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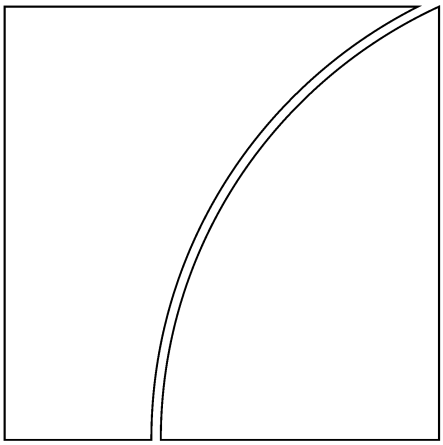

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The Great Depression as a credit boom gone wrong

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Abstract

The experience of the 1990s renewed economists' interest in the role of credit in macroeconomic fluctuations. The locus classicus of the credit-boom view of economic cycles is the expansion of the 1920s and the Great Depression. In this paper we ask how well quantitative measures of the credit boom phenomenon can explain the uneven expansion of the 1920s and the slump of the 1930s. We complement this macroeconomic analysis with three sectoral studies that shed further light on the explanatory power of the credit boom interpretation: the property market, consumer durables industries, and high-tech sectors. We conclude that the credit boom view provides a useful perspective on both the boom of the 1920s and the subsequent slump. In particular, it directs attention to the role played by the structure of the financial sector and the interaction of finance and innovation. The credit boom and its ultimate impact were especially pronounced where the organisation and history of the financial sector led intermediaries to compete aggressively in providing credit. And the impact on financial markets and the economy was particularly evident in countries that saw the development of new network technologies with commercial potential that in practice took considerable time to be realised. In addition, the structure of management of the monetary regime mattered importantly. The procyclical character of the foreign exchange component of global international reserves and the failure of domestic monetary authorities to use stable policy rules to guide the more discretionary approach to monetary management that replaced the more rigid rules-based gold standard of the earlier era are key for explaining the developments in credit markets that helped to set the stage for the Great Depression.

JEL classification codes: E3, N2.

Foreword

On 28-29 March 2003, the BIS held a conference on “Monetary stability, financial stability and the business cycle”. This event brought together central bankers, academics and market participants to exchange views on this issue (see the conference programme and list of participants in this document). This paper was presented at the conference. Also included in this publication are the comments by the discussants. The views expressed are those of the author(s) and not those of the BIS. The opening speech at the conference by the BIS General Manager and the prepared remarks of the four participants on the policy panel are being published in a single volume in the BIS Papers series.

Conference on
"Monetary stability,financial stability and the business cycle"
28-29 March 2003, Basel

Conference programme

Opening keynote remarks

Andrew Crockett (Bank for International Settlements)

Session I: The lessons from history

Chair: William White (Bank for International Settlements)

Paper 1: The price level, relative prices and economic stability: aspects of the interwar debate

Author: David Laidler (University of Western Ontario)

Discussants: Olivier Blanchard (Massachusetts Institute of Technology)
Nobuhiro Kiyotaki (London School of Economics)

Paper 2: The Great Depression as a credit boom gone wrong

Authors: Barry Eichengreen (University of California, Berkeley)
Kris Mitchener (Santa Clara University)

Discussants: Michael Bordo (Rutgers University)
Charles Goodhart (London School of Economics)

Session II: Monetary and financial frictions in business fluctuations

Chair: John Moore (London School of Economics)

Paper 3: Public and private information in monetary policy models

Authors: Jeffery Amato (Bank for International Settlements)
Hyun Song Shin (London School of Economics)

Discussants: Marvin Goodfriend (Federal Reserve Bank of Richmond)
Lars Svensson (Princeton University)

Paper 4: External constraints on monetary policy and the financial accelerator

Authors: Mark Gertler (New York University)
Simon Gilchrist (Boston University)
Fabio Natalucci (Board of Governors of the Federal Reserve System)

Discussants: Philippe Bacchetta (Study Center Gerzensee)
Philip Lowe (Reserve Bank of Australia)

Session III: Monetary policy challenges

Chair: Charles Freedman (Bank of Canada)

Paper 5: Asset prices, financial imbalances and monetary policy: are inflation targets enough?

Author: Charles Bean (Bank of England)

Discussants: Ignazio Visco (Bank of Italy)
Sushil Wadhwani (Wadhwani Asset Management LLP)

Paper 6: Financial strains and the zero lower bound: the Japanese experience

Author: Mitsuhiro Fukao (Keio University)

Discussants: Ignazio Angeloni (European Central Bank)
Jürgen von Hagen (University of Bonn)

Session IV: Achieving monetary and financial stability

Panel discussion

Chair: Andrew Crockett (Bank for International Settlements)

Panellists: Roger Ferguson (Board of Governors of the Federal Reserve System)
Otmar Issing (European Central Bank)
Michael Mussa (Institute for International Economics)
Yutaka Yamaguchi (formerly Bank of Japan)

Conference on
"Monetary stability,financial stability and the business cycle"
28-29 March 2003, Basel

Participants in the conference

Ignazio Angeloni	European Central Bank
Philippe Bacchetta	Study Center Gerzensee
Armando Baqueiro Cãrdenas	Bank of Mexico
Charles Bean	Bank of England
Olivier J Blanchard	Massachusetts Institute of Technology
Michael Bordo	Rutgers University
Barry Eichengreen	University of California, Berkeley
Charles Freedman	Bank of Canada
Mitsuhiro Fukao	Keio University
Simon Gilchrist	Boston University
Marvin Goodfriend	Federal Reserve Bank of Richmond
Charles Goodhart	London School of Economics
Otmar Issing	European Central Bank
Nigel Jenkinson	Bank of England
Thomas J Jordan	Swiss National Bank
Nobuhiro Kiyotaki	London School of Economics
David E Laidler	University of Western Ontario
Flemming Larsen	International Monetary Fund
Philip Lowe	Reserve Bank of Australia
Kris J Mitchener	Santa Clara University
John Moore	London School of Economics
Michael Mussa	Institute for International Economics
Fabio M Natalucci	Board of Governors of the Federal Reserve System
Peter Praet	National Bank of Belgium

Jan F Qvigstad	Central Bank of Norway
Hermann Remsperger	Deutsche Bundesbank
Hyun Song Shin	London School of Economics
Marc-Olivier Strauss-Kahn	Bank of France
Lars E O Svensson	Princeton University
Giovanni Toniolo	University of Rome Tor Vergata
José Viñals	Bank of Spain
Ignazio Visco	Bank of Italy
Jürgen von Hagen	University of Bonn
Sushil B Wadhwani	Wadhwani Asset Management LLP
Charles Wyplosz	Graduate Institute of International Studies
Yutaka Yamaguchi	formerly Bank of Japan
Gang Yi	The People's Bank of China
Andrew Crockett André Icard William White Renato Filosa Claudio Borio Gabriele Galati Jeffery Amato William English Andrew Filardo Ben Fung (Representative Office for Asia and the Pacific)	Bank for International Settlements

Contents

1. Introduction[1]

The experience of the 1990s, especially though not exclusively in the United States, renewed economists' interest in the role of credit in macroeconomic fluctuations.[2] Among the insights of this view is that not just money but also credit matters for macroeconomic and financial conditions. Not just banks but also nonbank financial intermediaries and securities markets play an important role in the provision of credit to households and firms. Not just macroeconomic policy but also the structure, regulation and response of the financial system shape the development of financial conditions and thereby macroeconomic dynamics. The policy implication drawn by some is that central banks should not simply set monetary policy with an eye toward inflation; they should also attend to conditions in credit markets and contemplate preemptive action to prevent the development of excesses that threaten economic stability even if there is no sign of inflationary pressure. Economists at the Bank for International Settlements (BIS) have been forceful proponents of this position, which for want of a better label is referred to as the BIS view.[3]

A capsule account of the role of credit in macroeconomic cycles, as informed by the experience of the 1990s, would go something like this. There is first an upswing in economic

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[1]We thank Pipat Luengnaruemitchai and Justin Jones for research assistance and Michael Bordo, Alex Field, Charles Goodhart, and Ian McLean for comments. The views expressed are those of the authors and not those of the BIS. We dedicate this paper to the memory of Charles Kindleberger, whose passing coincided with its completion.

[2] See for example Bernanke and Gertler (1999) or Tornell and Westerman (2002).

[3] See Vila (2000), Borio, Fufine and Lowe (2001), and Borio and Lowe (2002). That this is the right policy conclusion is, of course, not universally agreed. On the controversy over the role of asset prices and credit conditions in the conduct of monetary policy, see Bullard and Schaling (2002), Bernanke and Gertler (1999), Cecchetti, Genberg, Lipsky and Wadhwani (2000), Filardo (2000) and Goodhart (2000). This same debate figures prominently in the literature on the Great Depression, as we describe momentarily.

activity. As the economy expands, banks and financial markets provide an expanding volume of credit to finance the growth of both consumption and investment, particularly where regulation is lax and competition among bank and nonbank financial intermediaries is intense. Whether because the exchange rate is pegged or for other reasons such as a positive supply shock, upward pressure on wholesale and retail prices is subdued. Hence, the central bank has no obvious reason to tighten and stem the growth of money and credit, leading to a further expansion of output and further increase in credit.

Higher property and securities prices encourage investment activity, especially in interest-sensitive activities like construction. But, as lending expands, increasingly risky investments are underwritten. The demand for risky investments rises with the supply, since, in the prevailing environment of stable prices, nominal interest rates and therefore yields on safe assets are low. In search of yield, investors dabble increasingly in risky investments. Their appetite for risk is stronger still to the extent that these trends coincide with the development of new technologies, in particular network technologies of promising but uncertain commercial potential.

Eventually, all this construction and investment activity, together with the wealth effect on consumption, produces signs of inflationary pressure, causing the central bank to tighten. The financial bubble is pricked and, as asset prices decline, the economy is left with an overhang of ill-designed, non-viable investment projects, distressed banks, and heavily indebted households and firms, aggravating the subsequent downturn.

No single policy implication necessarily flows from this story, but some readers will conclude that the monetary authorities should respond preemptively to the rise in asset prices.

Central banks should not be misled, in this view, by the disconnect between asset price inflation and consumer price inflation. They should respond to the inflation of asset prices by reining in credit and preventing the expansion from taking a form that ultimately renders subsequent difficulties more severe.

This tale from the 1990s has obvious appeal for historians of the 1920s. The 1920s was a decade of expansion, reflecting recovery from World War I, new information and communications technologies like radio, and new processes like motor vehicle production using assembly-line methods. Accounts of the 'twenties in the United States (such as Kindleberger 1973) emphasize the ready availability of credit, reflecting the ample gold reserves accumulated by the country during World War I, the stance of Federal Reserve policies, and financial innovations ranging from the development of the modern investment trust to consumer credit tied to purchases of durable goods like automobiles. Credit fueled a real estate boom in 1925, a Wall Street boom in 1928-9, and a consumer durables spending spree spanning the second half of the 1920s. That these booms developed under the fixed exchange rates of the gold standard meant that they generated little inflationary pressure at home and that their effects were transmitted to the rest of the world. Absent overt signs of inflation, the Fed had no reason to raise the official short-term rate.

Eventually, however, the Fed and other central banks grew increasingly restive over what they perceived as speculative excesses in financial markets and with a growing incidence of malfeasance and graft, evident in the activities of Charles Ponzi in Florida, Clarence Hatry in London, and Ivar Kreuger in Stockholm. This concern with the effects of asset-price inflation on the economy led them finally to tighten. Banks passed along the higher cost of additional

reserves to their borrowers, and, in the U.S. case, they further felt direct pressure to limit their lending to securities market participants. By this time, positions - stock market positions in particular - were highly leveraged; as a result, borrowers experienced severe financial strain when credit tightened, leading them to compress their spending, and consumption and investment turned down. Ultimately, the resulting deflation became sufficiently severe to threaten the stability of the financial system and the economy more generally.[4]

While this credit boom interpretation has multiple precursors in the qualitative literature on the Depression, its validity and explanatory power have not been assessed in a systematic, quantitative way. Doing so is our goal in this paper. We ask how well quantitative measures of the credit boom phenomenon can explain the uneven expansion of the 1920s and the slump of the 1930s. In Section 2 we consider scholarly precursors to the modern credit boom view, such as Georgist theory, the Austrian School, the Minsky-Kindleberger financial-instability thesis, and the literature which attributes the Great Depression to a credit-fueled stock market bubble. Section 3 constructs quantitative indicators of the development of the credit boom for sixteen countries and asks whether the height of the boom was positively associated with the depth of the subsequent slump. In Section 4 we complement this macroeconomic analysis with three sectoral studies that shed further light on the explanatory power of the credit boom

[4] We do not explicitly address the policy implications in this paper. One conceivable implication (which is implicit in Galbraith 1972 and Kindleberger 1973) is that the Fed should have prevented the development of speculative excesses by maintaining a tighter policy stance toward the end of the 1920s, despite the absence of overt signs of inflation. Doing so, in this view, would have limited the build-up of vulnerabilities that became sources of financial stress when the economy eventually turned down. By limiting the extent of the credit boom in the late 1920s, it follows, a preemptive policy would have reduced the severity of the Great Depression in the early 1930s. There is of course an alternative view (e.g. Meltzer 2003) that policy makers should have focused exclusively on inflation, with the implication that policy in the late 1920s

interpretation: the property market (where recent experience suggests that credit-boom dynamics should have been particularly apparent), consumer durables industries (where financial innovation played a particularly important role in the 1920s), and high-tech sectors (where authors like Perez 2002 suggest that the imprint of the credit boom should have been especially pronounced). Obviously, the parallels with the 1990s are never far from our minds. In Section 5 we examine the hypothesis, echoing the early Austrian school and advanced recently by *The Economist* (2002), that credit booms have become more of a problem as the world has moved from the gold standard to more discretionary and elastic monetary regimes. Section 6 summarizes our findings and their implications for modern debates.

We find that the credit boom view provides a useful perspective on both the boom of the 1920s and the subsequent slump. In particular, it directs attention to the role played by the structure of the financial sector and the interaction of finance and innovation. The credit boom and its ultimate impact were especially pronounced where the organization and history of the financial sector led intermediaries to compete aggressively in providing credit. And the impact on financial markets and the economy was particularly evident in countries that saw the development of new network technologies with commercial potential that in practice took considerable time to be realized. In addition, the structure and management of the monetary regime mattered importantly. The procyclical character of the foreign exchange component of global international reserves and the failure of domestic monetary authorities to use stable policy rules to guide the more discretionary approach to monetary management that replaced the more

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was not too loose but too tight. To repeat, we do not tackle the policy controversy here.

rigid rules-based gold standard of the earlier era are key for explaining the developments in credit markets that helped to set the stage for the Great Depression.

This particular constellation of monetary, financial and technological factors was what allowed the credit boom of the 1920s to develop as it did. We would be prepared to make similar arguments about the macroeconomic cycle of the 1990s.

To be clear, we are not necessarily advocating a "credit-centric" interpretation of the Great Depression. Throughout, we attempt to maintain a posture of studied agnosticism regarding its merits, emphasizing the conceptual and methodological obstacles that stand in the way of testing it, including data limitations and problems of observational equivalence with alternative interpretations of the Depression. Indeed, we have vested interests, based on our own prior writings, in the literatures emphasizing other factors in the Depression.[5] But the Great Depression was a multi-faceted event that is unlikely to be adequately accounted for by any monocausal explanation. The role of credit should be taken seriously, even by those convinced of the importance of other factors. In this paper we provide an agnostic's guide to the literature and evidence.

2. Scholarly Precursors

The BIS view has several significant precursors in the literature. To the extent that the boom of the 'twenties and other similar episodes manifested themselves in rising property prices, the credit-boom view was anticipated in the work of Henry George (1879). The Georgist view acknowledged the role of credit in fueling speculation and argues in particular that "speculative

[5] Specifically, in the roles of the international financial system (Eichengreen 1992) and

advances in land values" are central to causing business cycles. Rising rents induce speculators to purchase land for capital gains rather than for current use, which in turn causes site values to rise in dramatic fashion, setting off further rounds of speculation that eventually erode the profits of firms by increasing mortgage costs and rents. Eventually, these burdens reduce new investment and aggregate demand and bring forth a recession. In effect, the high price of land acts to "lock out labor and capital by landowners" (George, 1879, p.270). Only as this cycle is unwound and land prices and rents fall does investment pick up again, allowing the economy to recover toward full employment. The Georgist view differs in terms of the timing of the rise of speculation and the decline of investment and economic activity; George and his followers saw the latter as starting to decline even while the property boom was still underway (albeit in its late states), whereas the views emphasized in the text see investment and demand generally as declining only after the bubble bursts.

Another significant precursor is the Austrian interpretation of the cyclical fluctuations, which both anticipated and was informed by the events of the late 1920s. The Austrian view, with roots in the work of Ludwig von Mises (1924) and Friedrich von Hayek (1925), focused on the divergence between the market rate of interest and the natural rate of interest.[6] When the market rate fell below the natural rate, Mises and Hayek argued, prices rose and investment boomed.[7] The source of that divergence, according to Mises, was the banking system, freed

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the structure and regulation of domestic banking (Mitchener 2003).

[6] In this respect there are parallels between the Austrian model and Keynes' *Treatise on Money* (1930), a fact appreciated by Keynes and emphasized by Laidler (1999). In addition, there are parallels between the Austrian view and the modern debate about whether central banks should simply concentrate on commodity price inflation or also be concerned about asset price inflation. We return to this below.

[7] Mises and Hayek did not typically distinguish between asset and commodity price

from the disciplining influence of the classical gold standard. Excessive credit creation by banks, both central and commercial, encouraged asset price inflation, fueling consumption and investment. The longer that asset-price inflation was allowed to run, the greater were the depletion of the stock of sound investment projects and the accumulated financial excesses.[8] Moreover, the more severe became the subsequent downturn. The credit boom thus contained the seeds of the subsequent crisis. The policy implication was that countries should avoid monetary arrangements that allowed significant divergences between the market and natural rates of interest (in particular, a gold standard of the rigid prewar variety was preferable to the more malleable interwar vintage) and that they should allow the downturn to proceed in order to purge unviable firms and investment projects from the economy, thereby clearing the way for sustainable recovery.[9]

The definitive application of the Austrian model to the Great Depression was by Lionel Robbins (1934) in a book largely responsible for popularizing the name now attached to this episode.[10] Robbins attributed the Depression of the 1930s to the unsustainable credit expansion of the 1920s. Blame for that credit expansion he in turn laid at the doorstep of the Federal Reserve System, which had kept interest rates below the natural rate for too long in the hope that

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inflation, but when they did, they minimized the relevance of the distinction. Laidler (1999) argues that Hayek in particular saw the rate of interest (which affected the evolution of asset prices) as the key price (since it was what equilibrated or disequibrated saving and investment); by this interpretation, asset price inflation in fact mattered more than commodity price inflation.

[8] Although Mises referred not to the build-up of indebtedness but to the inadequacy of saving, his point was essentially the same

[9] In Hayek's (1932, p.44) words, "any attempt to combat the crisis by credit expansion will...not only be merely the treatment of symptoms as causes, but may also prolong the depression by delaying the inevitable real adjustments."

[10] The Austrian views of the early Robbins were kept alive by, inter alia, Rothbard (1975).

low rates might help Britain surmount its balance-of-payments problems and thereby solidify the reconstructed gold exchange standard, and ultimately on the doorstep of the new gold standard itself, which gave central banks more leeway to manipulate policy. This divergence between market and natural rates stimulated the provision of bank credit, allowing the development of financial excesses which, when revealed, led unavoidably to the downturn, the financial crisis, and the Depression.[11] Central banks were misled into inaction by the tendency for the credit boom to stimulate not just aggregate demand but also aggregate supply (through increased production of consumption goods and growing investment in capacity). But, according to Robbins, the quality of much of that additional capacity was inferior. The credit boom had "the qualitative effect of providing a favourable atmosphere for the fraudulent operations of sharks and swindlers," which meant that neither the expansion of supply nor the high level of asset prices was sustainable and only set the stage for a disruptive crisis.[12] Moving from diagnosis to prescription, Robbins recommended against monetary and fiscal measures to counter the downward spiral, insisting that the economy needed to be cleansed of financial and nonfinancial excesses to set the stage for a sustainable recovery.

Another related literature attributes the Great Depression to a bubble in the stock market.[13] Galbraith (1972) describes how what he characterizes as a bubble developed in response to the combination of financial innovation and ample credit in an unregulated financial

[11] As Robbins (1934, pp.41-2) put it, "Sooner or later the initial errors are discovered. And then starts a reverse rush for liquidity. The Stock Exchange collapses. There is a shortage of new issues. Production in the industries producing capital-goods slows down. The boom is at an end."

[12] Robbins (1934), p.62.

[13] There is clear overlap between the Austrian view and the bubble interpretation; thus, Robbins points to the run-up in stock prices in the United States as a prominent consequence of

environment. Investor enthusiasm was grounded in the promise of new information and communications technologies; Radio Corporation of America (RCA) was the 1920s equivalent of America On Line (AOL). (Figure 1, which superimposes the price of AOL shares in the 1990s on the price of RCA shares in the 1920s, illustrates the parallel.) In addition, however, the enthusiasm of investors was importantly fueled by financial innovation and ample supplies of credit. The 1920s saw the spread from Britain to America of the investment trust, an entity that had existed in England for half a century, but now in a variant that allowed the manager of the trust to buy stocks on margin, raising the fund's leverage. This anticipates a theme we develop later in the paper – that the consequences of credit expansion and the extent of the boom thereby induced may depend on the structure and regulation of the financial sector. Individual investors were similarly permitted to purchase shares for 10 per cent down, borrowing from their brokers who in turn borrowed from the banks.[14] Capital gains on the representative portfolio of nearly 30 per cent in calendar year 1927 and more than 30 per cent in calendar year 1928 encouraged the belief that stocks could only go up.[15] Share prices and dividends had broadly moved in tandem through the first quarter of 1928. They diverged thereafter, in response it has been suggested to the Fed's cut in interest rates late in the preceding year.[16] (See Figure 2.)

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the expansion of bank credit in the 1920s

[14] Eventually they also borrowed from corporations, as nonbank firms shifted funds into the money market in response to rising demand.

[15] Estimates of asset returns are from Smiley and Keehn (1988).

[16] Santoni and Dwyer (1990) and Meltzer (2003) argue that this evidence is not necessarily consistent with the existence of a bubble. Meltzer, similarly, rejects the bubble interpretation on the grounds that the rise in equity valuations in the late 1920s was not out of proportion to the rise of earnings. From the present point of view, the issue is not simply whether earnings rose as rapidly as equity prices in these years but also whether the magnitude of capital gains created expectations of further capital gains which were less obviously justifiable by fundamentals.

There are any number of explanations for what happened next, from investment guru Roger Babson's warning at the National Business Conference that "sooner or later a crash is coming," to the credit squeeze, to the business deceleration, to protectionist rumblings in the Congress. Whatever the cause, the Great Crash bequeathed a legacy of problems for banks, corporations, and households, which had assumed heavy debt loads and packed their portfolios full of now poorly performing assets. Some policy makers concluded from this experience that central banks should take it upon themselves to deter excessive speculation.[17]

Finally, there is the Minsky (1986)-Kindleberger (1978) literature on booms, panics and crashes. These authors emphasize asymmetric information and agency problems in financial markets. Among the implications of asymmetric information to which they point are endogenous credit cycles and the fragility of financial systems. Minsky's emphasis is on the analytics of financial fragility, although he is inspired by the experience of the Great Depression and the Keynesian theorizing to which it gave rise. Kindleberger's emphasis is on the theory's applicability to particular historical episodes.

Many of these precursors were inspired by and/or attempted to apply their framework to the Great Depression. However, few if any of them analyze the role of credit in this macroeconomic cycle in a rigorous quantitative way. It is to this task – and the associated problems – that we now turn.

[17] Others argued that the authorities should resist the temptation to stabilize commodity prices (which were now falling rapidly, doing considerable damage to the economy), much less asset prices, for fear that this would only encourage the development of another, even larger bubble that would be followed by a still more devastating crash. Thus, Robbins (1934) drew this conclusion, in advice he later came to regret.

3. Quantitative Analysis and its Limitations

A particular difficulty for attempts to analyze the run-up to the Great Depression as credit boom is that we have only limited historical information on credit itself for this period for a significant number of countries. An ideal measure would include not only loans by financial institutions and corporate stocks and bonds but also consumer credit, mortgages, and trade credit, and other private credit. Goldsmith (1985) estimates this aggregate (total private credit, as the sum of loans by financial institutions, consumer credit, mortgages, corporate stocks and bonds, trade credit and other private credit) for two benchmark years, 1913 and 1929, for a total of nine countries. We display his figures, excluding claims against financial institutions (including currency and deposits) and government debt, on which Goldsmith also includes data, in Table 1.

As Table 1 shows, seven of the nine countries experienced increases in total private credit, so measured, between 1913 and 1929, and in four countries (Japan, the UK, the U.S., and Norway) this increase was quite pronounced. Germany and France are the only two countries where credit declined over the period. That Germany experienced a sharp reduction in the stock of outstanding credit is not surprising, given the massive destruction of credit wrought by the 1923 hyperinflation. France also experienced sharp inflation in the early-to-mid 1920s, consistent with this interpretation.[18] Clearly, the problem with using Goldsmith's estimates is that the second half of the 1920s is confounded with immediate post-World War I disruptions, not to mention the effects of the war itself. We suspect that if a 1925-6 benchmark were

[18] Belgium experienced a more modest inflation, and it had a relatively modest credit expansion over this period, consistent with this interpretation. At the same time, the limited extent of the credit expansion in Denmark and Switzerland (where credit, although it did not decline, increased only modestly) suggests that the explanation for these trends is more complicated.

available, the evidence of a credit boom in the second half of the 1920s would be more uniform and clearly evident.

Unfortunately, the information needed to construct Goldsmith-like estimates annually for the period 1926-9, much less surrounding years, is not available for most of these countries. An alternative is to analyze information on money rather than credit. Money has the advantage of being available for a larger sample of countries and for a continuous period of years. The corresponding disadvantage is that money and credit are not precisely the same. Bank liabilities are not the only way that credit to households and firms is financed; firms, for example, can also obtain credit through securities markets. To be sure, our period is one when banks were more important, relatively speaking, as a source of credit - securities markets in most countries not having gained the depth and liquidity they were to acquire subsequently. Thus, it may do relatively little violence to reality to use M2 (scaled by nominal GDP) as our measure of credit. Still, the problem is not a negligible one. For the nine countries on which we have data on the growth of both money and credit over the period 1913-1929, the M2/GDP and Credit/GDP ratios have a correlation of 0.70.

In what follows we measure the credit component of the boom using positive deviations from trend in the M2/GNP for a sample of 16 countries at an annual periodicity starting in 1920. The countries are Argentina, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, the United Kingdom and the United States. While the sample was admittedly selected on the basis of data availability (not just for M2 but also for the ancillary variables utilized below), the result is essentially the universe of

post-World War II OECD economies. The credit boom story as told by Kindleberger and Minsky is essentially a story about the now advanced (industrial) economies; from this point of view, we have precisely the appropriate sample. The one "ringer" is Argentina. In what follows we conduct sensitivity analysis to see whether any of our results depend on its inclusion. They do not.

M2/GDP has other labels, of course, such as Cambridge k and the inverse of the velocity of circulation. The literature on velocity (e.g. Bordo and Jonung 1987) has shown that this variable can trend downward (as it did in many countries before World War II) or upward (as it did subsequently) over a period of a decades, reflecting secular developments in the financial system. Similarly, in periods like the 1920s, when money supplies were tied, albeit loosely, to stocks of monetary gold, the M2/GNP ratio may trend upward or downward depending on whether global gold supplies are growing faster or slower than output.[19] For both reasons, distinguishing a credit boom cum monetary expansion from secular movements in velocity thus requires detrending the latter. We therefore fit a linear trend on data through 1930 and focus on the residuals. This allows us to analyze cumulative processes – that is, the cumulative deviation of credit from its baseline or trend level – as opposed to credit conditions in a particular year, which would be the focus if we simply considered its rate of growth in that year.[20]

Figure 3 shows the individual country experiences. There we see a downward trend of the M2/GNP ratio in the 1920s in half the countries, not obviously consistent with the existence

[19] There was much concern in the 1920s about the possibility that the slow growth of global gold supplies was constraining the growth of money and thereby putting downward pressure on the money/GNP ratio. See League of Nations (1930).

[20] We experimented with different filters and with filtering the data only through 1929 without substantively changing the results.

of a credit boom.[21] But what is relevant to our argument is not the trend but the deviations around it. Interestingly, M2/GNP is almost exactly on trend in the vast majority of our countries in 1928, which we take as the height of the ostensible credit boom on the basis of qualitative accounts. Only in a small number of countries (Argentina and perhaps France and Japan) was credit notably above trend in this year.

Thus, if we are to succeed in developing systematic, quantitative evidence of the credit boom phenomenon, it will be necessary to consider other aspects. As explained in the preceding section, the literature on credit booms is concerned with both the growth of credit and its effects. A significant expansion of the supply of credit is not sufficient by itself to constitute a boom of the sort that was of concern to the Austrians or which today attracts the attention of economists like Borio and Lowe (2002). What is critical in their view is that the growth of credit should be associated with a rise in asset prices and an acceleration in rates of fixed investment relative to trend. In the view of these authors, it is this confluence of factors that might be said to comprise the distinction between credit boom and credit growth. Whether credit booms and credit growth have significantly different implications for the subsequent development of the economy is of course what determines whether this distinction has substance.[22]

[21] This trend may be indicative of the intensifying deflationary pressure exerted by the interwar gold standard, which constrained the growth of money and credit as economies recovered from World War I and expanded through the second half of the 1920s. In a number of countries, M2/GNP ratios then rise relative to this earlier trend in the 1930s as interest rates decline and the velocity of circulation falls. This tendency is documented by Bernanke (2000) and commented on further by Cole, Ohanian and Leung (2002).

[22] And which presumably determines whether central banks should respond preemptively to the development of credit booms independent of their implications for inflation.

Contemporaries focused on the impact of accommodating credit conditions on asset prices, and equity valuations in particular. These are shown in Figure 4, normalized by the overall level of prices, again relative to trend over the period through 1930. Equity valuations rise relative to trend in the late 1920 in the majority of our countries. Although the U.S. stock market boom is the best known, these data suggest the existence of similar fluctuations in a number of other countries (as emphasized by, inter alia, Kindelberger 1976).[23]

Contemporaries also saw the credit boom as stimulating investment, both directly, by making external funding more freely available and reducing collateral constraints, and indirectly, by raising Tobin's q and the incentive to invest. Investment fluctuations are shown in Figure 5. Although those movements are dominated by the collapse in the 1930s, as a result of which fluctuations around trend in the second half of the 1920s hardly stand out, it is still evident that a number of countries experienced surges in investment in the 1920s. There are a few exceptions worth noting. For example, France experiences an investment boom in the late 1920s, which extends through 1930, reflecting its relatively late postwar stabilization in 1926, and the surge of investment initiated with the end of the post-stabilization recession in 1927 (sustained by the large amounts of financial capital that flowed back to the country as the strong franc came to be seen as a safe haven).[24]

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[23] While the positive comovement of stock markets may strike some readers as puzzling in light of the steady flow of capital from Europe to the United States, this is to neglect flow savings by residents of other countries and the substitution of stocks for other investments as the decade progressed. The positive comovement of stock markets across industrial countries is of course the same phenomenon observed in the late 1990s.

[24] Patat and Lutfalla (1990) observe that M2 continued increasing through the summer of 1930, unusual for the period, as a result of these capital inflows. This sequence of events and their connection with investment are analyzed by Eichengreen and Wyplosz (1988).

In order to more systematically draw out the connections between equity valuations and investment, Table 2 reports some simple investment equations (run in double log form), where the investment ratio is regressed on log q (equity prices deflated by wholesale prices, contemporaneous or lagged), lagged output growth (the accelerator term), and a lagged dependent variable (investment tending to be serially correlated because projects take time to complete and are less likely to be abandoned once underway). A doubling of q like that which occurred between 1926 and 1929 in the United States results, according to these equations, in an 18 per cent increase in investment, and the collapse in share prices that occurred subsequently would have had an even larger negative effect.[25]

We can ask which of these aspects of the credit boom phenomenon, if any, has explanatory power for the output collapse that followed. Figure 6 juxtaposes the deviation of each of these three variables relative to trend circa 1928 – which we take to be the peak of the

[25] In addition the collapse of stock market valuations could have worsened the Depression by undermining bank balance sheets and leading to the bank failures that, observers widely agree, were a key engine of deflation in many countries (see e.g. Bernanke and James 1991). In fact, however, there is little correlation between q in 1928 and the incidence of banking crises thereafter. A probit regression of the Bordo-Eichengreen banking crisis dummy on the deviation of q from its 1920s trend, with and without a variety of controls, never yields a coefficient that differs from zero at standard confidence levels. On reflection this is not surprising. Consider, for example the contrast between the United States and Canada. Although both had exceptional stock market booms in the 1920s, one had a banking crisis while the other did not. Evidently, the absence of restrictions on branch banking in Canada and regulations limiting the ability of Canadian banks to lend against real estate dominated the impact of changing asset valuations on bank solvency and stability. Or contrast Britain and Argentina. Neither country experienced a pronounced credit boom or rapid stock market run-up in the 1920s, yet the latter had a serious banking crisis in the spring of 1931, while the former escaped the problem entirely. The reasons are not hard to see: Argentina's terms of trade deteriorated in the Depression, while Britain's improved, and Argentina had been on the receiving as opposed to the sending end of capital flows in the 1920s. The behavior of stock markets mattered for the subsequent evolution of output and employment, and for the banking systems whose stability was an important determinant of macroeconomic fluctuations, but they were not the only thing

boom – with the subsequent collapse in GDP from 1929 through 1932. (To be clear, it is the *fall* in output that is displayed on the vertical axis; the larger the fall, the greater the value.) We address the problem of endogeneity by lagging our credit indicators when considering their association with subsequent business cycle movements. While this procedure is subject to Tobin's *post hoc, ergo propter hoc* critique, we are not convinced that his critique is compelling in our context.[26]

Of these three variables, only equity prices are strongly related to subsequent output movements.[27] The fact that deviations of M2/GNP from trend do not explain much of subsequent cross-country differences in the change in output follows from the fact that cross country differences in M2/GNP relative to trend circa 1928 are so small (as noted in our

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that mattered.

[26] In particular, we know of little evidence that contemporaries expected the severe downturn that we now refer to as the Great Depression in advance of the event (a few prescient Austrian-school forecasters to the contrary notwithstanding). See Dominguez, Fair and Shapiro (1988), Hamilton (1992) and Cecchetti (1992). For those not convinced that timing provides identification, in Section 4 we also relate the development of credit conditions to deeper institutional and structural features of the economy (the monetary regime, the sectoral composition of activity, the structure of the financial sector) that are clearly predetermined with respect to the credit-market developments of the 1920s.

[27] This points up the difficulty of distinguishing the credit and stock-market boom interpretations of the slump. While the stock market boom as a factor in the depression is a staple of history textbooks, it has not been much emphasized in the scholarly literature. In part, scholarly skepticism reflects problems with the thesis in the case of the United States, the country where the rise in stock prices was evidently most pronounced. The economic downturn in the U.S. preceded the stock market crash; while the business cycle peak was reached in August 1929, the Wall Street crash is conventionally dated as occurring in October. (The market reached its peak on September 3rd, 1929, but the big price drops associated in the popular mind with the Great Crash were Black Thursday, October 24, and Black Tuesday, October 29, well after industrial production peaked.) Moreover, the Great Depression in the United States was clearly compounded by the blunders of U.S. policy makers starting in 1930 – Hoover's tax increases and the failure of the Federal Reserve to stem the banking panics that ultimately forced a substantial fraction of all American banks to close their doors – as much as to any adverse consequences flowing from the run-up of the stock market. We will have more to say about this

discussion of Figure 5.) That deviations of investment from trend circa 1928 do not explain much of subsequent output movements is a generalization of Temin's (1976) point for the United States.[28]

3. A Composite Indicator

If we are prepared to be more courageous, we can combine these three dimensions of the credit boom phenomenon into a composite indicator similar to that utilized by Borio and Lowe (2002). The simplest approach is to weight the three components equally.[29] The result is shown in Figure 7, with the composite indicator averaged across countries. The idea is to capture not just the availability of credit to the private sector but also its interaction with asset prices and investment. The motivation is that the same increase in domestic credit may have different effects depending on the structure of the economy that amplifies or muffles its impact. The composite indicator thus seeks to capture both the impulse and its amplification by measuring not only the growth of credit but also its impact on asset prices and investment demand. Whether the composite indicator has more explanatory power than simpler alternatives is an empirical question. To be clear, we are not necessarily advocating the utility of this measure, but we are interested in exploring its explanatory power and implications.

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below.

[28] To reconcile the predictive power of equity prices with the lack of predictive power of investment, it is only necessary to observe that while the link from equity prices to investment is loose (as shown in Table 2), the link from investment to subsequent output movements is even looser.

[29] This is not exactly the procedure utilized by Borio and Lowe, who search for the best combination of weights that minimize the signal-to-noise ratio of subsequent banking crises correctly and incorrectly predicted. Below we experiment with some sensitivity analysis along these lines.

Figure 7 highlights the credit boom of the immediate post-World War I period, when interest rates were pegged at low levels but domestic demand was freed of wartime controls, allowing the volume of credit to be essentially demand determined and setting off a wave of merger-and-acquisitions activity and a surge of plant and equipment investment. This boom was then reined in by interest rate hikes starting in 1920 (see Lewis 1949). Lax credit conditions reemerged in the second half of the 1920s (as emphasized by Kindleberger 1973), peaking in 1928. In Figure 7, the late-1920s boom does not appear particularly pronounced relative to that at the beginning of the decade.

Figure 8 shows the composite indicator by country. Consistent with the interpretation of the immediate postwar credit boom in terms of the difficulty of curtailing wartime budget deficits and decontrolling interest rates, there is less evidence of the immediate postwar credit boom outside the main theaters of the war.[30] Turning to the second half of the 1920s, we see evidence of France's credit-induced recession in 1926, the year of the Poincaré stabilization. We observe the relatively early end of the credit boom in Germany, reflecting the Reichsbank's effort to discourage foreign borrowing in 1926 (by, among other things, allowing the Reichsmark to fluctuate more freely within the gold points, thereby introducing a foreign-investment-repelling element of exchange risk into the market) and then to put a damper on stock market speculation in the first half of 1927 (McNeill 1986, Voth 2002).[31] Evidently, the pegged

[30] In Argentina and Australia, for example.

[31] Robbins (1934, pp.49-50) argues that the German credit boom persisted into 1928, as capital flows from the United States "overbore" the Reichsbank's efforts to institute tighter conditions. Our composite indicators suggest that the boom ended earlier in Germany than the U.S., although one can quibble about the dating.

exchange rates of the interwar gold standard, while transmitting credit conditions across countries, also left room for distinctive national experiences.[32]

Figure 9 shows that the height of the credit boom, measured by the percentage deviation of the composite indicator from trend in 1928, varied across countries, and that its height at that date significantly predicts the severity of the subsequent downturn, here measured through 1932. We see, qua Robbins (1934), that the credit boom of the late 1920s was led by the North Americans – consistent with the U.S.-centered nature of the dominant interpretation of the financial boom and bust – with France and Italy not far behind. The Fed cut interest rates in 1927, partly in response to the motor-vehicle induced slowdown in the U.S. economy, as Henry Ford shut down his assembly lines to retool for the Model A (Kindleberger 1973), partly to address the problems of Western farmers suffering the effects of chronically depressed agricultural prices (Noyes 1938), and partly to relieve the pressure on sterling and other weak European currencies (Clarke 1967).[33]

A more limited credit boom is also said to have developed in the United States in 1925 (Kindleberger 1973), although this is hardly evident in our calculations (see Figure 8). The emphasis placed by these earlier authors on credit conditions in this period derives from the

[32] Schacht's emphasis on the need to introduce an element of exchange risk into the market in order to discourage what we would now refer to as the carry trade suggests that the pegged exchange rates of the interwar gold standard were a factor in the development of the credit boom. It will remind readers of contemporary arguments (viz. Goldstein 1998) that pegged rates can be an important source of investor moral hazard. We pursue these ideas in Section 5 below.

[33] Other authors thus offer a more eclectic interpretation of the Fed's motives than Robbins (1934), who focuses on the weakness of the British balance of payments and the Fed's concern for the stability of the interwar gold standard. Note that the NBER placed the business cycle peak in October 1926, and industrial production hit its low in the final quarter of the subsequent year. The Fed's interest rate cut was in the summer of 1927.

upsurge in residential construction, mainly in Florida but to an extent in other parts of the country as well).[34] This earlier credit boom may have similarly had roots in interest rate cuts taken by the Fed in 1924-5 to help Britain back onto the gold standard.[35] Whatever the motivations for the policy, there is little reason to doubt that monetary ease lay behind the property boom. In the words of Vanderblue (1927a, p.116), "[t]he relatively low yield on high-grade investments made it possible to tempt investors into purchasing real estate bonds...secured by new structures located in the boom territory."

But the 1925 boom was relatively minor and short-lived compared to what came after; this comes out clearly from our Figure 8, if not from narrative accounts of the period. By 1927 investment in real structures had declined by six per cent from its 1925 peak. Real investment declined from its peak because of the big decline in detached structures investment after 1925. Nevertheless, a frenzy of apartment building followed the detached dwelling boom (peaking in 1927), and a building spree in nonresidential structures continued through 1929 (Field 1992). This, clearly, poses difficulties for the credit-boom interpretation of the post-1928 slump. Even if credit fueled the residential real estate boom in the United States, the timing of the latter is

[34] On the nation-wide character of the real estate boom, see Field (1992). The Florida land boom is a story in itself (we will have more to say about it below). Among other things it featured the involvement of no less than Charles Ponzi. Ponzi issued certificates of indebtedness promising a 200 per cent dividend in two months' time. He used the capital thereby raised to purchase land for subdivision, planning 23 lots to the acre. Ponzi's advertising described the land in question as being "near Jacksonville," where in fact it was 65 miles west of the city and covered with a thick growth of palmetto and other weeds. When he was unable to quickly sell the lots, Ponzi predictably found himself unable to meet his financial obligations, and was subsequently indicted for violating Florida statutes regarding trusts and found guilty by jury. For details, see Vanderblue (1927a,b).

[35] Of course, other factors also contributed to the bias toward monetary ease, including the fact that the economy experienced a slowdown in 1923-4 and that the latter was an election year. On international motivations for 1924-5 interest rate policies, see Wicker (1966), Chapter

wrong for explaining the onset of the Great Depression, unless one is prepared to argue that the fall in investment in structures worked through to the rest of the economy with an unusually long lag.[36]

As investment in structures declined, the Fed cut rates. U.S. bank reserves grew faster in the second half of 1927 than in any other semester of the 1920s.[37] This supports the notion that the ready availability of credit to the American economy was a factor shaping the expansion of the later 1920s. Moreover, that expansion was heavily driven by spending on consumer durables purchased on the installment plan (Olney 1990), using credit provided mainly by nonbank lenders (finance companies, which had developed previously to finance purchases of income-earning durable goods like sewing machines and pianos but acquired new importance on the American scene when in the 1920s the major automobile producers established divisions and subsidiaries designed to finance purchases of their own durable goods), and by purchases of financial assets, financed with bank credit funneled to investors through their brokers (White 1990b).[38] The consequences showed up not just in the stock market, but in the burgeoning automobile industry, the leading sector of the 1920s, and in the commercial property market, which boomed in virtually every American city. It is no coincidence, for example, that the late 1920s was the occasion for the appearance of the modern high-rise, when the skylines of many American cities were defined. While the Florida real estate boom attracted more attention, given the sensational nature of some of the frauds and the colorful character of the individuals

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[36] This was of course Temin's (1976) objection to the older literature associated with authors like Robert A. Gordon emphasizing the rise and fall of fixed investment as a prime mover in the Depression.

[37] Rothbard (1975), Table 8.

involved, the urban building boom that followed later in the decade is temporally more consistent with the evolution of the composite indicator.[39]

In France, another country where there is evidence of a credit boom, capital inflows lubricated the operation of French capital markets starting in 1927, as the flight capital of the prior period was repatriated following the Poincaré stabilization. In the second half of 1926, this capital influx drove up the value of the franc. By the end of the year, the Bank of France and the politicians grew worried that further real appreciation would create hardships for French industry, and they pegged the currency (a policy given legal status in 1928 when gold convertibility was officially reestablished at the new, lower value of the franc). Nominal interest rates came down, and with the price level now stable (tied as it was to prices in the rest of the world), lower yields encouraged a movement into riskier investments (Eichengreen and Wyplosz 1988). Thus, one of the mechanisms that might have damped the subsequent investment boom, namely a real appreciation, was effectively disabled.

Less has been written about the credit boom in Italy.[40] Prior to the reintroduction of the gold standard at the end of 1927, the big universal banks could already count on discount window access at the Bank of Italy. Thereafter, capital inflows resulting from the placement of a

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[38] We elaborate the role of these factors in the sectoral studies of Section 5, below.

[39] From 1920 to 1929, real private nonresidential construction spending in the United States rose by a cumulative 56 per cent. Annual nonresidential real estate spending exceeded $5 billion in each of these years (up from $3 billion in the immediately preceding period); construction activity was most intense in the central business districts of cities like New York, Boston and Detroit. The value of commercial contracts awarded peaked in 1927-28, coincident with the peak in the composite credit boom indicator. Given the need for time to build, the process exhibited persistence: large commercial real estate projects like the Empire State Building were only finalized in 1929. (The Empire State Building actually broke ground only in March 1930; by 1931 it was being referred to as the "Empty State Building.") See Hoyt (1933).

[40] The classic reference is Toniolo (1980).

succession of foreign loans underwrote the continued expansion of credit. In addition, the central bank continued to follow an accommodating policy in view of its concerns with the financial condition of the three largest banks, something it could afford to do to the extent that it possessed reserves in excess of those required to back currency in circulation (Fratianni and Spinelli 1997, p.151).

The credit boom was less pronounced – though echoes were still audible – in Argentina, Australia, Belgium, Canada, Germany, and Norway.[41] It was all but absent in the United Kingdom, where starting in 1927 the Bank of England was forced to maintain restrictive credit conditions to support an increasingly overvalued currency, and in Denmark, another country that brought its currency back to par, which traded heavily with Britain, and which was tightly integrated into the London market.[42]

Boom turned to bust in 1929. The Fed, concerned that the high level of the stock market was diverting resources from more productive uses and heightening financial fragility, began raising its discount rate in 1928; higher U.S. rates in turn curtailed capital flows to Europe and Latin America, forcing central banks there to tighten to prevent their currencies from weakening.[43]

Overall, this analysis points to the existence of a short but sharp credit boom in the second half of the 1920s, peaking in 1928 and most prominent in the United States. Countries

[41] We will have more to say about some of these countries, Australia in particular, below.

[42] See Johansen (1987). Denmark is not conventionally regarded as a country with chronic financial problems in the second half of the 1920s, although the analysis here suggests that it may have had more in common with Britain than commonly believed. Consistent with this interpretation, Denmark was quick to follow the UK off the gold standard in 1931 and then joined the sterling area.

[43] The large flow of capital and gold to France in this period affected the rest of the world

with close economic ties to the U.S., such as Canada, had the greatest tendency to share in these conditions (Green and Sparks 1988). In contrast, countries with chronic exchange rate problems, notably Britain, did not share the same conditions because they did not share the same policies, their central banks being forced to put a damper on money and credit growth in order to defend weak currencies. A few countries where economic conditions were special – France because of the relatively late date of its postwar stabilization, Spain by virtue of never joining the interwar gold standard – display different time profiles, which is itself evidence of the tendency for an international financial system organized around the pegged exchange rates of the gold exchange standard to transmit these lax credit conditions to the rest of the world.

Figure 9 also shows the bivariate regression line summarizing the relationship between the height of the credit boom circa 1928 and the magnitude of the subsequent output collapse, accompanied by regression coefficients and t-statistics. The relationship is significantly positive (at the 90 per cent level). It retains its significance when we control for other national characteristics that also shape countries' susceptibility to recessionary forces – for example, their openness, their trade balances, and their dependence on international capital flows.[44]

The variation around the regression line reminds us that the magnitude of the credit boom, so measured, was by no means the sole determinant of the severity of the subsequent slump. The downturn in the United States was significantly more severe than the magnitude of

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in the same manner, as observed in histories of the period (e.g. Johnson 1998).

[44] For example, a regression of the change in real GNP per capita between 1928 and 1932 on the absolute value of the trade balance relative to GNP in 1928 and the 1928 value of the composite indicator yields (with t-statistics in parentheses):

y =	-97.95 -	32.21 trade balance ratio +	54.83 credit boom	
	(0.37)	(0.94)	(2.32)	F = 3.54, R-squared = 0.37

the credit boom alone would lead one to predict, particularly when the downturn is measured through 1932. This plausibly reflects policy-related shocks: the ratcheting up of interest rates to support the dollar after sterling's depreciation in September 1931 and the country's deepening banking-sector distress. Canada, while an outlier in the same direction, does somewhat better relative to the magnitude of its credit boom in the immediately preceding period. This may reflect that its banking system was more widely branched and that the commercial banks had been prevented from making mortgage loans in the 1920s (foreclosing one channel through which the credit boom might eventually lead to financial distress). The contrast is all the more striking given Canada's dependence on wheat exports and the droughts that swept the Prairies. On the other hand, the country was relatively slow to make up this lost ground in subsequent years. Australia does poorly relative to expectations (that is to say, relative to the regression line).[45] Japan is an outlier in the other direction: having suffered a series of economic difficulties in the 1920s and not going back onto the gold standard until 1930, it did not have far to fall when the Depression struck. Italy is also below the line. The Bank of Italy extended large amounts of secret last-resort lending to the three large ailing universal banks under cover of disguised exchange controls, supporting both the financial system and the economy.

These observations – and specifically the low value of the R-squared – give us an opportunity to clarify what we are and are not prepared to claim for this analysis.[46] We do not

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[45] Green and Sparks (1988) contrast the Australian and Canadian recoveries and attribute the timing of the turnaround to the identity of their principal trading partners: Australia's main export market, the UK, also began recovering at the end of 1931, whereas recovery in Canada's principal export market, the U.S., was delayed until 1933.

[46] Note also that the R-squared of the regression (of the fall in output between 1929 and either 1931 or 1932 on the one hand and the deviation from trend of the boom indicator in 1928)

wish to be misunderstood as arguing that the height scaled by the credit boom circa 1928 provides a complete explanation for the Great Depression, or that it provides a superior explanation to popular alternatives like post-1929 policy mistakes or the constraints of the international monetary system. Readers familiar with our own previous work on the role of the gold standard and bank failures (respectively) in propagating the Depression will have anticipated this point. Here the point is evident in the fact that the credit boom indicator explains less than a third of the cross-country variation in the post-1929 slump in economic activity. In addition, there is the fact, already emphasized, that the components of the composite indicator are not really distinguishable from proxies that might be used to test the effects of alternatives like the monetary, stock market bubble, and over-investment interpretations of the slump.

Thus, if we are going to convince the reader that the credit boom interpretation is a useful supplement to these better known interpretations of the onset of the Great Depression, this simple quantitative analysis will need to be supplemented with qualitative evidence pointing in the same direction. We turn to this qualitative evidence in the next section.

We conducted a variety of sensitivity analyses to give these measures a run for their money. For example, we considered only the fall in output through 1930 or 1931. Shortening

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is higher when we use the deviation of share prices from trend than when we use the composite. One way of understanding this is that the impact of the stock market was felt partly insofar as it also affected the other components of the composite indicator. Although these linkages existed, they worked in opposite directions and were subject to variable lags. Table 2 above documented the positive association of equity valuations with investment. At the same time, however, the fluctuation of share prices affected the excess supply of money and credit in the other direction. A higher level of q which stimulated investment would have also raised the denominator of the credit/GNP ratio, other things equal. With the other two components of the composite indicator moving in opposite directions in response to the rise of share prices, but subject to complex and variable lags, it is not entirely surprising that these other two components added more noise than information content useful for forecasting output.

the period over which the dependent variable is measured from 1929-32 to 1929-31 has essentially no effect; the t-statistic on the composite indicator changes from 2.36 to 2.49, and the R-squared of the regression is now 0.31 instead of 0.28. When we shorten the period covered by the dependent variable to 1929-30, however, the t-statistic on the composite indicator drops to 1.64 (just on the margin of significance at the 90 per cent level of confidence), and the R-squared falls to 0.16. There is a sense in which supporters of the credit-boom interpretation can take heart even from this negative result. Those who would emphasize the preeminence of policy mistakes (failure to act as a lender of last resort resulting in widespread bank failures, for example) would presumably argue that even if the credit boom indicator had explanatory power for the initial phase of the downturn, it can explain little of the subsequent cross-country variation in its depth and duration, which is primarily attributable to these other factors. In fact, we do not find that the shorter the period, the greater the explanatory power of the credit-boom thesis; the actual story is more complex.

We also experimented with a variety of alternative weighting schemes for the components of the composite indicator. One possibility is to weight the three ratios by their respective signal-to-noise ratios – that is, by the ratio of the share of subsequent crises successfully predicted by data through 1928 to the share of false positives, where the signaling threshold is set to maximize this ratio.[47] We are suspicious of this procedure insofar as it uses

[47] Borio and Lowe (2002) do something along these lines. When this is done separately for currency and banking crises, it yields slightly different composite indicators for the two cases, although the prevalence of twin crises in the 1930s dictates that the differences in the two variants are small. In practice, this means picking weights of 0.26, 0.40 and 0.34 on the M2/GDP, investment/GDP and equity price/CPI ratios for currency crises, and of 0.38, 0.32, and 0.30, respectively, for banking crises. Banking and currency crisis dates are taken from Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001). Conveniently, this is the same source as

information on post-1928 developments (on whether a country had a banking or currency crisis), which are plausibly correlated with the magnitude of the fall in output to derive the weights used to construct the composite used for forecasting the fall in output. For what it is worth, this variant of the composite actually performs less well; the t-statistics on the composite and the R-squared of the regression are lower than when we use unweighted averages of the three components, regardless of the period covered by the dependent variable.

We then looked to see whether there was any evidence of nonlinear effects of the credit boom indicators. Borio and Lowe (2002) suggest that credit booms are likely to have larger effects when the various indicators exceed typical levels by a relatively large margin (a "critical threshold"), and when several components exceed those typical levels simultaneously (when a high level of the composite indicator reflects substantial contributions from several components and not just one). A first test simply added squared values of the composite indicator as a second independent variable; these never entered with coefficients significantly different from zero or significantly enhanced the overall explanatory power of the regressions. We obtained more interesting results when we added to the regression equation displayed in Figure 9 interaction terms involving the individual components, setting the value of those components to zero when they were below trend. Thus, the interaction terms capture additional effects in above-trend "credit boom periods" only. When we added two-way interactions of credit with equity prices and credit with fixed investment, the coefficient on the composite remained essentially unchanged (the slope coefficient fell slightly to 1.13, and the t-statistic fell marginally to 2.33). In addition, the two-way interaction of credit and the stock market entered with a

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used by Borio and Lowe for the recent period.

coefficient that was significantly greater than zero at the 95 per cent confidence level, while the coefficient on the two-way interaction of credit and investment entered with a coefficient that was significantly less than zero at the 95 per cent level. This suggests that the credit expansion in the 1920s had the largest impact on the slump of the 1930s in countries where it was mainly associated with a stock market boom, while it had the smallest adverse effect where it was mainly associated with fixed investment. Neither of these additional interaction effects was large enough to reverse the dominance of the composite indicator in any of our sample countries. But the additional effects do suggest that whether the credit expansion of the later 'twenties was mainly associated with an equity run-up or a fixed-investment surge did significantly shape its implications for the severity of the subsequent downturn.

We then added the two other two interaction terms (the two way interaction of the stock market and investment, and the interaction of all three components of the composite index), but neither of the additional coefficients differed significantly from zero. The other effects were essentially changed.[48]

Some readers will worry about the combination of more and less developed countries in our sample and question whether the experience of the less developed countries speaks to the issues at hand. Eyeballing Figure 9 is sufficient to confirm that leaving out Argentina and the low-income European countries (Spain, Italy) does not weaken the relationship between the height of the credit boom circa 1928 and the magnitude of the output fall thereafter; if anything

[48] The significance levels declined, which is understandable given very limited degrees of freedom. The composite indicator was now significant at the 90 per cent confidence level, while the two-way interaction of credit and the stock market was significant at the 95 per cent level, and the two-way interaction of credit and investment just missed significance at the 90 per cent level.

the opposite is true. If we use weighted least squares (weighting the observations by per capita income), to more systematically reduce the weight on low income countries, the results are in fact strengthened; the fit of the equation is significantly improved. The same conclusion follows if we instead leave out the non-European and non-North American countries (Australia and Japan).

To summarize, the aggregate evidence provides some support for a Minsky-Kindleberger-Robbins-style interpretation of the Great Depression as a credit boom gone wrong. But the aggregate evidence has limitations. Given the important role of equity price deviations in the composite index, it is hard to distinguish the credit-boom and stock-market-bubble interpretations of the slump. And the preceding analysis tells us little about the precise circumstances where credit boom effects were particularly pronounced or the channels through which they were transmitted. For this, it is necessary to consider other evidence.

4. Sectoral Evidence

One way of shedding light on these questions is by looking more closely at the behavior of specific credit-sensitive sectors and activities, such as construction, consumer durables, and high tech. Doing so points us to two important conditioning factors. One is the structure and performance of the financial sector. We find that the credit boom and its impact were particularly pronounced where the organization and history of the financial sector led intermediaries to compete aggressively in providing credit. The other is the technological environment. We find that the credit cycle, as defined here, was particularly pronounced when accommodating finance coincided with the development of new network technologies with

significant long-term commercial promise but uncertain immediate potential (such as radio in the 1920s and the Internet in the 1990s).

A. The Construction Sector

As Figures 10 and 11 show, investment in structures, especially private residential fixed investment, rose sharply in the 1920s, not just in the United States but also in Canada, Finland, Sweden, the Netherlands, and the UK. The availability of credit played an important role in this response. But so too did indoor plumbing, electrification, the diffusion of the automobile, and the end of World War I. The war had destroyed thousands of structures and affected demographic conditions in ways that stoked the demand for housing (it led to unusually high family formation in the 1920s, for example). In turn, the cessation of the war stabilized the investment environment (or at least set the stage for doing so).

But there were significant differences across countries in the size and timing of their construction booms that cannot be explained by these factors. Australia, Canada, and the United States all experienced residential housing booms of varying degrees of intensity but had suffered no direct damage from the war. This points to the importance of credit market developments and in turn to differences in the structure and operation of the financial sector. Countries differed in terms of the institutions that were primarily used to finance mortgages (savings and loan associations and building societies in the U.S. and UK; savings banks in Australia; private mortgage banks in Belgium, the Netherlands, and Canada; the Credit Foncier in France; and cooperative mortgage societies in Scandinavia). They also differed in the development of secondary markets, as shown in Table 3. One conjecture based on Table 3 is that banks more aggressively financed investment in residential housing in countries where the financial system

was more intensely competitive. In the U.S., where banks and Savings & Loans were already failing at significant rates in the 1920s, financial institutions competed aggressively for high-yielding construction loans. In Australia, in contrast, where there had been prior consolidation of the financial industry, there was less of a tendency for banks to gamble for survival, and the magnitude of the construction boom was less.[49]

These differences in behavior in the upswing had important implications for the subsequent depression. Although the slump was severe in both Australia and Canada, in neither case was it compounded by a U.S. style banking crisis. The Australian banking system escaped the 1930s with only three bank suspensions despite a sharp decline in output. And Canada's 11 commercial banks remained in operation throughout the period. The resilience of their banking in the slump is commonly attributed, at least in part, to more conservative behavior during the upswing.[50]

There may have also been a role for accumulated experience in these differences. As noted above, Australia had experienced an earlier housing boom in the 1880s, fueled by rapid increases in mortgage lending by savings banks. Bank credit as a share of GDP doubled between 1880 and 1890. The majority of the increase went into residential construction, the 1880s being a period of rapid urbanization and population growth. In the early 1890s, when this boom turned to bust, 13 of the country's 23 banks failed or were forced to suspend operations. The U.S. also had credit booms in the 19th century, but none as dramatic as this earlier Australian episode.

[49] Indeed, Merrett (1991) criticizes the banks for the conservatism of their investment behavior in the 1920s.

[50] And partly of different macroeconomic policies after 1929, Australia being early to abandon the gold standard, the U.S. being relatively late.

None of these 19th century cycles had resulted in the failure of more than half of the country's financial institutions.

This earlier experience is said to have rendered Australian savings banks more cautious during the next credit boom, that of the 1920s. As Schedvin (1970, p.80) puts it, "Even after nearly 40 years the effect of the events of '93 coloured in no small way the banks' reaction to the depression." In contrast to the 1890s, even as credit expanded rapidly at the end of the 1920s (Figure 10), savings banks raised their capital ratios, limited their exposure to property, kept the maturity of loans relatively short, and held a relatively high share of government securities (Kent and D'Arcy, 2002). Meanwhile, in the U.S., S&Ls and other intermediaries fueled an orgy of construction that left the landscape littered with vacant apartment buildings, and with subdivisions that were prematurely divided and remained undeveloped for years (Field 1992). Mortgage debt more than tripled from $8 billion in 1919 to $27 billion in 1929. Realtors and developers often sat on the boards of S&Ls, influencing the operation and real estate lending of these intermediaries. This conflict of interest may have led lenders to make loans of lower quality and higher risk. Moreover, new and complementary sources of credit further fueled the boom. In 1913, regulators removed restrictions which had previously prevented national banks from holding real estate mortgages. And the growth of auto ownership (made easier in part through installment plans offered by auto finance companies, described below) accelerated the pace and extent of land subdivision and encouraged speculation on city edges and recently converted farmland.

To be sure, the structure and regulation of finance was not the only conditioning factor. Governments also put in place (positive and negative) incentives for residential housing

construction by the private sector. Most European countries imposed rent controls at the beginning of the war and kept them in place for some years following its conclusion.[51] The behavior of labor costs also was important.[52] But, then as now, the cyclical behavior of the construction industry cannot be understood without reference to the structure and regulation of finance.

B. Consumer Durables

Consumer durables further illustrate how the structure of the financial sector shaped the credit boom of the 1920s. To be sure, rising household incomes supported the growth of consumption, but financial institutions aggressively competing to supply households with credit allowed consumer spending to rise even faster than personal income. The most prominent case is the United States, where consumer debt as a percentage of personal income doubled from 4 ½

[51] The speed with which those controls were removed thus played a role in shaping the construction boom. In countries where the removal of rent control was delayed, the incentive for the private sector to undertake new construction projects was correspondingly less. Countries such as Belgium, Denmark, Norway, and France that were slow to remove rent restrictions in the 1920s or only did so partially (Table 3) experienced delayed growth or only modest growth in residential housing. In contrast, Finland, Sweden, and the Netherlands abolished rent control altogether in the 1920s, the UK began to phase out its laws in 1923, and Canada and the United States never adopted comprehensive rent control at the national level. In these countries, prices were freer to respond to the increase in demand for housing. The construction industry in turn responded to the market signals, undertaking building activity that was fueled by ample credit from building societies, mortgage banks, and insurance companies.

[52] Even after the initial postwar deflation, wage rates in the British building trades (circa 1923) remained 90 per cent above 1914 levels for craftsmen and fully 115 per cent for unskilled workers. Given the lag between price and wage adjustment in the 1920s, how and when countries stabilized their currencies appears to have mattered for the course of their subsequent housing booms. In particular, countries that deflated in the effort to restore prewar parities often saddled construction with higher labor costs that damped the response of the industry. These considerations go some way toward explaining the precocious timing of the U.S. construction boom. The country had no wartime depreciation to be reversed and no postwar depreciation to be halted; continual maintenance of the gold standard encouraged long-term financial commitments. It largely completed the necessary deflation in the initial postwar years, avoiding

per cent in 1918-20 to more than 9 per cent in 1929 (Olney 1991).[53] The only other country that appears to have come close is Canada, where proximity to the U.S. market heightened the power of example and made it relatively easy for U.S. financial firms to set up operations north of the border. By 1928 there were as many as 1,300 finance companies operating in Canada (which is only slightly smaller than the comparable number for the United States – see below).

Scattered evidence suggests that the rate of growth of the number of installment contracts in the 1920s was also rapid in a number of our other sample countries. But in other countries the process started from a lower base. Hence, consumer credit and household debt played a less important role in the macroeconomic upswing and eventual collapse in these other countries.[54] Recall that the credit boom as measured in Section 2 above was most pronounced in the U.S. and Canada. That financial institutions providing consumer credit had penetrated these economies extensively suggests that they played a role in amplifying the credit boom in both North American countries.

None of these practices was entirely new. In both the United States and Britain they were already widely commented upon in the first half of the 19th century.[55] Singer had sold

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extended disjunctures between prices and labor costs.

[53] Not surprisingly, analysts of the U.S. economy have placed considerable weight on the deterioration of household balance sheets as a factor depressing consumer spending in the subsequent slump (Mishkin 1978).

[54] This observation is not original with us. Crick (1929, p.103) argues that installment credit did more to amplify the business cycle upswing in the U.S. because it started from a higher base and its use was more evenly spread over the population. In the UK, in contrast, "the net result is a comparatively small expansion in the total volume of installment buying on the upward phase of the business cycle."

[55] The first instance of an installment credit plan in the United States of which we are aware was that introduced in 1807 by Cowperthwaite & Sons of New York, a furniture store. Scott (2003) argues that the phenomenon emerged in Britain in the second quarter of the century.

sewing machines on credit in both the U.S. and Britain from the 1850s. Pianos, household furniture and even books were financed using installment credit in subsequent decades.

But it was the advent of assembly-line methods for the production of automobiles and the development of a mass market in motor vehicles that resulted in the rapid growth of installment credit. The General Motors Corporation established the General Motors Acceptance Corporation (GMAC) in 1919 to finance sales of its cars. GMAC having demonstrated the advantages of this mechanism, other producers followed suit, along with a large number of independent (non-producer affiliated) finance companies. By 1925 there were more than 1,500 finance companies operating in the United States.[56] By 1927 nearly two-thirds of new cars in the U.S. were purchased on installment terms.[57] Olney (1991) shows that installment credit was of comparable importance for purchases of a variety of household appliances.

While the growth of installment purchase was global, commentators were unanimous in arguing that the phenomenon was most advanced in the United States. An indication of this fact is the role of U.S. financial institutions in the development of analogous mechanisms in other countries. Almost immediately following its establishment, GMAC branched into Canada, where General Motors and other U.S. producers dominated the motor vehicle market.[58] GMAC was active in the UK in the 1920s, prompting the development of indigenous competitors such as

[56] The National Association of Finance Companies was then formed with the object of standardizing the installment business. The NAFC laid down rules for, inter alia, deposits and maturities, and in 1925 the American Rediscount Corporation was established to act as a kind of proprietary reserve bank for finance companies. The history of the ARC is yet to be written.

[57] Bowden and Turner (1993), p.252.

[58] The first Canadian sales finance company, the Continental Guaranty Corporation Canada, was formed in 1916, coincident with the growth of motor vehicle purchases (Neufeld 1972). A specialized company, the Fidelity Contract Corporation, had been established in 1904 to discount piano paper, and it had been joined by several competitors by 1916.

the United Motor Finance Corporation Ltd.[59] GMAC similarly established branches in Antwerp, Berlin, and Copenhagen (Crick, 1929, p.22). Inspired by this example, the Italian Automobile Club attempted to establish a finance company to promote sales of cars.

Other American companies also participated in the development abroad of institutions of consumer credit, reflecting the relatively advanced state of installment lending in the U.S. and the country's role as a capital exporter. An important step in the diffusion of installment credit in the UK came in 1919 when Continental Guaranty of America created a British subsidiary, United Dominions Trust, to handle credit sales for motor cars. In the 1920s, the Commercial Investment Trust Company, the second largest American finance company, purchased subsidiaries in Germany, France and Scandinavia while operating its own offices in Argentina, Brazil and Cuba. Installment credit spread to the Netherlands partly through the creation of the N.V. Hollandsche Disconteerings-Bank in 1925, formed with American capital participation. Other capital and commodity exporters emulated the practice. Thus, once installment finance companies sprang up in Switzerland in the 1920s, they quickly opened offices in Germany to finance purchases of Swiss products.

Installment business similarly gained importance in Australia in the 1920s, especially in financing purchases of imported goods, including motor vehicles. By 1928 at least 70 companies were engaged in the business in the state of Victoria alone. Specialized finance companies issued cash orders to be paid off in installments that were accepted at leading shops in

[59] UMFC went public in 1928. In the UK the practice was known as hire purchase rather than installment purchase. Reflecting differences in legal convention, in the U.S. case ownership of the goods passed to the consumer, the seller or finance company merely retaining a lien. Under hire purchase, in contrast, the consumer leased the good (whose title thus resided with the financier) with an option to buy.

payment for virtually anything except food. (They were even used to pay for dental care on the installment plan.) But the Australian authorities, their views still colored by the crisis of the 1890s (see Subsection 4A above), began to worry about the over-extension of credit as early as the summer of 1927. In response they applied direct pressure to curtail the extension of installment credit for the purchase of imported cars. In parallel with the conservative approach of Australian banks to financing construction activity, this constrained the role of credit in fueling the upswing, and in turn limited the extent of financial distress in the subsequent slump.

Elsewhere, the growth of installment credit was rapid. Scott (2003) shows that the number of hire-purchase agreements outstanding in Britain nearly tripled from 6 million in 1924 to 16 million in 1928. Crick (1929, p.6) estimates that 80 per cent of pianos and gramophones, 50 to 60 per cent of motor cars, 70 per cent of sewing machines and 50 per cent of furniture sold in the UK in the 1920s were subject to installment agreements.[60] He notes that down-payment terms were lower than in the United States and that the terms on which installment credit was extended grew increasingly liberal over the period, consistent with other observations about financial behavior in the late stages of a credit boom.

However, all this growth began from a much lower base than in the United States. Even at the end of the 1920s, installment credit was still too small to significantly affect the macroeconomic aggregates. Figures in Scott (2003) suggest that installment credit financed only about 2 per cent of British retail sales in this period. Comparable ratios for other European countries were almost surely lower. In the U.S., in contrast, nearly 9 per cent of consumer

[60] The Board of Trade estimated that by the late 1930s, hire purchase agreements were used in more than 70 per cent of sales for cars and bicycles, working class furniture, and electrical household equipment (Hoovers, audio equipment), while trade estimates suggest that it

spending in the 1920s was on durable goods.[61] Of all spending on durables, 60 per cent was on big-ticket items (major durable goods), and some 70 per cent of that in turn was financed with consumer credit. In addition, a substantial fraction of minor durable goods were purchased under the installment plan.[62] We see here the higher base from which installment credit in the United States expanded in the 1920s and thus the more significant macroeconomic consequences of its growth.

As in construction, part of the explanation for these exceptional features of U.S. experience may have been the intensely competitive nature of the financial sector, including ease of entry. By the late 1920s, 1,500 finance companies competed with commercial banks for a toehold in the market. To be sure, other factors played a role as well; for example, relatively high household incomes and an egalitarian distribution of income meant that there was a large pool of households in a position to purchase big-ticket items like automobiles, vacuum cleaners, audio equipment, and kitchen appliances. European motor-car producers continued to concentrate on high-end vehicles, partly reflecting their slowness in adopting mass-production methods, but partly because they perceived more limited working-class demand.[63] Scott suggests that the household equipment component of consumer spending was less important in the UK than the U.S. because British husbands somehow failed to appreciate their wives' need

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accounted for at least this proportion of pianos and sewing machines.

[61] Olney (1991), p.27.

[62] Olney (1991, Table 4.4) suggests that the share may have been only slightly lower than that for automobiles.

[63] Bowden and Turner (1993) find that income distribution was very important for explaining the diffusion of motor vehicle ownership in the UK – that a more uneven income distribution than in the U.S. led to significantly slower diffusion.

for a Hoover! More plausibly the explanation lies in lower living standards and greater income inequality.

Thus, the structure and response of the financial sector seems to have played an important role in transmitting the credit boom of the 1920s, although financial structure was not the only factor shaping the differential response of different countries.

C. High Tech

The end of World War I and the restoration of price stability restored investor as well as consumer confidence. The most prominent aspect of this trend was investor enthusiasm for the commercial potential and profitability of newly developed, technologically sophisticated products and processes (including but not limited to consumer durables). A famous case in point is radio, as noted in Section 1 above. Radio was the 1920s analog to the Internet, right down to the use of the medium to trumpet the promise of investment in that same medium. RCA was market leader into which investors scrambled in anticipation of capital gains (the price of RCA stock rose from 1 ½ in 1921 to a high of 549 in 1929 – some 73 times earnings – despite the fact that the company paid no dividends anytime in the period).

But while radio was the most dramatic case in point, technological dynamism was not limited to this one sector. The 1920s was also the age of automobiles and mass production – the years following Henry Ford's development of the assembly line and the decade of the Model T.[64] It featured technological breakthroughs in the use of electrical machinery and the production of synthetic chemicals. Along with RCA, the high-tech stars of the period included Westinghouse, General Electric, AT&T, and Montgomery Ward (the Walmart of the time, whose attractions to

[64] Ford switched over to the Model A in 1927, as noted above, not without consequences

investors resided in the innovative nature of its retail network). Field (2003) suggests that the technological advances associated with the activities of these companies had as a corollary a significant acceleration in the rate of total factor productivity growth, which stoked the enthusiasm of investors.[65]

Firms captured this investor enthusiasm in rising stock prices. Our index of high tech stocks (sectors such as communications, electrical equipment and appliances, inorganic chemicals and transportation, and firms such as Dupont, Maytag, General Electric, Westinghouse, Chrysler and GM) rose by over 200% between 1926 and 1929.[66] (See Figures 12 and 13.) What these technological advances did not uniformly translate into, however, was short-run profitability. With benefit of hindsight, we now know that the enthusiasm of investors for the commercial potential of these new technologies, above all radio, was premature, although not wholly unwarranted. Networks require an installed base in order to be commercially viable, and radio in particular required a significant installed base before the industry became profitable. The number of U.S. households with radio sets rose rapidly but in 1928 was still less than a third of 1939 levels. A profitable market for advertising presupposed the existence of broadcast networks which only began to develop with the establishment of the National Broadcast Company in 1926 (initially as a network of 19 stations). For all these reasons, commercial viability took time. That investors overestimated the speed with which profitability would ensue may not have been entirely unrelated to prevailing credit conditions: the low level of interest

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for the course of the boom.

[65] Although, just as in the case of the second half of the 1990s, there remains dispute over the precise magnitude of the acceleration and the sectors in which it was centered.

[66] The quarterly market capitalization index is based on 10 industries, using SIC-level data from CRISP. The market capitalization figures for the 10 industries are summed and then

rates prevailing in the United States and the ample availability of brokers loans, reflecting the liquidity of the financial system, may have encouraged investors to reach for riskier investments.

Perez (2002) generalizes the point, arguing that the emergence of new network technologies regularly causes stock markets to overreact. In her view, securities markets regularly respond to the emergence of a new network technology with a boom and bust cycle which must be completed before glimmers of profitability and commercial viability finally become visible. She tells this same story of the canal boom of the 1820s, the railroad boom of the 1840s, electrification in the 1890s, the age of radio, automobiles and mass production in the 1920s, and the information and communications boom of the 1990s. Each of these innovations involved the deployment of a network technology, necessarily implying a lag of uncertain length between initial installation and eventual profitability. In each case, in her account, market participants overestimated the speed of deployment and adaptation, causing securities markets to overshoot.

Importantly from the present point of view, Perez emphasizes the role of the financial system, and of accommodating credit conditions in particular, in fueling speculative activity.[67] In each case, she argues, the availability of credit was enhanced by financial innovation, which provided channels for liquidity to flow to technologically dynamic sectors. In the 1920s the innovations in question included the new techniques for marketing securities to individual investors and the spread of the investment trust. In Perez's view, the infusion of liquidity into the markets leads to easy capital gains, which in turn encourage "ethical softening" in the frenzy

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indexed (1929:01 = 100).

[67] This, of course, is a familiar argument, also highlighted by, inter alia, Schumpeter (1939).

phase, followed by the inevitable fall.[68] The long-run productive potential of the economy is enhanced by the investment consequences of all this financial activity, but an extended period of capital losses and consolidation still must intervene before a positive impact on profitability is felt.[69]

Thus, in addition to reinforcing the emphasis we place elsewhere in this paper on financial structure, this sectoral study highlights the important role played by the interaction of finance with innovation.

5. Credit Booms and the Gold Standard

How a pronounced credit boom could develop under the gold standard is not obvious. In principle, the gold standard did not provide an elastic currency at the global level, which should have worked to limit the amplitude of the credit boom.[70] For the world as a whole, supplies of

[68] Again, the argument has important precedents, such as Minsky (1986) and Kindleberger (1978).

[69] Can the behavior of the high-tech sectors in the 1920s help us to distinguish between the credit-boom and bubble interpretations? That the run-up in the stock market was most pronounced among high-tech firms and particularly evident in the United States, the seed bed of the new industries, might seem like prima facie evidence for the bubble interpretation; as Perez argues, bubbles seem to be associated with the early emergence of network technologies of great promise but uncertain short-run profitability. However, accommodating credit conditions play an important role in the response of the securities markets, even in Perez's own story. It is not technology but the interaction of technology with financial conditions that matters for her story. The technological impulse propelling the stock market may have been exogenous from the present point of view, but had credit market conditions been tighter, due to some combination of a more restrictive monetary policy and a less dynamic financial structure, the response of securities prices would have been less.

[70] To be sure, the inelasticity of the currency under the gold standard created other problems, such as pronounced fluctuations in money and credit over the cycle that could cause financial stringency and distress in the banking system, including, in the worst case, financial crises. It is revealing that the Federal Reserve System was established precisely in order to provide "an elastic currency."

money and credit should have been tied down by supplies of monetary gold that were inelastic in the short run.[71] Hence, when a credit boom got underway, it was not accommodated by increased supplies of money and credit. Higher interest rates would tend to dampen investment and choke off borrowing by stock-market speculators. The implication was that credit booms should have been less pronounced under the gold standard. This was the contemporary conclusion of Mises and Hayek, described in Section 1 above.

Today, in contrast, "the external constraint on credit imposed by the gold standard has gone." "Central banks now virtually ignore the pace of credit expansion so long as inflation is under control. As a result, the 'elasticity' of private credit creation has increased significantly" (*The Economist* 2002, p.23).

How to characterize the 1920s from this point of view is not clear. There was a sharp rise in the importance of foreign exchange reserves relative to gold, compared to the prewar era, imparting more elasticity to global supplies of money and credit. During the boom period (1924-28) the share of foreign exchange in the total reserves (gold plus foreign exchange) of the 24 central banks considered by Nurkse (1944) rose from 27 to 42 per cent (before falling back slightly to 37 per cent in 1929). It then collapsed to 19 per cent in 1931 and 8 per cent in 1932. This lent a procyclical elasticity to money and credit under the hybrid interwar gold-exchange standard. It is one reason why the elasticity of credit creation could have been higher than suggested by textbook models of the gold standard system.

[71] Mining and prospecting activity and the incentive to melt down jewelry for coinage in periods of deflation lent some elasticity to global gold supplies, as emphasized by contemporary observers, but the magnitude of this response was limited at business cycle frequencies; see Rockoff (1984).

Of course, this critique of the interwar gold standard may equally constitute a critique of the prewar gold standard. Central banks also held foreign exchange reserves before 1913. But the practice was not as widespread as in the 1920s. And we are aware of no other period in which the share of foreign exchange reserves fell as sharply as in 1929-32, effectively destroying a third of the global monetary base.

Before 1914, central banks holding excess gold reserves were also able to manipulate the money multiplier by, inter alia, altering their discount rates. Bloomfield (1959) emphasized the tendency for the rates of discount of the major central banks to move together over the cycle, as if some such reaction was occurring on a global scale. Authors like Cairncross (1953) and Ford (1962) suggest that changes in money and credit conditions occurring in response to investment fluctuations were an important source of global business cycle fluctuations under the pre-1914 gold standard. Portraits of the consequences by authors like Kindleberger (1978) do not suggest that credit booms were less pronounced in the gold-standard years than under subsequent monetary regimes.

The preceding discussion focuses on the gold standard as a global monetary regime, an appropriate view if the credit boom of the 1920s is seen as a global phenomenon. Alternatively, we can consider the gold standard's operation at the country level and ask whether it would have worked to restrain or encourage a credit boom in a particular country.

We are not aware of much satisfactory theoretical analysis of the connections between the exchange rate regime and endogenous credit dynamics. The Asian crisis and other recent episodes in which pegged rates have collapsed have encouraged the view that pegged rates encourage credit booms. Under pegged rates, animal spirits that drive up the stock market and

investment, in turn raising interest rates, will encourage capital inflows from abroad, augmenting supplies of money and credit. When the exchange rate is pegged, there is little perceived exchange risk to deter interest arbitrage and no tendency for the currency to appreciate and tamp down the investment boom.[72] Even if the supply of credit is fixed at the global level, it is elastic from the point of view of the individual country. Thus, credit booms concentrated in individual countries (or groups of countries) may be even more pronounced under fixed than flexible exchange rates. This view is informed by the experience of Scandinavian countries in the late 1980s and by the experience of Asian countries in the 1990s, when large capital inflows sustained pronounced credit booms, setting the stage for an even more painful subsequent fall (McKinnon and Pill 1997, Goldstein 1998).

This view assumes that the boom does not originate in increases in domestic credit but rather from other sources like irrational investor exuberance and that it is then accommodated by capital inflows. If, on the other hand, the source of the boom is excessive domestic credit creation, then this will lead to balance of payments deficits and capital outflows that, if left uncorrected, may jeopardize the pegged exchange rate. In this situation, the pegged rate is a restraint rather than a contributor to the credit boom. From this point of view, whether pegged rates in general and the gold standard in particular are part of the problem or part of this solution will depend on the source of the boom – whether it is domestic credit as opposed to investment or asset-price inflation – and whether it is a global or country-specific phenomenon. The answer will also depend on how monetary policy is conducted, since even pegged rates provide some room for discretion under certain circumstances.

[72] Recall our discussion of the French credit boom of the late 1920s, which is couched in

Ultimately, then, whether credit booms were more or less pronounced under the gold standard is an empirical question. We can analyze it by constructing analogous indicators of credit booms using annual data for the period from 1880 up through 1997 and then calculating whether the volatility of our measure is greater in times and places when the gold standard was absent than when it was present. We have the necessary data for all or most of this period for nine countries: Australia, Canada, Denmark, France, Germany, Italy, Sweden, the United Kingdom and the United States.[73] We detrended separately for the pre-1914, interwar, Bretton Woods and post-Bretton Woods periods. We then computed the standard deviation of the detrended composite, looking only at boom periods (observations for years when the composite was above trend). Finally, we compared years when countries were on the gold standard with years when they were not, and years when exchange rates were pegged to when they were floating (on the grounds that the same arguments regarding the external constraint that apply to the gold standard also apply, in principle, to other fixed-rate regimes).

From the results (Table 4), it would appear that the amplitude of credit booms as measured by the standard deviation was greater in periods when exchange rates were pegged than when they were floating. The difference is significant at the 95 per cent level.[74] In contrast, when we compare when countries were on the gold standard with when they were not, we find no differences in volatility under the two regimes.[75] These comparisons thus lend little support

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exactly these terms.

[73] We are missing data for the early part of the pre-1914 period for Canada, Denmark, Italy and Sweden (due to gaps in the stock market series).

[74] This is also true when we use signal/noise ratios constructed on the basis of banking crises or currency crises.

[75] A variety of sensitivity analyses confirmed these results. Thus, we used different detrending schemes (for example, fitting log-linear rather than linear trends to the stock market

to the notion that credit booms were less of a problem under the gold standard. On the other hand, they are consistent with the view that *pegged rates* – which limit inflationary pressures but allow the demand for money to be endogenously determined, and which encourage policy makers to focus on the stability of prices and exchange rates but not the evolution of credit conditions – are conducive to credit booms, in individual countries or groups of countries at least, if not necessarily in the world as a whole.

It could be that the interwar gold standard was special – that the credit boom of the 1920s was an anomaly and that similar phenomena were absent, or at least more muted, prior to 1914. This, after all, was the Mises/Hayek view. Hence, the final row of Table 4, instead of comparing gold-standard and non-gold-standard observations, compares pre-1914 gold-standard observations with non-gold-standard observations (that is, it eliminates the interwar gold standard years). As before, we restrict the analysis to credit-boom episodes – that is, to periods when the credit boom indicator is above trend. This change in periodization transforms the picture. The amplitude of credit-boom episodes appears to have been less before 1914 than in the non-gold-standard years (starting in the 1930s).[76] Any evidence that credit booms were more

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series); the results were in all cases virtually identical. We weighted the components of the composite using signal/noise ratios, as explained above. We used different weights for the four subperiods (1880-1913, 1919-1938, 1945-1971, and 1973-97); again, none of our results was affected. We computed the standard deviation of the entire series (rather than simply for those portions where the composite indicator was above trend), in which case we were able to detect no significant differences between the gold standard years and other periods.

[76] Note that any bias in the volatility of estimates of pre-1914 national income would work against this conclusion (recent authors having argued that conventional estimates of pre-1914 GNP may be excessively volatile), which only reinforces our finding.

pronounced under the gold standard than other monetary regimes, in other words, is attributable to the 1920s experience that is the subject of this paper.[77]

Our overall conclusion is that the gold standard was neither the cause nor the solution to the credit-boom problem; the effects depended importantly on how that gold standard was structured and managed. Similarly, this analysis does not support the notion that pegged exchange rates are either a fundamental cause or a solution to the credit-boom problem. Our own view is that an exchange rate rule, which focuses monetary policy makers' attention on a particular asset price rather than on the broader constellation of asset and commodity market conditions, is not the optimal basis on which to formulate monetary policy. But the evidence of this section suggests that, more than the putative monetary regime, what matters is how monetary conditions are managed in practice.

6. Conclusion

The 1990s was a decade of low and stable interest rates in many countries. Accommodating credit fueled increases in property prices and facilitated increasing consumer indebtedness, notably in the United States, while financing high investment rates. It encouraged

[77] Recall also that we find that the credit boom of the 1920s was heavily concentrated in a handful of countries and that equity prices rather than the supply of domestic credit were the most important contributing factor. Our preceding discussion suggests that these are precisely the circumstances under which a pegged exchange rate would amplify such booms: as equity prices rose, stimulating investment and increasing the demand for credit, capital would flow in to arbitrage interest differentials, rendering credit more elastic and deactivating one mechanism (scarcity of funds and higher interest rates) that would work to limit the boom. The question, of course, is whether there was any difference in the factors initiating credit booms before and after 1914. The popular view of pre-1914 expansions and recessions is that they were mainly driven by investment and asset price booms and collapses, not by monetary policy. Thus, it is not clear that this provides an explanation for the apparent contrast between the pre-1914 period and the

rapid increases in securities prices. These developments heightened the vulnerability of financial systems and economies to a sudden reversal of sentiment, although the consequences to date have taken the form less of a bang than a fizzle. To be sure, credit market conditions do not provide the entire explanation for these developments. Investment and equity valuations were also stimulated by accelerating productivity growth, although the magnitude of this new-economy phenomenon remains a matter of dispute. But it is hard to dispute that credit market conditions at least played a supporting role.

Among the consequences of these developments has been renewed interest in the work of Mises, Hayek, Robbins and Rothbard, who emphasized the role of credit dynamics in post-World War I cyclical developments. For a combination of domestic and international reasons, the Fed maintained a relatively accommodating stance for much of the 1920s. With inflation stabilization, other countries found themselves on the receiving end of capital inflows. Financial innovation magnified the impact of these accommodating credit conditions, and central banks did little to preempt their effects. The consequences, as in the 1990s, included property booms, increasing consumer debt, surging investment and rising securities prices, particularly those of high-tech firms. They included growing worries about the stability of financial institutions and markets. They culminated in the collapse of financial markets and institutions and the gravest macroeconomic crisis the modern world has ever seen.

This characterization of the Great Depression as a credit boom gone wrong has much to recommend it as a cautionary tale for current-day policy makers. We wish not to be misunderstood: as emphasized above, we are not arguing that the credit-boom interpretation is a

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1920s evident in the data.

superior alternative to analyses of the Depression emphasizing the roles of the gold standard, the stock market boom, and monetary blunders. But a horse-race is not the appropriate context in which to assess theories of the Great Depression. The Depression was a complex and multifaceted event. The perspective provided by the credit-boom view is a useful supplement to these more conventional interpretations.

In particular, focusing on the credit boom of the 1920s directs attention to the role of the interwar gold standard in setting the stage for the slump of the 1930s. Our analysis suggests that equally pronounced credit booms were not a facet of the classical gold standard. Notwithstanding the colorful accounts of Kindleberger et al., the amplitude of credit fluctuations appears to have been less under the pre-1914 gold standard than under the more flexible exchange rate regimes that followed. Evidently, however, the interwar gold standard was different. Our conjecture is that the strongly procyclical behavior of the foreign exchange component of global international reserves and the failure of domestic monetary authorities to quickly install stable policy rules to guide the more discretionary approach to monetary management that replaced the more rigid rules-based gold standard of the earlier era are important for explaining the fragilities that set the stage for the Great Depression. Previous work has emphasized the role of the interwar gold standard in the post-1929 collapse of foreign-exchange reserves and money supplies and in the international transmission of destabilizing impulses. But the credit boom view suggests that the structure and operation of the interwar gold standard also played a role in the expansion phase, when the endogenous response of the foreign exchange component of global reserves allowed credit to expand more rapidly than

would have been possible under traditional gold standard arrangements. This is an important extension of the conventional gold-standard-and-Great-Depression story.

In addition, focusing on the role of credit conditions in the expansion of the 1920s and slump of the 1930s directs attention to two factors that warrant more attention than they have received in the recent literature on the Great Depression: the structure of domestic financial systems and the interplay of finance and innovation. Financial structure and regulation have featured in the comparative literature on the causes of banking crises in the 1930s (Grossman 1994), but other channels through which they could have shaped and accentuated the boom of the 1920s and the subsequent reaction may have not received their due. The interplay of finance and innovation in stimulating the expansion and setting the stage for the crash has been the subject of even less attention, with recent authors tending to focus exclusively on one or the other of these two factors. It was of course precisely the experience of the 1920s and 1930s that provided the backdrop for Schumpeter's great work, *Business Cycles,* where he characterized capitalism, and in particular its cyclical aspect, as "innovation financed by credit." The experience of the 1990s reminds us that the development and effects of credit conditions may play out in quite different ways depending on the nature of the technological environment. It reminds us that the interaction of credit with innovation warrants additional attention.

The implications for policy are less clear. One possible implication is that policy makers should act preemptively to prevent the development of unsustainable credit booms that might have seriously negative macroeconomic and financial consequences when they turn to bust. The strong version is that central banks should concern themselves not just with commodity price inflation but also with asset price inflation, especially in periods of technological dynamism

when asset market inflation has a particular tendency to overshoot. They should tighten when they see credit expanding rapidly and asset-market conditions responding enthusiastically, and do so even if commodity-price inflation remains subdued.

But most policy makers and analysts are reluctant to draw this conclusion. Central banks have no reliable way of determining when asset prices lose touch with fundamentals. This was as much a problem in the 1920s as the 1990s. It is only with benefit of hindsight that textbook writers refer confidently to a bubble, and even now, not all observers agree. In any case, monetary policy is a blunt instrument to deploy in response to increases in asset price valuations. The collateral damage to the real economy can be severe, as Hjalmar Schacht learned in 1927 and George Harrison learned in 1929.

A more appropriate conclusion, in our view, is that although financial market conditions are important, they are first and foremost the responsibility of financial market regulators. In the interwar period, regulators should have concerned themselves with conflicts of interest between the underwriting and advising activities of the investment banks before as well as after the fact. They should have engaged in closer supervision of financial institutions if they saw signs that loan quality was deteriorating. They should have contemplated increases in capital and liquidity requirements to prevent the credit boom from developing in ways that heightened the vulnerability of the economy and the financial system to a subsequent downturn. This seems to us the right lesson for policy to draw also from the experience of the 1990s. The problem, of course, is that such lessons are always more evident after the fact.

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Table 1
Ratio of Private Credit to GDP

	1913	1929
Belgium	2.34	2.51
Denmark	3.41	3.72
France	2.79	2.57
Germany	2.59	1.64
Japan	1.88	3.39
Norway	2.19	3.08
Switzerland	4.30	4.49
United Kingdom	2.65	4.60
United States	2.43	4.08

Notes: Computations based on data from Raymond Goldsmith, *Comparative National Balance Sheets, A Study of Twenty Countries, 1688 - 1978*, University of Chicago Press, 1985. The years provided by Goldsmith very slightly for some countries: US (1912); Norway (1930); Japan (1930); and UK (1927). Total private credit is the sum of the following national balance sheet items: mortgages, consumer credit, loans by banks and other financial institutions, corporate stocks and bonds, trade credit, and other private credit. The figures exclude government debt.

Table 2
Tobin's q and Investment
(Double log regression, with investment ratio as the dependant variable)

	Pooled		Country fixed effects		Country & time fixed effects		Random effects	
q	0.18	-	0.15	-	0.20	-	0.18	-
	(2.64)		(2.25)		(2.45)		(2.64)	
q_{-1}	-0.01	0.15	0.08	0.20	0.03	0.21	-0.01	0.15
	(0.06)	(4.34)	(1.12)	(4.98)	(0.43)	(4.72)	(0.06)	(4.34)
$(I/Y)_{-1}$	0.72	0.71	0.55	0.54	0.58	0.56	0.72	0.71
	(21.25)	(21.00)	(13.42)	(13.18)	(13.04)	(12.68)	(21.25)	(21.00)
$(GDP\ growth)_{-1}$	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(2.70)	(3.08)	(2.58)	(2.96)	(0.24)	(0.75)	(2.70)	(3.08)
Constant	-1.33	-1.25	-1.88	-1.79	-1.71	-1.55	-1.33	-1.25
	(7.09)	(6.78)	(8.79)	(8.57)	(7.32)	(6.42)	(7.09)	(6.78)
Number of obs.	298	298	298	298	298	298	298	298
R^2	0.67	0.49	0.66	0.66	0.73	0.72	0.72	0.71

Note: t-statistics in parentheses.
Source: See text.

Table 3
Residential Real Estate Market

	Average mortgage (as % of home value)	Return to gold standard	End of rent control
BE	60%	1925	1928 phase out begins; re-enacted 1934
UK	75%	1925	1923 phase out begins
DE	60%	1927	1929(except Copenhagen, 1935)
FI	50%	1926	1923
FR	60%	1928	1929 laws partially phase out
NE	65%	1925	1927
NO	60%	1928	1931
SW	55%	1924	1922
US	60%	na	none, only regional in nature
AU	na	1925	none
CA	55%	1926	none

	Second mortgage market	Usual length of mortgage	Primary source for borrowed funds
BE	no	5-20 years	Antwerp Mortgage Bank; Land Credit Bank of Belgium
UK		20 years	building societies, insurance co.'s
DE	yes		credit associations; mortgage associations
FI	yes		savings banks, insurance co.'s
FR	no	9-30 years	Credit Foncier de France
NE	not active		mortgage banks
NO	yes		insurance companies & savings banks
SW	yes	5 or 10 years/renewable	mortgage banks; Urban Mortgage Bank of the Kingdom of Sweden
US	yes	11 years	S&Ls
AU	no		Savings banks, building societies
CA	yes		Loan&Trust Co.'s, insurance co.'s

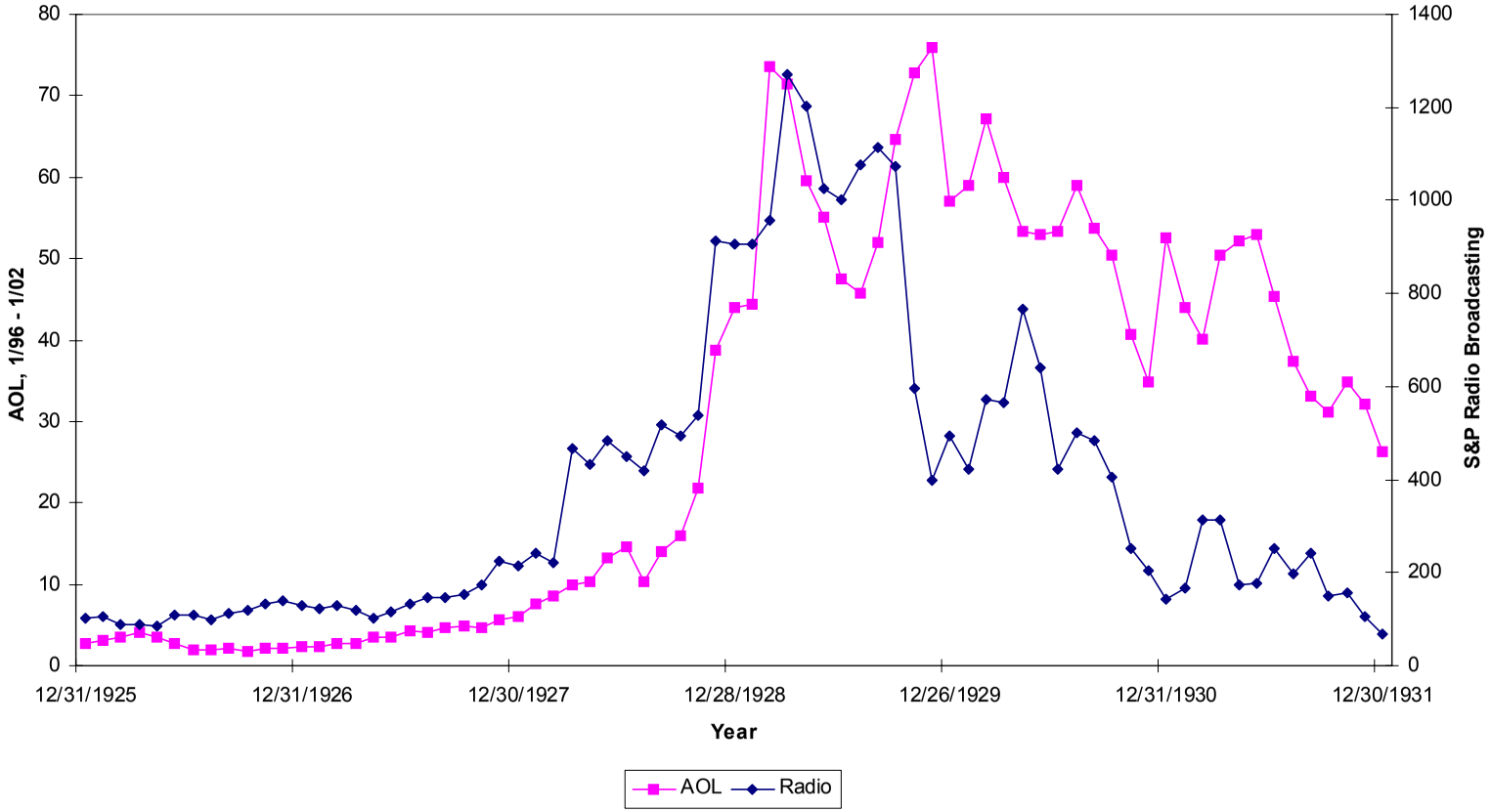
Source: League of Nations, *Urban and Rural Housing*, League of Nations, Geneva, 1939.

Table 4
Volatility of Credit Booms: The Gold Standard, Pegged Rates and Other Exchange Rate Regimes
(credit-boom observations only)

Comparison	Pegs (including Gold)		Flexible		p
	obs	SD	obs	SD	
Pegs v. others (equal weights)	216	7.46888	155	6.472419	0.0294
Gold Standard v. others (equal weights)	130	7.262342	241	6.949759	0.2786
Pre-1914 Gold Standard v. non-gold (equal weights)	88	5.373846	241	6.949759	0.0030

Source: See text.

Figure 1
Stock Prices: Radio versus the Internet



Source: Global Financial Database and CRISP.

Figure 2
Divergence in US Dividends & Stock Prices

Source: Data are from pp. 571-72 Rappaport and White, "Was There a Bubble in the 1929 Stock Market?" *Journal of Economic History,* 53, 1993, pp. 549-74.

Figure 3
Money to GDP (%) and Trend

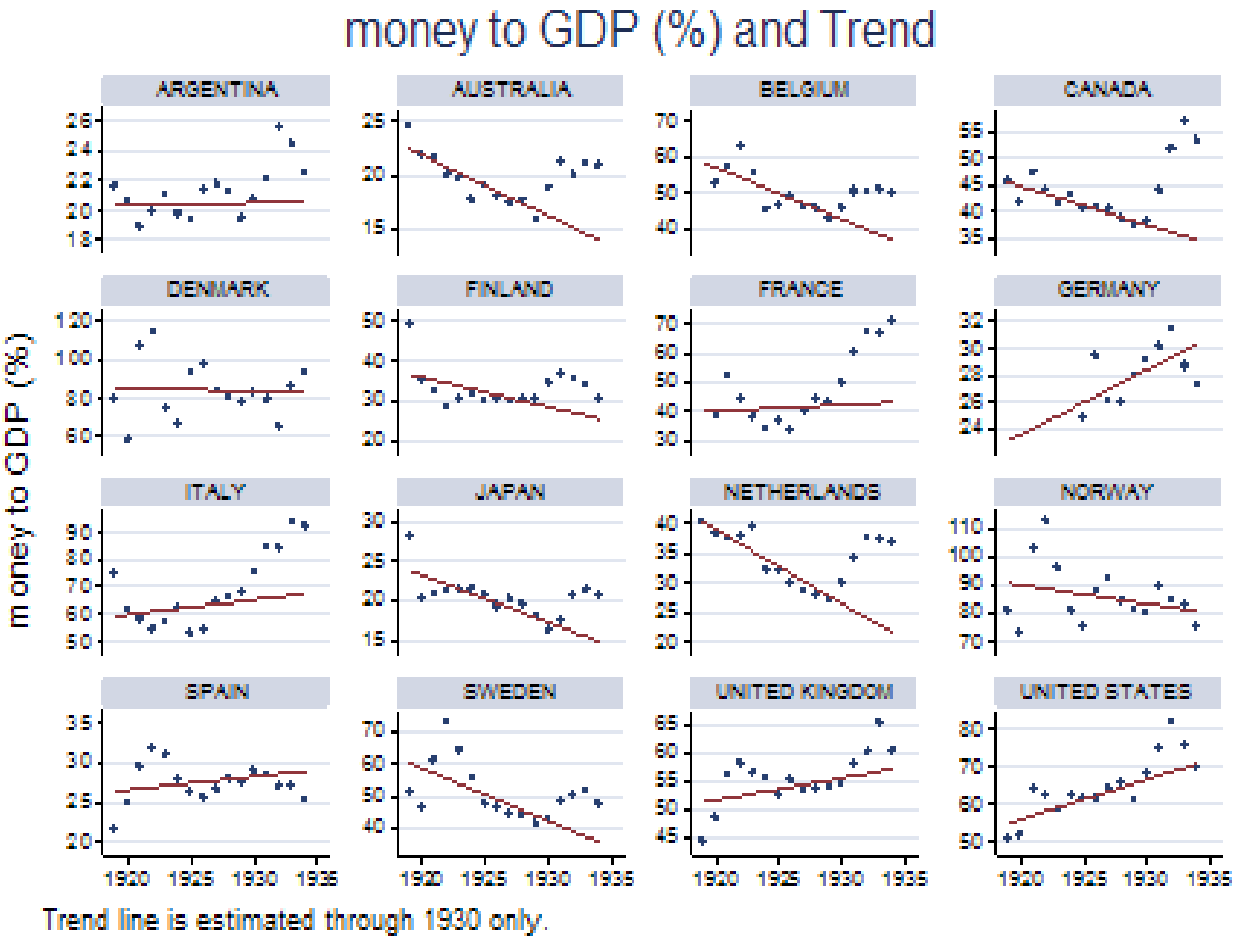


Figure 4
Stock Index Adjusted by CPI and Trend

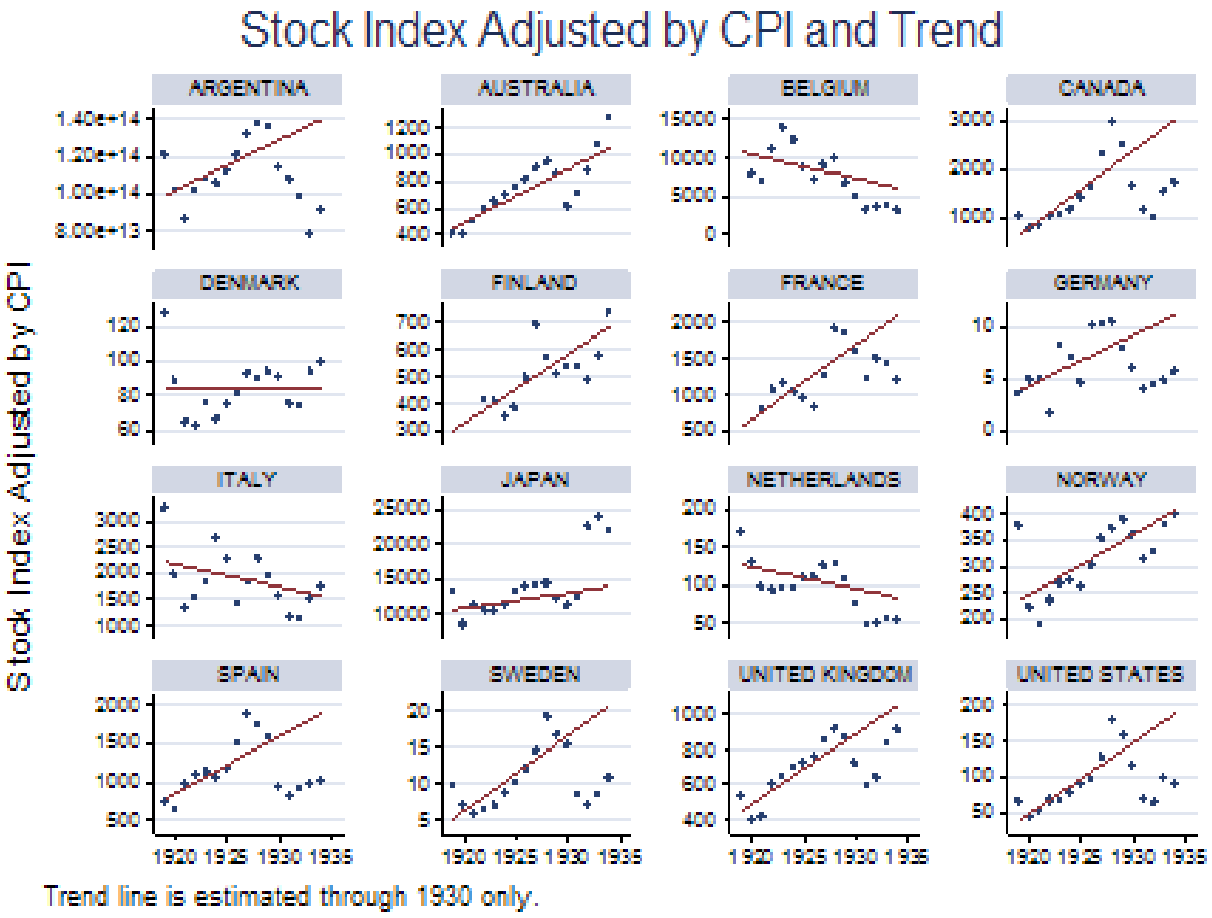


Figure 5
Investment/GDP and Trend

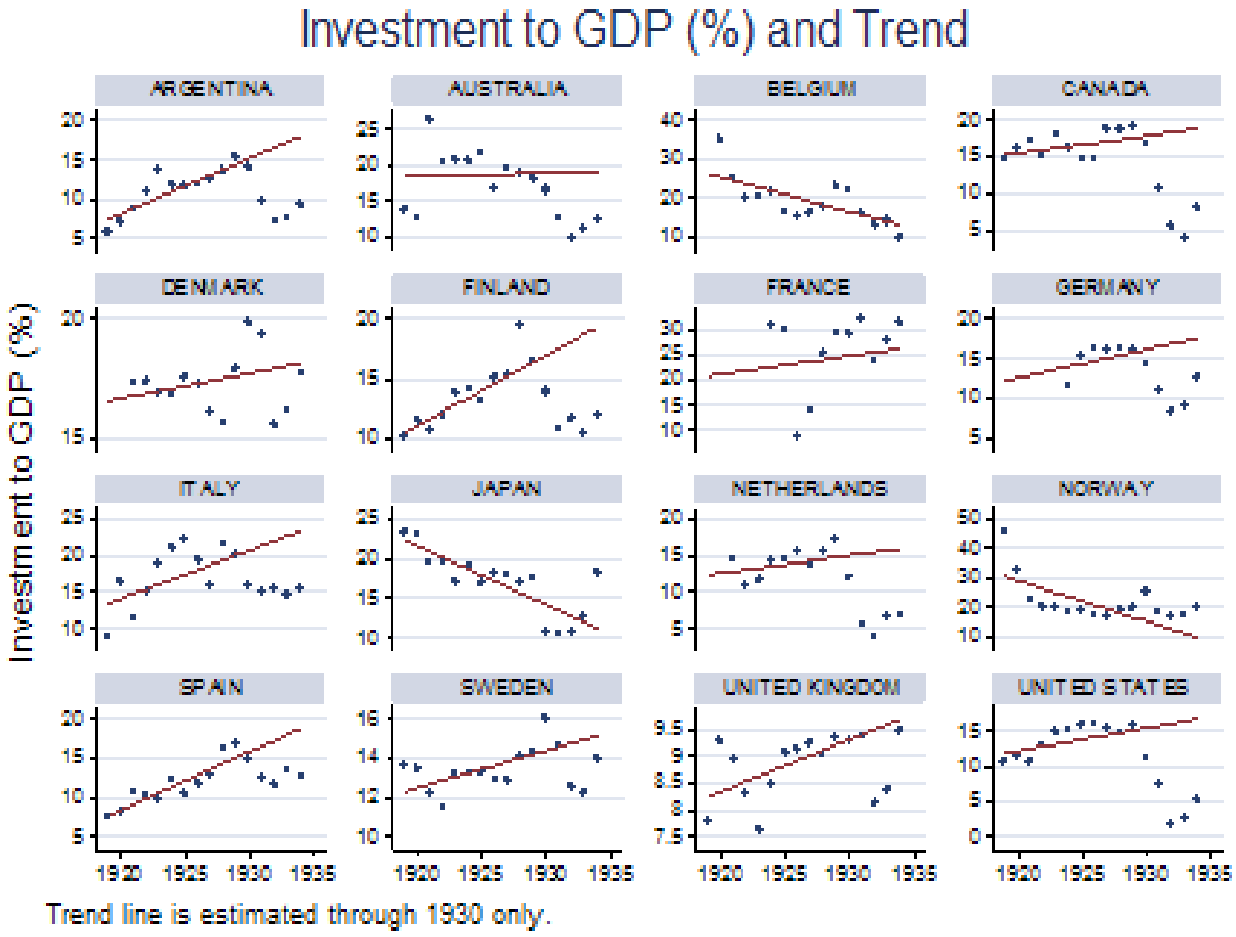
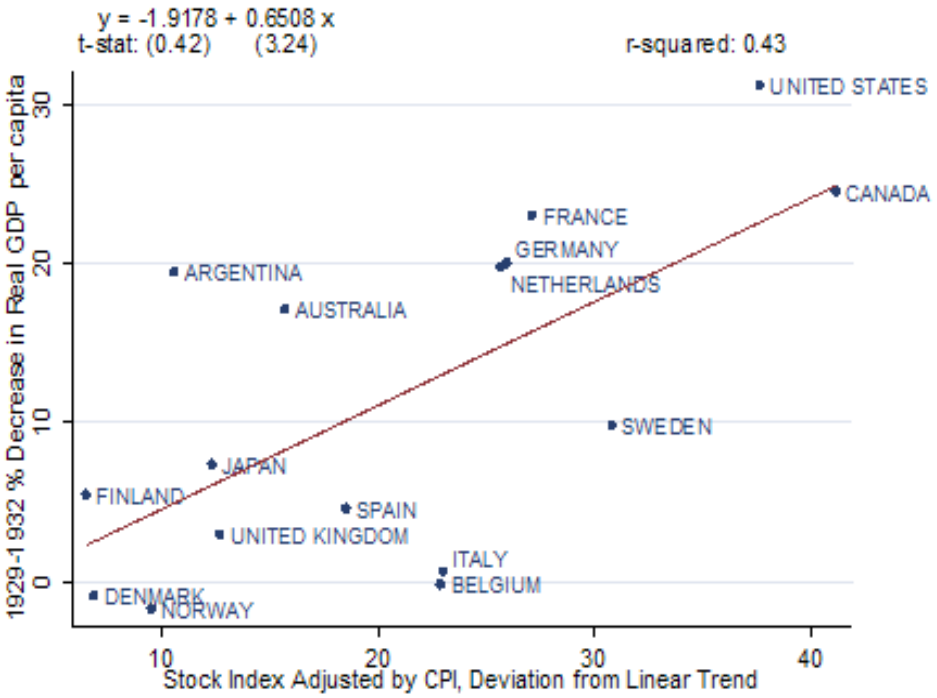


Figure 6
Credit Boom Components and Subsequent Output Fall



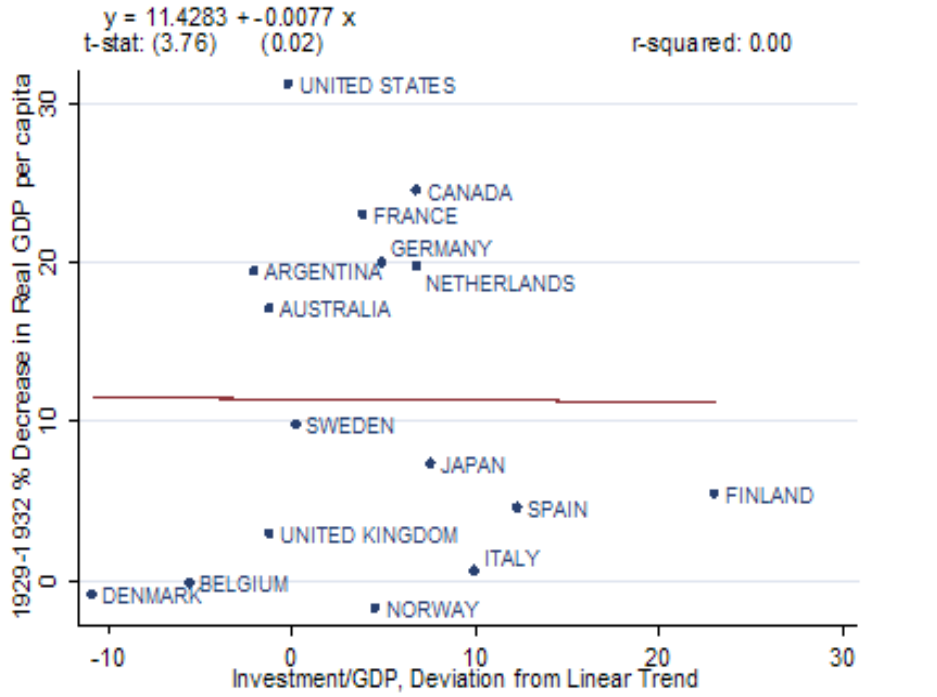


Figure 6 Continued

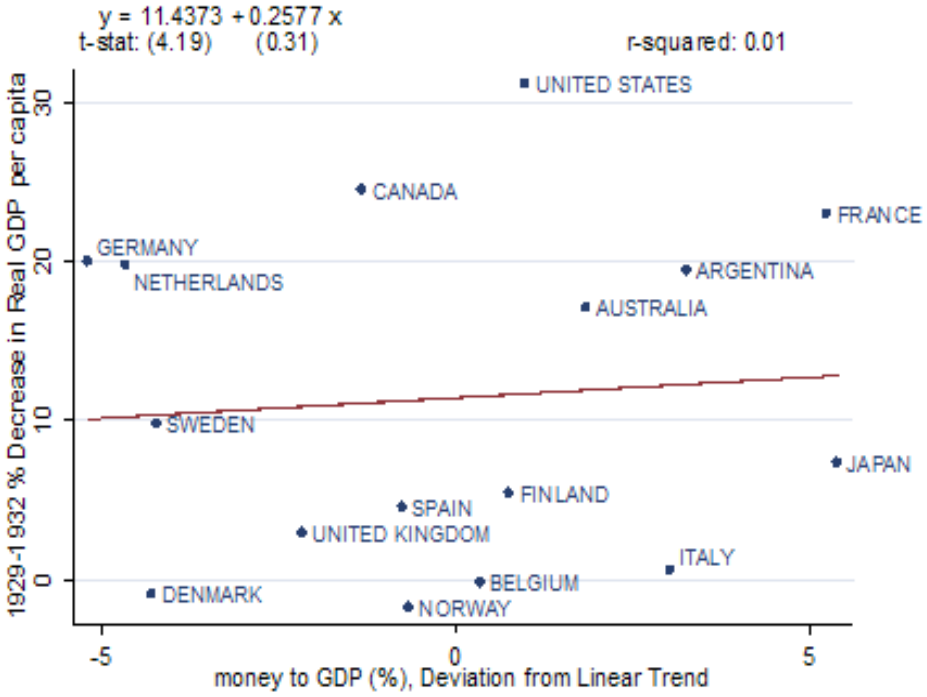


Figure 7
Average Composite Indicator Using Equal Weights

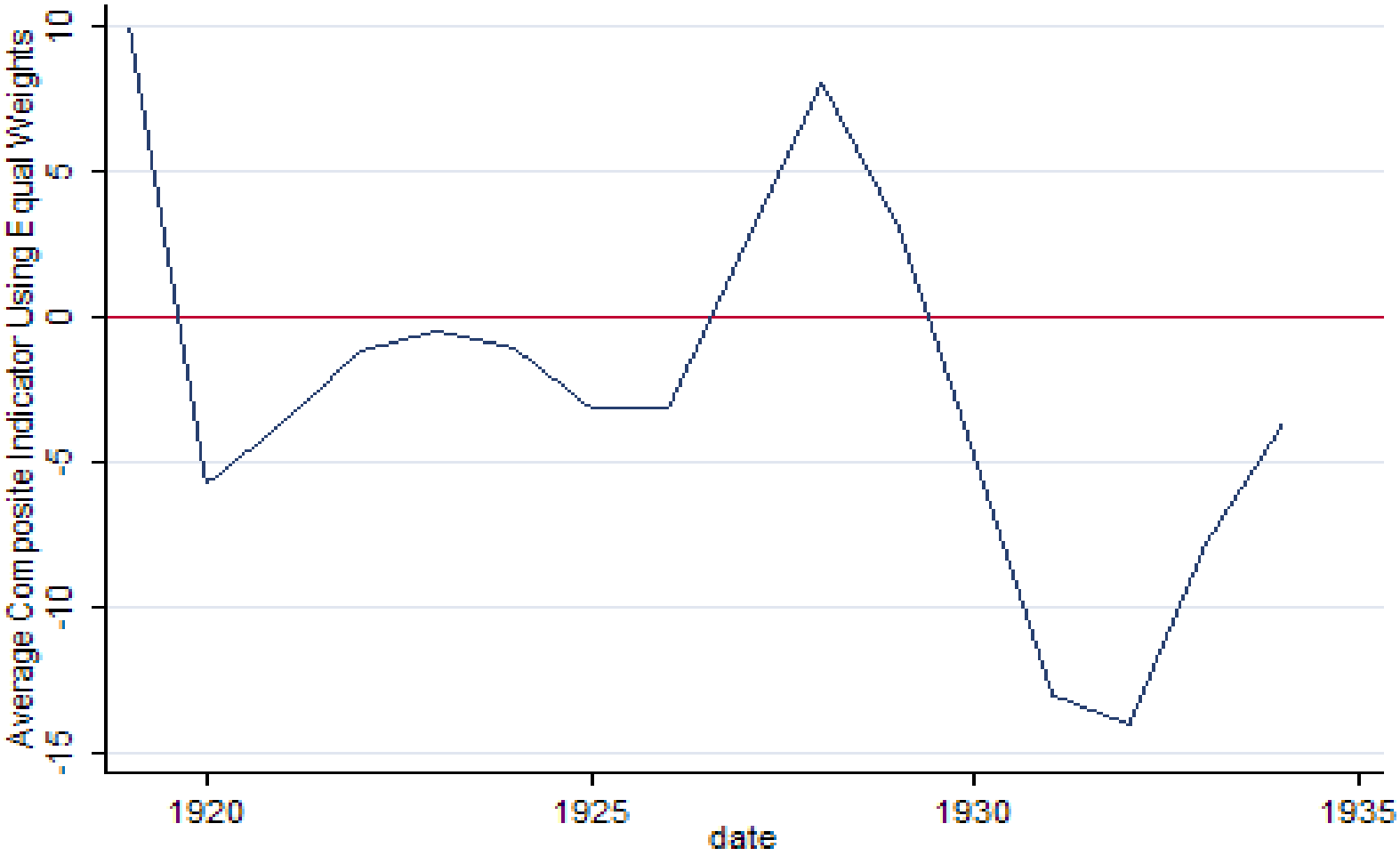


Figure 8
Composite Indicator Using Equal Weights

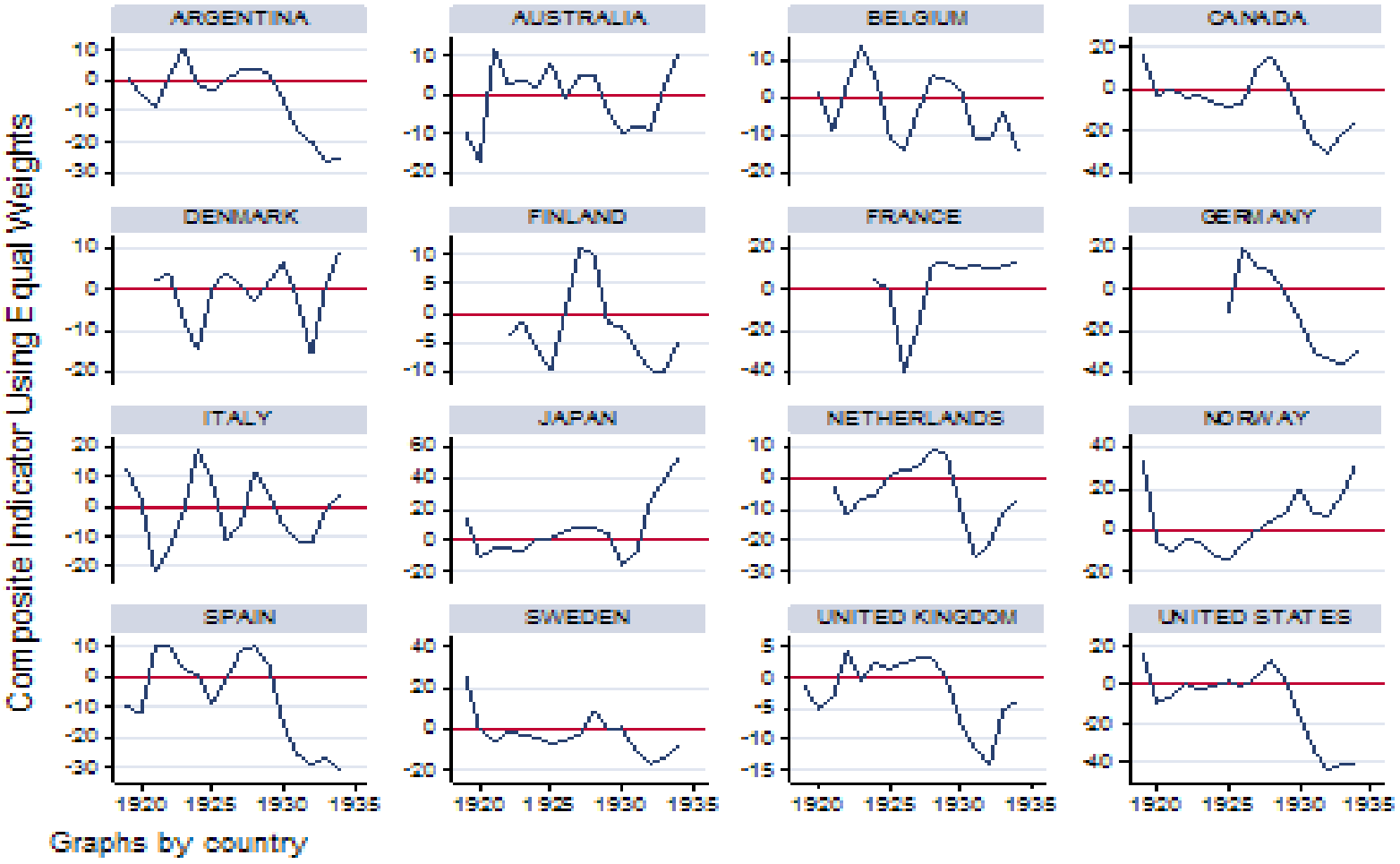


Figure 9
Credit Boom and Economic Slump

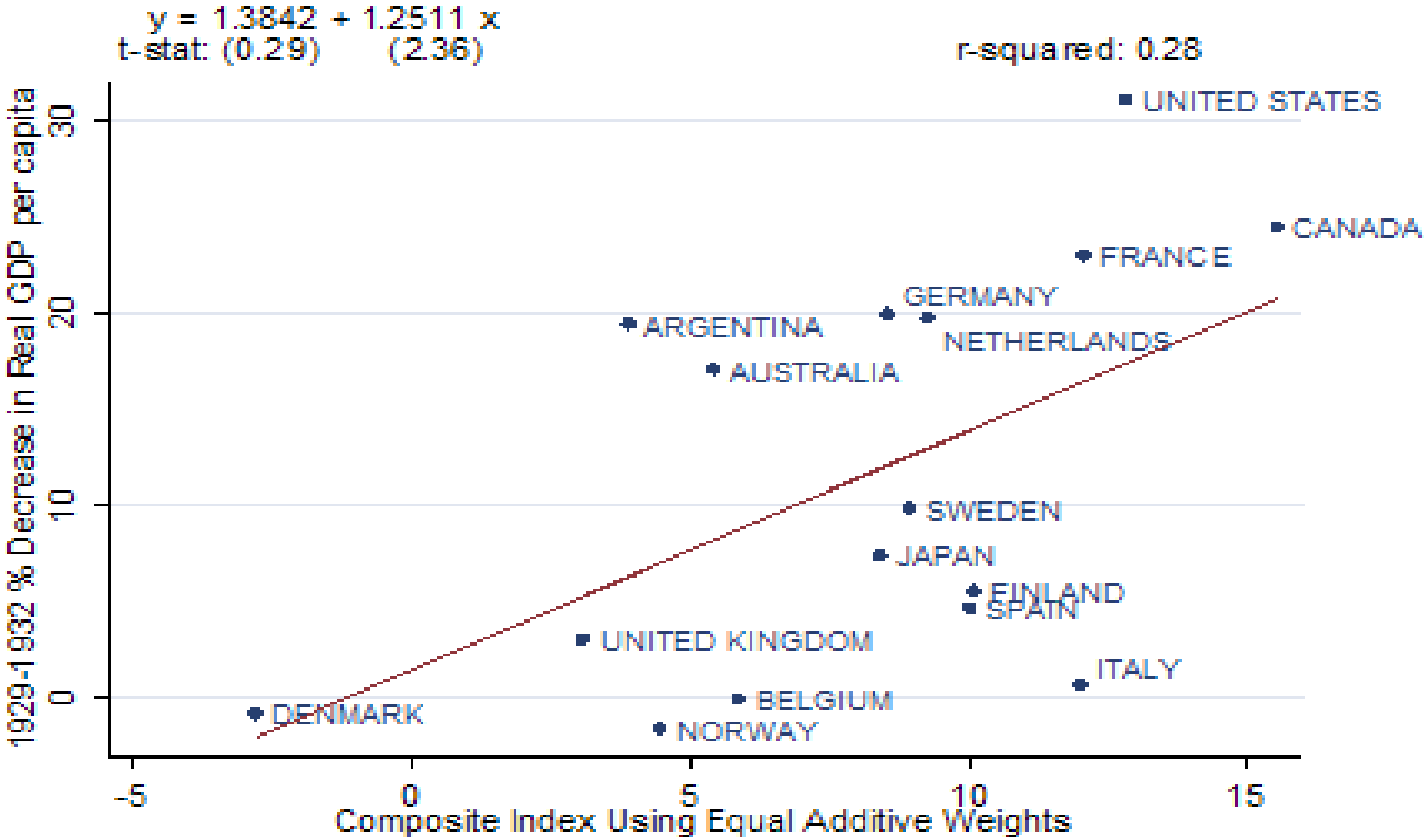
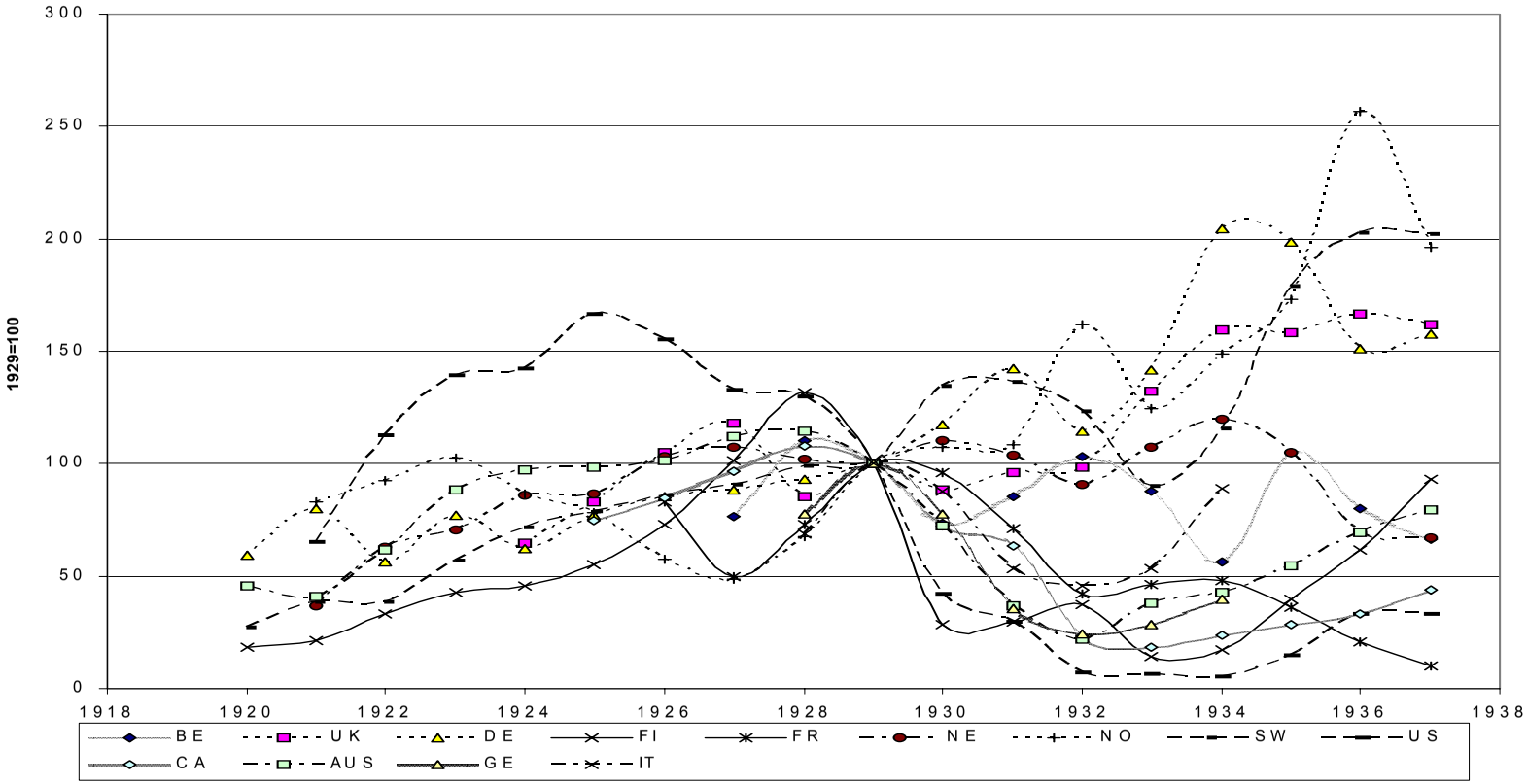
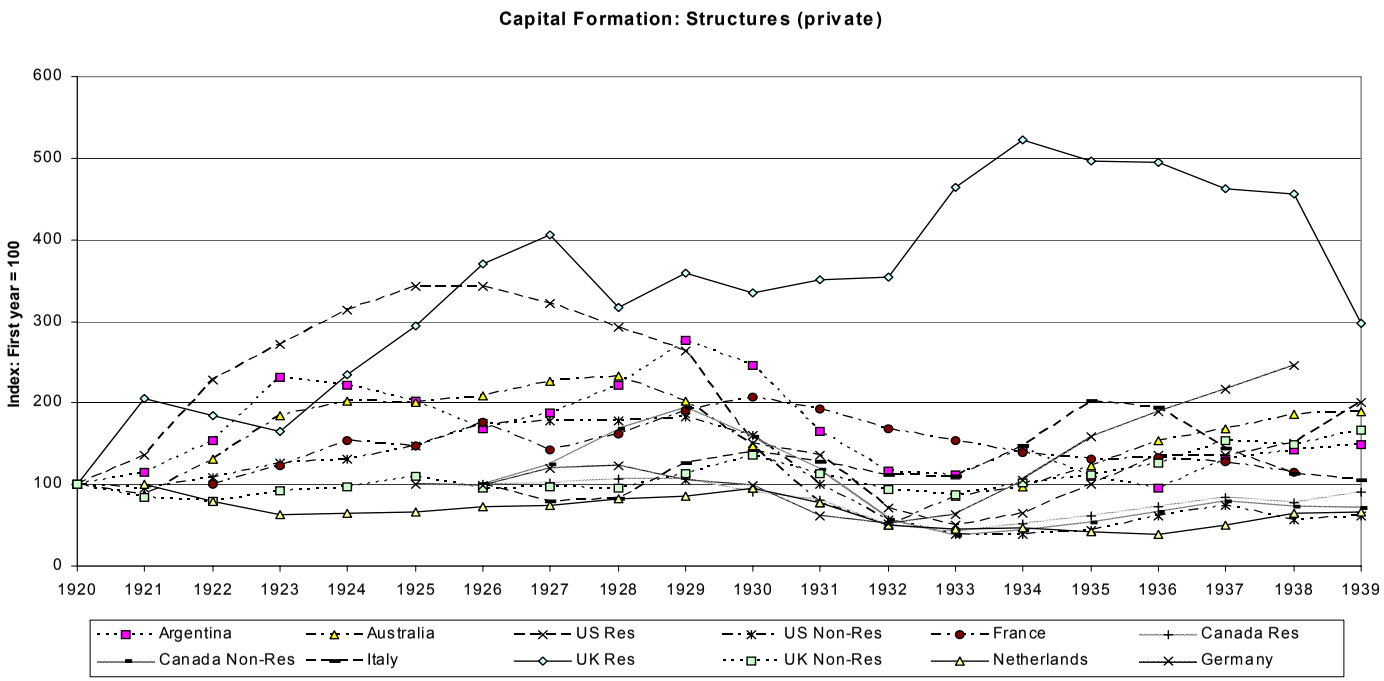


Figure 10
Newly Constructed Dwellings



Source: Authors calculations based on League of Nations, Urban and Rural Housing, League of Nations, Geneva, 1939 and League of Nations, World Economic Survey 1934-1935, League of Nations, Geneva, 1936.

Figure 11
Private Capital Formation, Structures

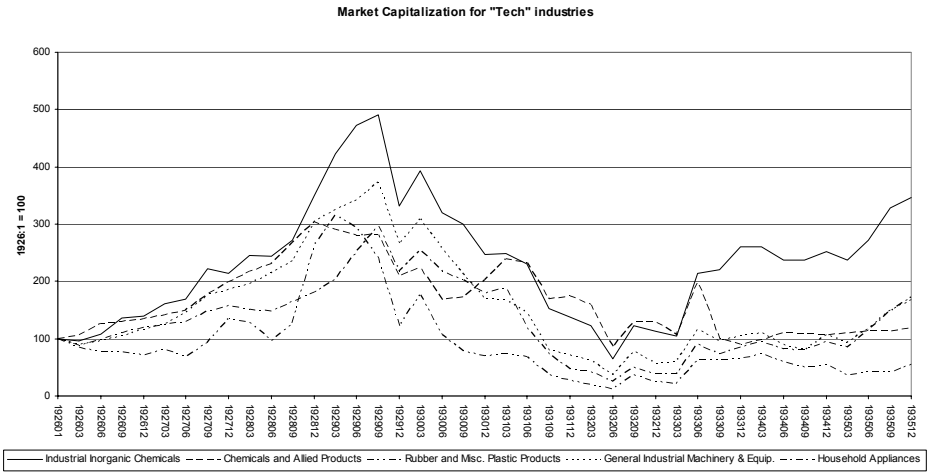


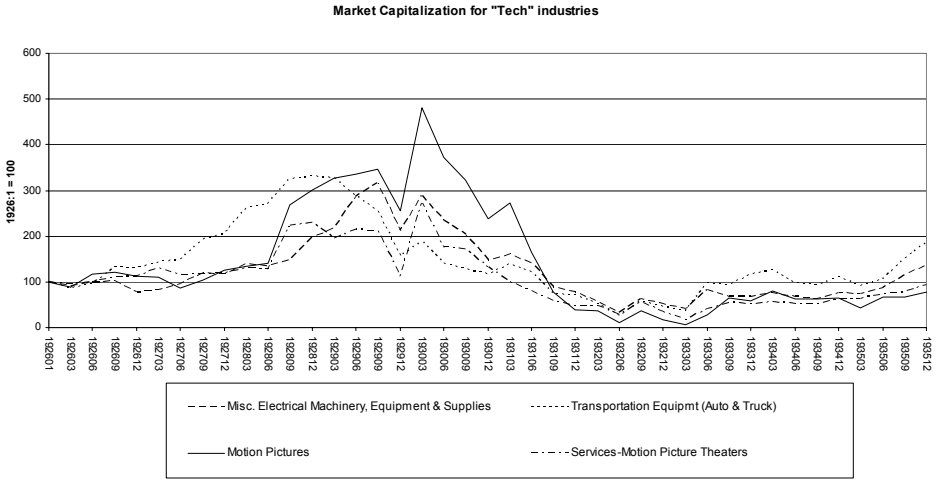
Source: Authors calculations based on Odd Aukrust and Juul Bjerke, "Real Capital and Economic Growth in Norway 1900-56," and Manuel Balboa and Alberto Fracchia "Fixed Reproducible Capital in Argentina, 1935-1955" in The Measurement of National Wealth, Series 8, edited by Raymond Goldsmith & Cristopher Saunders, Bowes & Bowes, London, 1959; The Australian Economy in the Long Run, edited by Rodney Maddock and Ian W. McLean Cambridge University Press, Cambridge, 1987; Simon Kuznets, National Income Since 1869 National Bureau of Economic Research, New York, 1946; M.C. Urquhart and K.A.H. Buckley, Historical Statistics of Canada, MacMillan, Toronto, 1965; Istituto Centrale di Statistica, Sommario di Statistiche Storiche 1926-1985 ISTAT, Rome, 1986; B.R. Mitchell, British Historical Statistics Cambridge University Press, Cambridge, 1988; National Accounts of the Netherlands, CBS Infoservice datafile; League of Nations, Urban and Rural Housing, League of Nations, Geneva, 1939.

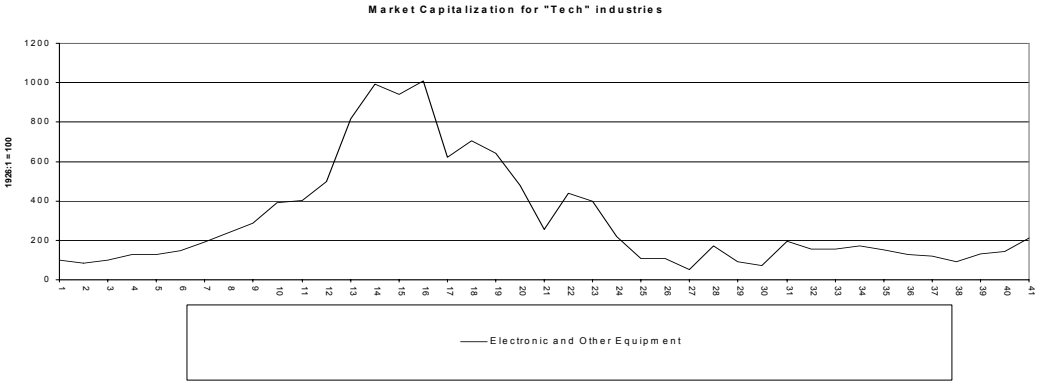
Figure 12
Market Capitalization for Aggregate Technology Index

Source: Authors' computations based on CRISP data for the 10 high- technology industries show n in figure 13.

Figure 13
Market Capitalization for Various Technology Industries of the 1920s







Discussion of "The Great Depression as a credit boom gone wrong" by Barry Eichengreen and Kris Mitchener

Michael D Bordo[1]

It is a great pleasure to discuss the Eichengreen and Mitchener paper. Barry Eichengreen is a frequent collaborator of mine, from whom I always learn a great deal whether from our joint work or his work with others. This paper is a very interesting and important paper. It focuses on the credit boom and bust of the 1920s that preceded the Great Depression. The 1920s experiences in many respects is the historical episode that has the closest resonance for the recent IT boom and bust that we are still experiencing. The Great Depression of course is the biggest macroeconomic event of all times.

My comments focus on two issues:

1. Whether the 1920s boom was mainly a real side phenomenon with the credit side aspect secondary.
2. The role of the gold standard and monetary policy.

1. Credit booms, real booms, crashes and recessions

My reading of the 1920s experience is that there was a credit boom which accompanied a real boom. The 1920s in the United States and other countries was a period of exceptionally rapid real growth. It was also a period when many new industries and products based on technologies developed earlier came to fruition. In that respect it is similar to the recent experience, although according to Gordon (2000) and David and Wright (1999) and others, the productivity boom of the 1920s was more significant than today.

Also like the recent boom, it had to be financed somehow and it was, by bank credit, commercial paper and equities. It was also supported by a benign and stable macro policy stance, although the underlying gold standard produced a mild deflationary trend in gold prices, unlike the low inflation of the 1990s.

The question is did the credit boom (and also the stock market boom since it is difficult to tease them apart) have to bust and produce a great depression, or could it have continued and kept financing the real growth that was occurring? Or could it have bust, as it did, but just lead to what Barry and I once termed "a garden variety recession"?

There are two parts to this question. Did the boom have to bust? Recent work by McGrattan and Prescott (2002), which follows an earlier study by Sirkin (1975), suggests that US stock market valuation in 1929 was fully justified by fundamentals which predicted productivity advances and real growth. They argue that tight Fed policy to stem the stock market boom was unnecessary. But even if there was a speculative (bubble) component to the run-up in stock prices in 1927-29, and even if the Fed had followed pre-emptive policy to deflate the boom to prevent a worse bust down the road (possibly created through adverse balance sheet effects interacting with collateral constraints, as Olivier Jeanne and I argue (2002a, 2002b)), did it have to produce the greatest depression of all time? The paper really does not adequately treat these issues.

In some research I did in a background paper for the April 2003 *World Economic Outlook*, I looked at the historical record for the United States and United Kingdom during 1800-2000 on stock market crashes, recessions, productivity booms and financial distress.

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[1] Rutgers University and NBER, 28 May 2003. Prepared for the BIS conference "Monetary stability, financial stability and the business cycle", Basel, Switzerland, 28-29 March 2003. The views expressed are those of the author and not those of the BIS.

Table 1 presents the evidence.

What the record shows is that there were many crashes (20 for the United States, 17 for the United Kingdom); that many of them, but not all, were associated with recessions; and that only a few were associated with preceding productivity booms. The memorable episodes in the United Kingdom were the 1825 Latin American mania and the 1840 railroad boom. For the United States, it was cotton in the 1830s, railroads in the 1870s, and radio etc in the 1920s. The severe recessions associated with asset price busts were also accompanied by banking panics in a policy environment without a lender of last resort and/or by severe financial distress as defined by an index developed by Bordo et al (2002, 2003). Finally, with the principal exception of the 1920s, none of these booms followed by busts led to a great depression.

Indeed, the fact that the 1920s was the unique event in the historical record highlights the importance of the subject of the Eichengreen-Mitchener study. I am sceptical however that the severity of the recession that followed was caused by the magnitude of the preceding credit (asset price) boom as this paper suggests. The collapse in asset prices and the accompanying financing was likely to have been relevant as an explanation for the first year of the slump, 1929-30, as argued earlier by Romer (1993) and others, but after that date, I posit that the US banking panics which could have been prevented by appropriate expansionary monetary policy and the role of the gold standard as an international propagation mechanism and constraint on policy action by the rest of the world became the salient feature. Indeed it was monetary policy failures that explain why the 1920s experience was then followed by the greatest depression of all time.

The policy lessons from the 1920s and 1930s seemingly have been learned by today's policymakers (perhaps with the principal exception of Japan), which probably explains why the recent bust has (so far) not had serious real effects.

2. The gold standard

The authors argue that the interwar gold standard was different than the prewar gold standard because it was a full-blown gold exchange standard in which foreign exchange reserves provided central banks with greater scope for independent accommodative monetary policies, hence encouraging foreign capital to finance credit booms.

Was this really different than the pre-1914 era? Massive investment booms occurred in the United States in the 1830s and 1870s which were followed by busts as was the case for Argentina in the 1880s. Why was that earlier experience different from the 1920s? The answer I believe lies not in the differences in the size of the credit boom stressed here but in the severity of the bust. As Bordo and Eichengreen (1999) and Delargy and Goodhart (1999) show, the busts in Argentina in 1890, the United States in 1893, and Italy in 1907 were severe but nothing compared to the Great Depression. As mentioned above, it was the policy response after 1930 and not the credit boom that accounts for the consequences of that event.

Table 1

Stock market crashes, booms and recessions: United Kingdom and United States, 1800-2000

Episodes	(1) Crashes				(2) Major causes	(3) Recessions			(4) Preceding booms			(5) Banking panic	(6) Severe financial distress
	Stock price changes					Peak	Trough	GDP contraction (in %)	Previous peak	Peak	Stock price changes (in %)		
	Peak	Trough	Nominal	Real[1]									
United Kingdom													
(1)	1808	1812	–40.8	–54.5	War	–	–	–	–	–	–	1810	–
(2)	1824	1826	–37.3	–33.6	Latin America mania	–	–	–	1822	1824	78.4	1825	–
(3)	1829	1831	–28.0	–27.0	Political agitation	–	–	–	–	–	–	–	–
(4)	1835	1839	–23.4	–39.1	American boom	1836	1837	–0.6	–	–	–	1837	1839
(5)	1844	1847	–34.1	–30.5	Railroad boom	1846	1847	–2.5	1840	1844	51.9	1847	1847-48
(6)	1865	1867	–23.9	–24.5	Overend Gurney crisis	–	–	–	1858	1865	48.4	1866	1866
(7)	1874	1878	–31.0	–19.7	European financial crisis	1874	1877	–2.0	–	–	–	–	–
(8)	1909	1920	–49.2	–80.5	World War I	1918	1921	–23.6	–	–	–	1921	–
(9)	1928	1931	–60.3	–55.4	Great Depression	1929	1931	–5.6	–	–	–	–	–
(10)	1936	1940	–50.1	–59.9	Housing boom, war scare	–	–	–	–	–	–	–	–
(11)	1944	1947	–29.2	–29.8	World War II	1943	1947	–14.7	–	–	–	–	–
(12)	1948	1949	–32.3	–34.0	–	–	–	–	–	–	–	–	–
(13)	1968	1970	–18.9	–27.8	Bretton Woods	–	–	–	1965	1968	24.6	–	–
(14)	1971	1974	–69.3	–76.6	Oil shock	1973	1975	–1.4	–	–	–	–	–
(15)	1975	1976	–19.1	–30.8	Pound crisis	–	–	–	–	–	–	–	–
(16)	1980	1982	–11.4	–27.0	Thatcher revolution	1979	1981	–3.4	–	–	–	–	–
(17)	2000	2002	–24.8	–26.7	Information technology boom	–	–	–	1993	2000	78.4	–	–

Table 1 (cont)

Episodes	(1) Crashes				(2) Major causes	(3) Recessions			(4) Preceding booms			(5) Banking panic	(6) Severe financial distress
	Stock price changes												
	Peak	Trough	Nominal	Real[1]		Peak	Trough	GDP contraction (in %)	Previous peak	Peak	Stock price changes (in %)		
United States													
(1)	1809	1814	–11.4	–37.8	War	1811	1812	–1.6	–	–	–	1804	–
(2)	1835	1842	–50.6	–46.6	Bank war	1836 1839 1841	1837 1840 1842	–2.0 –6.4 –1.0	1828 – –	1835 – –	57.2 – –	1837 1839 –	1837 – –
(3)	1853	1859	–50.6	–53.4	Railroad boom	1857	1858	–8.6	–	–	–	1857	1857
(4)	1863	1865	49.9	–22.5	Civil War	1864	1865	–6.2	1860	1863	20.5	–	–
(5)	1875	1877	37.7	–26.78	Railroad boom	–	–	–	1863	1872	50.5	1873	1873-74, 1876
(6)	1881	1885	–26.7	–22.2	Railroad boom	–	–	–	1875	1881	51.3	1884	–
(7)	1892	1894	–21.0	–16.4	Silver agitation	1892	1894	–3.0	–	–	–	1893	1893 1894 1896
(8)	1902	1904	–16.3	–19.4	Rich man’s panic	–	–	–	1899	1902	29.9	–	–
(9)	1906	1907	–19.4	–22.3	World financial crisis	1906	1908	–6.9	–	–	–	1907	–
(10)	1912	1914	–15.5	–17.6	War scare	1913	1914	–7.6	–	–	–	–	–
(11)	1916	1918	–20.4	–42.5	War	1916	1917	–	–	–	–	–	–
(12)	1919	1921	–22.0	–24.5	Disinflation, disarmament	1918	1921	–8.3	–	–	–	–	–
(13)	1929	1932	–73.4	–66.5	Roaring 20s and policies	1929	1933	–29.7	1922	1929	201.8	1930 1931-33	1931

Table 1 (cont)

Episodes	(1) Crashes				(2) Major causes	(3) Recessions			(4) Preceding booms			(5) Banking panic	(6) Severe financial distress
	Stock price changes					Peak	Trough	GDP contraction (in %)	Previous peak	Peak	Stock price changes (in %)		
	Peak	Trough	Nominal	Real[1]									
United States													
(14)	1936	1938	–25.7	–27.0	Tight monetary policy	1937	1938	–4.5	–	–	–	–	–
(15)	1939	1942	–28.1	–38.8	War	–	–	–	–	–	–	–	–
(16)	1946	1949	–10.8	–27.1	Post war slump	1944	1947	–22.7	–	–	–	–	–
(17)	1968	1970	–15.7	–24.4	Bretton Woods	–	–	–	–	–	–	–	–
(18)	1972	1975	–24.1	–38.7	Oil shock	1973	1975	–0.6	–	–	–	–	–
(19)	1976	1979	1.0	–20.9	Oil shock	–	–	–	–	–	–	–	–
(20)	2000	2002	–27.7	–30.8	Information technology boom	2001[2]	–	–0.5[2]	1993	2000	165.2	–	–

Data sources by column:

(1) Bordo, Dueker and Wheelock (2000, 2003).

(2) Kindleberger (1996), and others.

(3) Bordo, Dueker and Wheelock (2002, 2003).

(4) ibid.

(5) Bordo (1986), Eichengreen and Bordo (2003) and Kindleberger (1996).

(6) Bordo, Dueker and Wheelock (2002, 2003).

[1] Stock market crashes, including their peaks and troughs, were determined on the basis of real stock prices. In a few cases peaks and troughs in nominal stock price differed from those for real stock prices. The changes in nominal stock prices are based on peaks and troughs of real stock prices. [2] The Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) determined that a recession began in 2001 Q2. In the absence of a date for the end of the recession, the GDP contraction covers the period 2001 Q1-2002 Q3, when level declines were recorded.

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Discussion of "The Great Depression as a credit boom gone wrong" by Barry Eichengreen and Kris Mitchener

Charles Goodhart[1]

I am not yet as familiar with Kris Mitchener's work as I hope that I will shortly become, but I do know that any work co-authored by Barry Eichengreen will be lucid, well written, sensible and entertaining. This paper is no exception. Nevertheless, a discussant is not supposed just to shower praise. I am supposed to earn my keep by probing for weaknesses and criticisms. So here goes.

Barry and Kris use numerous adjectives to describe credit expansion in the 1920s and 1990s, such as ample, elastic and abundant. I would like to suggest that bank credit is, almost always, ample, elastic and abundant. The point is that central banks set official short-term rates, and then stand ready to supply reserves, with infinite elasticity, at that chosen rate, until they decide to change the official rate. With their access to additional reserves thus effectively guaranteed, commercial banks will in turn make loans freely available to all those seeking such loans, at a spread above the official rate and dependent on the borrower meeting certain risk and collateral requirements. Credit is, therefore, by institutional construction, made ample, elastic and abundant at almost all times.

What interpretation then can we give to the phrase credit boom? One more prosaic interpretation is just that the general level of nominal interest rates was too low to maintain output equilibrium and low and stable inflation, and that the growth rates of money and credit were a valid leading indicator of that. The problem with that interpretation is that inflation was low and stable in both the 1920s and 1990s, and output growth, though encouragingly rapid, was certainly thought at the time in each case to be on a new high plateau.

A second, and more interesting, potential meaning of the phrase credit boom is a relaxation by banks in the terms on which they would supply credit, for any given level of official interest rates, a supply shift bringing a softening of risk and collateral conditions. This would be represented by such phenomena as higher loan to collateral value ratios, declining risk spreads, and shifts in the composition of borrowers to higher risk categories. I reckon that this is rather what Barry and Kris have in mind. The problem with this is that the micro level evidence of such a relaxation of lending standards (given the level of official interest rates) is hard to find or, when there is some anecdotal evidence, eg on examples like Ponzi and the Florida land boom, difficult to show whether it had significance at the aggregate, macro level. And to be honest I do not feel that they have obtained sufficient evidence to make out a proper case that relaxation of lending standards played a major role in either the 1920s or the 1990s. Nevertheless this line of thought is closely in accord with the perceptions of senior officials in the Federal Reserve System in the second half of the 1920s, as Meltzer's recent (2003) history reminds us. Does this paper in some ways provide a more favourable reinterpretation of such previously unfashionable theories?

The other main candidate here for jointly explaining the 1920s/30s and the 1990s/2000s is the stock market, which exhibited a sharp run-up to a peak in 1929/1999 and subsequently an equally sharp decline. The authors note its effect on wealth, Tobin's q and business investment; and that, of their three so-called credit indicators, I quote, "only share prices are strongly related to subsequent output movements", and see Table 6. One can hardly fault them for using the term "bubble" since virtually everyone else does so also. But in fact in economic theory the term "bubble" has some stringent existence conditions, which neither the 1920s or late 1990s actually meet. What they both exhibited was an unsustainable deviation from equilibrium, unsustainable because the expectations for company earnings growth and stock returns could not possibly be met in the longer term by an economy growing at a rate of around 3-4%. As Meltzer again notes, in his recent first volume on the Fed, corporate profits rose at an annual rate of 12% between the end of 1924 and September 1929, and the value of traded stocks rose twice as fast again. No doubt in the late 1920s, as in the late 1990s, many investors, as 1990s surveys showed, extrapolated 20% plus stock returns into the wild

[1] London School of Economics. The views expressed are those of the author and not those of the BIS.

blue yonder, and this is just not sustainable. So why did it happen? I am a firm believer in the analysis, which the authors attribute to Carlita Perez, that stock markets overreact to new network technologies, but I doubt whether it is enough on its own. You need to mix in a bit of irrational exuberance, and greed and envy, into the pot alongside the overreaction to high tech to get the full extent of unsustainable divergence from equilibrium.

One of the endemic problems in this field is simultaneity, endogeneity. Everything is related to everything else. The authors take as their indicators of credit booms three variables, the ratio of M2 to GNP, the ratio of investment to GNP, and the ratio of equity prices to the CPI. All are somewhat dubious metrics of credit expansion. As Brunner and Meltzer have emphasised, the markets for credit and money are distinct in important ways. Again investment and equity price increases are as much a cause of credit expansion as a result of it.

Next, given these three disparate, not to say dubious, measures of credit expansion there is the question of trying to combine them into a composite index, though I rather question whether this latter exercise was worth doing anyhow. As already noted, the only one of their constituent relationships that was significant was that relating the excess over trend of stock prices in 1928 to the subsequent downturn. Their comments about possible interactions between the components (stock prices, investment and money) did not convince me. Moreover, it is quite surprising that 1919 shows a higher peak than 1929 (see Figure 7), perhaps partly due to the influence of stock market booms in a number of smaller countries (eg Argentina, Italy and the Scandinavian countries, see Figure 4). To be honest, perhaps brutally so, I did not feel that their quantitative exercise provided much support to their overall thesis.

Let me, however, finish by briefly touching on some of the related policy issues. First, can we observe an unsustainable asset price deviation while it is currently happening? In my own view the answer is yes, and I would give in evidence the British housing price booms of 1988-90 and 2000-2. If we, or rather the authorities, can do so, why then do such deviations not stop of themselves, as rational expectations would suggest? Perhaps a combination of limitations on short selling, differences of opinion, and belief in one's own ability to sell before the rest may provide some explanation. Should the authorities react to such asset price booms over and above that necessary to respond to their prospective future modal effect on output and goods and services inflation? Probably so in principle in order to try to avoid the potentially severe, and certainly asymmetric, effect of a future crash. I am aware of the argument that claims that a larger rise in interest rates, say in 1925-27 or 1999, would have caused a fall in output without halting the stock market surge, but I have seen no convincing arguments to support that assertion. In practice, however, I think it well-nigh politically impossible for even independent central bankers to raise interest rates, by more than a smidgen, when both inflation and forecasts of inflation are benign and growth remains close to its perceived trend rate, just because the central banker judges that an asset price has diverged from its equilibrium. It is not so easy to justify in public any judgment about the ex ante deviation from some dubiously estimated equilibrium level.

Perhaps a more useful question is how to respond when such an asset/credit boom does collapse. The current answer seems to be that, should one asset market, in this case the stock market, collapse, then the right response is to recreate another asset price/credit boom in another market, in this case the housing market. The hope is that, by the time the housing market does subside, taking consumption down with it, business confidence and investment will have recovered. Moreover, for a variety of reasons, some fortuitous, the Anglo-Saxon countries are engaged in some sizeable Keynesian-type contracyclical fiscal policies, although keeping rather quiet about it. What will happen in the euro zone, where neither of these stimulating factors are as strong, is even less promising, especially if the euro should appreciate further. I wonder whether the ECB would contemplate so-called unconventional measures if deflation in the euro zone should intensify and official interest rates fall to zero. But fortunately that remains a hypothetical question.

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