

# The Making of America's Imbalances

Moritz Schularick  
Paul Wachtel

School of Business & Economics  
Discussion Paper

Economics

2012/16

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Moritz Schularick  
*Freie Universität Berlin*  
moritz.schularick@fu-berlin.de

Paul Wachtel  
*Stern School of Business*  
*New York University*  
pwachtel@stern.nyu.edu

July 2012

## Abstract

This paper tracks the development of sectoral saving and borrowing in the US economy over the past 50 years. We show that the financial imbalances that erupted in the financial crisis of 2008 were long in the making and preceded the emergence of global imbalances in the 2000s. The record low household savings rate in the past decade was the product of two separate trends: a sharp fall in the asset acquisition of American households in the 1990s, and an explosion of mortgage borrowing in the 2000s. We present novel disaggregated estimates of the wealth effect on savings. We show that households reduce active savings in response to gains in financial wealth and increase borrowing with rising housing wealth. Finally, we argue that the American credit boom of the 2000s had few direct links to reserve accumulation in emerging markets. The mortgage boom was financed by the US financial sector which intermediated foreign funds from *private* sources.

Keywords: savings rate, flow of funds, wealth effects, financial instability, global imbalances, current account deficit.

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<sup>\*</sup> Some of this research was undertaken while Schularick was a visitor at the Economics Department of Stern School of Business, New York University. The generous support of Stern is gratefully acknowledged.

Discussions of the international economy give enormous emphasis to current account imbalances and the importance of reducing them. Global imbalances such as those between the US and China or Germany and the rest of the EU are the object of much debate. Many central bankers have embraced a reading of the global financial crisis in which imbalances and the surge in uphill net capital flows from poor to rich countries play a dominant role. In this view, a large and sudden rise of desired savings from developing countries, a savings glut (Bernanke 2005), flooded the US economy. Such explanations attribute a good part of the imbalance to events that took place outside the US and other developed countries. Yet the role of foreign capital in the US credit boom remains an area of much debate. What were the channels through which the reserve hunger of emerging markets fueled the housing boom in America? How did savings and investment patterns in the U.S. economy change with the influx of foreign savings?

It is widely understood that at the international level, one country's current account deficit is another country's surplus. Therefore, for example, a change in the American current account deficit will be matched by changes elsewhere. At the national level too, a change in the current account deficit, a nation's net financial investment with the rest of the world, will be reflected in adjustments to saving by one or more sectors of the domestic economy. Since the net financial investment of all sectors (including the financial and the foreign sectors) must sum to zero, changes in one sector must lead to changes elsewhere in the economy. We can therefore study the evolution of global imbalances through the lens of sectoral financial balances in the US economy. This provides us with a new and potentially more informative perspective on the role of global and domestic factors in the making of America's financial imbalances.

Our financial balances based approach meshes with other contributions arguing that for a better understanding of global imbalances, we have to look beyond the study of net flows of capital (as measured in the current account and implicit in the savings glut hypothesis) and focus on the underlying gross flows of capital (Borio and Disyatat 2011; Shin 2011). In today's world economy, net flows of capital are dwarfed by the underlying gross inflows and outflows of capital.<sup>1</sup> In the US case, gross inflows of capital in 2007

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<sup>1</sup> In the first globalization, before 1914, gross flows corresponded much more closely to net flows of capital; see Obstfeld and Taylor (2004) and Schularick (2006).

were approximately \$2.1 trillion while gross outflows of capital reached \$1.4 trillion. This resulted in a net inflow of foreign capital (equal to the current account deficit) of \$710 billion. Moreover, the gross financing flows do not have to align with trade flows. For instance, European savers can finance American deficits vis-à-vis Asia despite a balanced trade account between Europe and the U.S. Authors such as Obstfeld (2012) as well as Lane and McQuade (2012) have accordingly questioned the usefulness of the current account for an understanding the causes of the 2008 crisis and the drivers of financial fragility more generally. Jorda, Schularick and Taylor (2011) have shown that in advanced economies, current account imbalances are not a reliable warning signal for financial crises, but credit growth is.

The present paper extends this focus on gross financing flows to domestic US sectoral data. We will study the making of American macro-imbalances over the last 50 years using the Flow of Funds accounts. Our goal is to delve deeper than the usual generalizations about the decline in savings rates and the increase in foreign borrowing in an effort to understand the causes and consequences of the American role in the global imbalances debate. We will show that the relationships are more nuanced than the twin deficit terminology introduced in the 1980s when the US first encountered large current account and government deficits. The Flow of Funds data, while coarse, send clear signals of substantial shifts in the financing patterns within the US economy that could have been interpreted as an early warning sign (Eichner, Kohn and Palumbo 2010).

Specifically, we show that the America's imbalances were long in the making. Long-standing patterns of inter-sectoral financial flows have dissolved in the past two decades. New dynamics in the household and business sectors were apparent in the 1990s, before the deterioration in the US government balance or the current account balance and long before the arrival on the international stage of Chinese reserve accumulation. From this perspective, the decade of the 1990s – when rising equity wealth led to a sharp drop in active savings – was as crucial for the making of American imbalances as the 2000s when household borrowing accelerated sharply against the background of much reduced active savings. Our key results can be summarized as follows.

First, the deterioration of the US current account was mainly driven by the worsening financial balance of the household sector and temporary swings in the federal budget deficit. The business sector was, largely, a passive bystander. The worsening of the household financial position got underway in the mid-1990s when households' acquisition of financial assets fell dramatically. It deteriorated further in subsequent years when the unprecedented growth of mortgage borrowing occurred at a time of much reduced active savings by households.

Second, capital gains in housing and equities have played an important role in driving these developments. We study the impact of capital gains on savings and borrowing decisions separately and uncover a close statistical relationship between gains in equity (but not housing) wealth and active savings decisions (acquisition of financial assets) by households. The disaggregated data indicates that wealth effects on (active) saving are predominantly driven by the stock market. Borrowing behavior, by contrast, depends on fluctuations in housing wealth, both directly because of higher values of the housing stock and indirectly through mortgage equity withdrawals. We consider this an important distinction that was lost in previous analyses of the overall savings rate.

Third, China and other emerging markets played virtually no role in the financing of the American credit boom of the 2000s. Our examination of the data suggests that the American financial sector was the key source of financing for mortgage-hungry America. The financial sector turned increasingly to foreign sources of finance in the form of bond issues, but the flows that fed the bubble were private, not official. Chinese purchases of Treasury securities helped fund the war in Iraq at low cost, but the domestic credit boom was homemade, albeit with some support from (mainly) European creditors to American financial institutions. Our results here stand in clear opposition to arguments that link the bubble in US housing markets in the 2000s with the global glut of savings (Bernanke 2005). The increase in leverage in the US plays as important a role as the capital inflows from the rest of the world.

Lastly, also in the 1990s, the nonfinancial business sector ended its traditional role as a net borrower. For the past 20 years, the American nonfinancial business sector has been more or less self-financing, with minimal net borrowings from either the household sector or the rest of the world. A focus on gross flows is revealing. Both business

borrowing and financial asset acquisitions grew and cancelled each other out as the business sector increased its leverage and took on many features of a financial intermediary. To a significant extent, a shadow banking system developed within the nonfinancial business sector.

The structure of this paper is as follows. In the next section, we trace the evolution of sectoral balances and their composition over the past 50 years. In the following section, we briefly relate the flows to changes in stocks. We then provide some econometric evidence based on standard specifications of saving rate equations in order to show how changes in housing and equity prices (capital gains) affected household savings behavior. The last section presents some concluding thoughts.

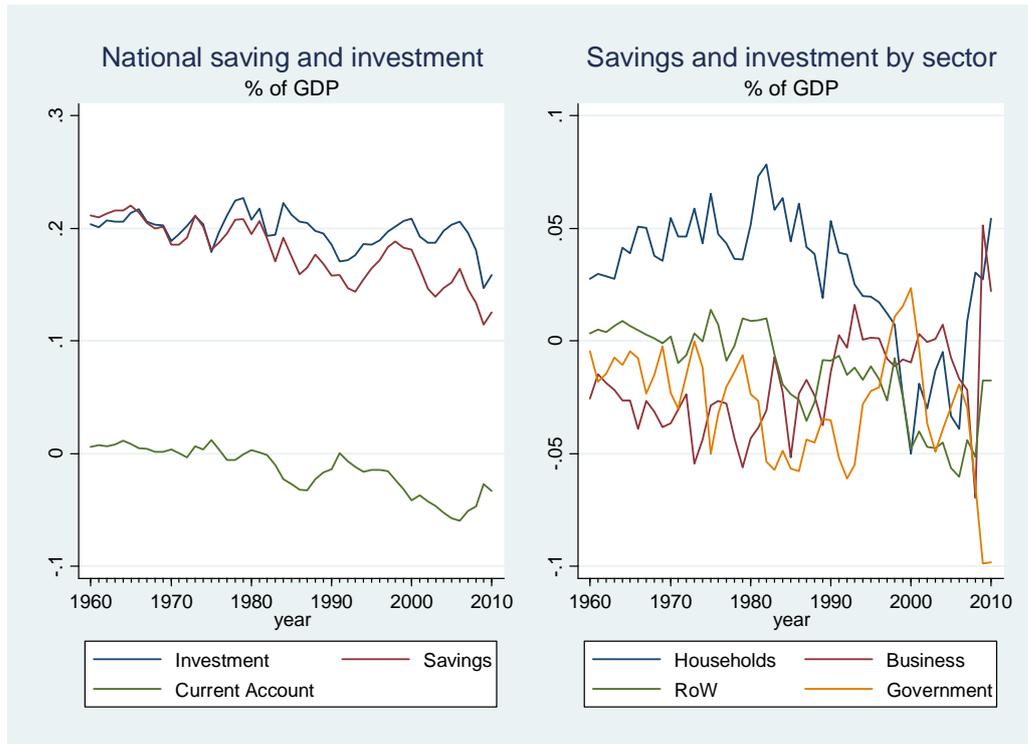
### *1. The Evolution of US Financial Balances 1960-2010*

Discussion of global imbalances usually starts with the observation that the current account balance (CA) is simply the difference between gross private domestic investment (I) and national savings (S):  $CA = I - S$ . The left panel of Figure 1 shows the decline of national savings as a percent of GDP in the US and, given a broadly stable investment rate, the concomitant widening of the current account deficit that takes center stage in the debate about the causes of the financial crises and the imbalances in the world economy.

There is another way of looking at the current account balance (Wachtel, 1991); it is also the (negative of) net financial investment of the rest of the world in the US, one of several sectoral financial balances. Similarly, the net financial investment of each domestic sector is the difference between its investment and saving:  $NFI^i = I^i - S^i$  where the sectors,  $i$ , are non-financial business, households, finance and government. Further, the sum of all the sectoral imbalances, the net financial investment of the domestic sectors and the rest of the world is zero:  $CA + \sum_i NFI^i = 0$ . Thus, for a full view of the evolution of savings and investment imbalances we look at the net financial investment of each sector as shown in the right panel of Figure 1. Although the variability of the sectoral balances makes it difficult to discern the trends, a few structural development

show through. Changes in the imbalances of the household and business sectors are as important as the government and foreign sector deficits.

Figure 1



The big picture story is that all sectors of the US economy have witnessed marked changes in their financial balances during the past 50 years. Long-standing relationships have been turned upside down since the mid-1990s. Household saving peaked in the early 1980s and the business sector ceased to be a net borrower in the early 1990s. After brief surpluses during the late years of the Clinton administration, the government sector financial balance turned negative in the 2000s. As a result, all domestic sectors of the US economy were in deficit for most of the 2000s. Only the foreign sector supplied funds to the US economy on a net basis. In the following, we will examine each domestic sector individually, which gives us the opportunity to look at the composition of each sectoral balance.

### *1.1. Household sector*

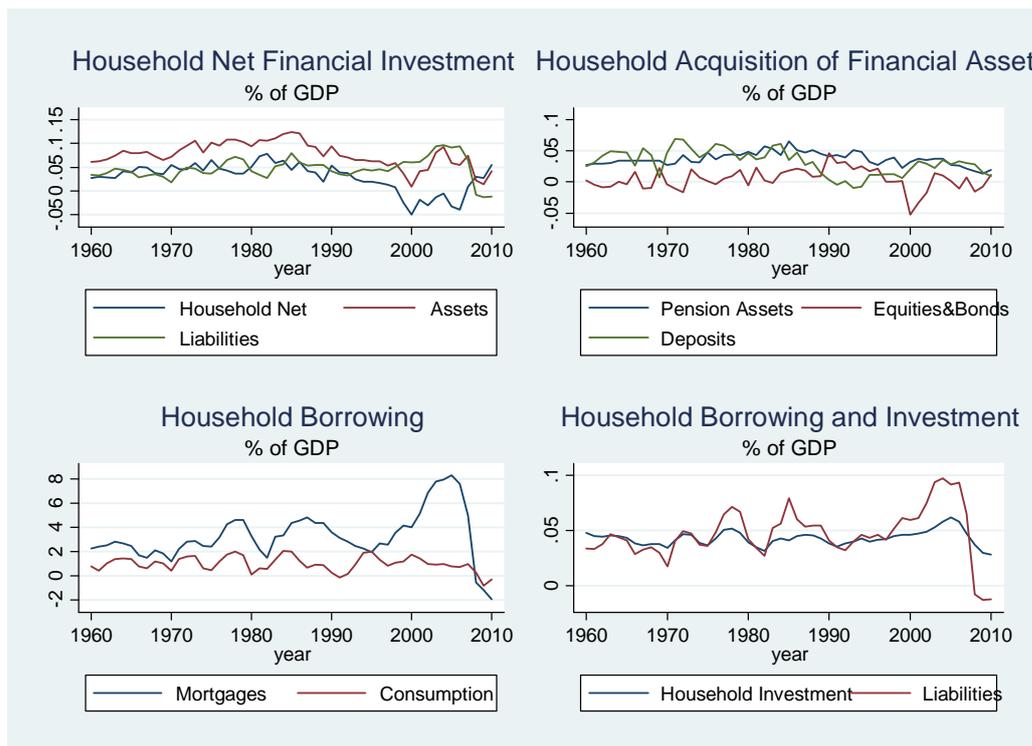
There was a positive trend in net financial investment by the household sector through the 1960s and 1970s, which is curious because real returns faced by household savers in this period were more often than not negative. There is a strong precautionary motive for households' savings, which increased with overall uncertainty about the economy (Juster and Wachtel, 1972). After reaching a peak in the early 1980s, the overall savings rate started to decline. The fall in was mainly due to a reduction in active savings – the acquisition of financial assets by households. This decline was due to a sharp decline of deposit growth and a steady fall in pension contributions as shown in Figure 2. Pension contributions declined from around 5% of GDP in the 1980s to around 2% by the mid-2000s. Similarly, deposit acquisition averaged about 4% of GDP in the 1980s. By the mid-1990s, it had fallen to zero, before recovering somewhat in the 2000s. Putting money in the bank was no longer an attractive option to many Americans. To a lesser degree, bond and equity purchases also declined in the 1990s. Moreover, during stock market booms, US households were large net seller of equities – in the mid-1980s, late 1990s and again after 2005.

The long decline in the active savings of households ended in the late 1990s at which point we also observe a marked shift on the liability side of the household balance sheet. In short, in addition to a much-reduced rate of accumulation of financial assets, US households started borrowing strongly after 1998. The rapid increase in the incurrence of financial liabilities (borrowing) following the ongoing fall in the acquisition of financial assets (saving) resulted in an unprecedented deterioration in the overall financial balance of the household sector in the 2000s. For the first time in modern American history, the household sector, typically the provider of savings for the rest of the economy, started running a financial deficit as can be seen from Figure 2.

The reasons behind the surge in private borrowing are not hard to identify. Mortgage borrowing was by far the most important component of the run-up in household debt over the past 15 years. Mortgage borrowing increased rapidly from less than 2% of GDP in 1995 to 8% in ten years and reached a peak of close to 10% of GDP. Of course, the run-up in household borrowing occurred at the same time as the boom in household investment in housing which crossed the 5% of GDP line in the 2000s. The

household sector borrowed for two reasons: first, to finance new investment in housing and house improvement. Second, households took on mortgage debt to finance consumption expenditure by withdrawing some of the increased equity in housing due to price appreciation (Greenspan and Kennedy 2008; Cooper 2009, 2010).

Figure 2



### 1.2. Business sector

For most of the post-WWII period, the non-financial business sector ran a financial deficit. Business sector investment typically exceeded sectoral savings by about 3% of GDP. This changed in the late 1980s and, by 1990, the US business sector stopped investing more than it saved.<sup>2</sup> Gross investment (capital expenditure) rates have stayed constant or declined only slightly over the past 30 years, but net investment has fallen by a few percentage points relative to GDP, mainly owing to higher depreciation charges. Business investment today has a larger share of computers, vehicles and other short-lived

<sup>2</sup> National Income and Product Accounts and Flow of Funds data differ slightly with regard to the timing of the transition, but both tell fundamentally the same story.

capital goods than it did during the era of large-scale industrial plants. With higher depreciation charges, more investment is financed internally and there is less need to borrow. From 1990 until the onset of the financial crisis, net financial investment by the business sector hovered around zero.

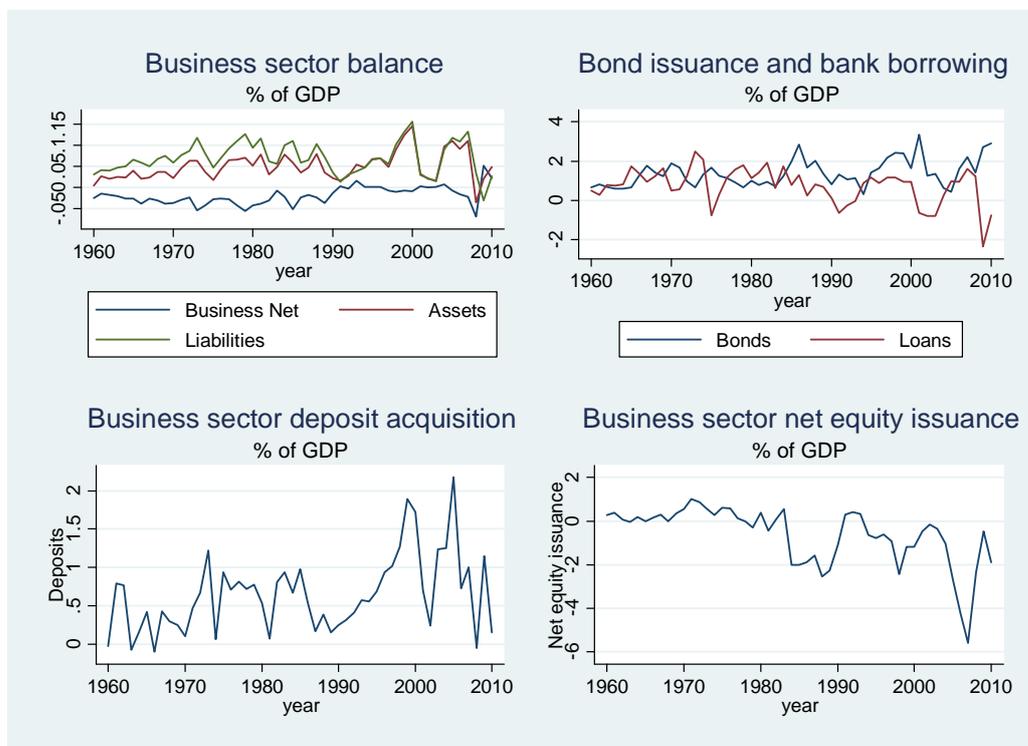
However, business has not reduced its gross borrowing in a significant way. Figure 3 shows that despite wide year to year variation, corporate bond issuance and bank borrowing have not declined. Bank loans have declined somewhat over the decades, but increased issuance of bonds has substituted for this to a large degree. As a result, gross borrowing by the American business sector has not changed all that much.

Yet as the incurrence of financial liabilities by the business sector has not changed dramatically, the necessary corollary of overall net financial investment of the business sector that hovers around zero is that the acquisition of financial assets has increased by a corresponding amount. As shown in Figure 3, American business has indeed increased its acquisition of financial assets, in particular deposit assets and shares in money market mutual funds. US business acquisition of deposits has grown strongly. It reached about 2% of GDP per year before the global financial crisis. The result seems paradoxical at first sight: American companies increasingly borrow long and lend short – the opposite function typically played by the banking system.

How can we rationalize these trends? In the early 1990s and again in the early 2000s, real short-term interest rates were negative for extended periods; under these circumstances, the business sector may find it advantageous to maintain greater liquidity. Further, although the flow of funds classifies all financial intermediaries, in addition to banks, as part of the financial sector, it is possible that an element in the development of the shadow banking system was the increase in intermediary activity among business entities. As a result, the business sector, like the financial sector itself, shows large and offsetting acquisitions for financial assets and incurrence of liabilities. Much of this intersectoral intermediation can be due to mergers and acquisition activity and share buybacks. As we will see below, the rest of the world does not only lend to the US, it also borrows from it and much of that borrowing could be in the form of cross border investments by US businesses.

Finally, a look at net equity issuance of the business sector underlines once again how the financial behavior of American business has changed in the last few decades. For most of the 1960 and 1970s, U.S. business issued equity on a net basis. Further, as seen in the last panel of figure 3, that net equity issuance was relatively stable over the cycle. Starting in the mid-1980s, the net issuance of equity dipped below zero – companies were reducing equity liabilities on average – and stayed negative for the next 25 years (with one short exception in the 1990s). Importantly, there are clear indications that net equity issuance has become strongly pro-cyclical in the past two decades. Companies sharply reduce equity in boom times, presumably by using part of their profits for share buybacks. In 2007, the reduction in equity liabilities of the business sector reached an astonishing \$780 billion or about 5.6% of GDP. Overall, the trends in equity issuance mesh well with the overall themes of this section: the business sector has ceased to be a net importer of savings from other sectors. Its net financial investment is very close to zero. Companies have reduced outstanding equity and in some respects, their behavior resembles the financial sector, as we will discuss below.

Figure 3



### *1.3. Foreign sector*

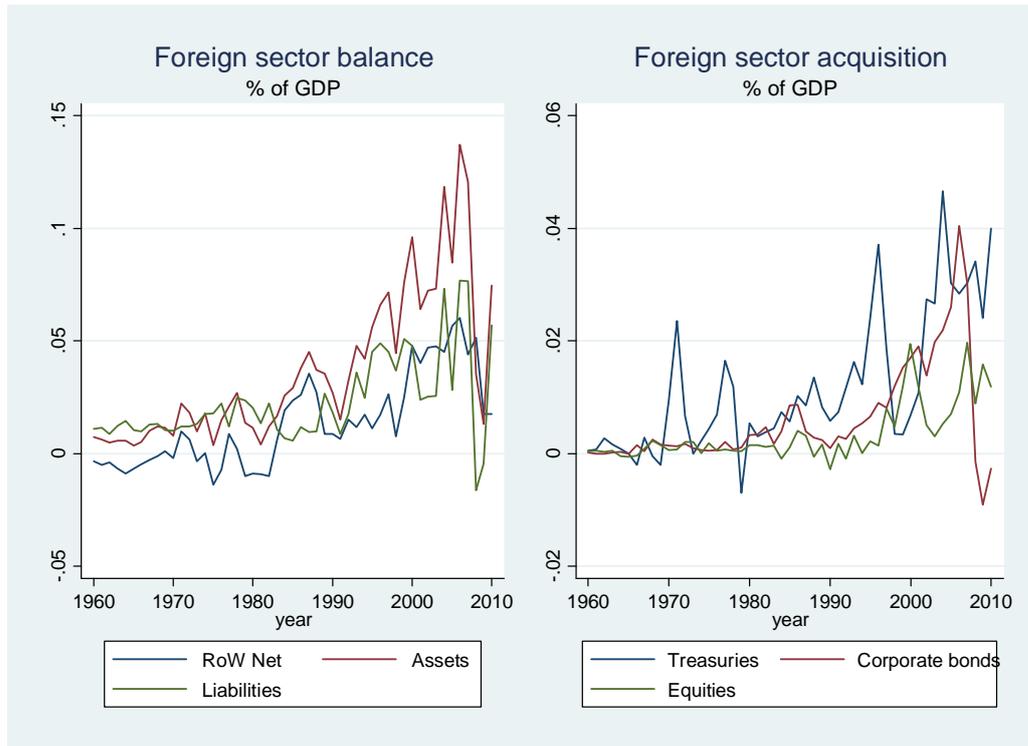
The foreign sector has become the most important – and since the reversal of the Clinton era budget surpluses—the only net lender to the American economy. The growing integration of global capital markets has opened up a new source of funds for the increasingly savings-starved US economy. However, Figure 4 shows that the story is more complex than the simple observation that the current account deficit is a source of saving. The acquisition of financial assets by the rest of the world in the US grew rapidly from somewhat less than 5% of GDP in the 1980s to over 10% prior to the financial crisis. This is a larger swing than the increase in the current account deficit because foreign borrowing in the US has also increased strongly.

The detail in the Flow of Funds accounts provides us with a more precise picture of the capital inflows – the flip side of the current account deficit -- that supply funds to the domestic sectors. While in the 1970s and 1980s, foreign buying of Treasury securities was the only meaningful foreign savings flow into the US, private sector inflows became more important in the late 1990s. In the late 1990s, both fixed income and equity inflows averaged about 2% of GDP. Equity inflows fell sharply in the wake of the dot.com bubble and have not yet reached their previous highs. Nevertheless, the 1990s boom in foreign buying of US corporate and financial sector bonds continued. After 2001, foreign buying of treasury and agency securities also reached previously unprecedented levels. There had been short-lived spikes in foreign purchases of US government securities – in particular when interest rates peaked in the early 1970s and in the mid-1990s. Yet unlike previous episodes the foreign inflow boom of the 2000s continued at a high level for almost a decade. Even during the crisis of 2008-09, foreign interest in treasuries remained high and inflows remained stable at around 3% of GDP.

Figure 4 also illustrates another unappreciated feature of the capital inflow boom of the 2000s. Inflows to the private sector (foreign acquisitions of private sector securities) were as large, if not larger, than foreign inflows into US government securities. Inflow into the corporate bonds grew enormously, reaching 4% of GDP before the crisis, although equity inflows played a secondary role and hovered around 1% of GDP. In net terms, purchases of foreign equities by Americans offset these large inflows.

The most interesting interaction between the foreign sector and the domestic economy occurred in the financial sector, which is where we turn next.

Figure 4



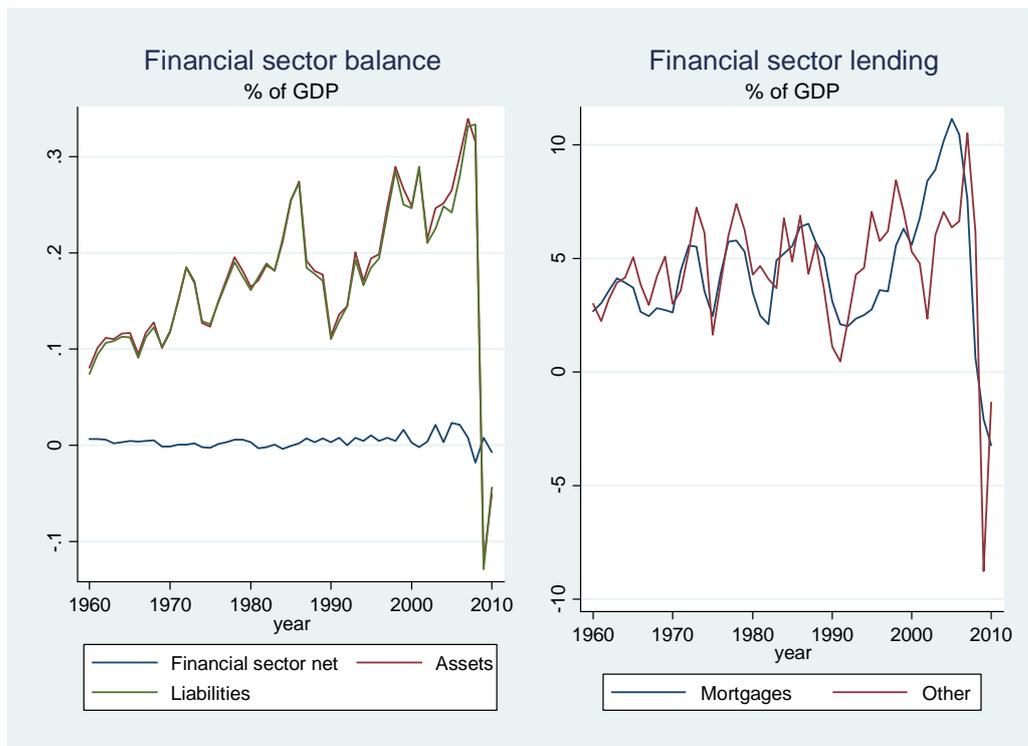
#### 1.4. Financial sector

The Flow of Funds accounts provide an additional perspective on the astonishing growth of financial intermediation in the past three decades. As shown in Figure 5, both asset acquisition and liability incurrence of the financial sector have grown strongly and steadily with the exception of the 1980s. In the 1960s and 1970s, the US financial sector intermediated savings flows on average of about 15% of GDP. Since 1990, the average savings flow has been about 25% of GDP and it reached a peak of almost 30% before the crisis. Of course, gross intermediary activity fell to below zero in the financial depression of 2009-10.

The Flow of Funds data allow us to examine the composition of this astonishing growth of the financial sector. Not surprisingly, on the asset side, the growth has mainly come from mortgage lending. The key role performed by the financial sector in the recent

decade was to channel savings from the household sector, the business sector and the foreign sector into mortgage borrowing by American households. The annual increase in mortgages held by the financial sector increased from under 2% of GDP during the recession of 1990-91 to more than 10% by the mid-2000s. There is evidence of a generalized credit boom as other forms of financial sector credit – unsecured consumer loans, business loans and corporate bond buying – also expanded relative to previous times. Nevertheless, the main driver was the tripling of mortgage lending in the 2000s relative to the 1990s.

Figure 5



How did the financial sector fund the mortgage credit boom? A look at the liability side of the financial sector in Figure 6 shows that the main source of financial funding was non-deposit borrowing such as the issuances of bonds and other paper, with deposits coming a distant second. The growth in non-deposit borrowing was facilitated by financial market developments such as the Repo market and money market funds.

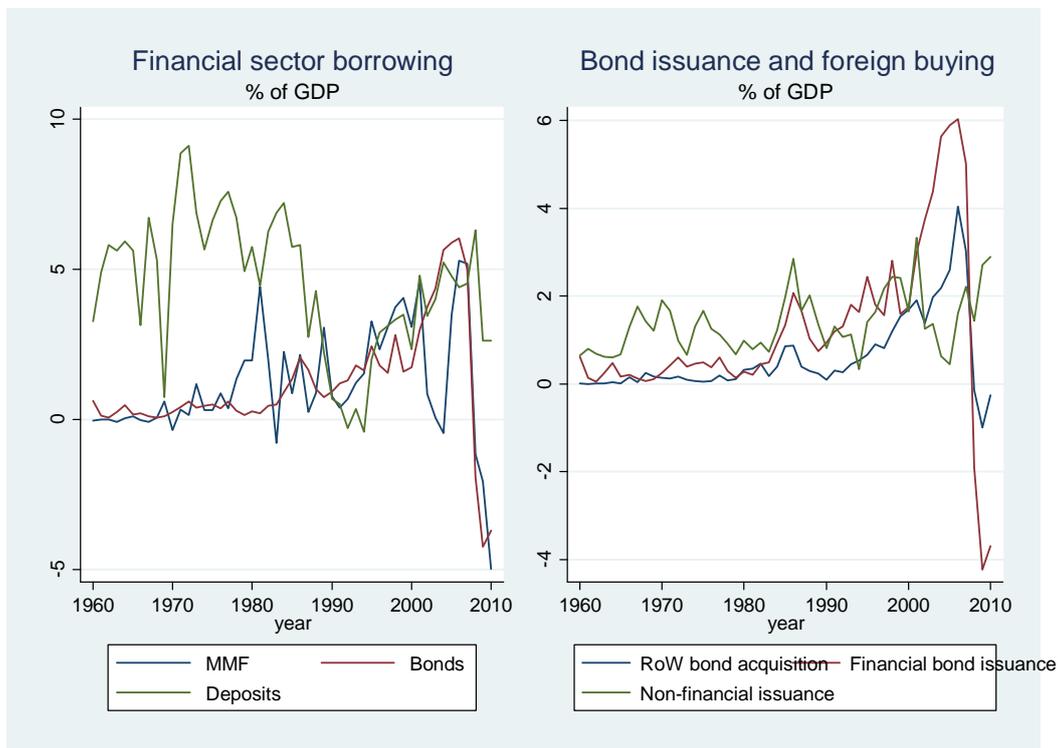
A closer look at the intermediary role of the financial sector indicates that a number of long-standing relationships dissolved over the past two decades. For most of the postwar period, the financial sector issued fewer bonds than it bought; deposits were a more important funding source. This is consistent with a traditional model of a financial intermediary sector that issues (short-term) deposits and uses them to buy (long-term) bonds issued by the owners of investment projects, primarily the corporate business sector. In fact, over time purchases of business sector bonds grew in importance and were a substitute for direct lending in the form of bank loans. Yet after 2002-03, the opposite was the case. The financial sector began to issue more liabilities than it acquired. This dramatic shift is shown in Figure 6. By 2005, the financial sector issued about five times as many new liabilities as the non-financial business sector.

These trends illustrate the dramatic shift in the funding mix of the financial sector. Whereas deposits were the dominant source of funds for the financial sector until the mid-1980s, financial sector bond issuance and money market mutual funds play a much more central role today. Such new forms of non-monetary funding of the financial sector have loosened considerably the link between money and credit (Schularick and Taylor 2012). Since the 1980s, banks' access to non-monetary sources of finance has become an important factor for aggregate credit provision. The increasing dependence of the financial system on access to wholesale funding also means that central banks are forced to underwrite the entire funding market in times of distress in order to avoid the collapse of the banking system as experienced in 2008/09. The Lender of Last Resort now must step in to confront non-deposit bank runs (Gorton and Metrick 2012).

Although the financial sector credit boom of the 2000s was a domestic phenomenon, the foreign sector was an important enabling factor. The expansion of the financial sector, which was needed to sustain the boom in mortgage lending, was increasingly supported by foreign purchases of private sector bonds. As we have mentioned before, the foreign sector was not only a major buyer of government securities, it also purchased private sector securities. Foreign buying of private sector bonds, filling the domestic funding gap of the US financial sector, was an important ingredient of the capital inflow boom of the past decade. Figure 6 shows that in the 2000s, the foreign sector emerged as a major source of funds for the expansion of the

American financial sector. Yet it is also apparent that the foreign official (central banking) sector has little to do with the borrowing spree of the U.S. financial sector. The latter turned to foreign private savings to satisfy the insatiable mortgage hunger of American households.

Figure 6

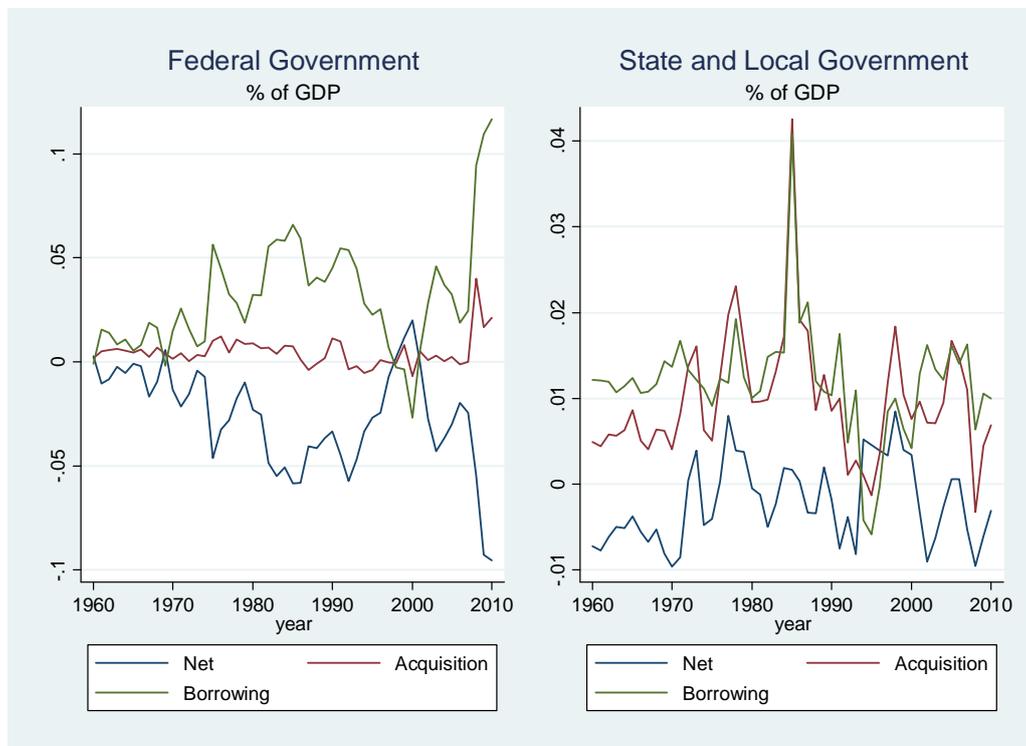


1.5. Government sector.

The Flow of Funds story for the government sector is relatively straightforward. Federal government deficits drive the sector’s net financial investment since state and local governments are for the most part required to balance their operating budgets. However, the government sector, particularly at the state and local level, also acts as a financial intermediary that both issues liabilities and accumulates financial assets. Figure 7 shows that financial asset purchases by the government sector often run around 3% of GDP but without any discernible recent trends.

With regard to the trends in lending and borrowing the flow of funds tell the well-known story of the sequence of US public sector deficits in the past 50 years. Budget deficits widened sharply under the Reagan administration in the 1980s and stayed around 5% of GDP until the early 1990s. The deficits were closed in the boom of the 1990s, but the Bush tax cuts and the post 9/11 military activity led to renewed deterioration of the federal deficit in the 2000s. Finally, the deficits incurred after the global financial crisis were unprecedented in peace time.

Figure 7



### 1.6. Summary.

Closer analysis of the trends in individual sectors gives a picture that is considerably more granular than the standard twin deficit view and, in some respects, challenges conventional wisdom about the tight links between reserve accumulation around the world and the American credit binge. The biggest change in financial behavior in the past two decades has come from the household sector. Two significant trends emerged in the last two decades. First, in the 1990s American households sharply

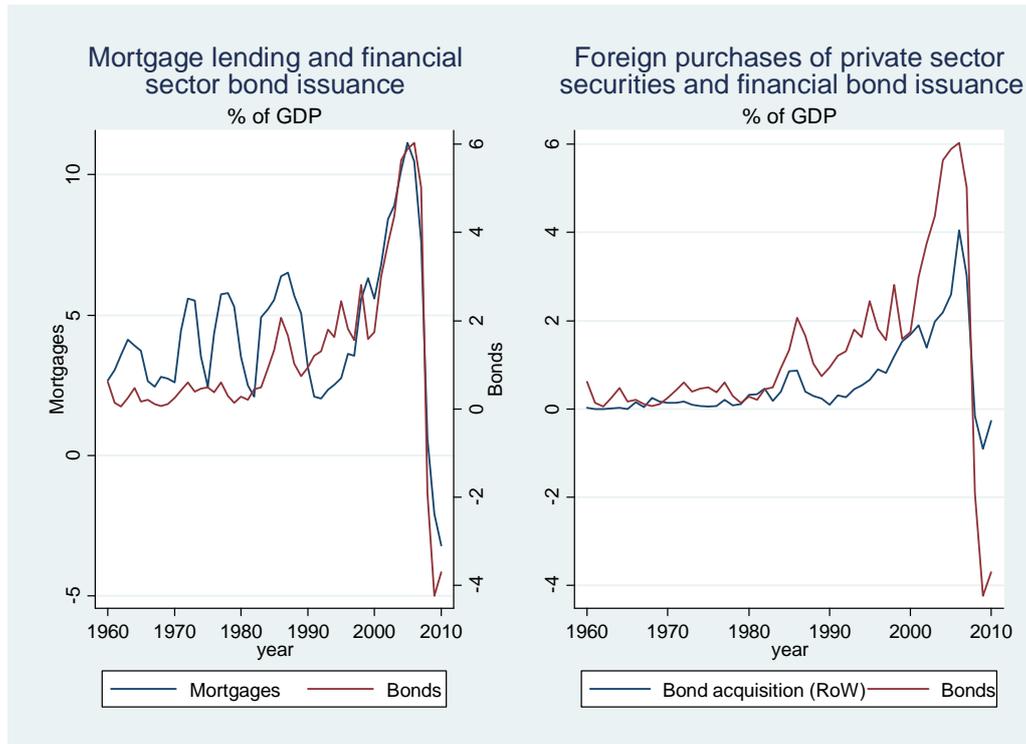
reduced their active savings which by the end of the decade stabilized at an historically low level where they remained roughly for the following decade. A second trend that quickly gathered speed in the 2000s is the rapid expansion of household borrowing, predominantly in the form of mortgages. Against the background of much reduced savings, the household sector started to run a financial deficit from 1998 on. In other words, it imported savings on a net basis from the other sectors. The financial sector intermediated the growing hunger of households for loanable funds from other sectors. As the business sectors' savings closely mirrored investment and the government turned into a net borrower after 2000, only the foreign sector could provide the necessary funds. Yet these funds were private, not official.

Our examination of trends show some important features of the role of foreign sector inflows to the US in the last two decades. Most attention is given to the last decade when the Bush era increase in the government deficit coincided with the start of rapid foreign exchange reserve accumulation by China. The overwhelming share of foreign official inflows went into Treasury securities. However, a closer look shows that the decline in private sector US saving and the increase in the current account deficit dates back to the 1990s.

The increase in mortgage borrowing starting in the mid 1990s was financed by financial sector bond issuance (mortgage backed securities and pools). This is shown in Figure 8. The US financial sector tapped foreign savings; and the foreign private sector was the principal buyer of financial sector bond issues and the US financial sector itself absorbed the rest. Foreign official purchases of US assets linked to the accumulation of foreign exchange reserve in East Asia, did not play a major role in financing the credit hunger of American households. The credit boom in the US, the increase in the ratio of private debt to GDP, was driven by the growth of the domestic financial sector which increasingly relied on funds from foreign private capital inflows. At the risk of oversimplifying a complex picture, one could summarize that Beijing may have financed the war in Iraq while American and European private investors financed the mortgage bubble. In short, the U.S. credit boom that ended so badly was a product of financial globalization in the private sector; it had little to do with capital inflows from foreign

governments. The American credit boom of the past two decades was essentially driven by the private sector.

Figure 8



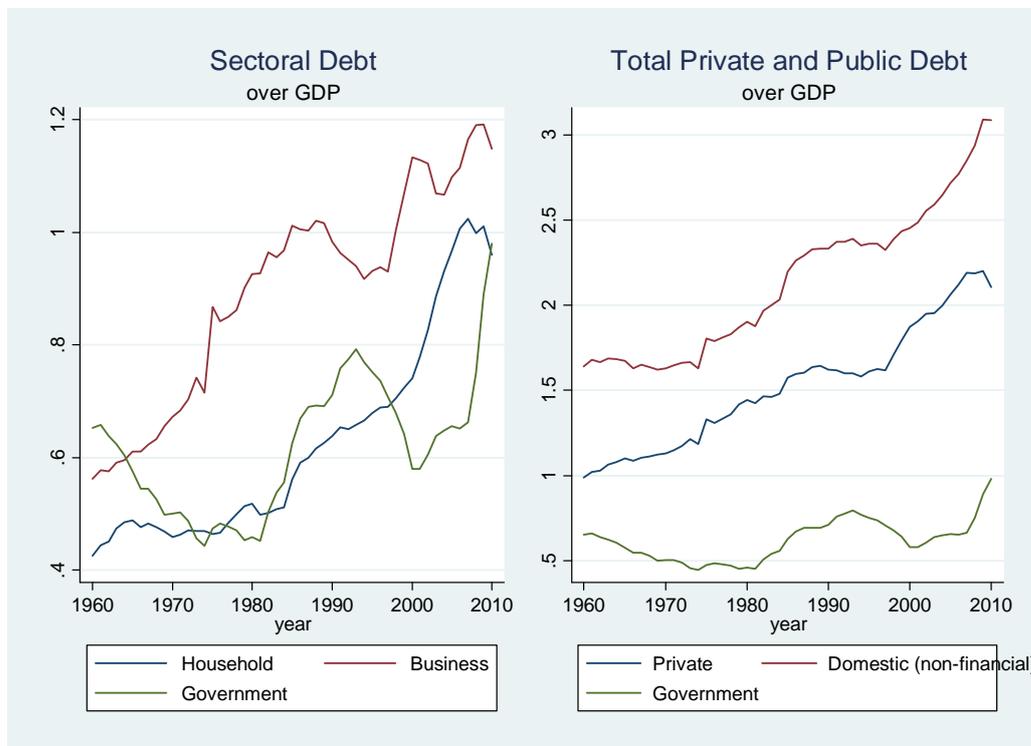
## 2. Flows and stocks

The large changes in sectoral flows seen repeatedly in the last section are likely, especially on the household side, to be related to changes in wealth. In addition there have been large increases in the amount of leverage throughout the economy. We are clearly not the first to explore this nexus. A large literature exists that studies the impact of wealth changes on savings behavior (Maki and Palumbo 2001; Juster et al. 2006; Case et al. 2005; Muellbauer 2008; Mian and Sufi 2011; Carroll et al. 2011; ). In this section, we will examine trends in the stocks of assets and liabilities and explore how they relate to the sectoral balances.

The dramatic increase in leverage in the American economy is shown in Figure 9. Total business debt to GDP has been rising throughout the period, from less than 60% to almost 120%, an even larger increase than that shown for the government since 1980. Government debt to GDP declined until the early 1980s, declined again in the 1990s and then rose sharply in the crisis. Household debt to GDP was relatively constant until the early 1980s.

Total debt of the domestic non-financial sectors (both private and the overall total) has increased steadily over the last 50 years (Figure 9). However, there have been two episodes of rapid increase in overall leverage, for a decade starting in the mid 1970s and again for a decade starting in the late 1990s. An extensive literature on finance and economic growth shows that increased financial depth (the ratio of debt to GDP) and more developed financial intermediary institutions are associated with higher levels of economic growth. However, it is also the case that rapid increases in financial depth can

Figure 9



be characterized as credit booms, which can lead to economic instability and financial crises (Wachtel, 2011). Moreover, Schularick and Taylor (2012) show that crisis risks are

higher in larger financial systems. The distinction between growth enhancing financial deepening and destabilizing credit booms is not readily apparent.

Looking at the household balance sheet, changes in wealth are due to changes in market values as well as asset and liability acquisitions. As the acquisition of financial assets has fallen dramatically in the late 1990s, movements in household wealth were predominantly driven by asset price trends. The changes in household wealth, shown in Figure 10 as a percent of disposable income, indicate that the decline in the acquisition of financial assets by American households that we identified earlier mirrored the large capital gains that households made during the equity boom of the 1990s. The figure also illustrates the unprecedented nature of the post-2007 collapse. Never before in recent history have both housing and equity wealth collapsed at the same time to this extent. As liabilities are, largely, fixed in the short run, such declines in the value of assets result in equally large movements in net worth.

Figure 10

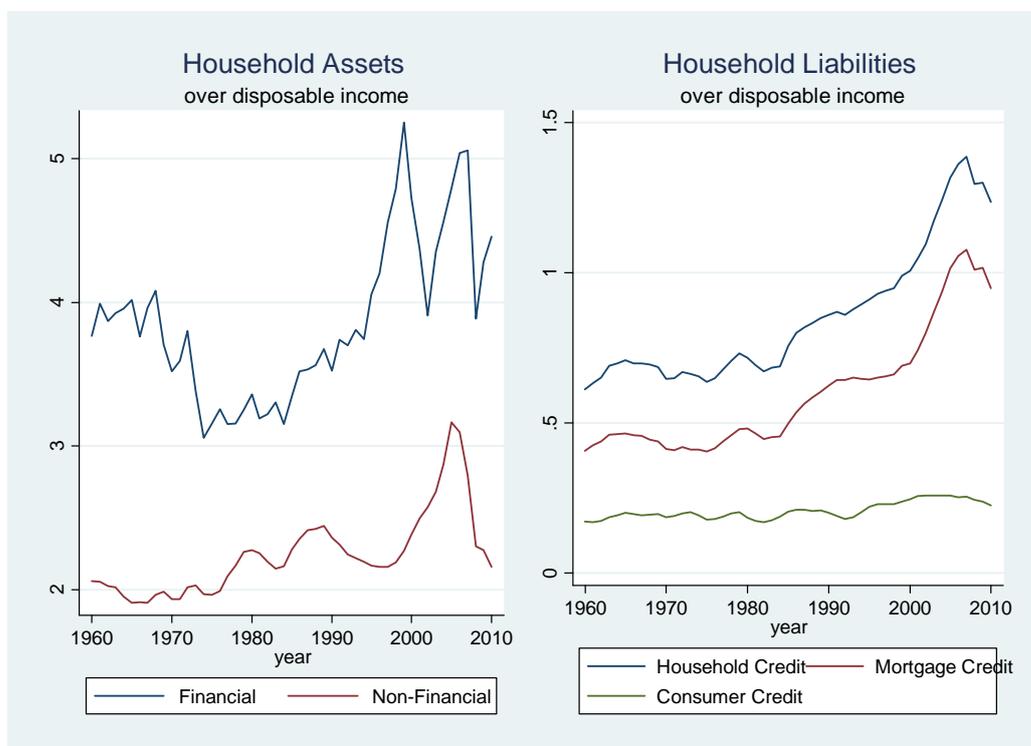
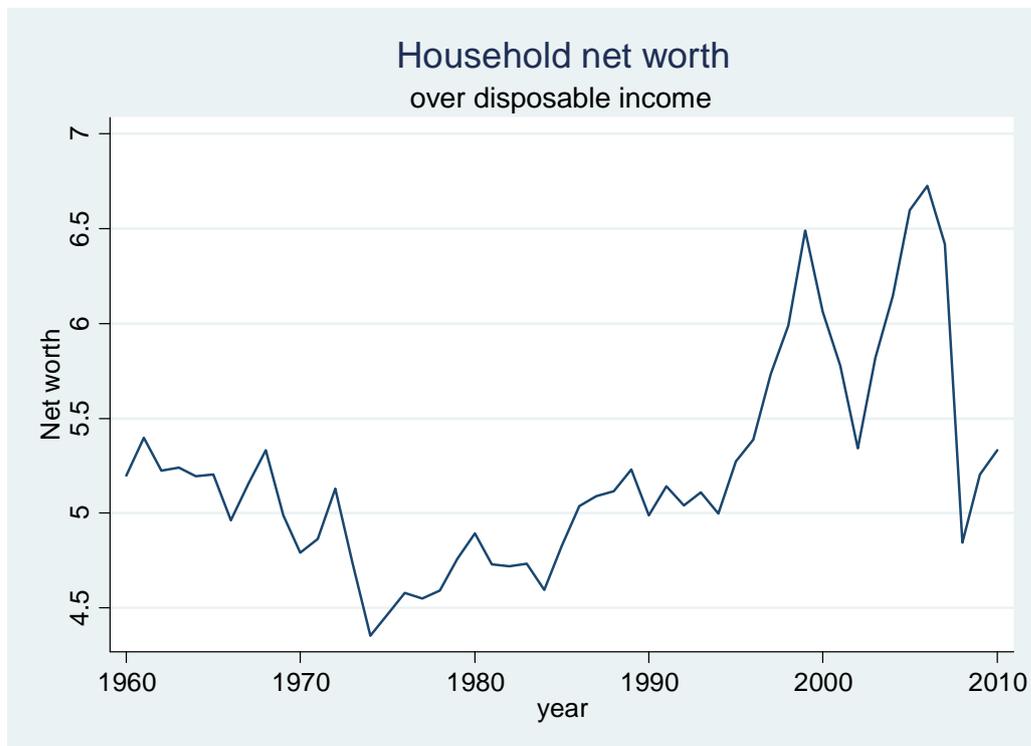


Figure 11 shows the wealth position of the household sector (relative to disposable income). It varies widely as the value of equities and housing change. Household net wealth levels improved strongly in the late 1990s, driven mainly by the equity boom, and in the 2000s when a synchronous surge in house and stock prices pushed net worth ratios sharply higher. The collapse in house prices and the decline in equity wealth during the financial crisis has brought the net worth of American households back to the levels seen between 1960 and 1990 – about five times disposable income.<sup>3</sup>

Figure 11



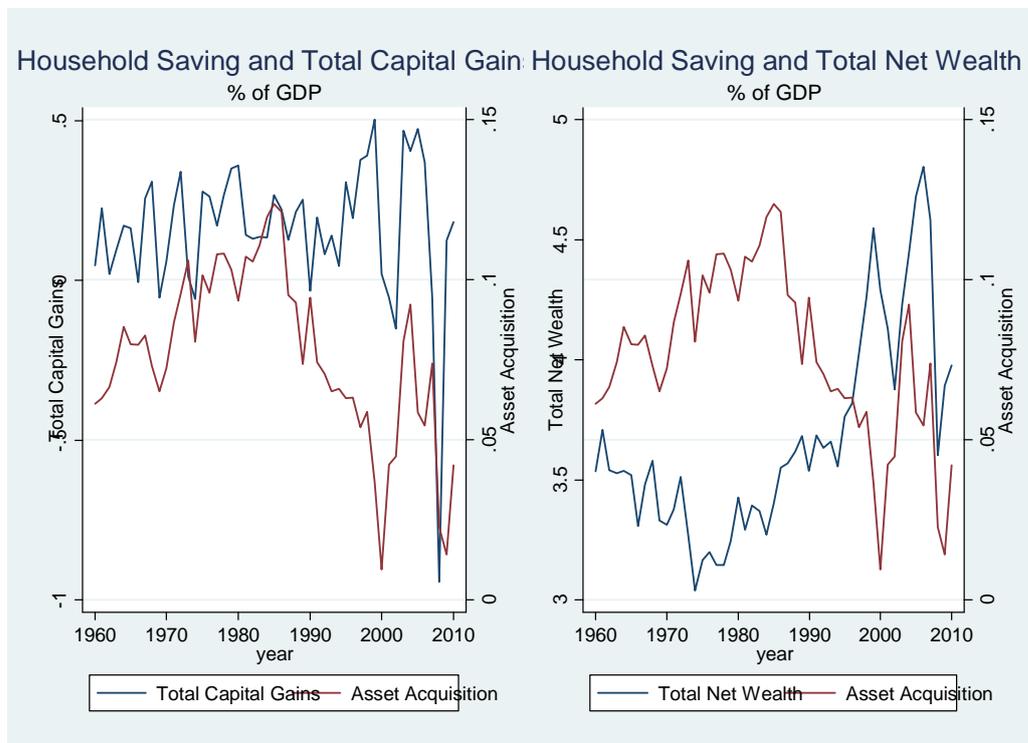
From the perspective of American households, wealth gains have more than compensated for the decline in active savings. If households expected the wealth gains to be permanent, a reduction in savings flows was indeed a rational response. From 1995 to 2000, the (unrealized) capital gains on households' equity holdings were between 20%

<sup>3</sup> This is only true for aggregates. As inequality has grown, the distribution of wealth is not the same as in previous decades.

and 40% of GDP per year – a multiple of flow-based savings rates. Nonfinancial capital gains – chiefly stemming from the price appreciation of the housing stock – averaged about 5% of GDP over 1980-2000 before increasing sharply in the housing boom of the 2000s. During the peak years of the housing boom, wealth gains stemming from house price appreciation reached between 10% and 15% of annual GDP. Accumulating over a number of years, this led to a sizeable improvement of the net worth position of American households despite the decline in active savings (Figure 11).

Figure 12 shows capital gains and total net wealth compared to active savings. It is clear from both panels that an inverse correlation exists between wealth gains (flows) and asset acquisition as well as between net worth (levels) and asset acquisition. However, asset acquisition is only one side of the financial balance of households. Household borrowing completes the picture. In the next part, we will take a closer look at these relationships.

Figure 12



### *3. Drivers of household finances*

The household sector has seen the most dramatic shift in financial balances in recent decades – from a net source of savings for the rest of the economy to a net importer of funds. Although, all elements of the flow of funds are both jointly determined and simultaneous, it is of interest to examine the influence of largely exogenous factors on household savings behavior. For example, we noted earlier that periods of negative real interest rate might have influenced borrowing behavior. Similarly, we suggested in the previous section that capital gains might have a direct causal influence on the behavior of households. If all wealth is ultimately owned by households then changes in the value of assets and the returns on assets held are likely to affect household decisions to consume or save. In this section we will examine these causal relationships, particularly the effect of capital gains on household savings behavior. To the extent that wealth levels can be taken as exogenous, it will be useful to turn to a regression framework that will help further understand the structure of savings behavior in the US.

As noted earlier, we are far from the first to look at the determinants of household savings behavior; it was the subject of many of the earliest econometric studies over 50 years ago. Most studies of the influence of changes in wealth on consumption focus on overall or net saving. Yet we will look beyond the net savings of the household sector and examine the effect of capital gains and other influences on the households' active savings, their acquisition of financial assets, and their borrowing behavior, the incurrence of financial liabilities, separately. We think that, for example, capital gains on existing assets might lead to a reduction in active savings, but have little direct impact on borrowing decisions.

Virtually every imaginable econometrics techniques has been applied to the study of savings behavior; the number of studies devoted to the subject is beyond enumerating. Nevertheless, there is an apparent consensus in the recent literature that relatively simple specifications of savings rate equations can be informative. We will follow in that tradition and estimate savings rate equations in order to identify which exogenous forces underlie the major trends in savings behavior. Further, we will disaggregate savings into

its components in order to provide, as tried with our discussion of the data above, a fuller understanding of the evolution of savings imbalances in the US.

In a first set of regressions we relate the net acquisition of financial assets relative to disposable income to the total net wealth of the household sector and the short term real interest rate using quarterly data for period Q1:1952 to Q4:2007.<sup>4</sup> Additionally, we test the robustness of the results by including a time trend, substituting the long term real interest rate for the short term real rate and by including the inflation rate separately. More formally, we estimate the following equation:

$$(1) \quad NAFA_t^{hh} = \alpha + \beta_1 W_t^{hh} + \beta_2 r_t + \varepsilon_t,$$

Where  $NAFA_t^{hh}$  is the net acquisition of financial assets by households over disposable income at time  $t$ ,  $W_t^{hh}$  the log of the ratio of total net wealth to disposable income, and  $r_t$  the real interest rate, calculated as the difference between the federal funds rate and the realized inflation rate.

Regressions estimates of (1) and several variations are shown in Table 1. Both  $NAFA_t^{hh}$  and  $W_t^{hh}$  are in natural logs. We choose the semi-log specification because it facilitates our interpretation of the results, estimates with linear or log-log specifications are not fundamentally different. Equations are shown both with and without a time trends. There was some evidence of the presence of serial correlation from the Durbin-Watson test. Consequently, we present results from Prais-Winsten regressions. In other words, we use the generalized least-squares method to estimate the parameters with serially correlated errors that are assumed to follow a first-order autoregressive (AR1) process.

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<sup>4</sup> The regressions sample ends at the onset of the financial crisis.

Table 1: Household Wealth and Active Saving

| Dep. Variable: Asset Acquisition / Income | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Total Net Wealth / Income (ln)            | -0.213***<br>(0.0296) | -0.233***<br>(0.0332) | -0.202***<br>(0.0377) |                       |                       |                       |
| Total Assets / Income (ln)                |                       |                       |                       | -0.176***<br>(0.0278) | -0.233***<br>(0.0343) | -0.200***<br>(0.0397) |
| Real Interest Rate                        |                       |                       | 0.00208*<br>(0.00114) |                       |                       | 0.00200*<br>(0.00118) |
| Change in log of Real Income              |                       |                       | 0.661**<br>(0.296)    |                       |                       | 0.641**<br>(0.297)    |
| Constant                                  | 0.449***<br>(0.0472)  | 0.470***<br>(0.0499)  | 0.409***<br>(0.0589)  | 0.415***<br>(0.0484)  | 0.491***<br>(0.0544)  | 0.425***<br>(0.0655)  |
| Time trend                                | No                    | Yes                   | Yes                   | No                    | Yes                   | Yes                   |
| Observations                              | 214                   | 214                   | 214                   | 214                   | 214                   | 214                   |
| R-squared                                 | 0.194                 | 0.203                 | 0.241                 | 0.155                 | 0.192                 | 0.226                 |

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Our baseline regressions display a large effect of net wealth as a determinant of active savings behavior that is significant at the 1% level. A 10% increase in the wealth to income level typically goes hand in hand with a decline in the savings rate of 2 percentage points. To put this in perspective, Figure 11 shows that household net wealth fell by about 20% when the dot.com bubble burst. This can be associated with an increase the asset acquisition ratio from 2% to 6%. The results also reveal a small positive effect of real interest rates on asset acquisition that is significant at only the 10% level and a positive effect, significant at the 5% level, of the growth rate in real income on active saving. That is, asset acquisitions increase in expansions (when the rate of growth of income increases). Further evidence on consumption smoothing over the cycle depends on what happens to borrowing which we will examine below.

We first take a closer look at the wealth effects on savings behavior by differentiating between equity wealth and housing wealth. Since holdings of housing and equities are distributed differently, it is reasonable to expect that the effects of capital gains might affect saving differently. A lively debate exists whether increased in housing wealth or increases in equity wealth have larger effects on aggregate consumer behavior, but no consensus has been established.<sup>5</sup>

<sup>5</sup> See the contribution by Case et al. (2005); Juster et al. (2006) as well as Muellbauer (2008) and Mian and Sufi (2011).

We estimate the following regression where  $HW_t^{hh}$  is capital gains on housing and  $EW_t^{hh}$  is capital gains on equities (the log of the ratio to income in each case). The results are shown in Table 2. The model we specify is the following:

$$(2) \quad NAFA_t^{hh} = \alpha + \beta_1 HW_t^{hh} + \beta_2 EW_t^{hh} + \beta_3 r_t + \varepsilon_t$$

Table 2: Household Wealth and Active Saving

| Dep. Variable: Asset Acquisition / Income | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Total Financial Wealth / Income (ln)      | -0.227***<br>(0.0256) | -0.226***<br>(0.0257) | -0.217***<br>(0.0295) |                       |                       |                       |
| Total Housing Wealth / Income (ln)        | 0.0431**<br>(0.0199)  | 0.0528*<br>(0.0308)   | 0.0678**<br>(0.0297)  | 0.0447**<br>(0.0202)  | 0.0300<br>(0.0375)    | 0.0326<br>(0.0357)    |
| Total Equity Wealth / Income (ln)         |                       |                       |                       | -0.137***<br>(0.0156) | -0.139***<br>(0.0162) | -0.135***<br>(0.0180) |
| Total Other Wealth / Income (ln)          |                       |                       |                       | -0.0283<br>(0.0565)   | 0.000553<br>(0.0841)  | 0.0600<br>(0.0829)    |
| Real Interest Rate                        |                       |                       | 0.00134<br>(0.00104)  |                       |                       | 0.00162<br>(0.00107)  |
| Change of log of Real Income              |                       |                       | 0.863***<br>(0.292)   |                       |                       | 0.936***<br>(0.295)   |
| Constant                                  | 0.407***<br>(0.0323)  | 0.405***<br>(0.0325)  | 0.376***<br>(0.0398)  | 0.219***<br>(0.0332)  | 0.205***<br>(0.0448)  | 0.150***<br>(0.0483)  |
| Time trend                                | No                    | Yes                   | Yes                   | No                    | Yes                   | Yes                   |
| Observations                              | 214                   | 214                   | 214                   | 214                   | 214                   | 214                   |
| R-squared                                 | 0.286                 | 0.288                 | 0.334                 | 0.286                 | 0.286                 | 0.340                 |

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results are striking; equity wealth has a strong and highly significant negative effect on asset acquisitions. Housing wealth, by contrast, has a positive effect. In other words, equity gains substitute for active savings while housing gains complement it. We think these results add an important new dimension to the long standing debate about the effects of capital gains on consumption on savings. To our knowledge, we are the first to disentangle the wealth effect by looking beyond the aggregate savings rate and studying the disaggregated effects of wealth gains on active savings and borrowing behavior separately. The regression results reported in table 2 indicate that households reduce active savings in response to gains in equity wealth. Housing wealth appreciation, by contrast, has no meaningful effects. As we will see below, the opposite is true for household borrowing decisions.

In a next step, we turn to the determinants of the net incurrence of financial liabilities that we relate to the same factors as before. We also differentiate between housing wealth and equity wealth. As before, we estimate both a general model relating the incurrence of liabilities to overall net wealth levels. In a second step, we look at the specific effects of changes in housing and equity wealth on household borrowing behavior. The following models are specified and the estimates are shown in Table 3:

$$(3) \quad NIFL_t^{hh} = \alpha + \beta_1 W_t^{hh} + \beta_2 r_t + \varepsilon_t,$$

$$(4) \quad NIFL_t^{hh} = \alpha + \beta_1 HW_t^{hh} + \beta_2 EW_t^{hh} + \beta_3 r_t + \varepsilon_t$$

The regressions using close to 50 years of quarterly data indicate that the only component of household wealth that has a significant effect on borrowing behavior is housing wealth. In every specification, the housing wealth to income ratio has a large and statistically significant effect on borrowing. A 10% increase of the housing to income ratio leads to an increase in the borrowing to income ratio of about 1 percentage point. No such effect is discernible in the case of increases in financial wealth. Households increase borrowing when the aggregate level of housing wealth is high. Further, higher real interest rates discourage borrowing although the coefficient is not significant. Finally, an increase in the rate of growth of income also leads to an increase borrowing.

Looking at the various results together it also becomes clear that there is some evidence of consumption smoothing. An increase in the rate of income growth leads to an increase in the asset acquisitions to income ratio that is not completely offset by the increase in the borrowing to income ratio.

Table 3: Household Wealth and Borrowing

| Dep. Variable: Borrowing / Income    | (1)                  | (2)                   | (3)                     | (4)                   | (5)                  | (6)                     |
|--------------------------------------|----------------------|-----------------------|-------------------------|-----------------------|----------------------|-------------------------|
| Total Financial Wealth / Income (ln) | 0.0138<br>(0.0251)   | 0.0133<br>(0.0252)    | 0.00792<br>(0.0274)     |                       |                      |                         |
| Total Housing Wealth / Income (ln)   | 0.100***<br>(0.0203) | 0.0884***<br>(0.0313) | 0.0978***<br>(0.0306)   | 0.0975***<br>(0.0196) | 0.123***<br>(0.0345) | 0.127***<br>(0.0330)    |
| Total Equity Wealth / Income (ln)    |                      |                       |                         | 0.0105<br>(0.0147)    | 0.0130<br>(0.0148)   | 0.00404<br>(0.0157)     |
| Other Financial Wealth / Income (ln) |                      |                       |                         | -0.0696<br>(0.0532)   | -0.117<br>(0.0738)   | -0.104<br>(0.0738)      |
| Real Interest Rate                   |                      |                       | -0.000105<br>(0.000856) |                       |                      | -0.000548<br>(0.000831) |
| Change in log of Real Income         |                      |                       | 0.319**<br>(0.130)      |                       |                      | 0.301**<br>(0.135)      |
| Constant                             | 0.00175<br>(0.0317)  | 0.00290<br>(0.0319)   | 0.00482<br>(0.0365)     | 0.0509<br>(0.0311)    | 0.0740*<br>(0.0394)  | 0.0702*<br>(0.0420)     |
| Time trend                           | No                   | Yes                   | Yes                     | No                    | Yes                  | Yes                     |
| Observations                         | 214                  | 214                   | 214                     | 214                   | 214                  | 214                     |
| R-squared                            | 0.142                | 0.142                 | 0.172                   | 0.161                 | 0.174                | 0.209                   |

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 3. Conclusions

Our panoramic tour across 50 years of sectoral balances in the US economy yields a number of new and potentially important insights. Long-standing relationships in the financial structure of the US economy have dissolved in the past two decades. Today's financial intermediation has, on aggregate, not much to do with textbook models where household savings are intermediated into business investments. American business has vastly expanded its financial relations with other sectors, but has ceased to be a net borrower. Not only the business sector, but also American households have displayed a striking change in savings behavior. For the first time in modern history, households have turned into net borrowers from other sectors and are no longer providing savings to the rest of the economy. This shift in the household financial balance is linked to trends that were underway long before the emergence of global imbalances and reserve accumulation in emerging markets.

Our statistical analysis provides a new perspective on the much-debated relation between saving, consumption and wealth. Disaggregating the wealth effect into acquisition of financial assets and the incurrence of liabilities, we uncovered a close link

between active savings and changes in equity wealth on the one hand, and between increases in housing wealth and increases in household borrowing on the other.

In the 1990s, American households dramatically reduced their acquisition of financial assets. Mostly in response to rising equity wealth during the stock market boom of the 1990s, households' acquisition of financial assets dropped from about 10% of GDP in the 1980s to slightly above zero in the late 1990s. Against the background of record low active savings rates, households started to borrow strongly after 1998 as the value of the housing stock appreciated and mortgage equity withdrawals helped sustain rapid consumption growth.

These results speak to the debate about the effects of asset price bubbles and the appropriate policy response. We show that changes in financial and non-financial wealth have major consequences for savings and borrowing behavior of households. If households treat the wealth gains incurred during asset price bubbles as permanent (our results suggest that they did so both in the 1990s and the 2000s), they will adjust their savings behavior. Our analysis indicates that savings behavior changes meaningfully both in response to gains in housing and financial wealth. This result challenges conventional wisdom that non-leveraged equity market bubbles pose a lesser problem for financial stability than credit-fueled housing bubbles. Equity market bubbles too trigger substantial changes in the financial behavior of households whose macroeconomic repercussions policy makers might find hard to reverse later.

Finally, our study reveals a much looser link between global imbalances and the American credit boom than is often assumed. Our results here mesh with recent emphasis on gross, not net savings flows (Borio and Disyatat 2011; Shin 2011; Obstfeld 2012, Lane and Quade 2012). The American financial sector increasingly intermediated foreign capital in order to finance the housing credit boom of the 1990s. It fed the credit hunger of the American economy mainly by issuing debt liabilities in international financial markets; as a result American financial institutions could finance a lending boom of historic proportions despite low domestic savings. The foreign private sector, not foreign governments, provided much of the fuel for the fire. Foreign official inflows went almost exclusively into Treasury securities while private investors bought bonds and other instruments by U.S. financial intermediaries. Those who are looking for international

drivers of the American credit bubble, should not look to Beijing and Riyadh, but to international *private* capital markets. The capital inflow bonanza of the 2000s that enabled the rapid build-up in leverage (Chinn and Frieden 2011) was primarily a private sector inflow. Beijing financed the war in Iraq at low cost; while Wall Street, foreign banks and private investors fueled the housing bubble.

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