation for falling output in the Depression. We build on Fisher's insight (hence "Fisher dynamics") in developing our more general account of how observed leverage is affected by changes in income growth, inflation, and interest rates.

III. Methodology

A. *Debt Dynamics*

We analyze changes in private leverage using a modified version of "the least controversial equation in macroeconomics," (Hall and Sargent 2011, 2) the law of motion of government debt:

$$b_{t+1} = d_t + \left(\frac{1+i}{1+g+\pi}\right) b_t \tag{1}$$

$$\Delta b_t = b_{t+1} - b_t = d_t + \left(\frac{i-g-\pi}{1+g+\pi}\right) b_t,$$

where b is the ratio of gross debt to GDP, d is the ratio of the primary deficit—that is, deficit net of interest payments—to GDP, i is the *nominal* interest rate, g is the *real* growth rate of GDP, and π is the inflation rate. The key point, well understood in the context of public debt, is that the evolution of debt ratios is not solely determined by public-sector borrowing; the primary balance, interest rates, growth rates, and inflation each play an independent role (Escolano 2010). The equation itself may or may not be an accounting identity, depending on how broadly d is defined. In some applications, an explicit stock-flow adjustment term is added on the right-hand side to capture changes in public debt not arising from deficits (such as assumptions of private debt); in others, d is implicitly defined to include all actions that increase or decrease the stock of debt (Aizenman and Marion 2009).

The typical application of this equation is to decompose changes in the public debt-GDP ratio over time, generally into changes due to the primary balance,

the real growth rate, the nominal interest rate, and inflation. Decompositions of the changes in the debt-GDP ratio have been carried out for various countries and periods, including the United States (Hall and Sargent 2011; Aizenman and Marion 2009), the United Kingdom (Buiter 1985; Das 2011), India (Rangarajan and Srivastava 2003), and more or less broad sets of countries (Giannitsarou and Scott 2008; Abbas et al. 2011). A common finding in these papers is that changes in growth, inflation, and interest rates play a large role in the evolution of public-debt GDP ratios historically. In particular, the fall in debt-GDP ratios in most advanced countries in the decades after World War II is primarily explained by growth rates in excess of interest rates. In many countries, public debt-GDP ratios fell substantially even though governments rarely or never ran primary surpluses.

To apply the public debt decomposition to private debt, we apply the same notion of primary balance to nongovernment sectors. For the household sector, we replace GDP with personal income.[2]

B. *Data and Variable Definitions*

Except where otherwise noted, data used for the decompositions is drawn from the National Income and Product Accounts and their predecessor series. In order to separate out the contributions of the variables, we use a linear approximation of equation (1):

$$\Delta b_t \approx d_t + (i_t - g_t - \pi_t)\, b_{t-1}. \tag{2}$$

For the range of values of i, g, and π observed historically (almost never above 0.1 in absolute value, and seldom above 0.05), the approximation is very close. The variables are defined as follows. (Data sources and values for all years are given in the Appendix.)

Income.—Our measure of income is personal income less imputed noncash income of persons; this is referred to below as adjusted personal income. Our reasons for excluding imputed flows of nonmarket services are that credit market borrowing depends on the difference between money outlays and money income, and that only cash income is available for debt service.

Debt.—The stock variable b is the end-of-period value of total credit market liabilities, divided by adjusted personal income. Debt, as defined here, does not include noncredit liabilities. These are a small portion—less than 2 percent in recent years—of total household liabilities, consisting mainly of security credit. Including these liabilities in our debt measure would not affect our qualitative results.

Interest Rates.—Interest payments are gross interest paid by households. (Gross rather than net interest is is appropriate since interest income is included in disposable

[2] We discuss possible alternative denominators in Section VI.

personal income.) The effective interest rate i is total interest payments divided by the stock of debt at the start of the period. In other words, it is the average interest rate on the current debt stock, not the marginal rate on new borrowing.

Primary Balance.—The household primary deficit d is calculated as net borrowing minus interest payments, divided by adjusted disposable personal income. Household net borrowing is equal to the change in credit market liabilities from the end of the previous year. This is equivalent to the way the primary deficit is calculated for governments. Note that borrowing flows are not observed directly in the Flow of Funds. All credit flow series are computed from the change in liabilities. Among other things, this means that defaults show up as lower net borrowing (and more positive primary balances). (See discussion in Section V.) This means that we cannot include a separate measurement error term; any measurement errors also show up in the primary balance d.

Growth and Inflation Rates.—Growth g and inflation π are the percent changes in the level of adjusted income and the personal consumption expenditure (PCE) deflator, respectively, from the previous year.[3]

Our primary balance measure differs from the conventional savings rate because we do not count interest payments as consumption, and we group consumption less interest payments, acquisition of tangible assets, and acquisition of financial assets together as "expenditure." While consolidating these flows is unusual, it is logical when the focus is specifically a consistent accounting for the evolution of household debt. A change in any of these flows relative to income has the same implications for new household borrowing.[4]

In principle, debt write-offs should be a separate term in equation (1). But since it is impossible to get a consistent series for household debt defaults for most of our period, defaults are instead included in the primary balance term as a lower deficit d. This results in an excessively high measure of household primary surpluses, particularly since 2008. Section V offers corrected numbers for the most recent period. A related problem, which we have not been able to correct for, is the fact that many loans have a period of nonperformance before being written off. Since our interest rate measure is the ratio of total interest payments to the face value of outstanding debt, this means our measure of the effective interest rate is biased downward in proportion to the fraction of nonperforming loans. We do not believe this materially affects our results. But it is worth raising, since it means that the already large role of defaults in explaining household deleveraging after 2008, as reported in the section on defaults, is to some degree understated.

Figure 2 and Table 1 show the behavior of the three "Fisher variables" over the whole 1929–2011 period. The smoothness of the effective interest rate series reflects

[3] Conceptually, the ideal inflation measure would reflect the change in household income attributable to inflation. The PCE or CPI is appropriate for this purpose if we think that wages are set in real terms, but over short periods this may be a misleading assumption; the GDP deflator or an index of unit labor costs might be more appropriate in that case. Fortunately, the various indexes move broadly together, so our results are not qualitatively affected, but this is a question worth returning to in the future.

[4] Cynamon and Fazzari (2013) takes a similar approach.

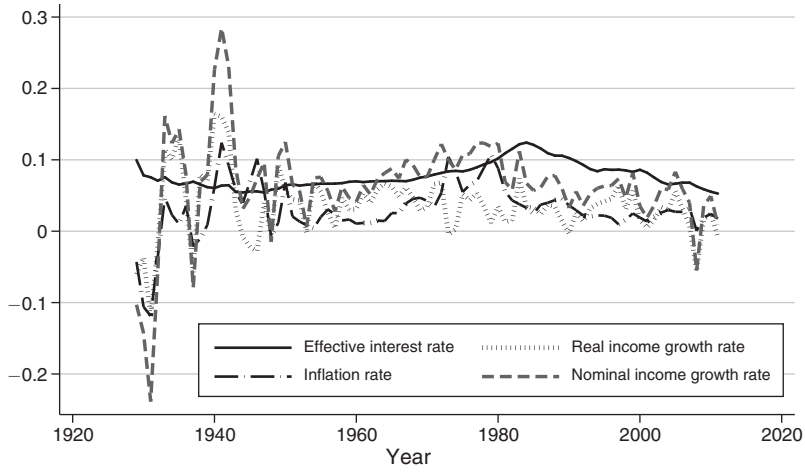

FIGURE 2. i, g, AND π FOR HOUSEHOLD DEBT, 1929–2010

Notes: The lines show the behavior of the three key Fisher variables since 1929. Adjusted income is calculated as described in the text; nominal income growth is the sum of real income growth and inflation. The effective interest rate is total household interest payments divided by the start-of-period stock of household debt. When the effective interest rate exceeds nominal income growth, a household primary balance of zero implies rising leverage; when nominal growth exceeds the effective interest rate, a primary balance of zero implies falling leverage.

TABLE 1—AVERAGE VALUES OF THE "FISHER VARIABLES" BY PERIOD, 1929–2011

Period	i	g	π
1929 to 1932	8.1	−5.6	−7.6
1933 to 1945	6.4	7.3	4.1
1946 to 1964	6.5	3.8	2.3
1965 to 1980	8.2	4.0	6.1
1981 to 1999	10.1	3.3	3.1
2000 to 2007	7.3	2.4	2.4
2008 to 2011	5.8	-0.5	1.5

Note: This shows the average values of the effective interest rates faced by households, the growth rate of adjusted household income, and inflation for seven periods. See text for details on variable definitions.

both the fact that the effective interest rate in any given year reflects debts incurred over many previous years, and the fact that the market rate faced by private borrowers generally moves than less than one for one with the policy rate. Note in particular that the effective real interest rate faced by households was positive in every year but 1974, and has remained well above zero even during the most recent period when the nominal federal funds rate has been fixed at zero.

IV. Results

The relationship between primary deficit and inflation, growth, and interest rates varies across periods. For the evolution of debt ratios, the most important question is whether nominal interest rates are greater or less than the sum of real growth and

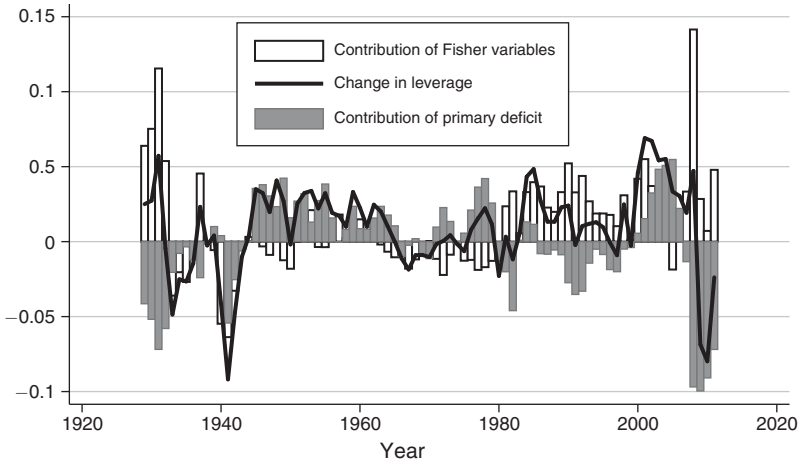

FIGURE 3. BORROWING AND FISHER DYNAMICS CONTRIBUTION TO CHANGES IN HOUSEHOLD LEVERAGE

Notes: The heavy line shows the annual change in the ratio of household debt to household income. The gray bars and empty bars show the respective contributions to the change in leverage of net new borrowing on the one hand and of the interest, inflation, and growth rates (the Fisher variables), on the other. Negative borrowing corresponds to running a primary surplus. See text for data sources.

inflation. The higher are nominal interest rates compared with nominal growth rates (or, equivalently, real interest rates compared with real growth rates), the greater the increase in debt ratios for a given level of new borrowing. When interest rates exceed growth rates, a primary balance of zero will imply rising leverage, while when growth rates exceed interest rates, a primary balance of zero will imply falling leverage. Over the full 1929–2011 period, the two cases ($i > g + \pi$ and $i < g + \pi$) are about equally common.

There are three distinct periods in the data. Before 1945, nominal growth rates fluctuate wildly, with periods both well above and well below the effective nominal interest rate. Between 1945 and 1980, nominal growth and nominal interest rates are stable and approximately equal. And since 1980, the nominal growth rate is almost always below the nominal effective interest rate. The most important factor in these shifts has been the large variations in inflation over the century. Real income growth also played a large role in the 1930s and 1940s, and again after 2007. Apart from the spike around 1980, nominal effective interest rates vary less, although the increase in interest rates in the 1980s also contributed to the shift to a regime of $i > g + \pi$.

Figure 3 shows annual changes in leverage and the contributions of new borrowing (expenditure minus income) and the three Fisher variables, respectively. The contribution of each Fisher variable to the change in leverage (shown individually in Table 2) is equal to the value of the variable multiplied by the debt stock at the end of the previous period. Figure 3 shows that over some periods—especially between 1945 and 1980, and in the housing boom period of the 2000s—changes in leverage track new borrowing (the primary deficit) closely. But over other periods, the two correspond less closely. In the 1930s, the trajectories of debt-income ratios and of new borrowing are almost inverted. Comparing the period 1965–1980 to the period

Table 2—Average Annual Change in Household Leverage and Components
(*Percentage points*)

		Attributable to:			
Period	Δb	d	i	g	π
1929 to 1932	2.6	−5.6	2.9	2.1	2.7
1933 to 1945	−1.9	−0.8	1.8	−2.3	−1.0
1946 to 1964	2.3	2.2	2.7	−1.6	−0.8
1965 to 1980	−0.2	0.9	4.7	−2.3	−3.5
1981 to 1999	1.3	−1.3	7.1	−2.4	−2.4
2000 to 2007	4.7	2.7	7.3	−2.6	−2.6
2008 to 2011	−3.1	−9.0	6.8	0.6	−1.8

Notes: This shows the annual change in the household debt-income ratio in seven distinct periods (first column) and the contributions to that change of primary deficits and interest, growth, and inflation rates. A negative number represents a component reducing in leverage and a positive number one increasing it. The sum of the contributions is not exactly equal to the change in the debt ratio due to interaction effects. The variables are defined as in Figure 4.

1980–2000, we see that households were running primary deficits (expenditure exceeded income) in the first period, but primary surpluses in the second; but household leverage was essentially flat in the first period and rose sharply in the second.

The goal of this exercise is to distinguish the changes in leverage resulting from variation in credit-financed household expenditure, from changes resulting mechanically from the Fisher variables—that is, to compare the actual trajectory of debt-income ratios from the trajectory that the same levels of new borrowing would have produced in a world where real interest and growth rates were constant or moved together. So we see that, compared with the path that leverage would have followed in a world of a stable relationship between real interest and growth rates, household leverage grew much more rapidly in the early 1930s. That is, the shift from rising debt in the early 1930s to falling debt in the later 1930s does not reflect a fall in new borrowing, but rather is an artifact of the very large swings in price and income growth rates in this decade.[5] In the 1940s, growth and inflation rose sharply but average interest rates did not (reflecting interest-rate ceilings and related policies of financial repression adopted during World War II), meaning that leverage fell more than it otherwise would. Changes in the Fisher variables were less dramatic after the war, but still important. Compared with a world of stable interest and growth rates, household leverage rose somewhat more in the immediate postwar period, and especially in the 1980s, and less in the 1960s and 1970s. Finally, the fall in leverage since 2007 would have been larger in the absence of the sharp fall in inflation and income growth in this period.

Figure 4 expands on Figure 3 and decomposes the aggregated Fisher-variable trajectory into the contributions of its three component variables. The bars show the aggregate contribution of the three variables, as in Figure 3. The lines show the

[5] We should stress here that we are not describing a counterfactual scenario that would also involve postulating alternative trajectories of borrowing behavior, for which our accounting framework provides no guidance. Rather, we are simply calling attention to the ways the trajectory of household debt ratios has systematically deviated from the trajectory of household borrowing behavior.

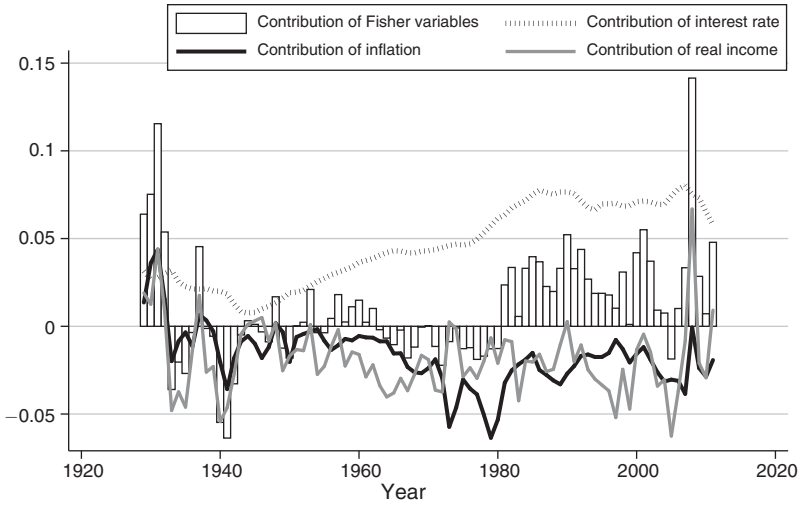

Figure 4. Contribution of "Fisher Dynamics" to Leverage by Component, 1929–2011

Notes: This figure shows the shares of leverage accounted for by the three variables. The bar is the contribution of the the Fisher variables, the three lines break up the contributions by the real growth rate of household income (thick grey line), inflation (solid), and the nominal interest rate (dotted).

contributions of each of the three components.[6] One clearly sees here the extent to which falling income raised leverage in the early 1930s and in 2009, and how deflation raised leverage in the 1930s and inflation held it down in the later 1960s and 1970s. Another striking feature is the large increase in the contribution of interest payments to leverage in the 1980s, and stability thereafter. The relatively constant interest contribution over past 25 years reflects the fact that interest rates facing households have declined at about the same rate as the debt ratio has increased, resulting in a constant debt-service burden. Another way of looking at this is that while the average interest rate has declined since the 1980s, it has declined more slowly than inflation, so that real interest rates facing households have remained higher than in the pre-1980 decades (Mason and Jayadev 2013). In effect, the contribution of interest payments to rising leverage after 1990 is a reflection of the disinflation of the 1980s.

Table 2 presents the same information as Figures 3 and 4. It outlines seven distinct periods. The exact periodization is not based on any formal test, and nothing hinges on the precise dates chosen; but visual inspection of the figures does suggest important variation in the relations among the variables across these periods. Comparing the first two periods, we see that household debt-income ratios rose by an average of 2.6 points per year from 1929 through 1932, and then fell by 1.9 points per year from 1933 to 1945. But the household primary balance moved in the opposite direction as one would naïvely expect, with households paying down debt equal to

[6] The lines show the respective contributions to the growth of leverage, not the variables themselves—that is, they show each variable times the start-of-period debt stock.

5.6 percent of income in the period of rising leverage and only 0.8 percent of income in the period of falling leverage. Looking at the final three columns, we see that positive nominal interest rates, falling real income, and deflation contributed about equally to the rise in debt-income ratios in the early 1930s. Changes in debt-income ratios corresponded more closely to household primary balances during the postwar decades. The 2.3 percentage point annual increase in leverage in the 15 years after the war is only slightly greater than the large primary deficits in this period, primarily mortgage borrowing.[7] The stabilization of leverage after the mid-1960s reflects lower household expenditure relative to income; but faster income growth and, especially, higher inflation also played important roles.

Leverage resumed its rise after 1980, increasing by an average of 1.3 points annually during the 1980s and 1990s. A large part of this rise can be attributed, in an accounting sense, to lower inflation, but the most important factor was higher interest payments. In this sense, the period can be understood as a slow-motion debt deflation (or debt-disinflation), with the combination of slower nominal income growth and higher interest rates producing rising debt-income ratios despite a substantial *fall* in household spending relative to income. The contrasts between the early and the later 1930s, and between the 1960s–1970s and the 1980s–1990s, both show how, in an environment of changing Fisher dynamics, the intertemporal effect of household credit transactions can be to transfer expenditure away from the periods with rising debt-income ratios. This does not directly address the question of what fundamental factors were responsible for changes in household borrowing behavior, but the timing of those factors may need to be reevaluated.

By contrast, Fisher dynamics do not change the conventional picture of rising debt in the first half of the 2000s. The acceleration of leverage after 1999 is largely attributable to higher primary deficits—this period saw the highest sustained levels of expenditure relative to income of the whole series, as is also clearly visible in Figure 3. Leverage would have risen even faster in this period if not for an acceleration in income growth (and in defaults, as discussed in Section V). Similarly, the fall in household debt-income ratios after 2007 reflects a sharp fall in expenditure relative to income, with households moving from large primary deficits to large primary surpluses. But the link between new borrowing and debt growth is somewhat weaker in this final period: the fall in leverage was much less than what the shift from net new borrowing to net pay-down of debt would imply, because of the simultaneous deceleration of income growth, to slightly below zero for those four years. As a result, while the annual surpluses over 2008–2011 were much larger than the annual deficits over 2000–2007, the fall in leverage in the latter period was much smaller in magnitude than the rise in the former period.

[7] The high level of mortgage borrowing in the 1950s presumably resulted from, in addition to pent-up housing demand, a number of regulatory changes intended to encourage home mortgage borrowing, such as mortgage guarantees through the Federal Housing Administration and the Veterans Administration, and more favorable treatment of mortgage borrowing in the tax code (Chambers, Garriga, and Schlagenhauf 2012).

V. Defaults

An important difference between private and public sector debt dynamics is that for public debt, defaults are discrete, rare events. By contrast some fraction of private debt is written off by lenders every year. So the law of motion for private debt should include an additional term on the right-hand side for defaults. Unfortunately, there does not exist a good series for defaults covering our full period. The Flow of Funds does not record defaults. Since net borrowing is computed from the change in debt stock, defaults appear in the FFA as reduced borrowing. We have followed this same approach in our main results. But our accounting framework would be more meaningful if we were able to consistently distinguish a higher default rate from a higher primary balance.

A number of data sources do allow for estimates of the fraction of household debt written off in recent periods. Since 1999, the New York Federal Reserve's Consumer Credit Panel (CCP) has tracked household credit flows, including defaults, directly (Lee and van der Klaauw 2010). To our knowledge, this is the only source that captures the full universe of household debt write-offs; importantly, it measures gross rather than net write-offs. Using it, we can construct a series for the contribution of defaults to changes in household leverage for the most recent period.[8]

While the CCP measure is conceptually the correct one for our purposes, its limited time coverage is a problem, so we also consider two other measures of household debt write-offs. From 1985, the Fed reports commercial bank default losses on various categories of loans, including credit cards, other consumer loans, and residential mortgages.[9] By applying these rates to the actual distribution of household debt, we can come up with an imputed figure for the fraction of household debt written off annually. There are two major problems with this series, however. First, the default experience of debt held by commercial banks may be significantly different from that of other household debt; this is more likely in periods where a large fraction of household debt is securitized. Second, the write-offs reported in this series are not gross, but net of recoveries. This does not bias the series as much as one might fear, since the bulk of household defaults have always been on unsecured loans; but it is a problem in the more recent period when mortgage defaults have increased in importance, since recovery rates on mortgages average well over 50 percent.

Finally, since 1934 commercial banks have reported all default losses to the FDIC. This series has the longest time coverage, and also has the advantage of reporting both gross and net default rates. But it does not distinguish household debt from other categories of debt. Since business and, especially, commercial real-estate loans generally default at substantially higher rates than household loans, and since there is not a strong correlation between periods of high household debt defaults

[8] While write-offs are measured in the underlying panel data, they are not reported in the main publication based on the CCP, the Quarterly Report on Consumer Credit and Debt. On the advice of Meta Brown at the Federal Reserve Bank of New York, we have constructed our default series by combining the Quarterly Report on Consumer Credit and Debt with the default data reported in Haughwout et al. (2012).

[9] We would prefer only owner-occupied mortgages, but they are not reported separately, so we use the rate for one to four family residences, the vast majority of which are owner-occupied.

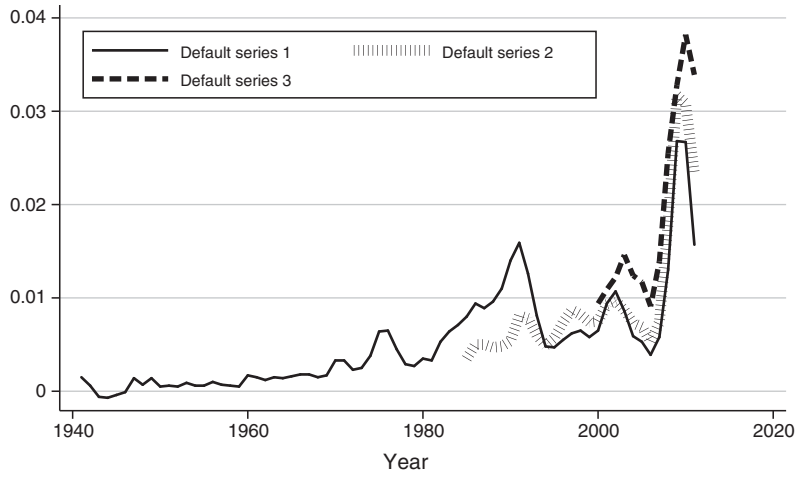

FIGURE 5. ANNUAL SHARE OF DEBT WRITTEN OFF, 1985–2011

Notes: The lines depict write-off rates as a fraction of debt outstanding, from three sources. Default series 1 is the gross write-off rate for all loans by commercial banks, as reported by the FDIC. Default series 2 is the net write-off rate for commercial bank loans to households, as reported by the Federal Reserve. Default series 3 is the gross write-off rate for all household debt, as reported in the New York Fed Consumer Credit Panel (CCP). Series 3 is the preferred measure for our purposes.

and high defaults in other categories of loans, this series is not a good guide to short-term movements in default rates. Like the previous series, it also does not capture the default experience of lenders other than commercial banks. It does allow us, however, to put a rough ceiling on default rates during the postwar period. Between 1945 and 1980, gross charge-offs at commercial banks averaged 0.2 percent of outstanding loans. Since household debt represented about half of debt in this period (both debt held by commercial banks and debt in the aggregate), this implies that if there were no defaults on nonhousehold debt, no more than 0.4 percent of household debt could have been discharged by default in any given year. Since nonhousehold loans do in fact default, we can conclude that the annual default rate on household debt over the 1945–1980 period was probably lower than 0.2 percent.[10]

Figure 5 shows the fraction of loans to households written off by each of these three measures. As we see, in periods where multiple measures are available, they behave roughly similarly, apart from the spike in the FDIC measure in the late 1980s reflecting elevated commercial real-estate defaults in this period. By all three measures it is clear that the default experience of the Great Recession is without precedent in the postwar era. From 2000 to 2006, according to the CCP data, an average of 1.1 percent of household debt was written off each year. For 2008–2010, that rises to 3.3 percent. So while the failure to distinguish defaults from the primary balance

[10] Again, this refers only to debt held by commercial banks. But commercial banks accounted for a much larger share of credit in this period, and in the period before securitization allowed for the unbundling and reallocation of credit risk, it seems unlikely that the default experience of nonbank lenders was dramatically different.

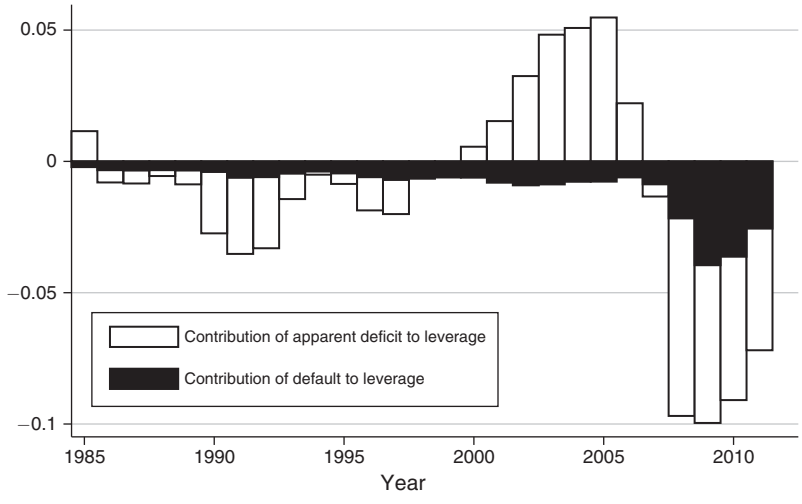

Figure 6. Contribution of Deficit, Accounting for Defaults, 1985–2010

Notes: The empty bars show the same household primary deficit as in Figure 3. The solid bars show the contribution of debt defaults to the observed balance. The difference between the two bars represents the true level of household new borrowing once defaults are accounted for. The default rate used here is the net write-off rate for commercial bank loans to households.

Table 3—Average Annual Change in Household Leverage and Components Accounting for Defaults

		Attributable to:				
Period	Δb	d − defaults	Defaults	i	g	π
Panel A. Defaults measured as net charge-offs of household debt by commercial banks						
1985 to 1999	1.4	−0.8	−0.5	7.2	−2.5	−2.0
2000 to 2007	4.7	3.5	−0.8	7.3	−2.6	−2.6
2008 to 2011	−3.1	−5.9	−3.1	6.8	0.6	−1.8
Panel B. Defaults measured directly at household level						
2000 to 2007	4.7	3.9	−1.2	7.3	−2.6	−2.6
2008 to 2011	−3.1	−5.1	−3.8	6.8	0.6	−1.8

Notes: This is equivalent to Table 2, except that defaults are broken out as a separate component of leverage changes. In the first panel, defaults are measured as the net charge-off rate of loans to households as reported by commercial banks. In the second panel, defaults are measured directly as gross default rates at the household level. The periodization reflects data availability: commercial bank charge-offs of household debt are available only from 1985, and household level default data is available only from 2000. See text for sources.

probably does not affect the results for most of the postwar era, it may be important for the most recent period.

Figure 6 and Table 3 show how our results for the recent period are modified by taking into account defaults. For the contribution of defaults, we use the CCP series for 2000–2011 and the Fed commercial bank series for 1985–1999. Because the table shows the contribution to the change in leverage, defaults are reported as a fraction of income rather than a fraction of outstanding debt. Figure 6 shows the same primary deficit as above, but Table 3 shows the primary deficit adjusted to take defaults into account. While the reduction of leverage attributable to defaults is small for the first

two periods, it is substantial in the final period. Nearly half of the apparent primary surpluses over 2008–2011 (9 percent average) is due to write-offs rather than reduced household expenditure. From Table 3, we see that the annual share of household debt written off by default averaged 2.6 points higher in 2008–2011 than in 2000–2007. So if the share of household debt written off by default had remained constant at its pre-2008 level, the reduction in household leverage over 2008–2011 would have been less than 20 percent of its actual value. Thus, it appears that even the very large swing in household balances toward surplus would have been insufficient to substantially reduce leverage in the absence of increased default rates. This has important implications for the degree to which changes in household borrowing behavior will be sufficient to reduce leverage in the future.

Unfortunately, we are not able to produce a systematic estimate comparable to that in Table 3 for the fraction of household primary surpluses in the pre-World War II period that should be attributed to defaults. But there is some evidence that defaults were an important factor in the trajectory of household debt in the 1930s (Olney 1999).

VI. Conceptual Issues in the Measurement of Household Leverage

Apart from our definition of the household primary balance, all our data definitions are standard. Nevertheless, they raise some conceptual and practical issues.

A. *Face Value or Market Value of Debt*

Like almost all published studies of household debt, this paper uses the face value rather than the market value of household liabilities. But is this appropriate? Shouldn't a rise in market interest rates imply a capital gain for economic units owing fixed-rate debt, just as it implies a capital loss for the owners of such debt?[11] The suggestion that credit-market liabilities should be revalued each period on the basis of current interest rates is a logical one, and it is occasionally followed in the literature on public debt (Hall and Sargent 2011; Sbrancia 2011). Nonetheless, we believe face value is the appropriate measure, for several reasons.

First, as discussed in Section II, focusing on the liability side of balance sheets is justified only where questions about repayment capacity are important. Changes in the market value of fixed-rate debt have no effect on the ratio of debt service payments to the income out of which those payments must be made. Second, there is an asymmetry between lenders and borrowers. Most lenders participate in the secondary market for debt; even when particular contracts are held to maturity, the option to hypothecate or sell in the secondary market is still important. With very few exceptions, borrowers, especially household borrowers, do not participate in secondary markets for their own liabilities. One possible exception is that when debt carries a high default risk, debtors may seek to repurchase the debt at the discounted market value. This is occasionally seen in the case of defaults and near-defaults

[11] We thank two anonymous referees for raising this issue.

by sovereigns, but there do not seem to be any equivalent cases for households.[12] Refinancings might seem to be an obvious exception to this statement, but they are not. Mortgage refinancing does not involve repurchase of the debt at market value, but the exercise of the option embedded in many debt contracts for early payment of the face value. Third, we use the face value of debt because that is what is used in virtually all official measures of liabilities, including not only US measures like the Flow of Funds but measures like the IMF's International Financial Statistics (Antoniewicz 1996; Begenau, Piazzesi, and Schneider 2012; Dawson 1996). To our knowledge, there is no major published measure of household-sector liabilities that adjusts the value of debt for changes in market interest rates. While this consensus among statistical agencies does not mean that there is no theoretical interest in alternative measures, it does offer some justification for our use of face value. Finally, the adjustment is impossible in practice, at least with existing data, since it requires disaggregating the debt stock by the interest rate at which it was incurred and the appropriate interest rate to discount it by in subsequent periods. Even in contexts where, in principle, adjusting the value of liabilities for market rates is desirable, the adjustment requires an ability to track distinct vintages of different instruments in a way that no publicly available data source currently allows (Begenau, Piazzesi, and Schneider 2012). But even if it were, we do not believe that the adjustment is relevant for this paper, since debtors' capital gains and losses are purely notional and do not affect repayment capacity.

B. *Alternative Measures of Leverage*

Arguably, a better way of capturing debt-service capacity would be to focus on asset-liability mismatch. In this case, the fraction of assets netted from liabilities would be neither one, as in the conventional savings measure, nor zero, as in our primary-balance measure, but some intermediate value representing the degree to which assets would be readily sold or hypothecated to meet immediate cash commitments.[13] This suggestion is appealing but is unlikely to improve on the more widely used debt-income ratio as an index of household leverage. While most households do have both assets and liabilities, only a small fraction of assets are plausibly available for debt service commitments. Unsecured debt in general carries a higher interest rate than any asset available to households, so a household would not be expected to take on such debt if it held readily salable assets. Secured debt, on the other hand, is usually incurred to acquire lumpy, illiquid assets, such as houses or cars. Student loans, an increasing fraction of household debt, finance the acquisition of maximally illiquid assets, for which there is no secondary market at all. In some cases, public subsidies allow households to acquire assets with a return higher than the rate they face as borrowers, which, in principle, could lead to households holding both debt and liquid assets. But in such cases there are typically legal or

[12] The Occupy Debt/Rolling Jubilee project was an attempt to take advantage of discounted market prices of household debt along these lines. (See www.strikedebt.org.) To date this kind of repurchase of distressed household debt on behalf of the debtors has not taken place on a macroeconomically important scale.

[13] This suggestion was made by both Perry Mehrling and Peter Skott in response to earlier drafts of this paper.

institutional obstacles to using the assets to meet debt commitments. The fact that most households hold checking accounts or similar transactions balances is further evidence for the illiquidity of most household assets, since otherwise there would be no reason to hold savings in this very low return form. The conventional use of debt-income ratios as a measure of debt-service capacity therefore seems reasonable. It also avoids the substantial practical difficulties in measuring the liquidity of household assets and comparing the distribution of assets across households to the distribution of debt.

It also might be more appropriate to use a different income flow for debt-service capacity, such as GDP or some measure of debtor-unit incomes. Scaling by GDP is useful for comparing leverage across sectors, but is less suitable for a discussion of household leverage specifically. Since discussion of leverage is motivated by an interest in the size of the debt stock relative to capacity for repayment, the appropriate denominator for household leverage is a measure of the money income of the household sector. Even if households are the residual claimants of business income and see their future income move with the government fiscal position, in a world where credit constraints are real and important—as discussions of leverage must assume—these future income streams are not available to meet current debt service obligations. So to the extent a change in retained profits, the government balance, or other flows of to nonhousehold sectors cause personal income to diverge from GDP, personal income is the more appropriate denominator.

The question of whether income should be some measure of debtor-unit income is less clearcut. There can be no meaningful measure of the income of "debtor households." A large majority of households have both assets and liabilities, and some debt is owed by households that are lenders on net, so it is impossible to divide households into debtors and creditors and presume that debt is carried only by the former. In principle it would, however, be possible to construct a measure of "debtor income" by weighting each household's income by its debt. And while there is not a clear separation of households into debtors and creditors, the distribution of debt with respect to income has certainly changed over time. To the extent that debt becomes more concentrated in the upper part of the income distribution, leverage—debt relative to repayment capacity—will be lower; to the extent that is distributed further down the distribution, leverage will be greater. A measure of debtor-weighted income could take such shifts into account. On the other hand, households' position in the distribution may shift frequently, and to the extent there are significant transfers between households (for instance as a result of family ties) the current distribution of debt with respect to income is less informative, and the aggregate measure is more meaningful. The debt-personal income measure of leverage is therefore meaningful, and even if a comprehensive panel dataset were available to construct a debt-weighted measure of income, we would want to use both measures to examine Fisher dynamics. In practice, the question of whether a debt-weighted measure of income would be desirable is a nonissue, since the data does not exist to construct it. The Survey of Consumer Finances is the most suitable data source, but it is a triennial survey that starts only in 1983, and a main goal of this paper is to provide a consistent accounting for a long period. We are particularly interested in comparing the more recent changes in debt ratios to those in the 1930s,

and in clarifying the contrast between stable household leverage before 1980 and rising leverage after; a series that starts in the 1980s is not suitable for either goal.

VII. Conclusion

While accounting identities such as the one we use cannot be used to establish causal claims, specific historical accounts of causal relationships need to be compatible with the facts derived from such an accounting. Whatever fundamental factors are responsible for changes in households' desired intertemporal allocation of expenditure via credit markets, its reflection in observed debt-income ratios will be altered when income growth, inflation, and interest rates change. For any given intertemporal allocation, observed debt-GDP ratios will rise faster in periods of high i and low π and g, and vice versa. As we show, these distortions are quantitatively important—in several important cases, the actual change in new borrowing by households has the opposite sign as implied by a naïve examination of observed debt-income ratios.

In our decomposition we showed that the rise in the leverage observed between 1980 and 1998 was not associated with greater net new borrowing in this period. Several explanations for the rise of household debt assume that this was due to higher net borrowing either because of financial innovation (Debelle 2004), changing discount rates (Parker 1999), or increased income dispersion (Pollin 1988, 1990; Sturn and van Treek 2012). Our analysis suggests that any causal story of household debt, whether based on credit-market frictions, intertemporal preferences, or other factors, it needs to explain not why household expenditure was higher relative to income in the 1980s than in other periods, but why it was lower.[14]

A further divergence between borrowing behavior and observed debt-income ratios is created by defaults. Since the official measures of borrowing flows, as reported in the Flow of Funds, do not distinguish defaults, they systematically underestimate new borrowing (or overestimate debt pay-down) in periods when defaults are high. Again, failing to correct for this may mean that observed changes in leverage give a misleading impression of the underlying economic processes at work. In the post-2007 period, in particular, an exceptionally high default rate means that households appear to be paying down debt at twice the rate that they really are. Failing to take into account that half of household's apparent surpluses are really defaults may lead to wrong conclusions about both the reasons for the deep fall in output the 2007–2010 period, and the range of household behavior likely in the future.

[14] Household *consumption* did rise during the 1980s, but this was offset by a larger fall in net acquisition of real and financial assets; housing investment in particular was unusually low. So while the conventionally measured savings rate did fall after 1980, this is separate from the rise in household debt.

Data Appendix

Data is defined as follows:

i is the total annual interest payments by households, divided by household credit-market liabilities for the first quarter of the year. Interest payments are taken from table 7.11 of the NIPAs.

g is the growth rate of personal income less noncash imputations (referred to as adjusted personal income), from the first quarter of the year to the first quarter of the following year. Personal income less noncash imputations is given in NIPA table 7.12, line 60.

π is the percentage change in the personal consumption deflator from January of this year to January of the following year.

b is the stock of debt divided by adjusted personal income, for the first quarter of the year. For 1947 and later years, the debt stock is taken from the Flow of Funds. For years prior to 1947, it is from the Historical Statistics of the United States.

d is the change in debt from the first quarter of the year to the first quarter of the following year, less total interest payments, divided by adjusted personal income for the first quarter of the year.

The contributions of i, π, and g to the change in the debt ratio are equal to the variable times the start-of-period debt ratio.

REFERENCES

Abbas, S. M. Ali, Nazim Belhocine, Asmaa ElGanainy, and Mark Horton. 2011. "Historical Patterns of Public Debt—Evidence From a New Database." https://www.imf.org/external/np/seminars/eng/2010/eui/pdf/AB.pdf.

Aizenman, Joshua, and Nancy Marion. 2009. "Using Inflation to Erode the U.S. Public Debt." National Bureau of Economic Research (NBER) Working Paper 15562.

Antoniewicz, Rochelle L. 1996. "A Comparison of the Household Sector from the Flow of Funds Accounts and the Survey of Consumer Finances." Federal Reserve Board Finance and Economics Discussion Series 1996-26.

Begenau, Juliane, Monika Piazzesi, and Martin Schneider. Forthcoming. "Remapping the Flow of Funds." In *Risk Topography: Systemic Risk and Macro Modeling,* edited by Markus Brunnermeier and Arvind Krishnamurthy. Chicago: University of Chicago Press.

Benito, Andrew, Matt Waldron, Garry Young, and Fabrizio Zampolli. 2007. "The Role of Household Debt and Balance Sheets in the Monetary Transmission Mechanism." *Bank of England Quarterly Bulletin* 47 (Q1): 70–78.

Buiter, Willem H. 1985. "A Guide to Public Sector Debt and Deficits." *Economic Policy* 1 (1): 13–79.

Caskey, John, and Steven Mark Fazzari. 1989. "Price flexibility and macroeconomic stability: an empirical simulation analysis." Federal Reserve Bank of Kansas City Research Working Paper 89-02.

Cecchetti, Stephen G., M. S. Mohanty, and Fabrizio Zampolli. 2010. "The Future of Public Debt: Prospects and Implications." Bank for International Settlements (BIS) Working Paper 300.

Chambers, Matthew, Carlos Garriga, and Don Schlagenhauf. 2012. "Did Housing Policies Cause the Postwar Boom in Homeownership?" Federal Reserve Bank of St. Louis Working Paper 2012-021A.

Cynamon, Barry Z., and Steven M. Fazzari. 2013. "Inequality and Household Finance during the Consumer Age." Levy Economics Institute Working Paper 752.

Das, Piyali. 2011. "Decomposition of Debt-GDP Ratio for United Kingdom: 1984-2009." http://www.indiana.edu/~econdept/conference/jrc2011/das.pdf.

Dawson, John C., ed. 1996. *Flow-of-Funds Analysis: A Handbook for Practitioners.* New York: M. E. Sharpe.

Debelle, Guy. 2004. "Household debt and the macroeconomy."*BIS Quarterly Review* March: 51–64.

Eggertson, Gauti B, and Paul Krugman. 2010. "Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo approach." http://www.princeton.edu/~pkrugman/debt_deleveraging_ge_pk.pdf.

Escolano, Julio. 2010. "A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates." http://www.esaag.co.za/images/presentations/swaziland-day1-presentations/imf-guide-to-public-debt-dynamics.pdf.

Fisher, Irving. 1933. "The Debt-Deflation Theory of Great Depressions." *Econometrica* 1 (4): 337–57.

Giannitsarou, Chryssi, and Andrew Scott. 2008. "Inflation Implications of Rising Government Debt." In *NBER International Seminar on Macroeconomics 2006*, edited by Lucrezia Reichlin and Kenneth West, 393–442. Chicago: University of Chicago Press.

Goldsmith, Raymond William. 1955. *A Study of Saving in the United States: Nature and deprivation of annual estimates of saving, 1897 to 1949*. Princeton: Princeton University Press.

Guerrieri, Veronica, and Guido Lorenzoni. 2011. "Credit Crises, Precautionary Savings and the Liquidity Trap." http://faculty.chicagobooth.edu/workshops/macro/past/pdf/liquidity%2003-20-2011.pdf.

Hall, George J., and Thomas J. Sargent. 2011. "Interest Rate Risk and Other Determinants of Post-WWII US Government Debt/GDP Dynamics." *American Economic Journal: Macroeconomics* 3 (3): 192–214.

Hall, Robert E. 2011a. "The High Sensitivity of Economic Activity to Financial Frictions." *Economic Journal* 121 (552): 351–78.

Hall, Robert E. 2011b. "The Long Slump." *American Economic Review* 101 (2): 431–69.

Haughwout, Andrew, Donghoon Lee, Joelle Scally, and Wilbert van der Klaauw. 2012. "Just Released: Has Household Deleveraging Continued?" *Liberty Street Economics*, August 29. http://libertystreeteconomics.newyorkfed.org/2012/08/just-released-household-debt-and-credit.html.

Jarsulic, Marc. 1989. "Endogenous Credit and Endogenous Business Cycles." *Journal of Post Keynesian Economics* 12 (1): 35–48.

Koo, Richard C. 2008. *The Holy Grail of Macroeconomics: Lessons from Japan's Great Recession.* Singapore: John Wiley & Sons.

Lee, Donghoon, and Wilbert van der Klaauw. 2010. "An introduction to the FRBNY Consumer Credit Panel." Federal Reserve Bank of New York Staff Report 479.

Mason, J. W., and Arjun Jayadev. 2013. "Loose Money, High Rates: Interest Rate Spreads in Historical Perspective." http://courses.umass.edu/econ804/Jayadev.pdf.

Mason, J. W., and Arjun Jayadev. 2014. "'Fisher Dynamics' in US Household Debt, 1929–2011: Dataset." *American Economic Journal: Macroeconomics*. http://dx.doi.org/10.1257/mac.6.3.214.

Mian, Atif, Kamalesh Rao, and Amir Sufi. 2011. "What Explains High Unemployment? The Aggregate Demand Channel." http://faculty.chicagobooth.edu/amir.sufi/MianSufi_WhatExplainsUnemployment_Nov2011.pdf.

Minsky, Hyman P. 1982. *Can "It" Happen Again?: Essays on Instability and Finance.* M. E. Sharpe.

Mishkin, Frederic S. 1978. "The Household Balance Sheet and the Great Depression." *Journal of Economic History* 38 (4): 918–37.

Olney, Martha L. 1999. "Avoiding Default: The Role of Credit in the Consumption Collapse of 1930." *Quarterly Journal of Economics* 114 (1): 319–35.

Palley, Thomas I. 1994. "Debt, Aggregate Demand, and the Business Cycle: An Analysis in the Spirit of Kaldor and Minsky." *Journal of Post Keynesian Economics* 16 (3): 371–90.

Parker, Jonathan A. 1999. "Spendthrift in America? On Two Decades of Decline in the U.S. Saving Rate." *NBER Macroeconomics Annual 1999*, edited by Ben S. Bernanke and Julio J. Rotemberg, 317–87. Cambridge, MA: MIT Press.

Philippon, Thomas, and Virgiliu Midrigan. 2011. "Household Leverage and the Recession." National Bureau of Economic Research (NBER) Working Paper 16965.

Pollin, Robert. 1988. "The growth of U.S. household debt: Demand-side influences." *Journal of Macroeconomics* 10 (2): 231–48.

Pollin, Robert. 1990. *Deeper in Debt: The Changing Financial Conditions of U.S. Households.* Washington, DC: Economic Policy Institute.

Rangarajan, C., and D. K. Srivastava. 2003. "Dynamics of Debt Accumulation in India: Impact of Primary Deficit, Growth and Interest Rate." *Economic and Political Weekly* 38 (46): 4851–58.

Sbrancia, M. Belén. 2011. "Debt and Inflation during a Period of Financial Repression." http://econweb.umd.edu/~sbrancia/Sbrancia_JMP.pdf.

Sturn, Simon, and Till van Treeck. 2012. "Income inequality as a cause of the Great Recession? A survey of current debates." In *New Perspectives on Wages and Economic Growth*. Geneva: International Labour Office.

Tirole, Jean. 2011. "Illiquidity and All Its Friends." *Journal of Economic Literature* 49 (2): 287–325.

Volcker, Paul A. 1979. *The Rediscovery of the Business Cycle.* Free Press.