

NBER WORKING PAPER SERIES

THE GREAT LEVERAGING

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Working Paper 18290

<http://www.nber.org/papers/w18290>

NATIONAL BUREAU OF ECONOMIC RESEARCH

1050 Massachusetts Avenue

Cambridge, MA 02138

August 2012

An earlier draft of this paper was presented at the BIS Annual Conference, Lucerne, 21–22 June 2012. For helpful comments I am grateful to conference participants, and especially to my discussants, Barry Eichengreen and Y. Venugopal Reddy. This paper draws on recent work with collaborators, whom I thank; but the views expressed are those of the author alone, and the responsibility for interpretation, and any and all errors, is mine. Alan Taylor served as a Senior Advisor at Morgan Stanley in 2010–11, and has received compensation for presenting research findings at private and public sector meetings. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

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The Great Leveraging  
Alan M. Taylor  
NBER Working Paper No. 18290  
August 2012  
JEL No. E3,E5,E6,N1,N2

**ABSTRACT**

What can history tell us about the relationship between the banking system, financial crises, the global economy, and economic performance? Evidence shows that in the advanced economies we live in a world that is more financialized than ever before as measured by importance of credit in the economy. I term this long-run evolution “The Great Leveraging” and present a tenpoint examination of its main contours and implications.

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An intellectual as much as an economic crash, the global financial crisis has thrown macroeconomic theory and policymaking into wreckage-sorting mode yet again. What will be picked up and what discarded during this time around remains an unsettled question. Whilst a useful result can be hoped for, theory alone can only take us so far. This paper starts from the premise that economic history is the only laboratory we have at our disposal for the study of many serious macroeconomic questions. In economics, as in any other scientific pursuit, empirical evidence is the ultimate arbiter of whether any particular model bears a useful relation to reality.

### **The Great Leveraging: five facts and five lessons for policymakers**

My concern is what history can tell us about the relationship between the evolution of the private credit system, the occurrences of financial crises, linkages to the global economy, and macroeconomic performance. All of these are key issues at the center of the current macroeconomic and financial economic crisis and remain an ongoing focus of researchers and policymakers.

My title, The Great Leveraging, comes from a simple observation — we live in a world that is more financialized than ever before. It is simple, at least, when you take the trouble to look at the long-run data: over a couple of decades, and compared to more than a century of modern finance capitalism, the so-called “advanced” countries shifted recently to an economic framework with a banking system (judged by aggregate bank balance sheets or simply by private bank loans) that is larger, relative to GDP, than anything we have ever seen in the past.

On that dimension, at least, this time is different. One implication is that we are, in some sense, having an out-of-sample experience. For an economist or a policymaker this may be as disorienting as an out-of-body experience is for a normal person. But in taking a look at the same questions over the very long run, I will argue that, in many important respects, the causes and consequences of today’s crisis are by no

means unusual relative to prior experience, although they represent a very extreme version of phenomena we have seen many times before. This, I hope, offers some modest reassurance — which is to say that, although we have an extreme draw, we are not operating in a strange economic world, but rather in an environment that should be quite recognizable, and which is, indeed, all too familiar to the macroeconomic historian.

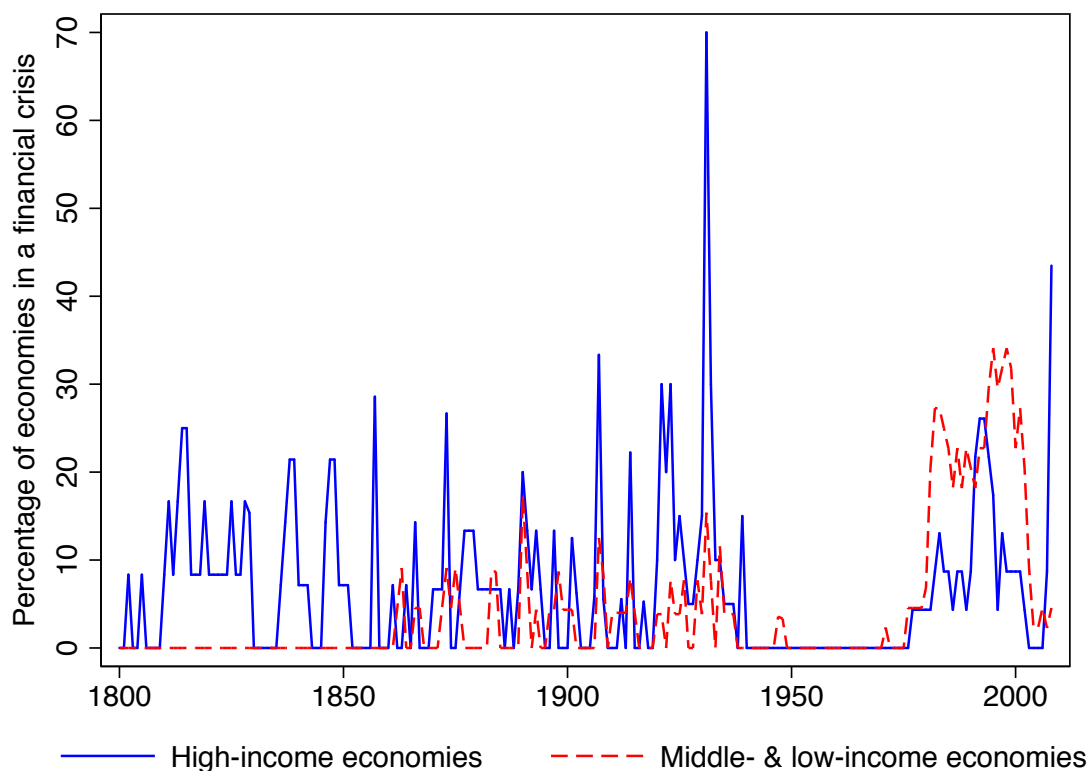
A wide range of work in a long tradition has deeply shaped what historians know today and fundamentally shapes the perspective I present below. Macroeconomic history is a work in progress, and a rather countercyclical one at that, but it is reassuring to note a new surge of interest in issues of macroeconomic and financial history. There are many others working in this field, more each year, and judging by current events, the need for us all to produce insightful research is not receding.

All that said, it is not at all clear that the historical record, and its implications for the present critical moment are fully and widely appreciated, so it is worth putting forward a summary of several essential issues that bear consideration not only by researchers, but, perhaps more importantly, by the policymakers currently at the helm. To respect constraints of space, I organize my discussion of these issues into ten key points: Five Facts and Five Lessons for Policymakers.

### **Fact 1. Crises: almost forgotten, now they're back**

The first fact is that in the last 60 years, until 2008, we had all but forgotten about financial crises in the “advanced” countries. And this was, arguably, for good reasons — as for two or three generations, going back to the Great Depression, very few such crises had occurred, and absolutely *none at all* occurred from World War 2 until the 1970s. This we knew from the work of Bordo et al. (2001) and more recent extensions and refinements to the historical data by Reinhart and Rogoff (2009) only serve to reinforce this message (Figure 1).

**Figure 1** The Frequency of Banking Crises



Notes and source: The chart shows the percentage of economies in each subgroup that were in a financial crisis in the each year in the period 1800 to 2008. Data from Qian, Reinhart, and Rogoff (2010).

Thus even as emerging markets began to experience financial crises at an elevated frequency in the 1970s, 1980s and especially 1990s, the risks in advanced countries appeared much smaller. There were some advanced-country crises: a few of them were quite painful macroeconomically, as in Scandinavia and especially Japan; others like the U.S. saving and loan crisis involved nontrivial fiscal costs, but appeared to have limited macroeconomic consequences. With the benefit of hindsight, naturally, we can say that this period of history amounted to nothing so much as an opportunity, albeit a self-created one, for advanced countries to lull themselves into a false sense of security.

Having dragged their macroeconomies out of the doldrums of the Depression and the ravages of war, and having built elaborate, and at times repressive, systems of financial regulation and supervision, these countries rode for three decades on favorable tailwinds. A glorious thirty-year phase of high growth, partly technological and partly simple catch-up, provided expanding real resources. Modest but positive inflation allowed nominal resources to grow even faster, and debts to inflate away gently but nontrivially, especially at long horizons. And finally the financial system was for a long time carrying low leverage, arising from a mixture of its own technology and preferences, as well as the constraints imposed by authorities.

Such a framework simply could not generate the kind of credit boom and bust cycles that had recurrently derailed economies every decade or two from the beginnings of modern finance capitalism circa 1800 up until the epic collapse and recalibration of the world economy after the 1930s. Though still attended to by those with any eye to history (see e.g., Kindleberger 1978) or more lately to the emerging world (see e.g., Kaminsky and Reinhart 1999), the contemplation of macro-financial crisis risks was naively ignored by most modern macroeconomists.

However it remains an open question, and an object of current and future research for many of us, to pin down exactly why that period from the 1940s to the 1970s was so unusually quiescent, with no financial crises at all. And also, more importantly, to ask the question at what price, if any, such tranquility was bought. Up until the crisis of 2008, the consensus view was that financial development — meaning more finance, or more M2, or more loans relative to GDP, as well as more financial instruments — all of these were an unalloyed good thing.

That premise is, as of now at least, not so easily taken for granted, and firm empirical evidence for the proposition remains elusive. Earlier work emphasizing potential benefits (e.g., King and Levine 1993; Rajan and Zingales 1998; Levine 2005) has been joined by new work pointing to potentially offsetting costs or risks (e.g., Rajan 2005; Arcand et al. 2012).

One way to frame the skeptical view in the context of the historical data might be as follows: how was it that the advanced economies could enjoy *Les Trente Glorieuses* up to 1975 despite having such small, repressed, and uninnovative financial systems, as compared to the era since? What can we infer from the fact that those olden times mobilized and allocated high volumes of saving to support rapid rates of economic growth yet without inculcating instability, as compared to today's financial systems?

The specification problem is of course quite serious here: what indeed is the counterfactual? Would post 1970s growth have been even slower had limitations on the financial system been maintained or expanded? Would the previous epoch have been even more glorious had banks been allowed or encouraged to lever up and take risks even sooner than they were?

Moreover, is it really just a question about the financial system anyway — after all, many other things were different in the 1950s and the 1960s, including pervasive fixed exchange rates resting on a foundation of capital controls. The Bretton Woods style resolution of the trilemma was so different from what we see today at the moment of writing (i.e., setting aside potential imminent developments in the Eurozone periphery). It is an important question whether that set of constraints on the external finance, was a supporting or even dominating factor in preserving financial stability, as compared to the many and varied internal restrictions on domestic finance previously noted. We shall return later to this issue, when we examine the links between capital flows, credit, and crises.

This is a deep and challenging research agenda that will keep us, and our successors, busy for quite a while but I will try to expand on this point as it is a central question as policymakers contemplate the tradeoffs inherent in any new designs for the world's macro-financial architecture.

## **Fact 2. Consequences: crises are depressing and deflationary**

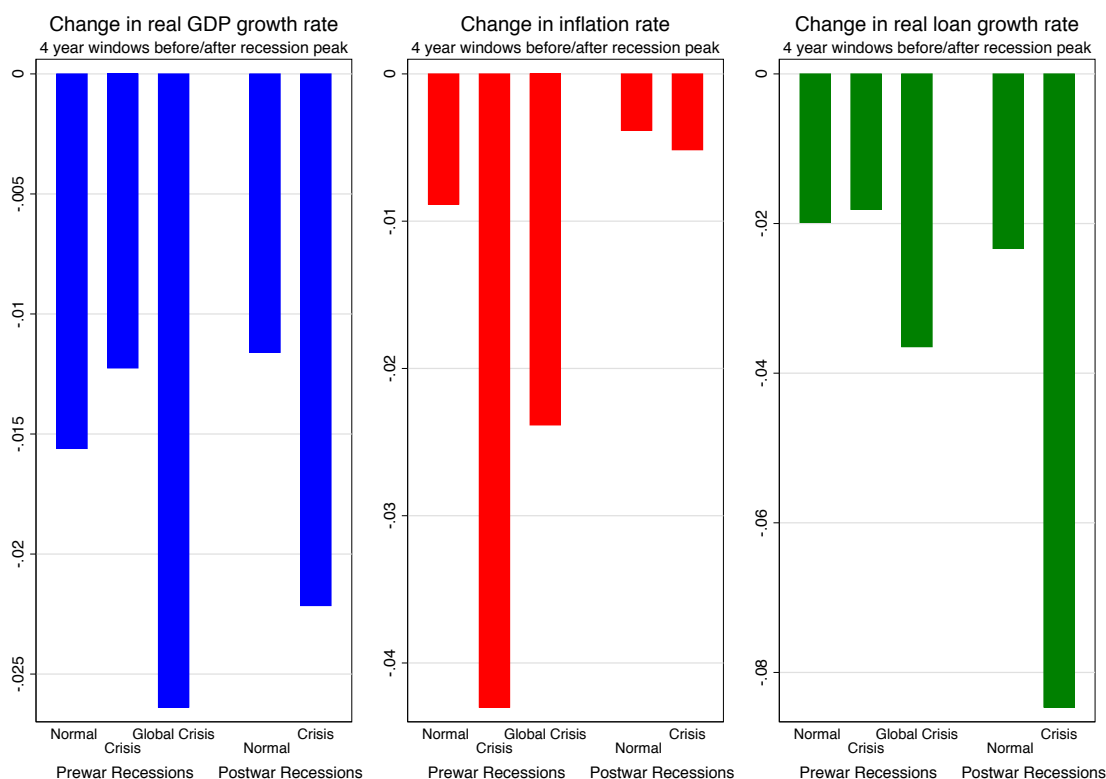
Perhaps because financial crises were almost forgotten, so too was much of the accumulated historical evidence showing that the consequences of crises for the economy could be profound and very damaging indeed compared to the normal experience in garden-variety downturns. And just as interest in this kind of evidence was waning, so too did the attention of theory turn away from mechanisms that incorporated monetary and financial phenomena, and their implications for the real economy in times of crisis. For example, the analysis of phenomena such as panics, deflation, flight-to-safety, liquidity traps, fiscal policies, etc., with notable exceptions, has only returned to the forefront of research prominence in the wake of the events of 2008. A return to a careful empirical evaluation of the history of financial crises is long overdue, and may better support the development of theory going forward.

To summarize, I draw on some of my recent and ongoing collaborative work. This is evidence-based macroeconomics, and uses data from 14 advanced countries over 140 years of history to analyze what goes on before, during, and after financial crises. Some of the work is causal analysis, and other work looks at consequences using an event study framework, an approach that is now being widely used to establish long-run stylized facts by others working in this field (Almunia et al. 2010; Reinhart and Rogoff 2009).

A new ingredient in our work, however, is the inclusion of data not just on the dates of sovereign and financial crises, and on levels of public debt, but also the collection and compilation of data on levels of private credit, which is to say the amount of loans and the size of balance sheets of the banking system (see Schularick and Taylor 2012; Jordà, Schularick, and Taylor 2011ab). This is highly relevant to current concerns, such as the question of whether financial crises tend to ultimately stem in large part from fiscal problems (a potentially plausible argument for Greece) or more typically reflect excesses in the private sector due to credit booms (the more agreed upon narrative for catastrophic cases like Ireland or Spain, as well as in other less distressed economies still affected by credit hangovers).



**Figure 2** Trend Changes in Recessions: Normal Recessions, Financial Crisis Recessions and Global Crisis Recessions



Notes and source: The chart shows the change in the variable, on average, between the 4-year periods just before and just after a recession peak. The bins are based on normal recessions, financial crisis recessions, and global crisis recessions; all bins are present in the prewar sample (1870–39), and the first two bins only in the postwar sample (1946–2008). Data from Jordà, Schularick, and Taylor (2011a).

Can history speak to these issues? The current crisis is but a small sample, yet by drawing together episodes across time and space we can mitigate the “rare event” problem for this phenomenon and thereby seek tighter inference. Figure 2 pulls together some evidence along these lines and compares what happens before and after in a typical normal recession (i.e., without an associated financial crisis) with what happens financial crises, either when the crisis is of a “local” kind or in the case of the rarer but more intense case of a synchronized global financial crisis (like 1929, or 1907, but excluding 2008 at the time of writing as the window had not yet

closed). Here we show the effects on real GDP growth per capita, the rate of inflation, and the rate of growth credit (log real bank loans).

The evidence sends a clear message. Recessions might be painful, but they tend to be even more painful when combined with financial crises or (worse) global crises, and we already know that post-2008 experience will not overturn this conclusion. The impact on credit is also very strong: financial crises lead to strong setbacks in the rate of growth of loans as compared to what happens in normal recessions, and this effect is strong for global crises. Finally, inflation generally falls in recessions, but the downdraft is stronger in financial crisis times.

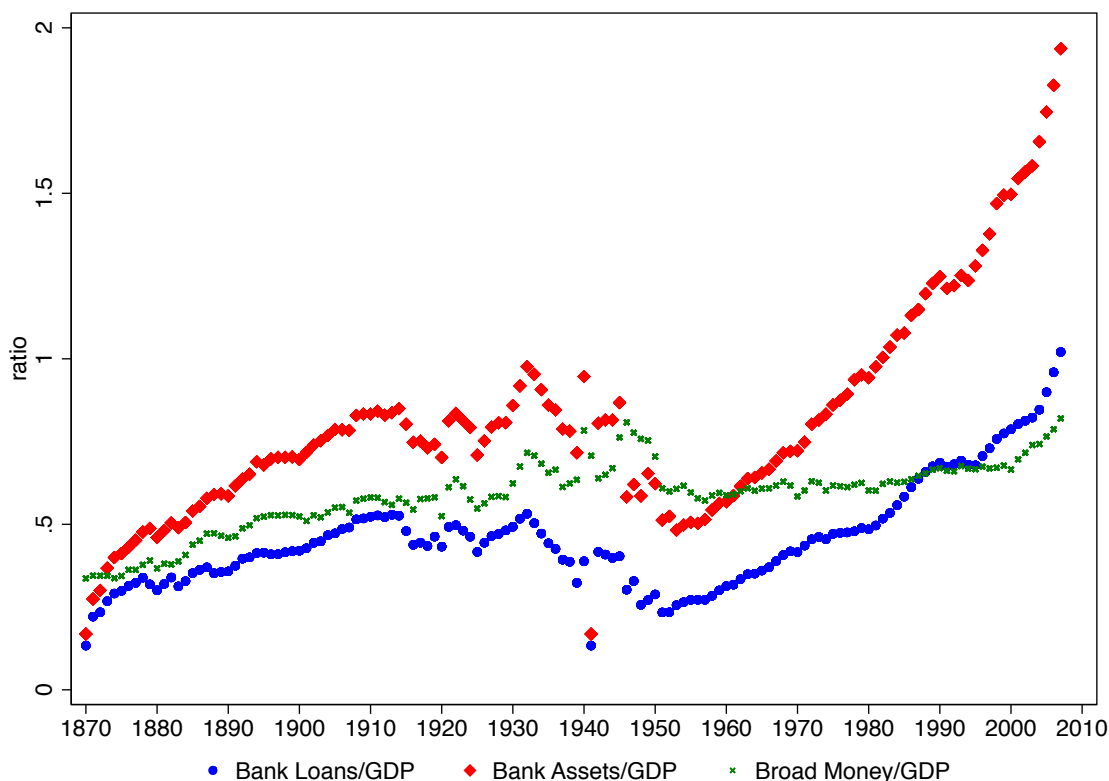
There is some sign of variation between the prewar and postwar samples, but not always in an encouraging way. Postwar recessions have been less deflationary in general, probably reflecting the escape from gold standard rules and *mentalité*, whereby more activist central banks could offset to some degree the raw deflationary forces at work. Against this, the credit crunches and real growth slowdowns do not appear to have moderated much as we moved from prewar to postwar periods, and credit contractions seem even stronger in recent times.

To sum up, where recessions are painful, those with financial crises are much more painful, and those with global financial crises are even worse still.

### **Fact 3. Extreme leverage: size of the banking sector is unprecedented**

Given these findings, a third fact is very much worth discussing, as it is central to the argument. It is the fact that, looking back over the long sweep of history, the financial sector in the world's advanced economies is now larger than it ever has been. The increase in size has been dramatic since the 1980s; after that date, compared with what had been the norm for more than a century, the banks almost doubled in size relative to GDP measured by loan activity, and almost tripled measured by total balance sheet size.

**Figure 3** The Size of the Banking Sector Relative to GDP: Loans, Assets, and Broad Money in 14 Advanced Countries



Notes and source: The sample period is 1870–2008. Bank loans are loans by banks in aggregate to the nonfinancial sector, excluding interbank lending and foreign currency lending. Bank assets are equal to the total balance sheet size of all banks in aggregate. Broad money is M2 or a proxy thereof. Data and more detailed definitions can be found in Schularick and Taylor (2012).

This fact is displayed in Figure 3, which shows the following three variables, bank loans (aggregate to the nonfinancial sector), bank balance sheets (all inclusive, including interbank lending), and broad money (typically M2), all relative to GDP. The sample, again, is the 14 advanced countries, and the graph shows year effects, that is to say averages for each period for the cross section, which serves to isolate the global trends in these variable, whilst also smoothing out cross country variation (Schularick and Taylor 2012).

The behavior of these variables up to the 1970s would be almost as any economic historian would have predicted, and the trends are, in particular, consistent with the predominant monetarist view associated with Friedman and Schwartz (1963). In that “money view” the fluctuations in the monetary liabilities of the banking sector are a very good proxy for what is happening on the asset side of the banks’ balance sheet, and the levels and changes in both broad money and credit move together almost hand in hand. We can refer to this first period from 1870 to the 1970s as the “Age of Money” and apart from the Great Depression, and subsequent years of financial repression in the 1940s and 1950s, the ratio of loans to money was more or less stable. Loans to GDP hovered in a range around 0.4 to 0.5, with broad money to GDP sitting a little higher at an average of about 0.6 to 0.7.

From the 1970s this picture changed dramatically, and we entered what might be called the “Age of Credit.” Although broad money relative to GDP remained almost flat at around 0.7 (rising a little only in the 2000s), the asset side of banks’ balance sheets exploded. Loans to GDP doubled from 0.5 to 1.0 and assets to GDP tripled from about 0.7 to roughly 2. The decoupling of loans from broad money reflected the rise of nonmonetary liabilities on bank balance sheets, such as wholesale funding. The even faster expansion of bank assets reflected this too, plus the rise in more interbank lending. Along the way risk also increased, as the banks’ asset mix put an ever diminishing weight on safe assets (government securities), a fraction which was down to virtually zero in the 2000s, after starting at 60%–70% in 1950.

Both trends went along with increased leverage as conventionally measured, or as measured here by the leverage of loans relative to the stable funding base provided by deposits, which by the postwar period had been insured to try to prevent runs. However, in the end the banking system, insured against one type of run, can be seen to have endogenously switched over time to alternative funding sources, like wholesale, which had no such insurance, at least explicitly.

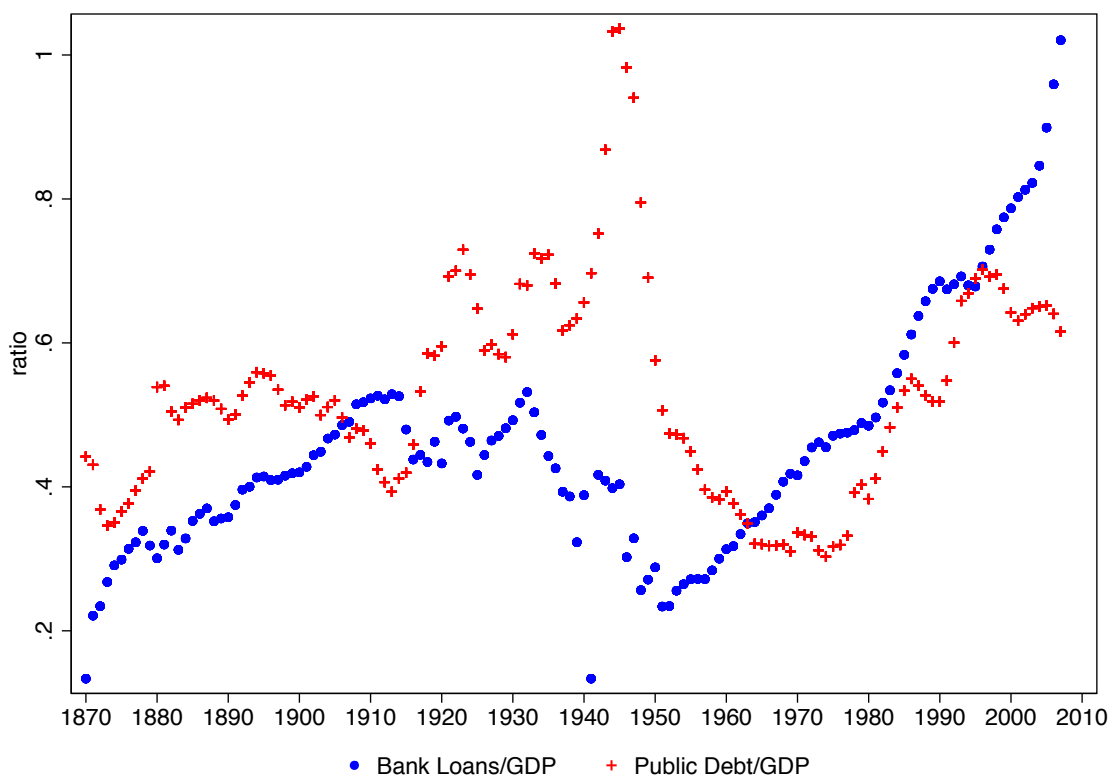
These trends highlight important changes in the modern financial landscape in the last 30 or 40 years, and suggest that much more attention be given to how and why

those changes took place, and with what beneficial (or harmful) effects. For example, one hypothesis would be that banks' risk tolerance changed over time, as they rebuilt their enterprises after the ravages of the Depression and World War 2. Another would be that binding regulations were gradually relaxed as a result of financial liberalizations from the 1970s on, allowing banks to push further out along the volume/leverage/risk frontiers. The impact of Lender of Last Resort and deposit insurance — the moral hazard argument — could also play a role, whereby the authorities, trying to avert one problem after the 1930s, created a new problem down the road as an unintended consequence.

Two further points deserve mention. The first is that we can compare private debt creation via the banks with public debt creation. The trends since 1945 are striking, and show an almost complete inversion. The scale of the increase in the balance sheets in the banking sector has effectively flipped the main credit risk nexus, measured by debt magnitude, from the sovereign side to the banking side. After the war, banks were cautious and had few loans to the private sector on their books, but the sovereigns had very large debts. But by the 1990s and 2000s — and even after substantial postcrisis increases in average public debt in advanced countries — this observation still holds true, as seen in Figure 4. It is private debts on bank balance sheets that far outweigh public debts on sovereign balance sheets.

One can surely find exceptions (like Greece, which is not in our sample) but the data suggest that recent Irish or Spanish tribulations are much more indicative of the dangers that lurk, hopefully in a more contained fashion, in the balance sheets of almost every advanced nation. There is much more private debt out there than public debt, and this can only change rapidly if there is sudden debt shifting (as the pollution of Irish and Spanish sovereign credit shows).

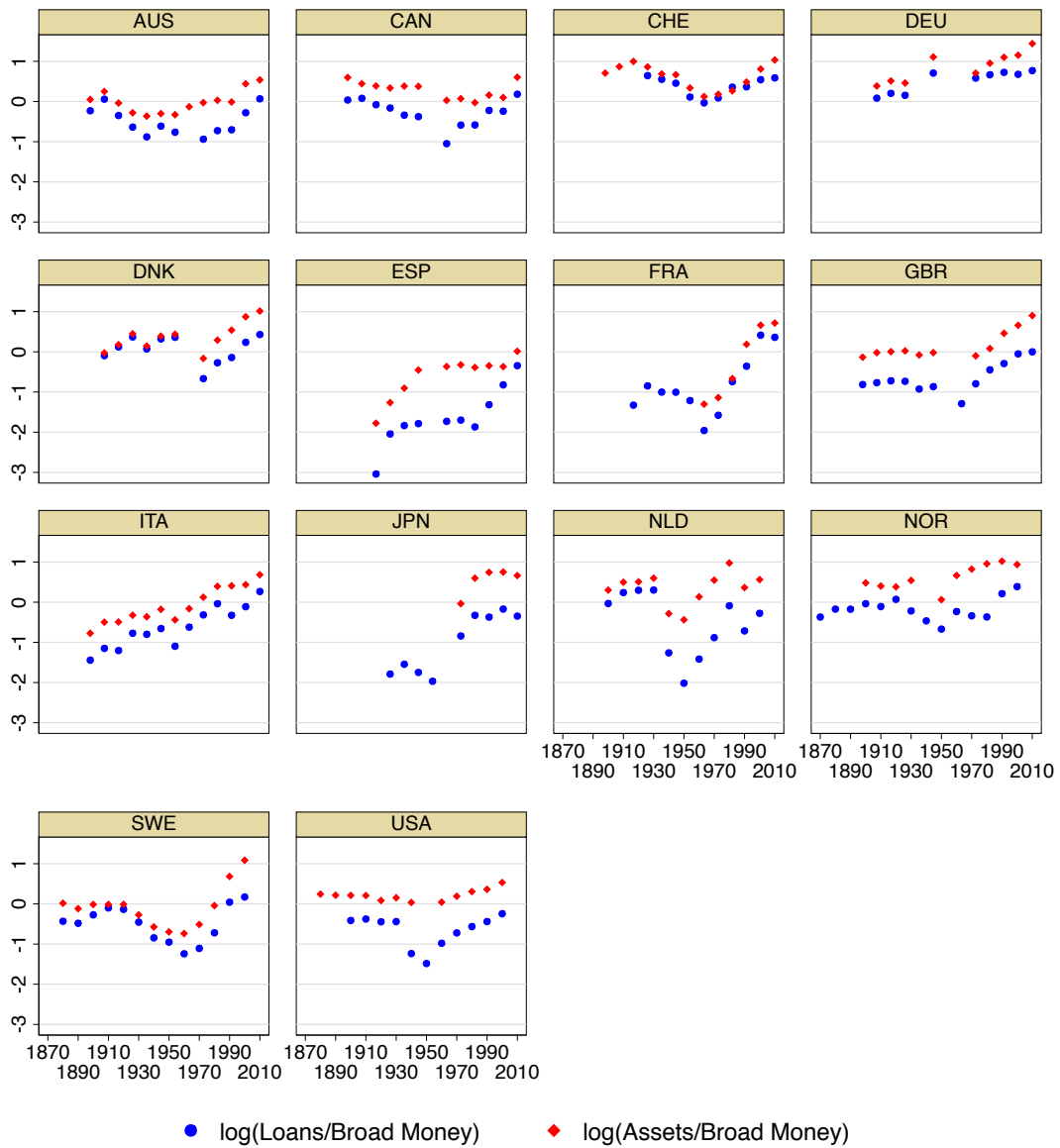
**Figure 4** Private (bank) loans v. public (sovereign) debt, 14 Advanced Countries



Source: The sample period is 1870–2008. Bank loans are loans by banks in aggregate to the nonfinancial sector, excluding interbank lending and foreign currency lending based on Schularick and Taylor (2012). Public debt is total sovereign debt outstanding based on Reinhart and Rogoff (2009). See Jordà, Schularick, and Taylor (forthcoming).

The other point to stress is that the phenomena under discussion are not just a result of trends in a few countries, for example, the Anglo-Saxons. Figure 5 shows country trends over the long run, and the run up in credit in the postwar period is evident across the board. The UK and US saw large expansions, but so too did Australia, Canada; so did Germany, France; so did Scandinavia, Switzerland. They may not be quite at Icelandic levels, but all the advanced countries now have banking sector balance sheets that are a multiple, and in some cases quite a large multiple, of national GDP.

**Figure 5** Long run trends by country



Notes and source: Bank loans are loans by banks in aggregate to the nonfinancial sector, excluding interbank lending and foreign currency lending. Bank assets are equal to the total balance sheet size of all banks in aggregate. Broad money is M2 or a proxy thereof. Data and more detailed definitions can be found in Schularick and Taylor (2012).

#### **Fact 4. Global asymmetry: EMs buy insurance, DMs sell it**

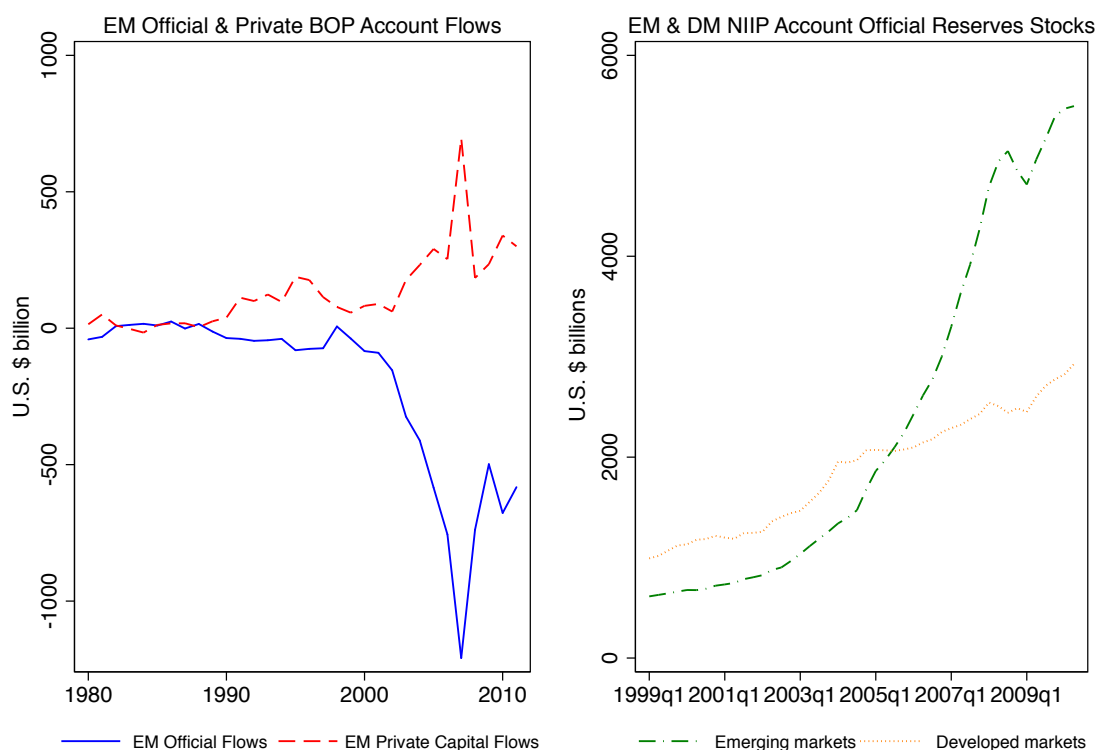
Moving from a focus on financial structures to financial flows, the last two key facts focus on aspects of the global financial system which mark the last two decades as one of the most unusual epochs we have ever seen in economic history. Here again, this time is quite different when it comes to the emergence of global imbalances on the scale we have seen. To grasp their causes and consequences, we will again need a historical perspective to figure out why the flows emerged, what form they took, and to understand when and how those forces might eventually unravel.

In this way, in the 1990s, the global financial system changed fundamentally for two linked reasons: emerging markets (EMs) joined developed markets (DMs) in an integrated the global economy (globalization), but with very different economic fundamentals (asymmetry). Globalization allowed EMs to expand their external balance sheets, to admit both net and gross flows, either inward or outward. Which of these would dominate? The neoclassical prediction once held sway. To quote H. Ross Perot, many expected a giant sucking sound: a flow of investment “downhill” from rich to poor countries. In the end, the opposite seemed to happen: a net flow “uphill” from poor to rich. But a focus on net flows obscures crucial information in the structure of capital flows in the post-1990 financially globalized world.

First, *private capital has been flowing downhill* all the time and in substantial quantities. Here, in the area where private incentives for investment actually matter, there is no paradox, no puzzle of uphill flows at all. Private investors have moved capital from rich to poor countries all along, just as standard economic theory would predict. Second, and especially after the Asian crises of the late 1990s, *official capital has been flowing uphill* from EM to DM, but at an even greater rate, sufficient on net to more than offset the private capital flows from DM to EM. These official flows are principally driven by what we might call the “Great Reserve Accumulation” (soon approaching \$10 trillion in EMs, after a brief run down in the crisis) plus a smaller but rapidly growing component in sovereign wealth funds (where the data are more opaque, but the totals may now be above \$4 trillion).



**Figure 6** Private and Official Capital, Stocks and Flows, Emerging Markets (EM) and Developed Markets (DM)



Notes and sources: The left panel shows EM financial account BOP data for official reserve flows and private (nonreserve) financial flows; negative = capital outflow. The right panel shows EM and DM NIIP data for stock of official reserves. Data from IMF; see Pradhan and Taylor (2011a).

An extended discussion of this topic appears in Pradhan and Taylor (2011a), but Figure 6 shows some key facts. Note that we have never seen anything like the Great Reserve Accumulation any time in economic history. There were episodes during the Gold Standard where a country would, for idiosyncratic reasons, feel a need to expand or replenish reserves. But that system was able to run on low reserve levels on average, at least in the advanced countries of that time. Episodes such as the Argentine gold accumulation of the 1890s or the French hoarding in the 1920s were relatively rare. And it was a zero sum game given inelastic supply at most times: on the whole one country's gain in gold reserves had to be another's loss.

Now we live in fiat world, and the reserve unit is the U.S. dollar, plus maybe one or two other currencies, vying for a secondary role. (No doubt the plan was that the euro would be vying for a primary role right now, but the current fiasco has probably delayed that, and may yet destroy the possibility altogether.) And unlike gold, these paper reserves can be created at will. Although therein lies a problem because if the demand grows too far or too fast (as it could do given the possibility divergent EM and DM growth rates), or if the supply of creditworthy reserve issuers contracts (from over issuance in the case of several DMs, plus the risk of euro collapse) then this game cannot go on for ever.

I interpret this as a result of insurance motives in the EMs, particularly after the painful EM crises of the 1990s made clear to EM policymakers that the risk of currency crises, financial crises, and sovereign crises were extremely high for them, a fact that was only amplified by the associated and well-known political risks that could befall you when one or more of those events took place on your watch. Without insurance, a sudden stop, or perhaps more seriously, a sudden flight, could leave your economy and polity in ruins, and entirely dependent on the kindness of strangers — and given multiple equilibria, such fates may or may not be entirely deserved. In recent collaborative work, I have argued that it is the potential flight of liquid liabilities in quasi-fixed exchange rate systems that drives the remarkable, and ex post successful, reserve hoarding of EM countries in recent years (Obstfeld, Shambaugh, and Taylor 2009, 2010).

Without market access, and without reserves, you had to go looking for credit, at the IMF or somewhere else. As Korea and other countries learned then (and as Greece, Ireland, Spain and others are learning now) such liquidity may arrive in the end, but it could be too little, it could be too late, and it will almost always come on terms that are stringent and humiliating. The only feasible alternative for now is self-insurance, absent some large, global, international risk pooling entity. (But as the Eurozone example suggests, the latter may be a fantastical idea for the foreseeable future; even at the level of Europe, a political project with over 50 years of

groundwork and a deep historical sense of destiny, even ideas for limited forms of international risk sharing, via full banking union or common bonds, face resistance).

In this way, ironically, EM policymakers have taken on board, with greater gusto than many might have expected, the kind of advice on prudence and fiscal rectitude handed out decades ago by the DMs: moving to more countercyclical policies over the cycle and building up buffer stocks over the longer run (Frankel, Végh, and Vuletin 2011). Many DMs have done the opposite, piling up gross debits and, if anything, undoing automatic stabilizers and practicing austerity during downturns.

One might marvel that on these dimensions the world has to some degree turned upside down, but on reflection this is in large part a manifestation, perhaps unanticipated, of the underlying deeper asymmetries that financial globalization has brought to the surface. A natural question then, is, how long will this last? Is this a permanent switch to a new state of affairs? Will the urge to hoard persist in the EMs, and will this ultimately be a self-defeating force that will run up against the constraint that there can never be an infinitely elastic supply of safe assets?

#### **Fact 5. Savings glut: short run panic v. long run demography**

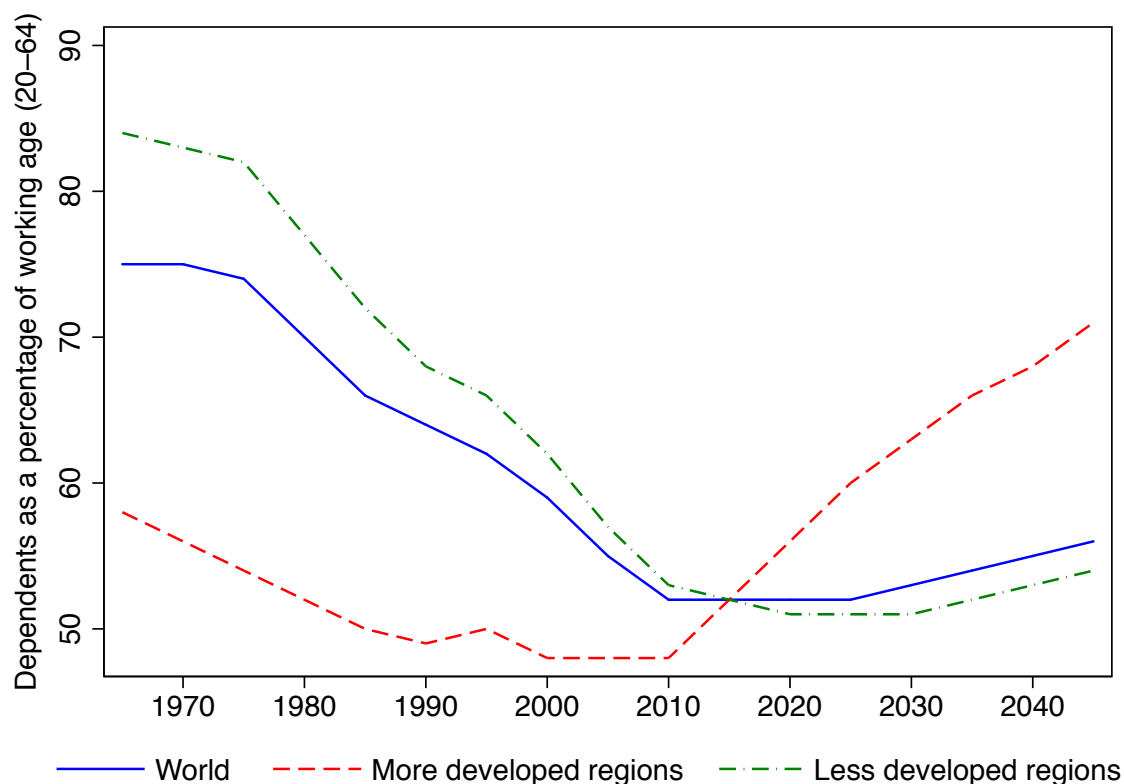
The data show that we have been living through a spectacular and never-before witnessed structural shift in gross and net flows, and thus stocks, with marked differences between private and official behavior. The risk assets are almost all on the private side, the safe assets on the official side. And the official flows have shown little sign of diminution yet, with every signal in the market suggesting that growth of demand is outstripping supply, e.g., US 10Y yields at all time lows (under 1.5% of late), and the Swiss curve turning negative out to the 5Y tenor. So what happens next? Are we going to be in savings glut mode forever? Is cheap capital here to stay? I think there are three reasons to be wary of simply extrapolating the recent past here, as argued in Pradhan and Taylor (2011b).

One is simply to note that some of the demand for safe assets is probably panic-augmented, even though the trend in real yields goes back over a decade, beyond the crisis. Historical experience shows that real and nominal yields always fall in times of fear, and this time is no exception. When (or do we say if?) normality resumes, as in every previous cycle, the reversal of the flight-to-safety trade will start to undo the relentless downward pressure on the yields of safe sovereigns. Investors will put capital to work in risk assets, and the hoarding will stop. In this larger than normal cycle the postponement of investment has been of a more extreme form, in magnitude and duration, so the rebound, when it comes, could be sharp. (The moment is hard to predict given the special circumstances of deleveraging plus the failure of policymakers, and Eurozone policymakers in particular, to take decisive measures to end the depression in the developed world.)

Second, there is reason to doubt that the stocks, and hence, flows, of EM reserve assets will expand ad infinitum at the same rate. The EMs were painfully short of reserves in the 1990s, as events revealed. So to some extent the last 10 to 15 years have been about a step change, building up from a low toward an adequate level of reserves. Once something deemed adequate has been reached, the accumulation only needs to keep pace with the growth in the size of the EM economies. That force too may also be subject to slowdown in the longer terms as the forces of economic convergence wane, and the development gap continues to close.

Lastly, when we think about the deep determinants of real yields there are other more fundamental forces at work in the medium run, and the key one is demography. For decades first DMs and then EMs have experienced major demographic tailwinds. The boomer cohorts in the DM world gave a boost to savings world wide, and this trend was augmented by the start of a massive demographic transition in the EM countries. But looking forwards these forces are now starting to abate and will soon go into reverse as shown in Figure 7.

**Figure 7** Long-Run Demographic Trends, Dependents per 100 Working Age



Notes and sources: The dependency ratio is the population of ages 0–19 and 65+ divided by the working age population of ages 20–64. Data from U.N. Population Statistics; see Pradhan and Taylor (2011b).

The DM world now faces a demographic tailwind as the boomers retire, and in the EM world aging populations are set to grow as the demographic transition winds down. Substantial heterogeneity lies behind these averages of course, but these patterns presage major changes in the saving-investment balance going forward.

### **Summing up the facts: what is happening?**

At first glance, the historical record appears to present us with a rather inconvenient truth, namely that financial crises might just be an occupational

hazard, a simple fact of life, in modern finance capitalism. However, one major exception was the era 1950–70 with tighter domestic financial regulation, and external capital controls. This was a period of low credit growth, and very little in the way of financial innovation. But it was also still a period of very high investment, savings and real growth for the advanced economies.

This period did not last, thanks to a series of unfortunate events. Starting in the 1980s it gave way to a less regulated and more risk-hungry world, reflected above in the rapid growth of bank lending. By the 1990s, with a firmer low-inflation nominal anchor, the entry of high-saving self-insuring emerging economies took the world down a path of ever lower nominal and real rates. Ostensibly a good thing for the consenting adults involved — who could object to cheaper capital? — with hindsight we see that not every private project funded by this glut of funds was, ex post, worthwhile from a risk-reward point of view. In this respect a historian might reflect that we have traversed back not only to the good aspects of integration seen in the first era of globalization, but also its not so good aspects, namely increased financial fragility, despite all we had supposedly learned along the way.

Will anything change? On some level, probably not. The EM economies have seen their reserve accumulation strategies pay off handsomely, as they avoided the worst of the crisis and bounced back strongly. The hunger for safe assets may well grow for some time, and joined with persistent deleveraging and precautionary motives in the DM world we are unlikely to see change in a hurry. Real rates will be low for some time. And with that as a backdrop, plus the ongoing deflationary forces amplified by the shift to cash and cash-like safe instruments, safe sovereigns will be able to fund themselves for a time at the low or even negative rates we now see.

They might be well advised to grab that opportunity while they can. Over a longer time frame adjustments will, indeed must occur. As an accounting device, the long-run budget constraint alone tells us that one can no more borrow for ever than save for ever, and historical experience tells us that at some point those limits do get breached. Demographic shifts will start to put a drag on savings, and the world's

investment drought, intensified by the near-disappearance of DM net capital formation in 2008–09, will leave a large overhang of unmet investment requirements.

Yet even if a new more or less steady state makes its presence felt in the long run, its nature and stability, and the path we take from here to there, are highly contingent on what steps policymakers take in the short run. Thus, the remainder of this paper turns from the macroeconomic and financial facts that we can see in past and present, to the lessons we can draw for policy in the future.

### **Lesson 1: Past private credit growth does contain valuable predictive information about likelihood of a crisis**

The first point makes use of new evidence and new methods, but builds on important precursors. Indeed any work in this area stands on the shoulders of the BIS, and especially Borio and White (2004), whose warnings at Jackson Hole and elsewhere went unheeded by those who should have known better. Bolstering arguments can be found in Eichengreen and Mitchener (2004) on the origins of the Great Depression as “a credit boom gone wrong.”

A more formal approach can confirm that over the past course of history of credit growth turns out to contain valuable predictive information about the likelihood of a financial crisis event (Schularick and Taylor 2012). To see this in the historical data we used a simple classification test, standard in clinical and other applications in hard sciences. We stay agnostic about the policymaker’s utility function and just ask whether our classifier (a model signal  $f(x)$  and a fixed threshold  $c$ ) can generate something better than the null (a coin toss) in sorting the binary “crisis event” data.

To proceed with inference we can chart true positives against true negatives in the unit box, for all thresholds  $c$ , and create a Correct Classification Frontier (CCF). A classifier is informative if its CCF is above the null CCF of a coin toss which lies on

the diagonal, i.e. generates “more truth”. Formally, the area under the curve (AUC) should exceed 0.5 for the null to be rejected, and inference on families of AUCs turns out to be simple (they are asymptotically normal). In what follows we adopt a null of country-fixed-effects, which captures the unconditional likelihood of a crisis in one country versus another.

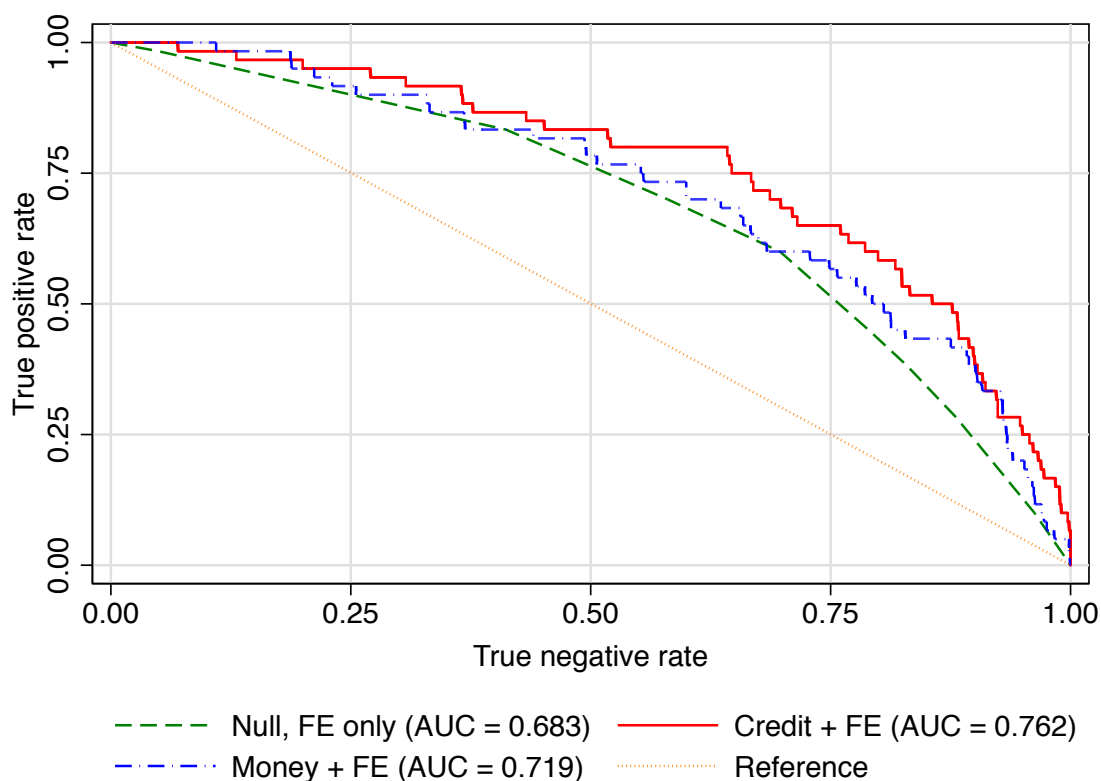
A key result is shown in Figure 8, which covers 14 advanced countries for the period 1870 to 2008. We group predictions from the pre-WW2 and post-WW2 models in Schularick and Taylor (2012), where it is in the postwar period that the distinctions between money and credit are starkest. For reference, the area under the curve or AUC for the credit-based model (5-year lagged moving average of the change in loans to GDP ratio) is 0.762; but the broad-money based model is not all that informative with an AUC of 0.719. The credit model AUC is higher, and significantly different from the country-fixed effects null ( $p=0.0046$ ), whereas the money model AUC is not ( $p=0.0635$ ). Note that in medical diagnostics, an area of 0.75 is considered highly informative (e.g., certain types of cancer screening).

Similar results hold for the prewar and postwar samples, and robustness checks confirm the results with controls for macroeconomic conditions, asset prices, and other specifications (e.g., multiple lags of annual credit growth). In a nutshell, credit matters, and it matters more than broad money, as a useful predictor of financial crisis events. Unfortunately, such indicators were not widely used — or if used, not heeded — by central banks and financial stability authorities prior to the crisis. Even the ECB’s monetary pillar was largely dormant, and one could argue that a focus on money rather than credit was the wrong kind of pillar anyway.

If history is a guide, then it is surely welcome that we should finally see, as we already do, interest among macroprudential authorities in including some form of “excessive credit” indicators into the set of inputs that will be considered going forward. Assessing exactly how to form reliable indicators, and more importantly how one should act upon them, will remain an important goal for research in the foreseeable future.



**Figure 8** Using Lagged Credit Growth as a Classifier to Forecast Financial Crises: The Correct Classification Frontier



Notes and source: See Schularick and Taylor (2012). In this chart, for all models, the predictions from the prewar and postwar country-fixed-effects logit models of Schularick and Taylor (2012) are combined to give a crisis prediction for the full sample 1870–2008 and 14 advanced countries. War years are omitted. Schularick and Taylor (2012) show that the models using credit and broad money differ significantly between the two eras, with the predictive value of credit outstripping that of broad money after WW2. The “Null” is the model with country-fixed-effects only and no other regressors. The “Money” model uses a 5-year lagged moving average of the change in broad money to GDP ratio. The “Credit” model uses 5-year lagged moving average of the change in loans to GDP ratio. The chart shows the Correct Classification Frontiers (akin to ROC curves) and inference is based on a  $\chi^2$  test of the area under the curve, AUC, which would be 0.5 under the “Reference” null of no information. Relative to the country-fixed-effects “Null” with AUC = 0.683, the “Money” model attains only marginal significance with AUC = 0.719 ( $p=0.0635$ ); the “Credit” model outperforms significantly with AUC = 0.762 ( $p=0.0046$ ).

## **Lesson 2: As symptoms of financial crises, external imbalances are a distraction, and so are public debts**

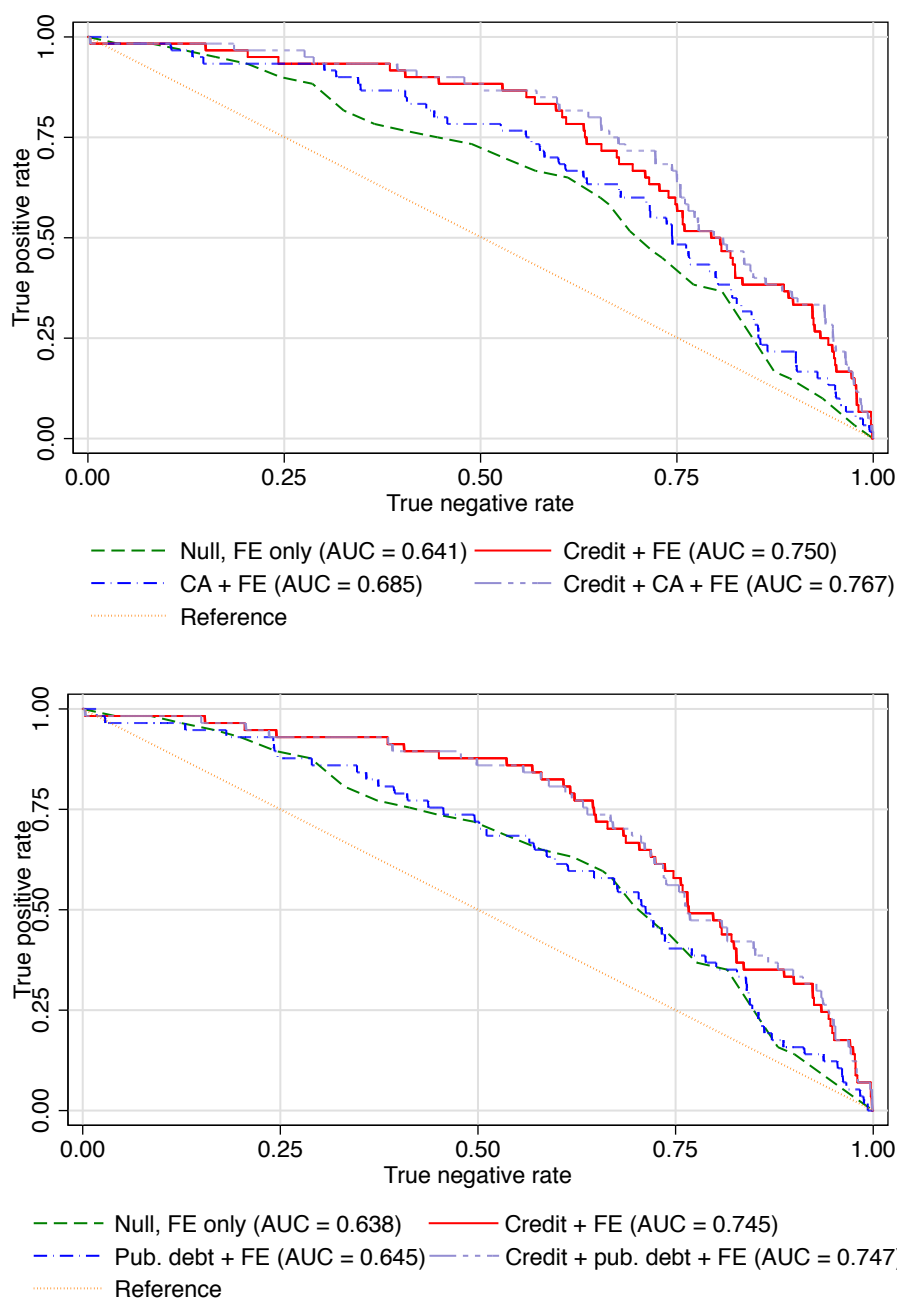
But with the correct classification test apparatus we can do much more than analyze which variables may contain useful predictive information about financial crisis risk. We can also seek to find out which variables do not. In the current debate over the origins of the crisis, a couple of candidate variables cry out for such scrutiny.

The first comes from those worried about the risks from *global imbalances* — according to this view, excessive external current account deficits could amplify or spillover into the risk of a financial crisis. The second comes from those worried about fiscal profligacy — according to that view, rising public sector debt levels could be an important risk trigger for financial crisis. However, neither of these hypotheses follows unambiguously from theory, and each rests on a number of assumptions. So these hypotheses are not a priori valid; they are empirically testable propositions, and, as such, ideal candidates for the statistical framework we have at our disposal.

So what do the historical data say? Have current account deficits or rising public debt levels contributed anything to the elevation of financial crisis probabilities? Drawing on ongoing work (Jordà, Schularick, and Taylor, forthcoming), Figure 9 provides an answer, by taking our existing and quite successful forecast model based on credit, and running it against rival models with a different variable added: in the upper panel it is the 5-year lagged moving average of the change in the current account to GDP ratio, and in the lower panel it is the 5-year lagged moving average of the change in the public debt to GDP ratio. Each model can be run with credit, the other variable, both or neither (the null being fixed-effects only, again).

The question is do any of these other variables add any information at all, either relative to the null or relative to the credit-based model, when they are added in the classifier, as judged by a positive and statistically significant increase in the area under the CCF. And the answer in both cases is very clearly no.

**Figure 9** Using Lagged Credit Growth plus Current Accounts or Public Debts as a Classifier to Forecast Financial Crises: The Correct Classification Frontier



Notes and source: See Figure 8 and Jordà, Schularick, and Taylor (2011a and forthcoming). In the upper panel, “CA” uses a 5-year lagged moving average of change in the current account to GDP ratio. In the lower panel, “Pub. debt” uses a 5-year lagged moving average of change in the public debt to GDP ratio. Relative either to the “Null” or the “Credit” model, the addition of “CA” or “Pub. Debt” does not significantly improve the classifier. In this chart, for all models, the predictions of the prewar and postwar country-fixed-effects logit models are combined as in Figure 8.

Adding the current account slightly improves on the country-fixed-effects null (AUC rises from 0.641 to 0.685,  $p=0.0165$ ), but credit does much better (AUC rises to 0.745,  $p=0.0010$ ). Once credit is in the model, adding the current account on top achieves little. After a moment's thought, this result perhaps should not come as too much of a surprise. There are clearly cases of countries today, and certainly in the past, where current account deficits have gone hand in hand with credit booms and, ultimately, financial crises — the Eurozone periphery comes to mind. But by the same token there have been cases today of current account surplus countries ending up in financial distress. Why?

Credit booms and busts can be driven just as easily by domestic savings as foreign saving. Gross stocks and flows can often be delinked from net flows across border, so balance sheets can expand even if no net cross border flows are recorded. Finally, at a disaggregated level, current account gross and net flows can be composed of a widely varying mix of bank, debt, equity, FDI and other claims, and each type has very different risk characteristics, with bank and debt flows being the ones at risk of rollover risk (stops, flight). Recent evidence points to all of these factors playing a role in the current crisis, globally and within the Eurozone, and in away that should push future analysis beyond the narrow and simplistic “global imbalance” framework which all too often dominated discussions in the last decade.<sup>1</sup>

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<sup>1</sup> See, for example, Lane (2012) and Obstfeld (2012) for suggestions as to the way ahead. Past policy misdirection is acutely observed in the self-flagellating IMF (2011) postmortem into the global financial crisis, viz.: “For much of the period [2004–07] the IMF was drawing the membership’s attention to the risk that a disorderly unwinding of global imbalances [and inflation].... The IMF gave too little consideration to deteriorating financial sector balance sheets, financial regulatory issues, to the possible links between monetary policy and the global imbalances, and to the credit boom and emerging asset bubbles. It did not discuss macro-prudential approaches that might have helped address the evolving risks. Even as late as April 2007, the IMF’s banner message was one of continued optimism ... benign global environment ... positive near-term outlook and fundamentally sound financial market conditions. Only after the eruption of financial turbulence did the IMF take a more cautionary tone .... The lack of a coherent macro-financial storyline to underpin the laundry list of risks ... created an impression that the IMF was warning only about global imbalances and inflation. This was the message heard by authorities, other stakeholders, and most staff interviewed for this evaluation ... Confirmation bias ... may explain staff’s focus on the IMF’s primary concern — global imbalances and a disorderly dollar decline — as the key risk to global stability, largely ignoring evidence pointing to other risks.”

Historical evidence backs this idea of an important distinction between current account flows and the behavior of credit. Suppose we look back over history since 1870 and compute correlations in the aforementioned 14-country advanced-economy datasets between external inflows (current account, % of GDP) and the change in aggregate credit (change in bank loans, % of GDP). If we divide the panel into 20-year periods from 1870, excluding the two world wars, the answer is that over the long run the correlation has been essentially zero. Only in one period, 1870 to 1889, was there a significant negative correlation between the current account and changes in bank lending. Not surprising: this was a peak period of settler economy capitalism with large capital flows out of high saving core economies. In one later period, 1949–1968, there was a positive correlation: high saving economies were in current account surplus but also expanding credit rapidly. Apart from these periods, and on average, the correlation was zero.

Thus, compared to credit conditions, the horse race shows that current accounts seem to perform poorly in a head-to-head contest to explain the incidence of crises.

A similar exercise can be undertaken for public debt, by adding the change in public debt to GDP ratios as a crisis predictor, as shown in the second panel of Figure 9. This might as well be a one horse race. The public debt variable clearly has no benefit as a predictor even as compared to the country-fixed-effects null (AUC of 0.645 versus 0.638,  $p=0.4468$ ). Thus, the idea that financial crises have their roots in fiscal problems is not supported over the long sweep of history. Some cases may of course exist — like Greece today — but these have been the exception not the rule. In general — like Ireland and Spain today — financial crises can be traced back to developments in the financial sector itself, namely excess credit.

Over 140 years there has been no systematic correlation of financial crises with either prior current account deficits or prior growth in public debt levels. Private credit has always been the only useful and reliable predictive factor.

### **Lesson 3: After a credit boom, expect a more painful “normal recession” as well as a more painful “financial crisis recession”**

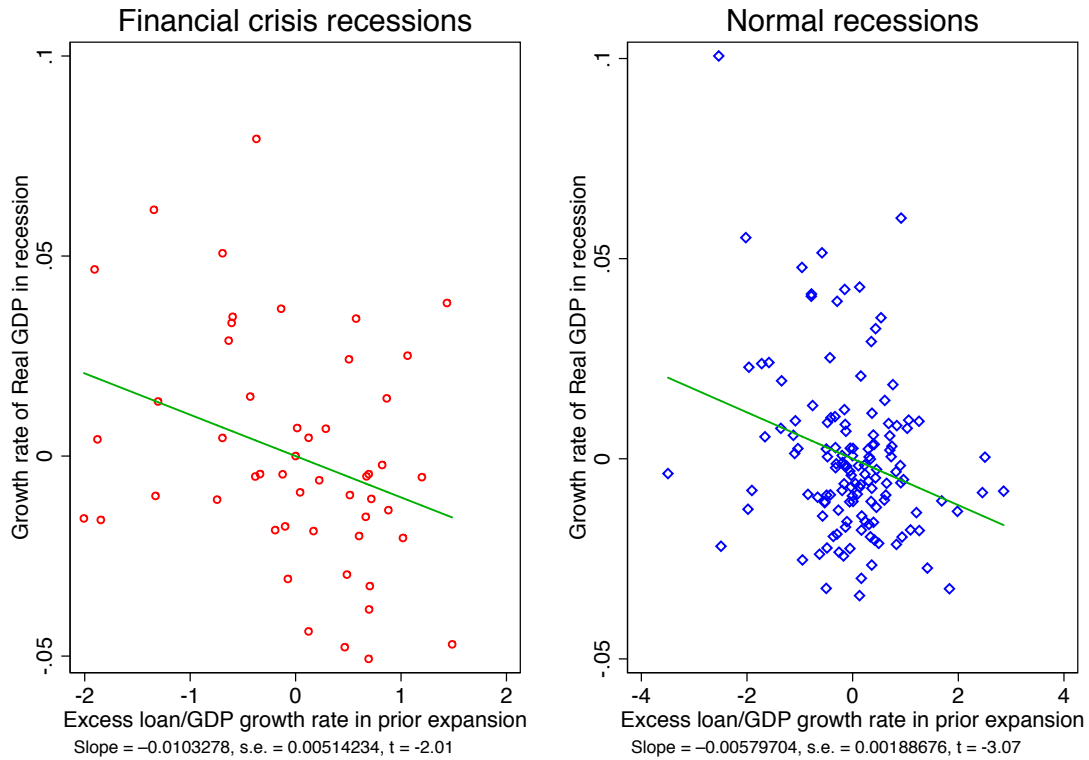
As far as they go, these results may be somewhat provocative, but could be downplayed. If boom-bust cycles of credit were occasionally responsible for rare, but still quite painful, financial crises, that might be a useful finding. But from a policymaking standpoint it would be like a doctor faced with a test for a very rare disease. If the treatment is painful, in any utility-weighted decision the incentive to act will be downweighted for two reasons: the cost of a false positive, and the infrequency of positive outcomes overall.

Thus, in more recent collaborative work, we sought to address the relevance of the credit cycle, not just for the rare events known as “financial crises” but for all recessions of any form (Jordà, Schularick, and Taylor 2011b). To do this we classify all recession events in all countries, and classify them as normal recessions or financial crisis recessions based on coincidence ( $\pm 2$  years) with a crisis event. This takes our sample size way up, and brings into view recession events that are far more frequent than financial crises. In just under 140 years for 14 countries we observe 51 financial crisis recessions, and 187 recession of all kinds (normal and financial). The corresponding frequencies are 2.6% and 9.7% (approximately 1 in 40 years versus 1 in 10).

The question we wanted to ask here was: are the echoes of credit booms during the expansion phase only manifested in the likelihood of a financial crisis taking place in subsequent years, a zero-one binary outcome? Or is there a more generalized echo of a credit boom, whereby more leverage in the expansion years can be traced to weaker economic performance in the subsequent recession phase?

Figure 10 sums up what appears to be a clear answer, one that is robust to many different controls, samples, and specifications, some of which we shall see in a moment.

**Figure 10** “Excess” Credit Growth in Expansion and the Intensity of Recession



Source: Jordà, Schularick, and Taylor (2011b). The charts show simple bivariate scatters between the rate of growth of real GDP in the recession phase, and the growth rate of credit-to-GDP in the prior expansion. The left chart shows financial crisis recessions only, the right chart normal recessions only.

The bottom line here is that our earlier argument that credit booms matter as a financial crisis risk factor is a rather narrow conclusion, and that a more general and worrying correlation is evident. During any business cycle, whether ending in a financial crisis recession or just a normal recession, there is a very strong relationship between the growth of credit (relative to GDP) on the upswing, and the depth of the subsequent collapse in GDP on the downswing.

The import of these results is broader, and applies to recessions not just crises. Following credit should not only interest financial policymakers or macroprudential powers who are mainly concerned with averting a low-probability crisis or tail event. It should also concern central bankers and other policymakers who are

concerned with overall macroeconomic stability at business-cycle frequencies, that is, even in more typical cycles when crises are averted and the economy suffers only a “normal” recession (see, e.g., Drehmann et al. 2011, Turner 2011).

In a very important way history matters: in recessions following bigger credit build ups, our research shows that an “unconditioned” policy forecast would be prone to error, whereas under a properly “conditioned” policy allowance is made for that fact that economic outcomes are systematically worse the larger has been the prior credit boom. If such a finding were ever to have any applicability, it might be in the present circumstances.

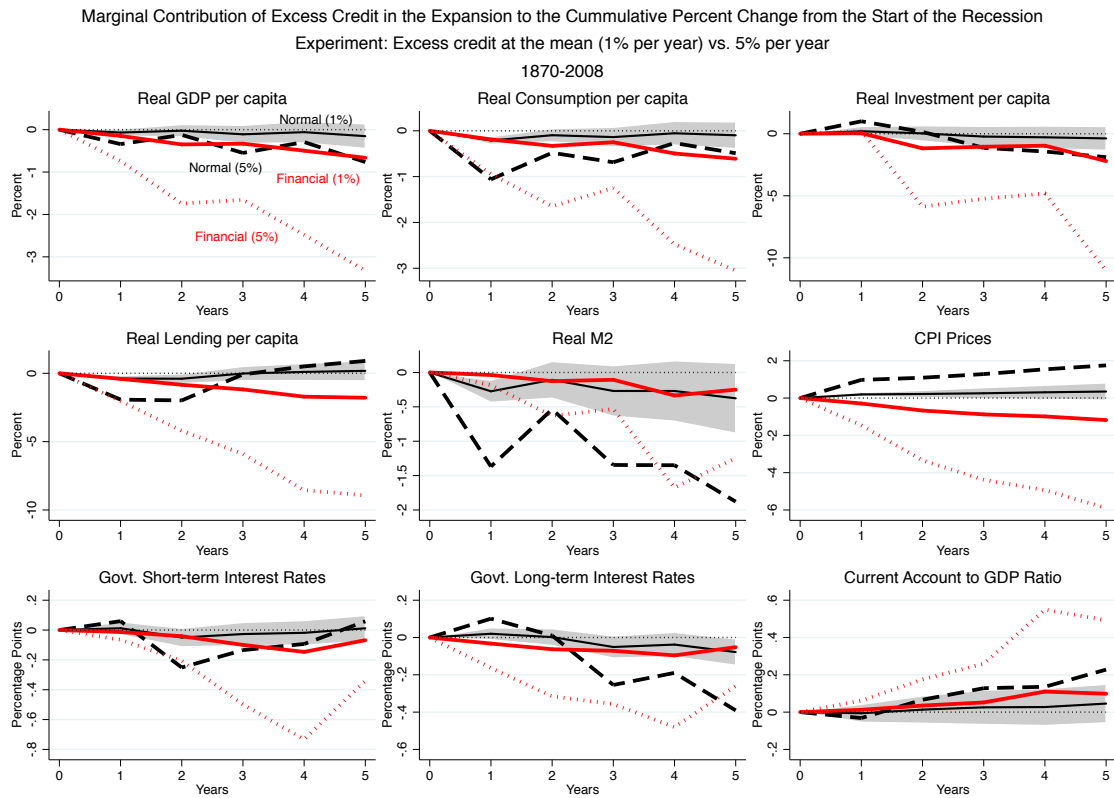
The importance of findings such as these may now be clear. The results challenge the view that credit is an epiphenomenon: something driven by real fundamentals, but not an interesting or important economic driver in its own right. In a naïve view, high- and low- levels of credit-to-GDP growth in expansion phases might occur, with credit intensity levels given by disturbances around some mean; these might be followed by weak- or harsh- recession phases, or even financial crises, with these outcomes also distributed around some mean. But, after properly conditioning the cyclical data, it is not clear why there should still be a systematic link between the two, which is what we actually tend to see in the historical data. In closing, we can take a closer look at some further patterns which strengthen this point.

#### **Lesson 4: In a financial crisis with large run-up in private sector credit, mark down growth/inflation *more***

The final two lessons take off from the preceding idea of conditioning recession path outcomes on economic conditions seen at the pre-recession peak or in the prior expansion phase, but in what follows we can expand the modeling framework using local projection methods to ask two questions of contemporary salience (Jordà, Schularick, and Taylor 2011b).



**Figure 11** “Excess” Credit Growth and the Paths of Normal and Financial Recessions



Notes and source: Paths shown are cumulative impacts. Jordà, Schularick, and Taylor (2011b), revised. Results from a 9-variable local projection model. Sample of 14 advanced countries, 1870–2008. Zero = recession path with 0% pa excess growth of credit in prior expansion measured by real loans per capita. Black solid path = normal recession, at +1% pa excess growth in credit (with shaded confidence interval). Black dashed path = normal recession with +5% excess growth in credit. Red solid and dashed lines show the same paths but in a financial crisis recession.

First, we ask: how are macroeconomic characteristics of the recession path related to expansion phase credit build up? In Figure 11 we show *cumulative impacts* from a 9-variable local-projection estimation cumulated over 5 years after a recession peak for our sample of 14 countries for 1870 to 2008. The experiment is to compute the “marginal” treatment effect on each path of an extra unit (here +1% or +5% per year) of loan to GDP growth during the prior expansion. The experiment is framed by observed data: actual observed average loan to GDP growth during expansions is

close to 0% just before normal recessions, and about +1% average before financial recession, with in each case a standard deviation of 6%–7%.

In the chart, the line at zero is the no recession reference path with 0% excess credit. The black solid path is that for a normal recession under the average +1% excess credit expansion in the prior expansion (with shaded confidence interval). The black dashed path is that for a normal recession under the marginal treatment with an increase to +5% excess credit expansion in the prior expansion. The red solid and dashed lines show the path in a financial crisis recession under when excess credit is at +1% and +5%, respectively, in the prior expansion.

Important inferences quickly follow from this chart based on over a century of experiences. First, unsurprisingly, excess credit generally makes matters worse, but especially so in a financial crisis, with lower output, consumption, investment, lending, money, inflation, and interest rate responses, and a sharper move to current account surplus. Also noteworthy are the downward pressures on growth, credit, inflation, and investment, characteristics that are highly noteworthy in the context of the present weak recovery from the 2008 crisis. As an illustrative example, consider a crisis with +5% excess credit growth beforehand (corresponding roughly to the U.S. in the pre-2008 boom) the rate of inflation on the postcrisis path is about 75–100 bps below reference on average out to the 6 year horizon, leaving the CPI level depressed by 4–6 percentage points, and real investment per capita and loans per capita down by about 5–10 percentage points.

The point is simply that from an empirical point of view, a credit boom and a financial crisis together appear to be a very potent mix that correlate with abnormally severe downward pressures on growth, inflation, credit and investment for long periods. A “normalization” of the economy on all these dimensions just takes much longer under such a scenario. It is easy to see how, policymakers, if they happened to be ignorant of such factors, might carelessly wander into unduly optimistic forecasts, or premature policy actions, putting at risk a very fragile recovery path.

**Lesson 5: In a financial crisis with large public debt, and large run-up in private sector credit mark down your forecast *even more***

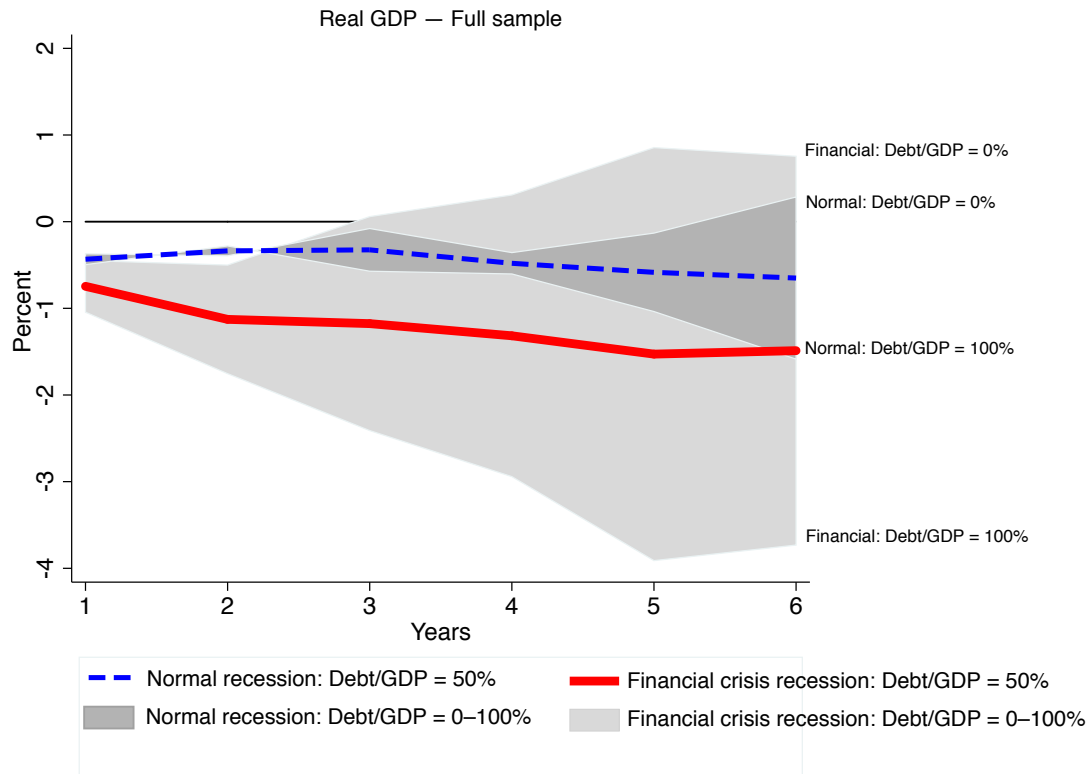
The final lesson builds on the last one. Now we can add the much-debated fiscal policy dimension to the analysis. Such is the flexibility of the local projection framework that it can be easily used to generate forecasts adapted to discrete bins corresponding to various conditioning events, or it can be used with a continuous conditioning variable to see how outcomes vary over some meaningful range of conditions. The question we focus on here is how the fiscal health of the government *ex ante*, at the start of the recession, might shape the subsequent recession path.

Figure 12, from work in progress (Jordà, Schularick, and Taylor, forthcoming), studies the impact of a similar “marginal treatment” as in the last exercise (here +1% per year of extra loan to GDP growth during the prior expansion), but in the manner of a fan chart, generates *dynamic impacts* (in this case, *noncumulative*) forecast paths for varying levels of public debt to GDP at the recession onset, where the range goes from 0% to 100% across the fan (shaded), with a central forecast (colored line) at the 50% public debt to GDP level. The exercise is revealing. For brevity we examine here just the results for the GDP path.

First look at normal recessions (blue dashed line, dark shaded fan). Extra credit growth in the prior expansion is correlated with mild drag in the recession, say 50–75 bps in the central case, but the effect is small, and does not vary all that much when we condition on public debt to GDP levels (the dark fan is not that wide).

Now look at financial crisis recessions (red solid line, light shaded fan). Extra credit growth in the prior expansion is correlated with much larger drag, almost twice as large at 100–150 bps, and the impact is very sensitive to public debt to GDP levels going in (the light fan is very wide). At public debt to GDP levels near 100% a sort of tailspin emerges after a financial crisis, and the rate of growth craters down from the reference levels by 400 bps at the end of the window. (Recall, effects in this chart are shown as non-cumulative.)

**Figure 12** “Excess” Credit Growth and the Paths of Real GDP in Normal and Financial Recession Contingent on Initial Public Debt Levels



Notes and source: Paths shown are dynamic impacts at each date, not cumulative. Jordà, Schularick, and Taylor (forthcoming). Results from a 9-variable local projection model. Sample of 14 advanced countries, 1870–2008. Zero = recession path with 0% pa excess growth of credit in prior expansion measured by loans to GDP. Blue dashed and red solid paths: normal and financial recession paths, at +1% pa excess credit growth in prior expansion when country starts recession with initial public debt to GDP ratio of 50%. Dark and light gray fans: deviation from these last two respective paths as starts recession with initial public debt to GDP ratio varying from 0% to 100%.

In terms of historical resonance, these results have a deep ring to them as we contemplate the current crisis. Exposure to a credit boom can make recessions painful, but when combined with an adverse fiscal position at the onset of the crash, economies are perhaps even more vulnerable. Such empirical evidence would suggest that even if the stakes are lower in normal recessions, countries with more “fiscal space” are better able to withstand a financial crisis, perhaps by having room to offer stabilizing support to their economy (or at least dodge austerity).

## **Summing up: what next for macroeconomics and policy?**

In many old-fashioned models and policy frameworks, the key issues at the core of the crisis were frequently simplified to the point of unrecognizability, or else assumed away altogether: for example, banks, financial crises, defaults, lenders of last resort, safe assets, credit, leverage, debt-deflation, central banking (beyond simple targets and policy rules), and even money itself, to name a few.

For observers with a longer perspective, however, such matters were far from irrelevant, and surely not merely epiphenomena. Instead, they seemed so to be so systematically important and have such recurrent patterns across the broad sweep of economic history that it was hard to see how they could be placed to one side.

If a better empirical foundation is to be found, then what features of the real world should new and better models and policymaking pay heed to? If something beneficial can be said to have come out of the crisis, it has at least reignited interest in crucial macro-financial issues.

With a focus on banking systems and credit, this paper has summarized some new historical evidence on the evolution of a key part of the global financial system, its workings, and its fragility. Arguably, empirical research is now ahead of theory, but the two will need to work together.

For researchers, constructing models consistent with the evidence, as well as strengthening and expanding the evidence itself, is a major challenge for the future. For policymakers, unfortunately, the challenge is right now, and first and foremost it is to understand, based on these and other empirical observations emerging from the historical laboratory, the peculiar nature of the fiercely depressing and deflationary spiral in which the advanced world now finds itself — and in turn to figure out what to do about it.

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