Inside the Great Leveraging

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Abstract

This paper discusses what we have learned about the debt build-up in advanced societies over the past century. It shows that the extraordinary growth of aggregate debt in the past century was driven by the private sector. To understand the driving forces of debt growth and financial instability, we have to study private borrowing, and in particular real estate lending. I also argue that the next frontier to understand the Great Leveraging is to open up the black box of aggregate data and exploit long-run micro data. I present first insights from a long-run micro dataset that allows us to study the distribution of debt over time, the changing borrowing behavior of different cohorts, as well as the sensitivity of different income groups to asset price fluctuations.

1   Introduction

Debt and balance sheets more generally were the great absentees from pre-crisis macroeconomics. Take the example of household finance and consumption. Most macroeconomists before the crisis thought that the financial position of a household could be sufficiently described by a single number: net wealth. It did not matter whether a household had, say, 100,000 Euros in cash, or assets of 1.1 million and debt of 1 million. As the net wealth number was the same, both were assumed to be identical for all practical purposes. Until this day, very few macroeconomic models contain mechanisms in which gross positions on household balance sheets matter.

Yet we understand now that balance sheet positions make a big difference. The crisis has opened up a lively debate about the effects of the composition of household balance sheets on macroeconomic activity, and research since the crisis has shown that balance sheets and leverage dynamics matter a great deal for economic outcomes. Among other things, we have learned a lot about the aggregate demand effects of changes in borrowing constraints (Eggerttsson and Krugman 2012; Mian and Sufi 2013, 2014), the importance of gross credit growth as a driver of financial instability (Schularick and Taylor 2012), the importance of debt overhang for slow recoveries from financial crises (Koo 2003; Jorda, Schularick and Taylor 2013), and that the market does not price the crash risks of credit booms correctly as both equity and bond investors seem to be caught in the same heuristic bubble and expect low risks going forward (Baron and Xiong 2016; Krishnamurty and Muir 2015).

In this paper, I want to do two things. First, I want to briefly sketch what we have learned about debt and debt traps in modern economies. I will speak from the perspective of macroeconomic history, outlining the big trends and using statistics not to explain things, but to show what we need to explain, as Schumpeter once put it. Most importantly, I will show that the extraordinary growth of aggregate debt in the past century was driven by the private sector. Public debt has also grown in most countries relative to income, but two thirds of the increase in total economy debt occurred in the private sector. Moreover, at least in peacetime, financial stability risks typically originated in the private sector. Put differently, to understand the driving forces of debt and financial instability, we have to study private borrowing and its problems, and here in particular real estate borrowing, and the interaction of credit growth and asset prices.

In the second part, I want to talk about what I see as the next frontier in research on debt and present some first results. My main argument will be that we need to move beyond macro evidence to household data to fully understand the causes and economic implications of the rise in private debt. For instance, take the vexed question whether credit booms drive asset price booms, or whether asset price booms drive credit booms. Do people form wrong expectations about future asset prices that makes them borrow too much, or does access to cheap credit boost asset prices and causes the boom in the first place? These are complicated questions that are beyond the scope of this paper, but I will present first insights from a historical micro dataset that I compiled in joint work and that will help us open the black box of aggregate trends and study the great leveraging from a micro-perspective.

2   The Great Leveraging

Let me start with a note on data. To sketch aggregate trends in debt in advanced economies over the past century and a half, I will rely on the **Macrohistory Database** assembled over the years and with the generous support of the Institute for New Economic Thinking by Oscar Jorda, Alan Taylor and myself. It contains macroeconomic and financial data for Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, U.K., and U.S. from 1870 to 2015. At annual frequency, the dataset contains public and private debt data, interest rates, exchange rates, and a wide range of macroeconomic variables such as income, consumption, and investment, but also monetary aggregates, inflation rates, stock market indices and house prices. All the data are freely accessible at **www.macrohistory.net/data**.

Until the global crisis, economists mostly worried about public debt, not about private debt. With the benefit of hindsight, this was a mistake. Spains public debt level in 2007 was 35 percent of GDP, the overall budget was solidly in surplus and the primary budget balance even posted a whopping surplus of three percent of GDP. Things looked even better in Ireland. Both countries were poster-children of the Maastricht criteria. Two years later, their financial systems had imploded, unemployment skyrocketed, and both countries were forced to seek bail-outs from Brussels. Importantly, there was next to nothing in key indicators of public debt that indicated the imminent catastrophe. Private sector borrowing was the epicenter of the crisis, and private credit growth, in particular real estate lending, would

have given the correct early warning signal.

It is also not hard to see why economists (and not only in Germany) tend to worry a lot more about public debt than private debt accumulation. Private agents are generally assumed to act in their enlightened self-interest. When governments borrow, economists intuition is that incentive problems abound and that the temptation to finance economically wasteful pet projects or serve special interests at the cost of future generations is too big to be contained. It is considerably easier to explain the political economy logic of overexploitation of common pools than an endogenous build-up of financial fragility.

Before the crisis macroeconomics had put theory ahead of empirics, with problematic consequences. A major implication was that the discipline missed the extraordinary build-up of private debt in the second half of the 20th century. It was not until we had compiled the long-run data that the extent to which private debt had grown faster than income became clear. Figure 1 shows the strong increase of private debt relative to income over the last century. The break with the past is particularly evident since the 1970s. Public debt was on an upward trajectory too and before the crisis had climbed to levels that were high for peacetime, but all in all the recorded levels were still within the historical range.

Figure 1: **Public and private debt**
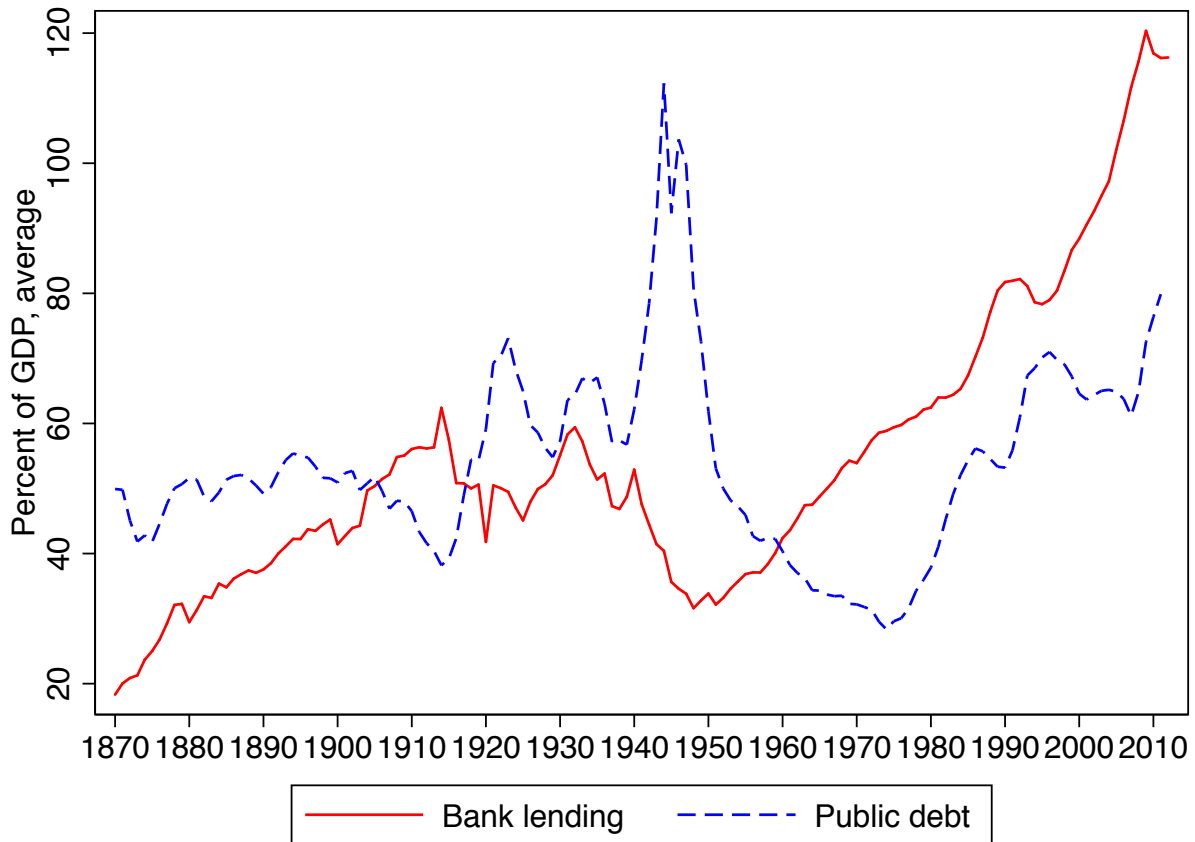
What also became possible with the long-run data for public and private debts that we had assembled was to test a very basic proposition, namely how financial crises are related to public and private debt levels. Which is the better predictor of financial crises? In a paper that we wrote a couple of years ago, we horse-raced public and private debt against each other as predictors of financial instability. We specified a simple crisis prediction model for a crisis in country i in year t as a function of private and public debt accumulation:

$$logit(p_{i,t}) = \beta_{0i} + \beta_1 L(\Delta\, PublicDebt_{i,t}) + \beta_2\, L(\Delta\, PrivDebt_{i,t}) + \epsilon_{i,t}$$

Public debt lost by a mile. The regressions showed that it even tended to be inversely correlated with financial crisis risk, meaning that in advanced economies crises are more likely when public finances look good. By contrast, changes in private credit are very closely

associated with crisis risks. We concluded that financial stability risks have almost exclusively come from private sector debt growth, not from the public sector (Jord, Schularick, and Taylor 2015). Public debt increases after crisis, not before as governments step in to stabilize a weak post-crisis economy (Reinhart and Rogoff 2009; Laeven and Valencia 2012; Schularick 2012).
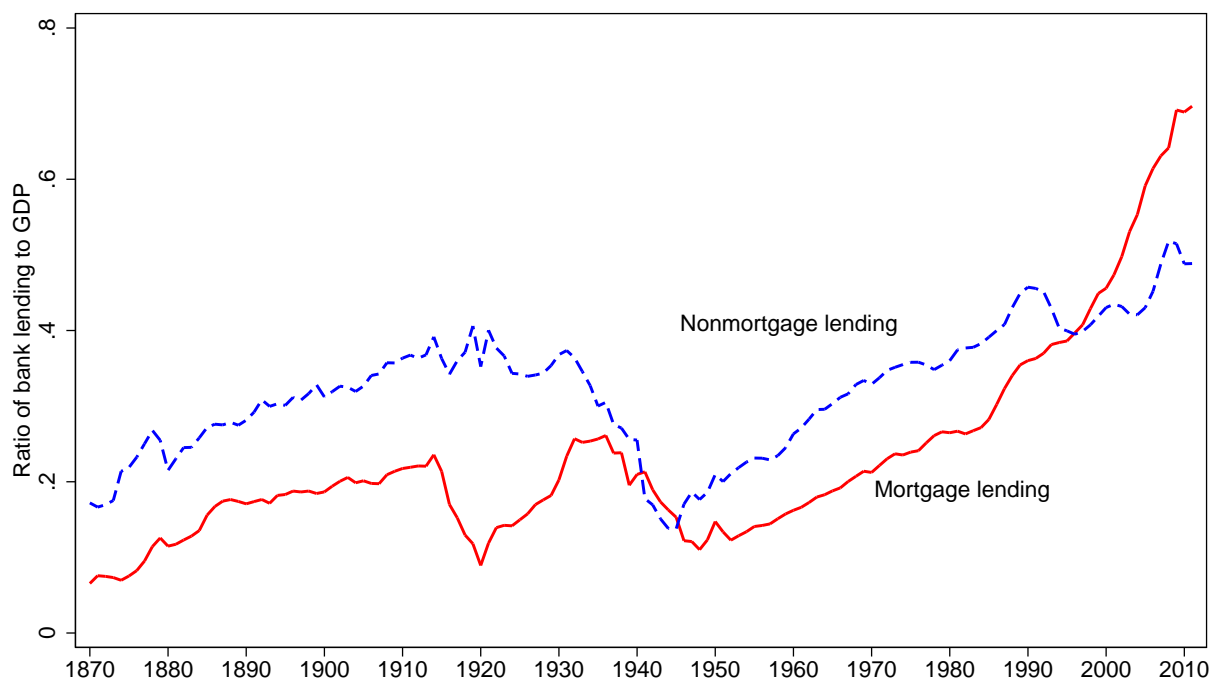
Let me come back to the surge in private debt in the 20th century. What have been the drivers of the surge in private debt shown above in Figure 1?

This is a question that Alan Taylor, Oscar Jorda and I spent considerable time investigating over the past years. What we found was that the sharp increase of credit-to-GDP ratios in advanced economies in the 20th century has been first and foremost a result of the rapid growth of loans secured on real estate, i.e., mortgage and hypothecary lending. The share of mortgage loans in banks' total lending portfolios has roughly doubled over the course of the past century from about 30% in 1900 to about 60% today. To a large extent the core business model of banks in advanced economies today resembles that of real estate funds: banks are borrowing (short) from the public and capital markets to invest (long) into assets linked to real estate.

When we looked more deeply at the composition of bank credit, it became clear that the rapid growth of mortgage lending to households has been the driving force behind the change in the composition of banks' balance sheets. The intermediation of household savings for productive investment in the business sector the standard textbook role of the financial sector constitutes only a minor share of the business of banking today, even though it was a central part of that business in the 19th and early 20th centuries. Figure 2 shows the changing composition of bank lending to the non-financial private sector over the past 150 years. Debt levels today are so much higher than they used to be, because of mortgage lending. We also showed that mortgage credit growth aka real estate booms have become a core driver of financial crisis risks.

Drilling down deeper on the mortgage credit boom in the 50 years since 1960, the growth in total lending to the private sector amounted to about 80 percentage points (p.p.) of GDP on average in the 17 advanced economies. At the country level, Spain tops the list with overall growth of the bank credit to GDP ratio of 135 p.p. followed closely by the Netherlands and Denmark. The U.S. stand out as the only country where most of the leveraging has occurred outside the traditional banking system and mostly through government institutions. In no

Figure 2: **Mortgage and non-mortgage debt**

other country the government plays the same large role for housing finance. With regard to the sectoral composition, the picture is very clear. The two thirds of the total increase in bank credit since 1960, predominantly driven by real estate lending.

Table 1: Change in bank lending to GDP ratios (multiple), 1960–2010

Country	Total lending	Mortgage	Non-mortgage	Households	Business
Spain	1.35	0.97	0.38	0.76	0.60
Netherlands	1.35	0.70	0.65	—	—
Denmark	1.26	0.97	0.3	0.75	0.51
Australia	1.13	0.70	0.42	0.77	0.36
Portugal	1.05	0.58	0.47	—	—
USA*	0.88	0.54	0.34	0.48	0.39
USA	0.22	0.20	0.02	0.15	0.07
Great Britain	0.82	0.55	0.27	0.67	0.16
Sweden	0.71	0.45	0.26	—	—
Canada	0.62	0.35	0.27	0.55	—
Norway	0.62	0.59	0.03	—	—
Finland	0.62	0.27	0.35	0.43	0.19
France	0.62	0.41	0.20	0.45	0.16
Italy	0.59	0.45	0.15	0.39	0.20
Switzerland	0.52	0.74	-0.21	0.52	0.01
Germany	0.51	0.29	0.20	0.21	0.29
Belgium	0.48	0.28	0.20	0.31	0.18
Japan	0.35	0.38	-0.03	0.27	0.08
Average	0.79	0.54	0.25	0.50	0.26
Fraction of average	1.00	0.68	0.32	0.64	0.33

Notes: Column (1) reports the change in the ratio of total lending to GDP expressed as a multiple of the initial value between 1960 to 2013 ordered from largest to smallest change. Columns (2) and (3) report the change due to real estate versus non-real estate lending. Columns (4) and (5) instead report the change due to lending to households versus lending to businesses. The USA entry with * includes credit market debt. *Average* reports the across country average for each column. *Fraction of average* reports the fraction of column (1) average explained by each category pair in columns (2) versus (3) and (4) versus (5). Notice that averages in columns (4) and (5) have been rescaled due to missing data so as to add up to total lending average reported in column (1). Source: Jorda, Schularick and Taylor (2016b).

3   The New Frontier

Macro data will only bring us half the way. In order to understand the borrowing decisions and hence more fundamentally the causes and consequences of the financialization of Western economies, we must turn to household data. Only micro data allow us to test competing hypotheses, study the evolving distribution of debt, and get a better understanding of the deeper sources of financial fragility. I will demonstrate a few of these issues using a long-run micro dataset for the U.S. that I constructed in painstaking work over the past three years with two colleagues in Bonn, Moritz Kuhn and Ulrike Steins (see Kuhn, Schularick and

Steins 2017).

Most people that are interested in household finances know the Survey of Consumer Finances (SCF). The SCF is a key resource for research on household finances. The SCF is a triennial survey and data for the various survey waves starting in the 1983 are available for download from the website of the Federal Reserve. However, the first consumer finance surveys were conducted much earlier, namely as far back as 1948. Historical SCF waves were taken annually between 1948 and 1971, and then again in 1977. The raw data are kept at the Inter-University Consortium for Political and Social Research (ICPSR), at the Institute for Social Research in Ann Arbor. To the best of our knowledge, the pre-1983 SCF data have not yet been systematically processed and harmonized so they can be linked to the modern SCFs. This is what we did. We call the resulting new long-run dataset the Historical Survey of Consumer Finances.

The historical surveys contain all the important variables that are needed to construct long-run series for the joint evolution of income, financial and non-financial assets, and debt. In addition, the SCFs contain additional information on age, sex, race, marital status, family size, and education levels. On the basis of the SCF, we can construct total income as the sum of wages and salaries, income from professional practice and self-employment, and household debt that consists of housing and non-housing debt. Housing debt can be calculated as the sum of debt on self-occupied homes and debt on other real estate. Non-housing debt includes car loans, education loans, and loans for the purchase of other consumer durables. We then use these variables to analyze the six-fold increase in U.S. household debt in the six decades after World War II. Let me highlight three important insights from this exercise.

## 3.1 The distribution of household debt

The first set of questions concerns the distribution of household debt. Who owes all the debt, and how has the composition changed over time? There are various ways to slice and dice the data, by income, wealth, race, age, and we plan to exploit all the detailed information in the SCF in the future.

Lets start with income. Note that the income-debt link has gained some prominence in the discussion. In his 2009 best-selling book, Raghuram Rajan put forward the idea that

rising debt and rising income inequality were closely linked. Households hit by stagnant real incomes increasingly relied on debt to finance consumption be it out of sheer necessity or to keep up with Joneses. Such a nexus between socio-economic pressures and growing household credit has been an important research theme in other disciplines too. Political scientists like Streeck (2011) and Krippner (2011) have linked the debt build-up to growing socio-economic pressures. In his history of household borrowing in America, historian Louis Hyman (2011) tied the growth of household debt in America to widening income disparities. Note also that all these hypotheses were formulated without access to long-run micro data.

So what do the micro data tell us about the distribution of debt and potential changes over time? First, we look at how debt is distributed among rich and poor households and how this distribution has evolved over time. In Figure 3, we sort households according to their income and compute the share of total debt that is owed by each income group.The upper panel of Figure 3 shows that debt shares, in the past and present, increase with income. These relative shares have been broadly stable over time. The top 20%'s share slightly increased over time. In 1950, it was about 45% and since 1992 the top-20 owe more than half of aggregate debt, more than twice as much as households in the quintile below.

Figure 3: **Shares in aggregate debt**
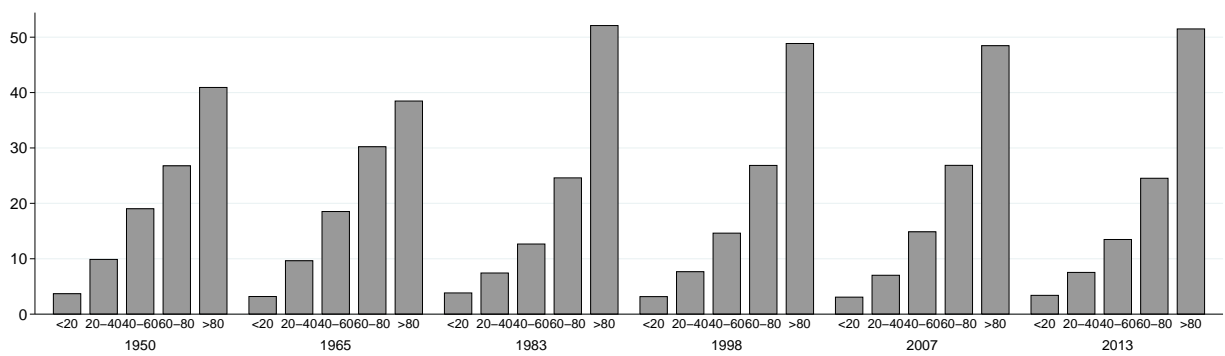
Notes: Source: Kuhn, Schularick and Steins (2017)

Figure 4 shows that debt-to-income ratios have increased at approximately the same rate over the past six decades across income groups. They are highest for the 80th to 90th income percentile. The top-10% income households have approximately the same debt-to-income ratio as the bottom 20%. Using college education as a proxy for high (low) permanent income households yields the same result. The increase in debt-to-income ratios has been stronger for richer college households than for poorer, non-college households. The simple

reason is that housing debt is by far the dominant component of household debt, homes are the main middle-class asset and it is consequently the middle-class and upper middle class from, say, the 50th to the 90th percentile of the income distribution where most debt and leverage is concentrated in the economy. But surprisingly also the richest 10% of Americans still have significant amounts of debt, presumably because of tax incentives.

Figure 4: **Mean of Debt-to-Income Ratios**
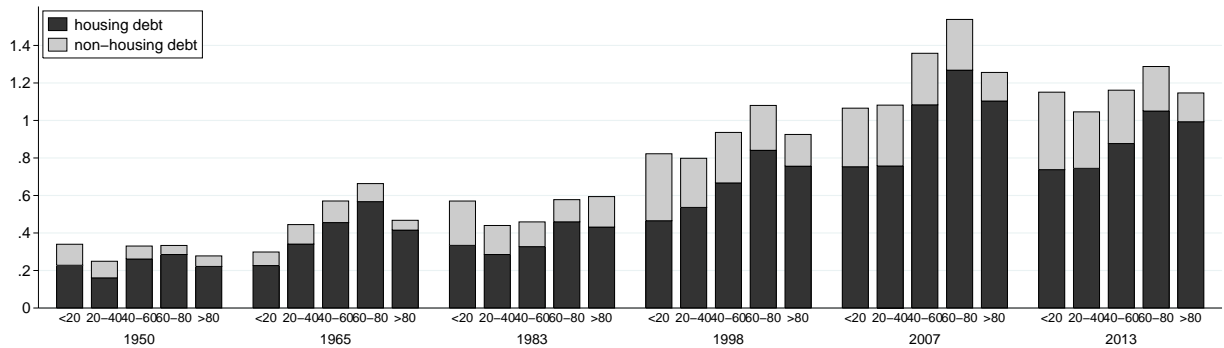
Notes: Kuhn, Schularick and Steins (2017)

3.2 The life cycle of debt

Second, thanks to the micro data, we can move beyond the cross-sectional analysis and study the role of shifts in life-cycle patterns, obtaining more granular evidence why the financial behavior of American households changed. More precisely, we can construct birth-year cohorts of American and track their debt levels over time, asking at what point in the lifecycle behavior has changes and debt increased. This is what we did in Figure 5 that tracks debt-to-income levels for different cohorts. Figure 5 shows mean debt-to-income ratios for different birth cohorts.

The graph reveals two main things. First, the younger the cohort, the higher household are indebted throughout the whole life-cycle. Second, life-cycle profiles have changed substantially over time. Households born between between 1915 and 1924 became more indebted up to the age of 45 and reduced indebtedness afterwards essentially a hump-shape pattern in line with the permanent income hypothesis. In contrast, the life-cycle profile of the next two cohorts has become roughly a flat line, i.e., households are higher indebted both at the beginning and at the end of the life-cycle. For the last two birth cohorts mean debt-to-income

Figure 5: **Mean debt-to-income of 10-year cohorts**
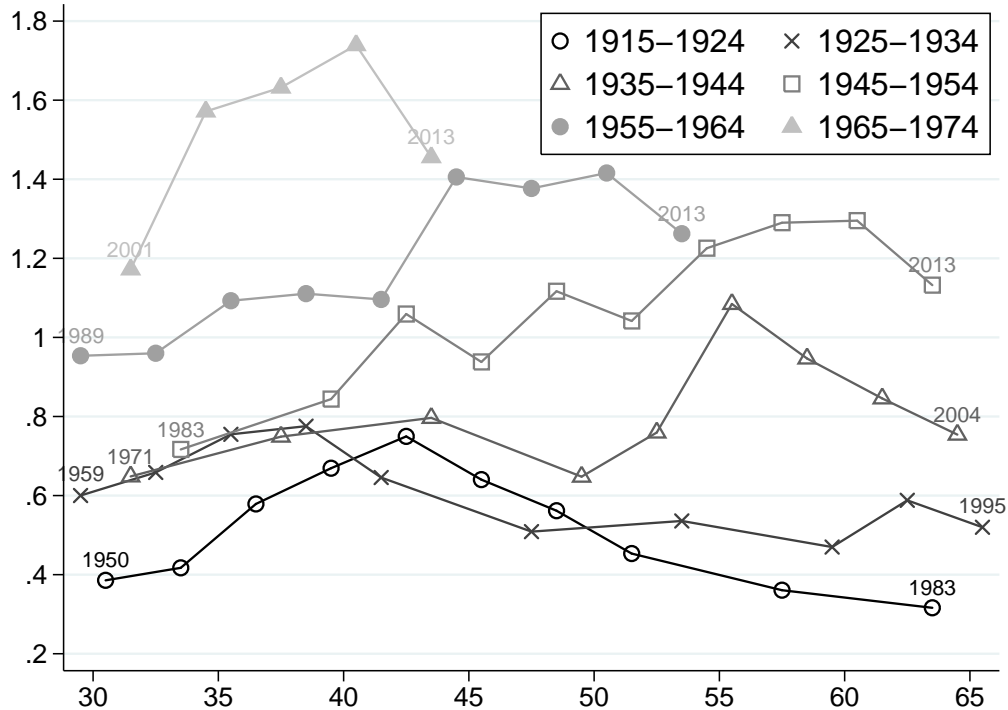
ratios are even increasing with age.

What does this mean? These cohort profiles point to a quite substantial shift in the behavior of households over time. Older American households repaid their debt over their life-time. Today, older Americans do no longer repay their debt, but die with considerable gross debt, but similar amounts of home equity and net wealth. Why could this be the case? A promising explanation is that old households use mortgage debt to withdraw equity from their homes that have risen considerably in value and use it for additional consumption.

3.3 Macroeconomic and financial stability

The third set of questions speaks to the implications for macroeconomic and financial stability. Has the sensitivity of household balance sheets to fluctuations in asset prices rose in lockstep with higher household debt and if so, how did they change?

The 2008 financial crisis clearly demonstrated how a drop in house prices can lead to size-able amounts of negative equity in the system and trigger widespread defaults on mortgage contracts. The role of leveraged asset price fluctuations on household balance sheets and their knock-on effects on consumer spending have been studied intensively in recent years (Mian and Sufi 2009, 2011). Which households are financially the most fragile, and where are financial fragility risks located in the economy?

Figure 6: Home equity at risk

(a) absolute value

(b) relative to aggregate income
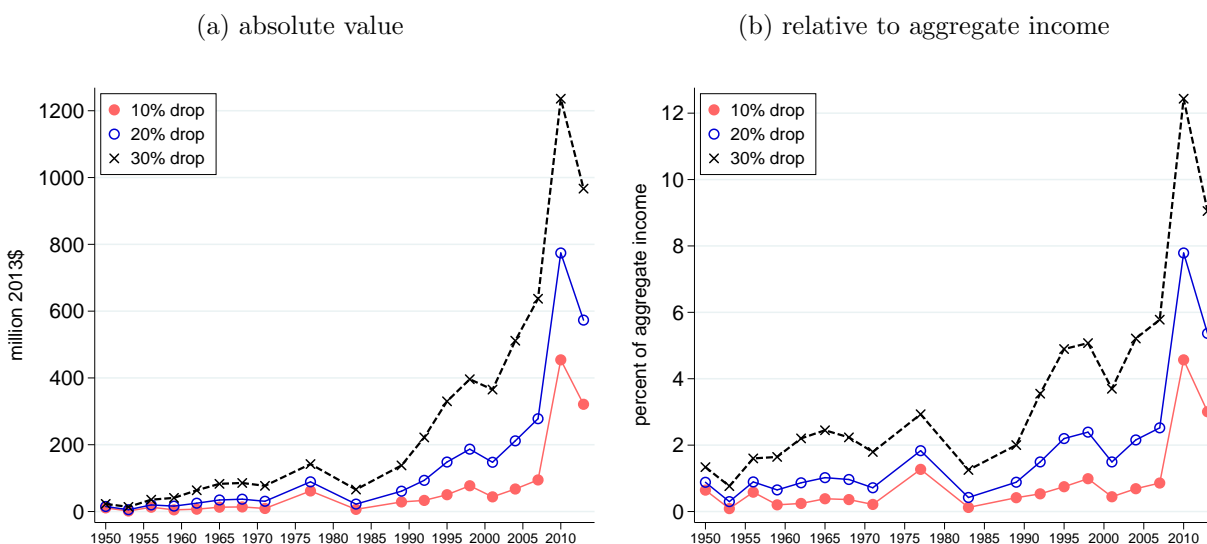
Notes: Kuhn, Schularick and Steins (2017)

A simple way to quantify the rising fragility of the economy is to implement a stress-test for household balance sheets. With the micro data, once can easily construct a measure for the value of households' home equity as well as mortgage debt at risk for a given 10, 20 and 30% decline in house prices. Put differently, once can "shock" household balance sheets with an exogenous decline in house prices and then track the amount of negative equity and the share of negative net wealth households over time.

The core result is that rising leverage has dramatically increased the vulnerability of the American economy and its financial system. Figure 6 demonstrates how much more sensitive U.S. households have become to house price fluctuations. While a 20% drop in house prices was associated with a drop in home equity equivalent to about 1.5-2% of aggregate income until the 1990s, the sensitivity is now more than three times as high. In 2013, a 20% drop

in house prices would have led to about 800 billion Dollars of negative home equity in the system.

Figure 7: Home equity at risk by income groups (20% drop in house prices)

(a) absolute value

(b) relative to aggregate income of group
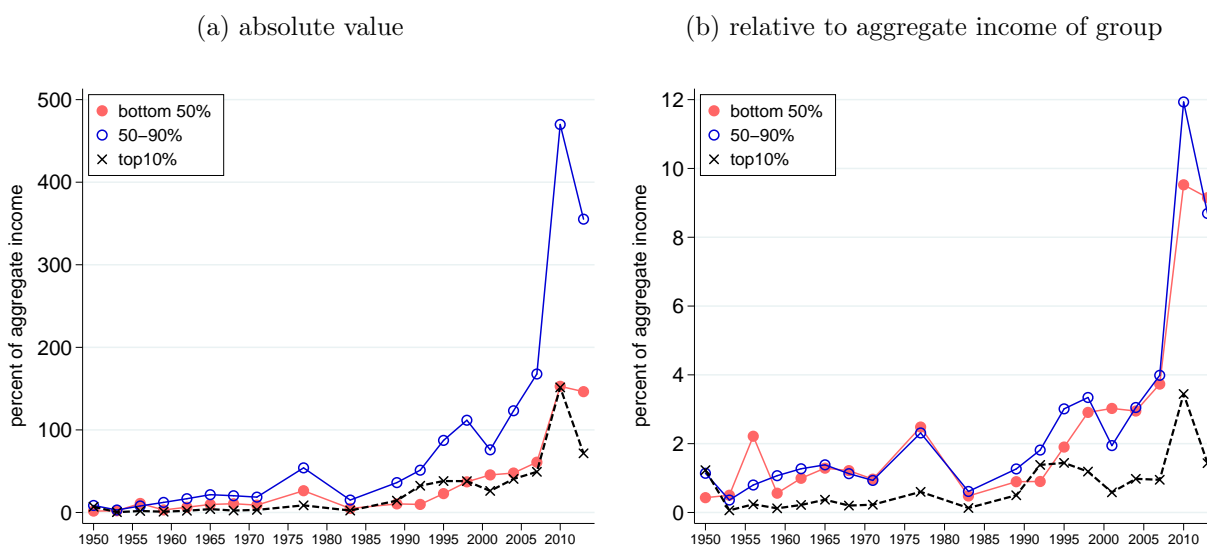
Notes: Kuhn, Schularick and Steins (2017)

Furthermore, Figure 7 demonstrates that these home equity losses account for a large part of middle class and low-income incomes. In 2013, about 15% of households in the bottom income brackets would have negative net wealth after a 20% house price drop. But even for the upper half of the income distribution, the number is significant: about 8% of households lose all their wealth in a 20% house price decline.

Summing up, higher leverage has made the American economy considerably more fragile. Nowadays, owing to higher leverage, house price fluctuations have far more serious consequences on the health of the balance sheets of consumers – and of the banks who hold the mortgage loans. With higher leverage, asset price fluctuations have come to play a pivotal role for macroeconomic stability, and their distributional effects have grown over time.

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