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The tale of two great crises

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The Tale of Two Great Crises

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December 14, 2015

Abstract

The great depression of 1929 and the great financial crisis of 2008 have been the two big events of the last 75 years. Not only have they produced serious economic consequences but they also changed our view of economics and policymaking. The aim of this work is to compare these two great crises and highlight similarities as well as differences. Monetary policy, the exchange rate system and the role of the banks are our fields of investigation. Our findings are that two big events have more similarities than dissimilarities.

Keywords: Great Depression, Great Financial Crisis, gold standard, Eurozone. money multiplier, shadow banking.

JEL classification : E5, E31, E42, G21.

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I. Introduction

The Great Depression of 1929-1933 (GD) and the Great Financial Crisis of 2008-2009 (GFC) have not only been colossal and worldwide events, but have challenged our "consensus" view of economics. Policymakers as well have had to learn new lessons and adopt, at times improvising, new strategies in response to events. The GD started 86 years ago and has been studied, interpreted and re-interpreted by an army of scholars. It never seems to go out of fashion. The GFC, being barely seven years old, cannot claim the pedigree of the GD nor its monumental literature. Yet, sufficient time has passed since 2008 to justify a comparative exercise, perhaps historically an early one, of the GD and GFC. We intend to identify and analyze those critical factors that are either similar or different between these two crises.

The obvious question is what we consider as critical factors. There is no denying that we have used our own selection process, which has been guided by the historical accounts, the literature, and empirical evidence. A prominent factor is monetary policy. What role did it have in triggering and exacerbating the recessions? To what extent the fix, our abbreviation for the fixed exchange rate regime, acted as a straitjacket on monetary policy in the inter-war gold standard? Were monetary authorities following the rules of the game? Was the Humean price-specie flow mechanism functioning properly, not only in the 1930s, but also in modern times within the Eurozone, the other big fix? We look into capital flows, in particular their proclivity to sudden arrests and flow reversals, in precipitating quick and sharp macro adjustments under fix, again both in the gold-standard countries and within the Eurozone. International cooperation under fix is an essential element to prevent a deflationary bias stemming from asymmetric adjustments imposed on deficit countries to restore their external balances. Neither the inter-war gold standard nor the modern Eurozone are pristine examples of such a cooperation. Banks's troubles typically are either the cause or the victim of crises; either way they accentuate their depth. When in difficulty, because of either illiquidity or insolvency or both, banks may impair the money supply process by inducing the public to cash deposits or themselves hoarding monetary base instead of extending loans. Institutions have adjusted after the experience of the GD by guaranteeing deposits into cash at par, but there is no apparent antidote to the depressive

effects of banks' raising their degree of risk aversion. Crises, as we have mentioned, provide useful lessons to policymakers. We discuss how central banks have learned from the GD experience. Banking has evolved over the last thirty years. The business of banking is now also done by non-bank financial institutions, known as shadow banks. The latter are the product of liberalization and regulatory arbitrage. Unlike traditional banks, shadow banks have no direct access to central bank funding, a feature that makes them fragile. They have played a critical role in the GFC.

Our comparative exercise will be based on two statistical universes. The first is an aggregate of 14 industrial countries that for short we define the "world." It will permit us to set the GD and the GFC in a global perspective. The second is a group of five significant countries – the United States, the United Kingdom, Germany, France and Italy—that will be analyzed in detail. The structure of the paper is as follows. Section II deals with the antecedents of the crises. Section III looks at the crises in terms of real sector's performance–in particular the growth of per capita real GDP and the rate of inflation—and alternative explanations for this performance. Section IV examines the constraints and potential deflationary bias implicit in a fixed exchange rate regime that is subject to asymmetric shocks. Section V delves into the world of banking activities and money creation and their potential to trigger crises. Section VI summarizes the comparison between the two crises by underscoring similarities and differences.

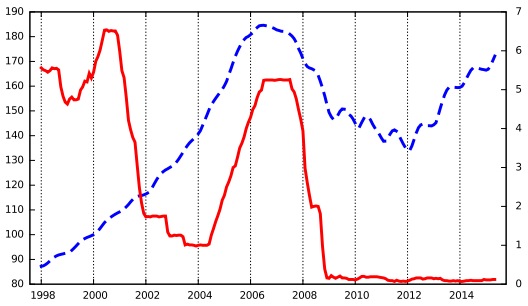
II Antecedents

Monetary policy is an important aspect in explaining the starting point of many financial crises. This is true, in different degrees, also for the GD and the GFC. In this section, we provide a sketch of critical monetary policy actions that preceded the outbreak of these two great crises. Figure 1 shows the relationship between the policy interest rate and an index of house prices, the reference "bubble" asset; for details on sources and notes, see Data Appendix. The years 2000-2014 cover a sufficiently long pre-crisis period, the two crisis years, and a four-year post-crisis phase of two large monetary unions, the United States and the Eurozone.

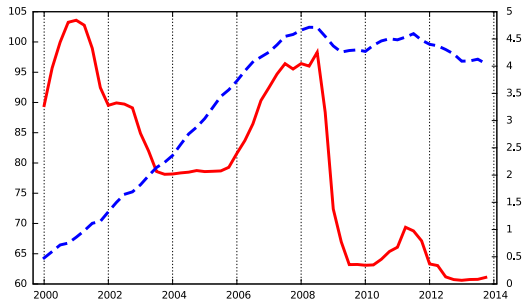
After the East Asia financial crisis of 1997 and the bursting of the dot-com bubble of 2000, US

Figure 1: Monetary policy and house price index, 1998-2014

(a) House price index - Fed funds (US)



(b) House price index - Eonia (UE)



Source: Data Appendix. The blue dashed line shows the house price index (left axis) while the red line shows the short-term interest rates (right axis, percentage).

monetary policy became very accommodating. The Fed funds rate plunged from 6% in 2001 to below 2% at the start of 2002, starting a phase of exceptionally low interest rates that is now popularly known as the "Greenspan put". [1] The housing market was the main but not the exclusive beneficiary of this accommodating policy (Justiniano et al., 2014; Punzi and Kauko, 2015): borrowing to buy homes became very cheap and consequently pushed up house prices.

Matters changed drastically at the start of 2006. The US monetary authorities had two critical concerns, the fear of a "Japanese scenario" and the consequences of a "saving glut" in the world (Bernanke, 2005). The first concern referred to the effort of the Japanese authorities to kick start economic growth, through an aggressive cut of their short-term interest rates, in the midst of their "lost decade" of the 1990s (Hoshi and Kashyap, 2004). [2] This failed because there was no much economic growth in Japan in the following ten years. The second concern referred to the hypothesis that the world, but primarily Southeast Asia, was awash with an excess of saving over investment that was spilling over in the US financial markets. In fact, from 2001 to 2006, the year preceding the crisis, the United States soaked up $ 3,573 billions of world capital flows (IMF, 2008, Table A11). The consequences of the saving glut for the United States, so ran the argument, were low long-term interest rates and a flat yield curve, despite growing current-account deficits. The decision was taken

[1] According to Taylor (2007, 2009), the Fed funds rate was well below the value predicted using his standard monetary policy rule during the period 2002-2004.

[2] The "lost decade" is the expression used by Hayashi and Prescott (2002) to synthesize Japan of the 1990s.

that the moment had arrived to switch monetary policy: the Fed rate jumped by almost 400 basis points in less than two years; see left panel of Figure 1. The rest of the world imitated, to different degrees and timing, the new US policy. In particular, the newly created European Central Bank (ECB) waited almost two years before mimicking Fed actions: see right panel of Figure 1.

The other significant monetary antecedent of the GFC was the creation of the European Monetary Union (Eurozone) in 1999. This monetary union, unsupported by a fiscal union, has a lot in common with the inter-war gold exchange standard, especially as it regards the macroeconomic adjustment mechanism operating among its member countries. Under fixed exchange rates and a high degree of capital market integration, inter-member current account imbalances tend to be compensated by net private capital flows, under normal circumstances. However, if these flows stop suddenly because of a confidence shock, and inter-member government transfers cannot substitute for private capital flows due to the absence of a fiscal union, the adjustment must occur with money flows. As money moves from current-account deficit to current-account surplus countries, aggregate national spending and relative prices and wages are affected. [3]

The history of the Eurozone adheres fairly well to the above script. The creation of the monetary union sparked a process of convergence of long-term interest rates towards German rates in traditionally high-inflation countries such as Greece, Italy, Spain and Portugal (the South); see right panel of Figure 2. This triggered large capital flows from the capital-rich North to the capital-poor South (Waysand et al., 2010). As a proxy of these flows, we use the evolution of claims by banks in the North of the Eurozone –defined as Austria, Belgium, France, Germany, and the Netherlands – on banks in the South; see left panel of Figure 2. These claims rose until the first quarter of 2008 when a first inversion occurred. A second inversion took place at the end of 2009, in concomitance with revelations by the Greek government that data on budget deficits and public debt had been doctored. [4] The markets took these revelations as a wake-up call that capital flows had been used by the borrowing

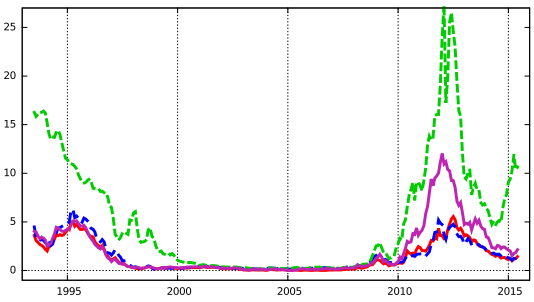
[3]These money flows reflect net balances arising from the operation of the payment system. In the Eurozone, net credits or debits are known as Target 2 balances (Target being the acronym of trans-European automated real-time gross settlement express transfer system) which each national central bank carries with the ECB.

[4]On the timing of the sudden stop and reversals of capital flows in the GFC, see Milesi-Ferretti and Tille (2011) and Merler and Pisani-Ferry (2012) We use gross claims of the North on the South instead of net claims to isolate the behavior of the dominant creditor, a point made by Milesi-Ferretti and Tille.

Figure 2: Capital flows and long-term interest rates (EU)

(a) Assets of Northern banks in the South

(b) Long-term interest rate spreads (EU)



Source: see Data Appendix. Greece (green), Portugal (purple), Spain (red), Italy (blue).

countries to support domestic consumption instead of productivity-boosting investments (Higgins and Klitgaard, 2011). It was the start of the sovereign debt crisis and of rising spreads between the yields on long-term government bonds of the Southern countries relative to Germany's.

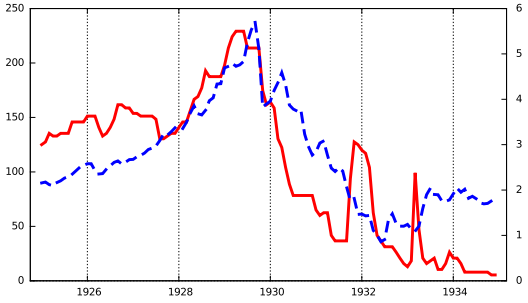
There is a close similarity between the sudden capital flow of 2008-2009 and what happened to Germany in 1928. Post-WWI monetary policy was characterized by the determination of governments and central banks to return to gold convertibility, in some cases to pre-WWI parities. Germany returned to gold convertibility in August 1924, followed by the United Kingdom in May 1925, Italy in December 1927, and France in June 1928. According to Hamilton (1987), France's return to the gold standard was one of the main antecedents of the GD. The French government had implemented restrictive monetary and fiscal policies since 1926 with the objective of drastically reducing the rate of inflation and prepare for a return to gold parity. Three years before the return to convertibility, France moved to a current-account surplus and gold inflows. From 1928 to 1932, the country received 42.5 billion francs of net capital flows; see Figure 4. For much of this period, French short-term interest rates were consistently below comparable UK rates, reflecting market expectations that the franc was a strong currency and that the commitment of the pound to gold convertibility was somewhat shaky; see Figure 3.[5] In essence, France enjoyed a safe heaven status.

In terms of adjustment mechanisms, the rules of the games would have required that the French increase their money supply (McKinnon, 1993), but this did not happen. France accumulated gold

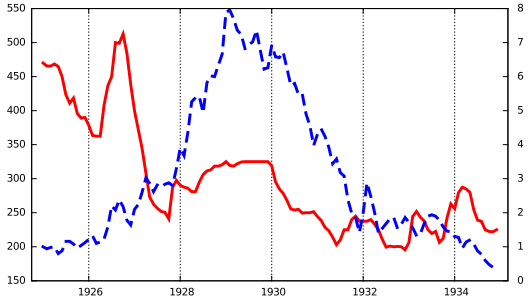
[5]According to Accominotti (2009), the credibility of the UK commitment to gold convertibility was weak starting in 1929 and of the US commitment starting in 1931. On the other hand, the author's Figures 6 and 7 show modest values for the estimates of devaluation expectations of the pound and the dollar.

Figure 3: Private discount rate and stock price index, 1925-1935

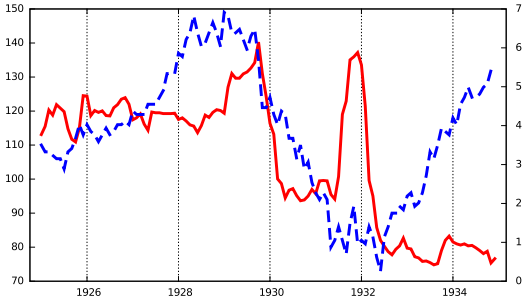
(a) United States



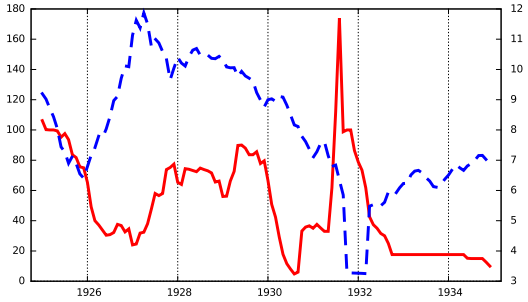
(b) France



(c) United Kingdom



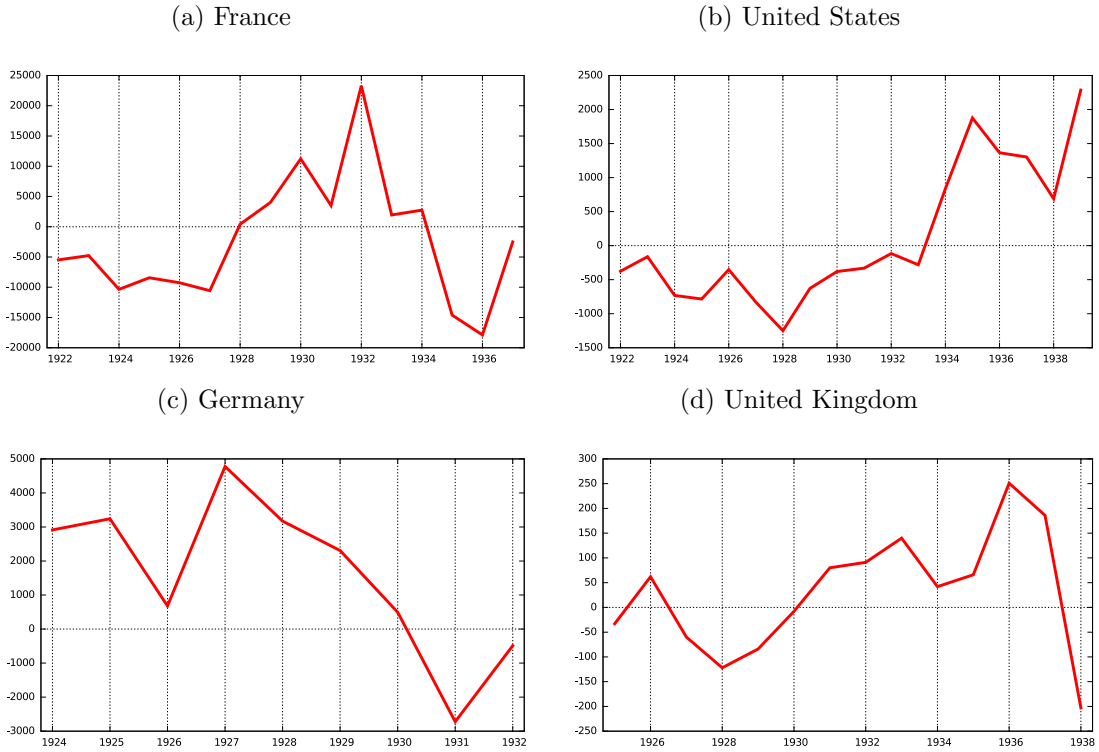
(d) Germany



Source: see Data Appendix. The blue dashed line shows the stock price index (left axis) while the red line shows the short-term interest rate (right axis, percentage).

without a monetary expansion. Money tightness in the world was raised considerably in 1928, when US monetary policy turned restrictive, as evidenced by the rising discount rate (Figure 1). US monetary authorities had two goals: discourage US capital outflows and burst the stock market bubble (Hamilton, 1987). From 1924 to 1928, net capital outflows of the United States amounted to approximately $4 billions, a great of which going to Germany; see Figure 2. The monetary actions of 1928 accomplished the first goal. Capital started to come back home, even though the stock market euphoria had not been tempered, at least at the beginning. Germany, the main beneficiary of US capital exports, was the first and most significantly to suffer the consequences of such restrictive policies. The sudden stop, or more precisely the reversal in net capital flows, occurred at the time of the start of US money tightness and was followed by massive outflows towards, not only to the United States, but also to France; see Figure 2. It precipitated precipitated a great depression in Germany before it happened elsewhere.

Figure 4: Net capital flows in the 1920s and 1930s



Source: Data Appendix.

To summarize, monetary policy played a crucial role in the GD as well as in the GFC. Expansive policies were followed by sharp reversals in both crises, especially in the United States. In 2006, higher

interest rates burst the house price bubble. In 1928, instead of bursting the surging bubble in the financial markets, the capital flows into the United States resulting from higher interest rates gave further impetus to the surge in stock prices.

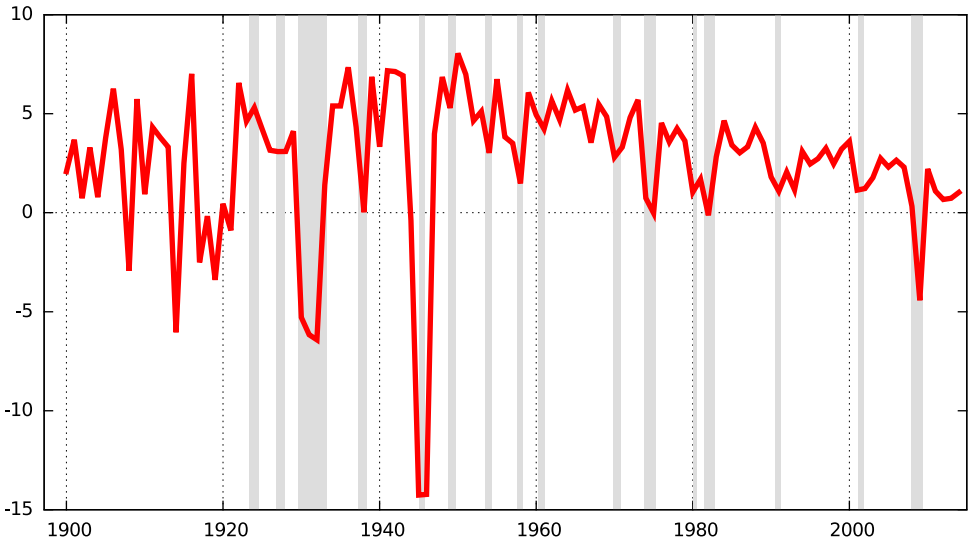
III Output and Prices

In this section, we compare the two crises in terms of the real sector's performance, in particular the growth of per capita real GDP and the rate of inflation measured in terms of the consumer price index (CPI). To have a global view of the two crises, we start by considering an aggregate of 14 countries that defines our "world" and then by examining in more details a sample of five countries, the United States, the United Kingdom, Germany, France and Italy. The world series of per-capita output is shown in Figure 5. The sample annual average is 2.6 per cent. There are six periods when per-capita growth is negative, two of which connected with the first world war, one with the second world and its aftermath and three others with peace time, of which one is the GD and the other is the GFC. The biggest drop in per-capita output over the 114-year sample occurred in the second world war period 1944-46 (-29 percentage points), followed by the GD of 1930-33 (-17.9 percentage points), then by the first world war period 1917-19 (-6.1 pp) and 1914 (-6 pp), then by the GFC of 2009 (-4.4 pp) and last in 1908 (-2.9 pp). Based on this measure, the GD rates as a bigger shock than the GFC. It was also in terms of depth and persistence of unemployment, a variable not explicitly considered in this paper.

Figure 6 shows the world rate of inflation, again over the same 114-year history. The sample annual average is 1.5 per cent. There are two periods of deflation, defined in the classical sense of negative rates of inflation: 1921-1922 and 1927-1933. In 1921-1922, the CPI dropped by 6.5 percentage points and in 1927-1933 by 12.5 percentage points. In contrast, in the depression year of the GFC, 2009, the inflation rate dropped to zero. Again, the negative shock of the GD, measured in terms of deflation, was much bigger than that of the GFC.

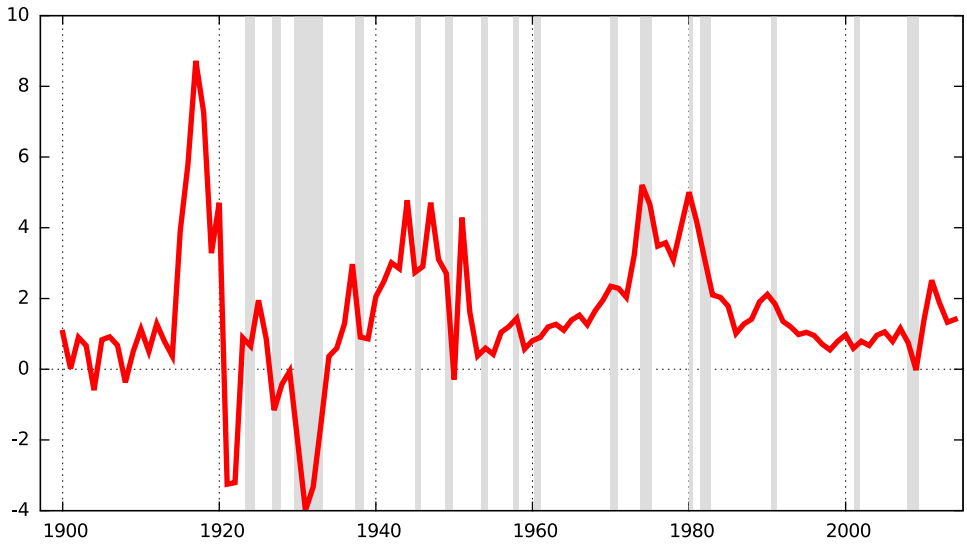
Table 1 compares the two crises using the same two macro variables for our group of five countries. Column 2 lists the years of negative percentage changes in per capita real GDP (recession years).

Figure 5: Annual percentage change of world real per capita GDP, 1900-2014



Source: see Data Appendix.

Figure 6: World inflation rate, 1900-2014



Source: see Data Appendix.

These recession years may not coincide with reference dates of business cycle peaks and troughs.[6] In addition, we report the economic growth performance over the Thirties and 2008-14 to see the longer impact of the two crises. The United States was hit the hardest by the GD in terms of both recession years and the longer period of the Thirties; the United Kingdom and Italy were hit the least; Germany and France sat in the middle in terms of recession years but differed sharply in terms of the longer run performance over the Thirties, with Germany cumulative per capita real growth exceeding that in the gold standard; more on this in the next section.[7] The United States, Germany, and the United Kingdom had cumulative deflation ranging between 10 and 14 percentage points.

The worst hit by the GFC was Italy, both in terms of recession years (-7.2 percentage points of per capita real growth) and performance over the 2008-14 period (-11.5 percentage points). Germany had the second largest drop in per capita real GDP in recession years but scored the highest performance over the 2008-14 years. France, the third large country in the Eurozone, was in in an intermediate position between Germany and Italy. In addition, the three members of the Eurozone, France, Germany and Italy suffered a second shock in 2010, the sovereign debt crisis. As we shall argue later, this second shock revealed in full force the sharp heterogeneity among Eurozone member countries, in particular with respect to external imbalances.

Despite popular accounts of deflation, no evidence of falling prices emerged in the GFC. The United States, for example, experienced a 13.5 percentage point drop in the CPI in the seven years 1927-1933, but gained 10 percentage points in the seven years from 2008 to 2014. Italy lost 18 percentage points in the CPI from 1927 to 1934, but gained 12 percentage points in 2008-14. In sum, whereas canonical deflation was the order of the day in the GD, the GFC was afflicted by declining rates of inflation. This is not to deny the contractive forces operating in the GFC. The economic structure has changed over time and one aspect of it is that nominal rigidities may have become more relevant in the GFC

[6]For example, according to the National Bureau of Economic Research, the US GD started in August of 1929 and ended in March of 1933.

[7]The United Kingdom went off the gold standard in September of 1931; Germany practically ended it in July of 1931 in connection with the banking crisis and the imposition of exchange controls, although the formal decision to exit the gold standard was delayed until 1932 (James, 1999); Italy ended it *de-facto* in May of 1934 when exchange controls were set in place, although the formal decision was taken in 1937 (Fratianni and Spinelli, 2001, p. 313); the United States, on January 31, 1934, raised the price of one ounce of gold from $20.67 to $35, implying a 59 per cent devaluation of the dollar; and France went off gold in 1937.

Table 1: Per-capita output growth and inflation rate in five countries in the GD and the GFC.

Country	GD years and 1930-38 period	Cumulative change p.c. real GDP, % points	GFC years and 2008-2014 period	Cumulative change p.c. real GDP, % points
		Per capita real GDP		
US	1930-33	-33.6	2009	-3.7
	1938	-4.1	2008-14	3.9
	1930-38	- 5.4		
UK	1930-31	-6	2009	-5.0
	1930-38	16.9	2008-14	-0.3
Germany	1929-32	-17.6	2009	-5.5
	1929-38	26.2	2008-14	6.4
France	1930-32	-15.8	2009	-3.5
	1934-35	-3.6	2008-14	-0.5
	1930-38	3.5		
Italy	1930-31	-5.6	2008-09	-7.2
	1933	-0.7	2008-14	-11.5
	1930-38	14.0		
		Inflation rate (CPI)		
US	1927-33	-13.5	2008-09	0
			2008-14	9.9
UK	1926-33	-10.1	2008-09	3.8
			2008-14	18.4
Germany	1930-33	-11.6	2008-09	0.7
			2008-14	8.9
France	1927-35	-31.9	2008-09	1.3
			2008-14	9.2
Italy	1927-34	-18.4	2008-09	2.3
			2008-14	11.6

Source: see Data Appendix.

than in the GD, implying a higher elasticity of output to the price level.

Our five-country sample

Moving from general to country-specific considerations, Germany was the first country to enter the GD. This occurred after the mentioned sudden capital inflow stop in the second half of 1928, following the sharp tightening of US monetary policy. In 1929, net inflows into Germany were about half of those in 1928, in 1930 they virtually disappeared, and in 1931 there was a sharp net flow reversal. The German index of industrial production fell by 11.5% on annual basis in the fourth quarter of 1928, starting the great contraction that preceded that of the United States and lasting until the end of 1932 (Sommariva and Tullio, 1987, p 167). These authors attribute the German great contraction to the sudden stop of capital inflows. Eichengreen (1992, p. 223) places the blame "...not just [to] a restrictive shift in US policy but [to] a restrictive shift in policy worldwide. At the root of that shift was the international gold standard, which tied the economic policies of different nations together." At any rate, following monetary tightening in the United States, Germany, in early 1929, lost significant amounts of international reserves, which imperilled the maintenance of the 40 per cent gold cover ratio on currency in circulation. Faced with a clear-cut alternative of letting the exchange rate adjust or stick with gold convertibility, the choice fell on the latter. The Reichsbank raised its discount rate to 7.5 percent and imposed credit rationing. Gold convertibility did not survive the events that began to unfold in May 1931. First, in the wake of the failure of the Austrian Credit-Anstalt bank, Germany suffered more losses of international reserves, prompted by withdrawal of foreign-owned deposits and capital outflows. The gold cover ratio fell to the critical level of 40 per cent. Second, the Reichsbank responded with a rise in the discount rate to 7 per cent in the middle of June, but with little effect. The failure of the Danat bank a month later triggered a banking crisis, to which the authorities responded with a banking holiday and the imposition of exchange controls. The German gold exchange standard *de-facto* ended in July of 1931 (James, 1984).

Preoccupied about gold outflows but primarily by an ebullient stock market, US monetary policy, as we have mentioned, was tightened in 1928. According to Hamilton (1987), "it would have been

difficult to design a more contractive policy than that adopted in January 1928." The negative impact of gold outflows on the US monetary base, from December 1927 to July 1928, was exacerbated by open market sales and reductions of bank borrowings from the Fed (Hamilton, 1987, Table 1). Hamilton's data indicate that monetary policy, from December 1927 to July 1928, was responsible for a $889 million reduction of monetary base. Our data, from the same source, tell us a much smaller monetary base reduction. [8] Nominal interest rates rose, while the real money stock declined, a pattern that is consistent with the prediction of a standard IS-LM framework (Hamilton, 1987, Table 2). A monetary explanation of the severe economic contraction of 1931-33 is more problematic because of a continuous decline of short term interest rates (Hamilton, 1987, p. 168). Friedman and Schwartz (1963, Ch. 7) have it right on two basic points. First, the Fed failed in preventing bank failures, which scared the public in converting large amounts of bank deposits into currency and banks in raising their reserves in relation to deposits ratio: both were responsible for the collapse of the money multiplier. Second, the Fed failed in offsetting the collapse of the money multiplier with an appropriate expansion of the monetary base. But money alone does not seem to fully explain the US Great Depression. For Temin (1976), falling interest rates and an approximately constant real money stock are consistent with a leftward shift of the IS curve and an unchanged LM.[9] He identifies the leftward shift in the IS curve with an autonomous decline in spending that took place between 1929 and 1930. Romer (1990) provides an answer to this leftward shift, by linking a decline in consumer durables to the high degree of uncertainty following the stock market crash of 1929. This uncertainty, she argues, was pervasive and affected also consumers who did not own stocks because the stock market was viewed as a predictive barometer of the economy. The more eclectic study by Gordon and Wilcox (1981) proposes more non-monetary explanations of the US GD, such as an autonomous decline in construction spending, wealth effects due to gyrations in the stock market, and the deleterious

[8] At the end of 1927, total gold reserves held by the Fed were $2,733 millions, reserves other than gold $134 millions, and bills and securities $1,591 millions for a total of $4,458 millions. At the end of July of 1928, the corresponding numbers were $2,597 for gold, $154 for non-gold reserves and $1,433 for bills and securities for a total of $4,184 millions; see Federal Reserve Board (1928, Table n. 7, p. 66). The difference between July 1928 and December 1927 is -$274 millions, about a third of the amount reported by Hamilton in Table 1. To explain in part the difference, Hamilton reports total monetary gold stock rather than Fed gold holdings.

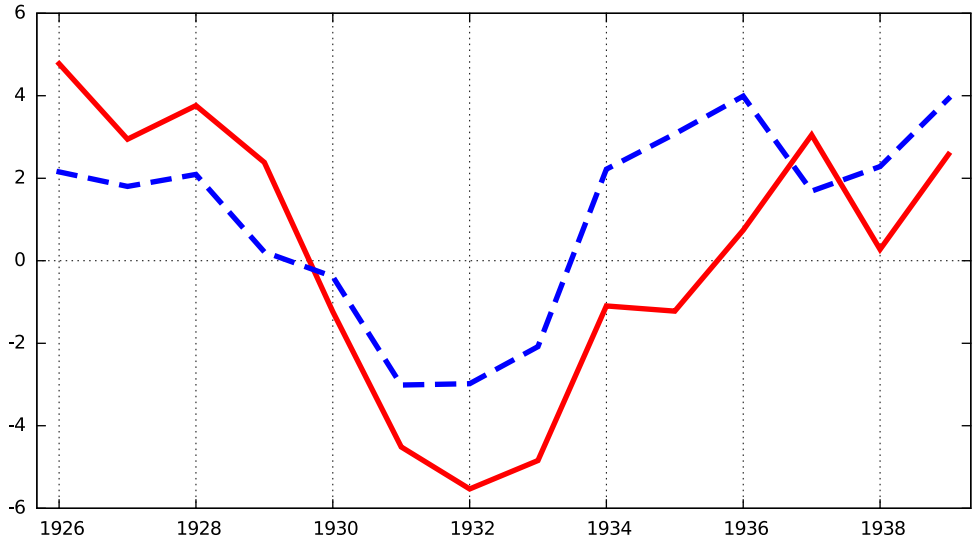
[9] Did low nominal rates imply low real rates, or was the deflation unanticipated? If deflation was anticipated, low nominal rates could have coexisted with high real rates. But on this point, the literature is mixed; see Eichengreen (1992, p 224).

consequences of the Smoot-Hawley protectionist legislation.

Bernanke (1983) focuses on the disruption of the credit channel as a supplementary mechanism to the monetarist explanation of financial crises. When crises erupt, the important intermediation role performed by banks deteriorates. For bank-dependent borrowers the real cost of intermediation becomes more costly with the result that even borrowers with good investment projects are denied access to bank credit. The ensuing credit crunch affects negatively output. In the empirical work, Bernanke finds that proxies of the intermediation cost, such as the real flow of deposits of failing banks and the difference between the yield on corporate bonds rated Baa and the yield on safe US government bonds, provide significant additional explanatory power beyond purely monetary forces to variations in output. A similar finding is obtained by Bemanke and James (1991) in a study that examines the impact of banking crises and panics on output in a group of 24 countries during the inter-war years. The insights one gets from the credit view is that the mechanism of financial intermediation, once it breaks down, may take longer to repair than a money supply process that instead depends on the actions of a central bank. Figure 7 shows that the collapse of bank loans in the world, in addition to being deeper than the collapse of money, lasted longer. In sum, the period of the gold-exchange coincided with monetary deflation, a deflation led by the United States and sustained by a faltering price-specie flow mechanism. In addition to monetary contraction, the world suffered from a credit squeeze that measured in terms of growth rates was deeper and lasted longer than the money squeeze. The credit mechanism reinforced the monetary mechanism.

Finally, the GD must be set in the global contest of a deflationary gold-exchange standard, the subject of the next section of the paper. Hamilton (1987) blames the failure of the price-specie flow mechanism in stabilizing the US economy in 1929-1931. Money stocks were declining, not only in the United States, but elsewhere, evidence of a generalized deflation. In Table 2, we report the annual growth rate of broad money for our group of five countries and for the rest of the world from the perspective of the United States. Several aspects of the table are worth noting. The first is that the US money growth decelerates sharply from 1927 to 1932; in 1933, there is an uptick with respect to 1932 but growth remains robustly negative. A similar pattern holds for the rest of the world, but

Figure 7: World bank loan and money growth, percent, 1926-1939.



Source: see Data Appendix. Loans (red line), money (blue line, dashed).

only until 1931. The second is that the US monetary contraction is considerably stronger than that of the rest of the world from 1927 to 1933; after that relative positions change. The third is that a highly positive correlation exists between US money growth and money growth in each of the other four countries in the period 1928-31. Then, when the United Kingdom and Germany go off gold, US money growth correlates negatively with that of these two countries; cf. 1932 and 1933.

Of the remaining three of the five countries in our group, the United Kingdom, which went off gold in 1931, achieved the fastest recovery from the GD. By 1935, the level of industrial production was 13 per cent higher than in 1929. In contrast, in the same year in France, which was late in exiting the gold standard, the level of industrial production remained 28 per cent below that of 1929; whereas in Italy, which had imposed exchange controls in May of 1934, the same index in 1935 had almost returned to the 1929 level (Feinstein et al., 1997, Table 9.3).[10]

France and Italy, two countries that shared a similar exchange rate policy from the mid-twenties to the mid-thirties, pose an interesting contrast in terms of economic performance. Both countries underwent significant exchange rate depreciation in 1925-26, France much more than Italy. [11] The

[10] Also Germany, which went off gold in 1931, had fully recovered the 1929 level of industrial production.

[11] In relation to the pound, the French franc had a cumulative depreciation of about 160 per cent over the two years, whereas the lira depreciated by 23 per cent.

Table 2: Annual percentage changes of broad money in five countries, 1927-1939.

	US	UK	France	Germany	Italy	Row for US	US- Row
1927	1.08	0.75	5.13	3.67	1.03	2.13	-1.04
1928	1.61	1.12	8.85	1.82	1.72	2.31	-0.71
1929	0.07	-0.68	-0.08	0.79	0.87	0.28	-0.21
1930	-0.97	1.33	2.27	-2.82	-0.12	-0.12	-0.85
1931	-3.50	-2.64	-1.49	-7.46	-0.44	-2.79	-0.71
1932	-7.80	4.68	-0.26	-4.41	-1.40	-0.81	-6.99
1933	-5.41	-0.25	-2.62	1.08	1.16	-0.58	-4.83
1934	3.56	0.63	0.27	3.33	-0.57	1.62	1.94
1935	6.09	2.28	-3.08	4.90	0.23	1.72	4.38
1936	4.83	2.90	5.10	3.19	4.05	3.61	1.22
1937	2.02	0.92	3.59	3.35	0.14	1.54	0.47
1938	0.00	-0.96	6.28	8.58	3.22	3.31	-3.31
1939	3.45	2.11	10.02	0.00	5.70	4.15	-0.70

Source: see Data Appendix.

exchange rate crisis reached its peak in July 1926 in France and in August of the same year in Italy, when decisive stabilization policies were launched to return to gold convertibility. In 1927, the franc appreciated by 18 per cent relative to the pound and the lira by 25 per cent. Much of the nominal appreciation translated in real appreciation, leaving the two countries arguably with overvalued moneys. From 1927 to 1934, when Italy imposed exchange controls, the lira-franc exchange rate was virtually constant, oscillating between 0.75 and 0.77 (Fratianni and Spinelli, 2001, p 49-56). Yet, as we have already noted, Italy did better than France in the GD in terms of both depth of the slump and the pace of recovery.

France, at the time, was a more developed country than Italy. Financially, France was ranked immediately below the United Kingdom; in contrast, Italy was part of the "periphery" of the international gold standard. The Poincaré stabilization brought to France large capital inflows and a rapid accumulation of international reserves, mostly in the form of gold, as we shall detail in a subsequent section. Italy, instead, was losing international reserves despite significant inflows of capital in the period 1928-1930; a reversal of capital flows in 1931-32 accelerated the rate of decline of international reserves (Fratianni and Spinelli, 2004, Table 8.1). Traditionally, Italian imports had been very sensitive to domestic income and insensitive to own prices, whereas exports had been moderately sensitive to foreign income but quite sensitive to own prices. Rising and widespread protectionism

further eroded the market for Italian labor-intensive goods (Paradisi, 1976, pp 296-297 ; Fratianni and Spinelli, 2001, pp 305-309) . Exporters, facing an overvalued lira and protectionism, resorted to the practice of dumping. In sum, French and Italian external imbalances were diverging much to the disadvantage of Italy.

So, what factor might justify the better economic performance of Italy over France? One reason might have to do with higher Italian flexibility of nominal wages (Asselain and Plessis, 1995, p. 200). This flexibility was imposed by the Fascist regime through its tight control on labor unions. In fact, the government first permitted, in 1926, the stretching of the working day from eight to nine hours at the same daily wage rate and then imposed two reductions of 10 per cent each of the nominal wage rate, in May and October of 1927.

IV The limit of the fix

In the mid-twenties many countries re-established gold convertibility to control inflation. Austria and Sweden did it 1922 and Germany in 1923 after the hyperinflation. The United Kingdom, the center country of the pre-war gold standard, returned to the old parity in May of 1925. Other countries, such as Australia, Hungary, the Netherlands, and Switzerland followed suit in the same year. Belgium, France, Italy, and Denmark re-entered, either formally or de-facto in 1926; finally, there were nations, such as Spain, that never did.[12]. The informal rules of the game dictated that full credibility would be restored if gold convertibility were to occur at the old parities, that is, those that existed before the start of the WWI (McKinnon, 1993) The United Kingdom, Denmark, the Netherlands, and Switzerland adhered fully to this rule. Italy, instead, set the new parity at approximately 30 per cent of the pre-war parity; France at 20 per cent; Portugal at 4 per cent; Austria at 0.00007 per cent, and Germany at 0.0000000001 per cent (Feinstein et al., 2008, p. 46). These differences reflected, to a large extent, differences in accumulated inflation rates and the degree of success of post-war currency stabilizations. For example, in the UK, both the Conservative government and the Bank of England were extremely keen in full restoration. They implemented, from 1921 to 1925, tight fiscal

[12]On the dates of *de-facto* convertibility restoration, see Feinstein et al. (2008, p. 46) and text below.

and monetary policies that produced a strong deflation, high unemployment rates, and real long-term interest rates rising in excess of 20 per cent (Alesina, 1989, p. 66).[13] The restored parity of $4.86 to the pound in 1925 arguably overvalued the pound.[14] French currency stabilization, on the other hand, came later in the wake of a devastating rate of inflation in the period 1923-26 that brought to power the government of Raymond Poincaré who acted decisively in raising interest rates and taxes while appointing the strong-minded and fiercely independent Emile Moreau to head the Banque de France. While France returned formally to gold convertibility in June of 1928, in fact stabilization actually started in 1926. The new parity undervalued the French franc (Eichengreen, 1986, p. 153). A somewhat similar story occurred in Italy, where Mussolini announced in August of 1926, less than a month from the formation of the Poincaré government in France, the launch of a strong lira policy (*Quota Novanta* or the target of 90 lire per pound) and the country's return to gold convertibility (Asselain and Plessis, 1995, p. 188). By then, the Fascist government had already balanced the budget and was about to force a conversion of all public floating debt into consols (Fratianni and Spinelli, 2004). As in France, the formal gold convertibility took place after the de-facto stabilization at a parity that arguably undervalued the lira like the franc.

The gold exchange standard and Gresham's law

The principles of the inter-war gold standard were enunciated, but not enforced, at the Genoa Conference of 1922. The starting assumption of the conference was that monetary gold would be in short supply and would have to be supplemented, to economize on its use, by international reserves in the form of deposits that periphery countries would keep with center countries, essentially the United Kingdom and the United States. Hence, the inter-war gold standard was to become a gold-exchange standard. Short-term liabilities issued by the two key currency countries would be linked to gold by a fixed conversion rate. This expansive form of international reserves, would provide the means to

[13] Real interest rates surged to 14 per cent in 1921, followed by another surge to 23 per cent in 1922, then declined in the next three years to 10, 5 and 4 per cent.

[14] Estimates of over and under valuation are based primarily on purchasing-power calculations. Keynes was of the advice that the pound returned to gold as an overvalued currency, but strong conclusions cannot be made because results are sensitive to the different types of price indices being used (Moggridge, 1969, p. 74). Friedman and Schwartz (1982, p. 291) famous chart of PPP in terms of the dollar-pound exchange rate does not suggest that the pound was overvalued in 1925.

settle balance-of-payments deficits and surpluses and the legal cover against currency in circulation at home.[15] However, the workability of such an arrangement depended on the credibility of the commitment to a given gold parity. Two moneys linked by a fixed exchange rate fall prey to Gresham's Law if there is any doubt about the durability of this commitment. In fact, under the gold-exchange standard, as it would later be true under Bretton Woods, gold became the scarce money: international money in the form of liquid claims (essentially dollar and sterling denominated assets) on center countries pushed away gold as an international means of payments. Gold was hoarded and kept jealously in the vaults. Triffin's dilemma (1960) was just as valid for the gold-exchange standard as it was under the gold-dollar standard of Bretton Woods. The participants to the conference were aware of the lure of gold and called for international cooperation to deflect countries' efforts to hoard metallic reserves. But their recommendations were not followed. Nurkse (1944, p. 33) reports that the last two years of the gold exchange standard were marked by a wholesale liquidation of foreign exchange reserves reflecting the complete collapse" of the system.

Monetary gold holdings were heavily concentrated in few countries. In 1928, France and the United States had half of the world's gold; our group of five countries held 66 percent of it (Nurkse, 1944, Table 2). This concentration increased further after 1928, mostly due to French diffidence towards foreign exchange reserves denominated in pounds.[16] Figure 8 illustrates vividly French adherence to Gresham's law applied to gold. At the end of 1927, France had almost a 50-50 mix between gold holdings and foreign exchange reserves. By 1932, the year after the United Kingdom went off the gold standard, foreign exchange reserves had virtually disappeared. As these conversions took place, the world stock of international reserves declined because while French stock of international reserves was not affected by the conversion, that of the United Kingdom instead declined. Britain's loss of gold, although not as dramatic as it is often described, signalled to the authorities the unsustainability of London to retain its status of center-country of the international gold standard role.

[15]The implied definition of balance-of-payments deficit or surplus is the official settlement, that is the sum of the current-account balance and what formerly was called the capital account balance (today the financial account balance).

[16]There is an interesting parallel between the French gold conversions of the late 1920s and early 1930s and those of the late 1950s and early 1960s under Bretton Woods. France had remained faithful in her distrust in foreign exchange reserves. The standard French argument was that a key-currency country enjoys "exorbitant privileges" (Alessandrini and Fratianni, 2009, p. 392).

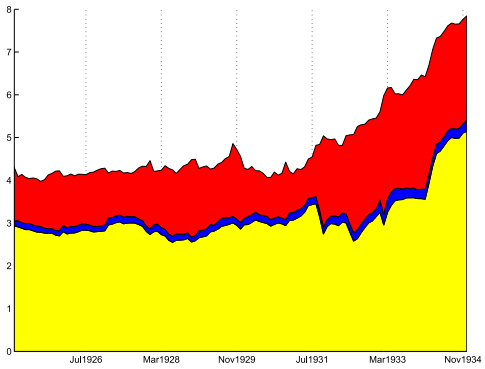
We agree with Nurkse (p. 39) that France was responsible for giving the *coupe de grâce* to the gold exchange standard and for aggravating "the pressure of deflation in the rest of the world." Irwin (2010), in a paper with the provocative title "Did France cause the Great Depression?", goes further and concludes that France shares part of the blame with the United States for the worldwide deflation of 1929-33. Figure 8 corroborates the deflationary bias of the gold exchange standard. The Banque de France and the Fed, with a large and rising combined gold share in the world, did not expand their domestic assets. The other three central banks, with a falling combined share of gold, also did not expand domestic assets sufficiently to compensate for the loss of international reserves. The end result was a world-wide squeeze on central bank money.

Asymmetric adjustment to external imbalances

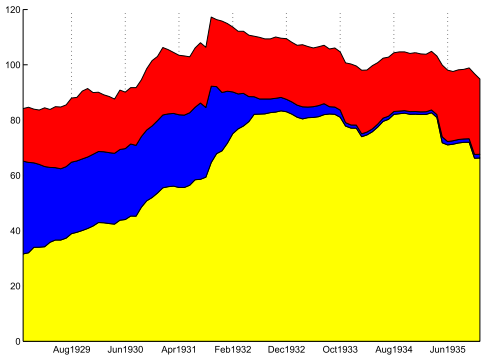
A second deflationary bias of the gold-exchange standard stems from an asymmetry in the adjustment to external imbalances. The rules of the game were that a surplus country needs to reinforce inflows of international reserves with an expansionary monetary policy (or more generally with an expenditure increase), while the opposite has to be done in a deficit country. The actual practice was that the adjustment fell disproportionately on deficit countries, for which the consequences of taking no corrective action was an exit from the gold standard. The consequences of taking no action for the surplus countries, instead, was an over-heating economy that could be prevented with the central bank pursuing a policy of sterilizing the inflows of international reserves. This bias for deflation was ultimately driven by the strong motive of countries to accumulate gold. France actually made this motive so transparent to the point of impeding legally the Banque de France to undertake purchases of securities in the open market that would have reinforced the expansionary impact of gold inflows. Eichengreen (1986) argues that the reason underlying the formal impediment was the French fear of rekindling the disastrous inflation of the early 1920s. More generally, the correlation between changes in the foreign and domestic component of the monetary base was overwhelmingly negative, an observation that has been identified with a generalized practice of sterilization. Yet, a negative correlation does not necessarily imply a policy of sterilization. In a regime of fixed exchange rates and

Figure 8: Central bank's assets, 1928-1935

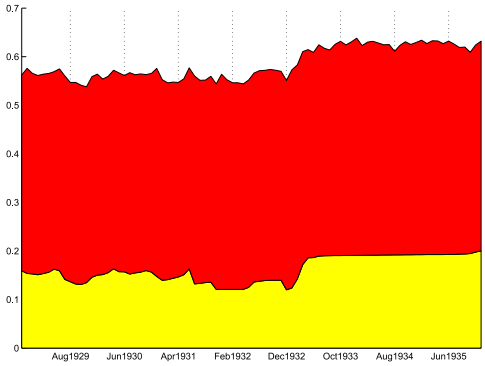
(a) FED



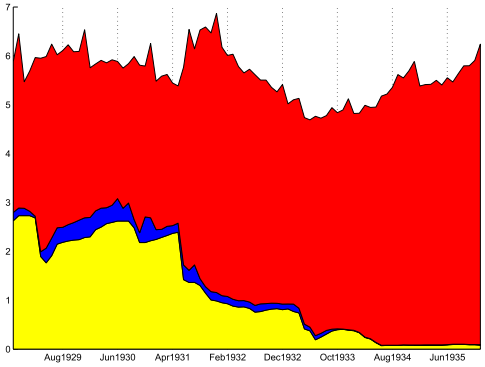
(b) Banque de France



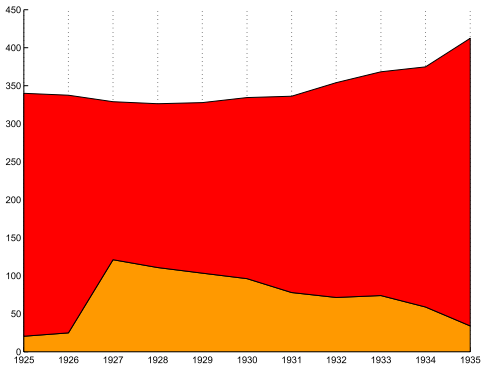
(c) Bank of England



(d) Reichsbank



(e) Banca d' Italia



Source: see Data Appendix. Yellow (gold), blue (foreign exchange), red (Domestic), orange (gold + foreign exchange).

highly integrated capital markets, autonomous changes in the monetary base bring about offsetting flows of international reserves. For example, an open market purchase of securities by the central bank leads to an immediate decline of the short-term money market rate and to a delayed rise in nominal income. The interest rate effect is to reduce net capital inflows and the effect of nominal income is to reduce the trade balance, with an overall negative impact on the official settlement balance. In essence, in the absence of other intervening factors, movements in international reserves tend to offset movements in the domestic component of the monetary base.[17] To distinguish policy-driven sterilization from endogenous offsetting movements between the two components of the monetary base one needs an appropriate identification procedure or a careful reading of the historical records. On this, Nurkse (p. 74) concludes that "... neutralization [sterilization] of gold imports, though in part it occurred 'automatically,' was a deliberate policy, and that there were sound and compelling reasons for it."

International cooperation as a scarce resource

Effective leadership and international cooperation could have prevented the deflationary bias resulting from each country unilaterally seeking to obtain a larger share of a slow growing supply of gold. In a world where national monetary policies influence one another and the utility of each central bank depends on the "common" inflation rate, unilateral actions are seldom optimal. In Hamada's (1976) game-theoretic monetary model, Nash behaviour does not lead to the optimal configuration given by cooperation. This is because changes in the world stock of international reserves fall below the sum of desired national external imbalances; the outcome is deflation. The solution has a straight forward intuition. Under fixed exchange rates, a country may want to create an insurance policy against future negative external shocks by accumulating a target stock of the valuable international money, namely gold under the gold exchange standard. If those national targets do not add up to the existing world gold supply, countries will implement relative deflationary policies to increase their world share of

[17] Nurkse (1944, p. 68 and following) recognizes the difference between endogenous and policy-driven negative correlation. For example, on page 70, he states that: "An inflow of gold, for instance, tends to result in increased liquidity on the domestic money market, which in turn may naturally lead the market to repay some of its indebtedness to the central bank."

gold.[18]

The optimal solution that the sum of individual desires for gold matches the world stock of gold reserves requires a country either to act like the director of the international orchestra, to use Keynes' well-known phrase, or international cooperation, or a combination of both. This requirement stems from the fact that fixed exchange rates force participating countries to relinquish part of its monetary independence. The system as a whole has one degree of freedom to determine its common monetary policy. The last degree of freedom serves two basic objectives. The first is to set the system's long-run inflation rate. The second is to determine the system's response to fluctuations in aggregate demand and supply, world interest rates, world prices, and in general to all those factors that influence all participating countries jointly. There are two extreme solutions: either to assign policy independence to a leading country or effect coordination in such a way that the last degree of freedom is shared by all participants. The UK role in the classical gold-standard period and the US role in the Bretton Woods system have been interpreted as instances of leadership (Kindleberger, 1973; Keohane, 1984; Eichengreen, 1989). The European Monetary System of 1978-1998, on the other hand, has been interpreted as a mixture of cooperation and German leadership (von Hagen and Fratianni, 1990; Fratianni and von Hagen, 1992, Ch. 3) . The inter-war gold standard, finally, has been interpreted as either lacking a leader (Kindleberger, 1973) or as a failure of international cooperation (Eichengreen, 1995).

The detailed account of central bank cooperation in the period 1924-31, provided by Clarke (1967), underscores a breakdown in cooperation that occurred in mid 1928, in concomitance with the tightening of monetary policy in the United States and the sudden arrest of its net capital outflows. This failure of cooperation was exacerbated by the strains created by war reparations:

> "This pressures that were being exerted on the rest of the world by the United Sates were augmented by the other major surplus country, France... Under the policy followed by the French authorities after June 1928, foreign exchange acquired by the Bank of France... was converted virtually entirely into gold...The pressure emanating from the United States and France was felt throughout the world... Among the hardest hit by the change in the international economic climate was Germany which had been so dependent on the inflow of foreign, especially American, capital... Britain was also hard hit by the change in the economic climate... A variety of difficulties prevented the major central bankers from

[18] In light of the more limited political participation between the two world wars, central banks had more freedom to pursue deflationary policies whose effects fell disproportionately on non-elite groups (Alesina, 1989).

> cooperating... Norman, Moreau, and Schacht [the heads of the Bank of England, Banque de France, and Reichsbank, respectiveluy] all became involved in greater or less degree in the frequently acrimonious negotiations over reparations." (Clarke, 1967, pp 148-150).

But even before 1928, cooperation had been faltering. From the end of 1926 to mid-1927, French international reserves rose by $720 millions; in May of 1927 the Banque de France informed the Bank of England of her intention to convert sterling reserves into gold at a weekly rate of £3 millions (Eichengreen, 1984). With the UK economy in difficulty, the Bank of England was reluctant to raise rates for fear of social unrest. This was a classic case were cooperation would have been a superior outcome to unilateral action: the United Kingdom was experiencing a slow economy and an external deficit, while France had a good economy and an external surplus. Montagu Norman suggested that the Banque de France reduce rates, but the French insisted that the burden of adjustment had to fall entirely on the United Kingdom (Eichengreen, 1984, p. 80).[19] Such a solution, as we have already noted, imparts a deflationary bias under the fixed exchange rate system (Keynes, 1943).

Other instances of inadequate international cooperation occurred in 1931, first with the failure of the large Austrian bank Credit-Anstalt, then with the crisis of the Reichsmark and finally with the attack on sterling that led to the suspension of gold convertibility on September 21 (Clarke, 1967, Ch. 8). The UK decision removed one "director of the orchestra" from the stage of the international monetary and financial system. The other director of the orchestra, the United States, was mired in a deep economic depression and was in no mood to lead an aggressive international cooperative effort. The fixed exchange rate broke down giving room to a cycle of devaluations:

> "Devaluation was felt to be necessary, and was used, chiefly as a means to obtain freedom of national action in combatting depression... If the leading industrial nations had initiated, by whatever methods appropriate to local conditions, a simultaneous policy of monetary expansion in, say, the spring of 1931, they would probably have had little difficulty in keeping their mutual exchange rates stable. Actually there was at that time complete lack of agreement, within as well as between countries, as to what should be done to combat the depression..." (Nurkse, 1944, p. 130).

In sum, in the absence of international cooperation, the gold exchange standard acted as a strait-jacket on monetary expansion, thus imparted a deflationary bias to the system. In an interesting experiment, Choudhri and Kochin (1980) demonstrate that Spain, which followed flexible exchange

[19] As reported by Eichengreen, Moreau, the head of the Banque de France, was resentful of the "imperialism of the Bank of England."

rate, escaped the great slump in prices and output that instead ravaged countries that adhered to the gold standard. In addition, Denmark, Finland, and Norway, which let the exchange rate float in mid course of the GD, reaped benefits relative to those countries that stuck with the fixed exchange rate regime.

Parallels between the Eurozone and the gold standard

The Eurozone is a "strong" fixed exchange rate arrangement, where the qualification of strong derives from the fact that member countries share the same currency and a common monetary policy. The gold standard was also a fixed exchange arrangement, although not as strong as that of the Eurozone because the cost of leaving the standard was smaller than the cost of leaving the Eurozone. Both the Eurozone and the gold standard share another feature, the lack of a fiscal union. In this section, we underscore three similarities between these two types of fixed exchange rate arrangements.

The first similarity is that the price-specie flow mechanism appears to have worked in the wrong direction in the Eurozone, as it did during the gold-exchange standard days. To see that, consider the sharp difference between the external current-account deficits relative to GDP of the Southern countries of the Eurozone and the large and rising current-account surpluses of the Northern countries; see Figure 9. Deficits and surpluses refer to each country's position in relation to the rest of the world and not to the unavailable inter-member balance of payments. The former is used as a proxy of the latter with the justification that Eurozone countries trade a great deal with one another. The South, in addition to experiencing an excess of domestic absorption over domestic production (from 1999 to 2012), has had a consistently higher inflation rate of inflation than Germany, the center country of the Eurozone (Alessandrini et al., 2014, Table 2). Given these facts, the price-specie flow mechanism would have predicted that net flows of money and credit would have moved towards large current-account surplus and low inflation Germany. The data in Table 3 for France, Germany Italy and Spain say otherwise. From 2000 to 2007, the year before the peak of the sub-prime crisis, Spain had accumulated a growth of broad money of 23 percentage points higher than Germany's; its cumulative excess growth of bank loans was even higher, 45 percentage points. Qualitatively similar differences

Table 3: Cumulative growth rates of money, bank loans and total bank assets of France, Italy and Spain relative to Germany's, 2000-2007 .

	France - Germany	Italy - Germany	Spain – Germany
Broad money	25.2 % points	29.7 % points	44.7 % points
Bank loans	11.1 % points	13 % points	22.8 % points
Total bank assets	16.6 % points	26.5 % points	40.7 % points

Source: see Data Appendix.

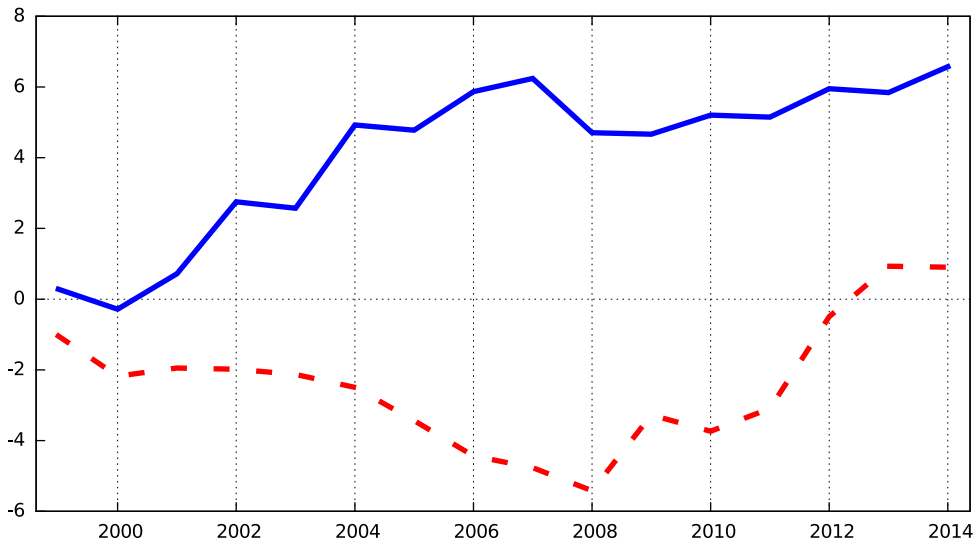
hold between Italy and Germany and between France and Germany. A similar finding has been reported for Greece by Dellas and Tavlas (2013, Table 2).[20] While more work needs to be done in this area, the above data suggest a malfunctioning of the price-specie mechanism, an outcome that resonates with the experience of the gold-exchange standard.

The second similarity lies in the importance of capital flows as a financing mechanism of current-account deficits and the proclivity of these flows to stop or even reverse their direction. In an earlier section, we have discussed the sudden capital flow arrest to the Southern countries first in 2008, after the Lehman bankruptcy and then in 2010, after the revelation of the Greek fiscal crisis. The 2008-2010 sudden stops are a close parallel of the 1928 sudden stop, and their consequences were similar. In 1928, Germany had to choose between keeping the fix or do an expansionary policy by letting go of the fix. Germany kept the fix and embarked on a very deep economic contraction. In 2008 and 2010, the South kept the fix and was forced to a rapid correction of its current-account deficit while facing rising sovereign yield spreads relative to Germany (Alessandrini et al., 2014, Table 6).

The third and final similarity between the Eurozone and the inter-war gold standard is the asymmetric adjustment to current-account imbalances. This asymmetry results from two phenomena. The first is the Eurozone's neglect of setting limits on members' current-account imbalances, both deficits and surpluses; a neglect that stands in sharp contrast with budgetary and debt-to-GDP targets. The second is that the external-surplus North, in particular Germany, has refused to accept the principle that adjustment has to be shared by surplus and deficit countries alike. More to the

[20]Dellas and Tavlas argue that two factors were responsible for the perverse flows. The first is that foreign-held proportion of Greek debt grew very rapidly during the 2001-2009 period. The second is that Greek banks unloaded government debt and used the proceeds to expand bank credit. The two phenomena are linked by the posture of financial markets in not distinguishing appropriately the sovereign credit risks of the Eurozone countries.

Figure 9: Current-account balance as a per cent of GDP,
North vs. South of the Eurozone, 1999-2014.



Sources: see Data Appendix. North (blue), South (red, dashed).

point, the burden of adjustment ought to fall predominantly on surplus countries when economic activity is slack and predominantly on deficit countries when conditions are inflationary (Keynes, 1943; Mundell, 1968; Alessandrini and Fratianni, 2009). But the North has been unwilling to reflate in the post-subprime period and has imposed, instead, an internal devaluation on the South through a policy of fiscal austerity. The pattern of rising current-account surpluses to GDP of the North and the falling current-account deficits to GDP of the South since 2008, evidenced by Figure 9, is consistent with this asymmetric adjustment. Given nominal rigidities and high rates of unemployment, the financial markets have expressed scepticism on the success of the internal devaluation policy, with the consequence that spreads on the sovereign debt of the South have risen.

In sum, the Eurozone shares three similarities with the inter-war gold standard: the malfunctioning of the price-specie mechanism, the proclivity to capital flow sudden stops, and the asymmetric burden of adjusting to external imbalances.

V Banks and Money

Banks played a big role in both great crises. Several aspects of this role are similar in the two crises, others differ. One important difference is that the banking crises in the 1930s occurred after the implosion of the real economy, whereas the sequence of events in 2007-2008 was first the occurrence of the banking (financial) crisis and then the recession. In both instances, banking crises, regardless of the timing, had a big impact on the real economy, strong evidence against the neutrality of output relative to credit and money.

The first is the large number of bank failures and bank holidays in the GD relative to those in the GFC; see Tables 4 and 5. Banks are fragile institutions in the absence of deposit insurance and of an active lender of last resort (Diamond and Dybvig, 1983). This fragility was corrected in the United States by introducing, among other things, deposit insurance. In other countries, for example Italy, stability came with the nationalization of much of the banking system and protecting from competition the non-nationalized part. Entry limitations, interest rate ceilings, and restrictions on types and composition of bank assets were common banking features after the GD and before the wave of liberalization that started in the 1980s. The second observation is that runs have migrated, in the recent past, from traditional banks to non-bank financial institutions that engage in banking. With the expansion of finance, large holders of liquidity bypass traditional banking, where deposit insurance is restricted to small depositors, and placed deposit-like claims against the security of collateral. This type of banking is fragile because collateral is not perfectly safe and the involved institutions do not have access to central bank financing; more on this below. The third is that the lesson of the GD has reinforced the view that banking, whether traditional or not, is a special industry: government feels compelled to rescue it in times of troubles. Even under normal times, large banks are protected on account of being too big to fail (TBTF).[21] The protected-view of banking was confirmed in full force during the GFC with massive government rescues and consequent shift of credit risk from the financial

[21]TBTF policy was officially enshrined in the United States in September of 1984, when the Comptroller of the Currency testified before Congress that eleven banks in the United States were TBTF. Judging by the reactions of the stock market, the announcement was perceived to be credible. In fact, nine of the 11 banks had positive excessive rates of return over a specified time window around the announcement date, in contrast to negative excess rates of return for listed banks not included in the Comptroller's list O'Hara and Shaw (1990).

Table 4: Banking crises in the GD

Date	Country	Description
August 1929	Germany	Failure of Frankfurter Allgemeine Versichenrugs AG and small banks runs on Berlin and Frankfurt savings banksa[a]
November 1929	Austria	Failure of Boden-Credit-Anstalt that is absorbed by Credit-Anstalt[a].
October 1930 September 1931	France	230 banks failed, among which Failure of Banque Adam at Boulogne-sur-Mer and Banque d'Alsace-Lorraine; runs on provincial banks[b].
November 1930 January 1931	USA	First banking crisis; 806 banks are suspended with deposit losses of $628 millions; currency held by the public rose by $224 millions.[c]
February 1931	Italy	Secret agreement between Credito Italiano and the monetary authorities that provide a rescue loan of Lit 330 millions.[d]
May 1931	Austria	Failure of Credit-Anstalt.
April July 1931	Germany	Darmstaedter Bank closes (July 13), an event that sparks panic and bank runs; bank holiday (July 14) and foreign exchange controls follow (July 15); banks reopen for limited business on July 16 and in full on August 5; Darmstaedter was absorbed by Dresdner Bank in March 1932.[e]
April August 1931	USA	Second banking crisis; 573 banks are suspended with deposit losses of $496 millions; public increases hoarding by $496 millions; crisis is more regional than national.[c]
August October 1931	USA	Third banking crisis that overlaps with the UK exit from the gold exchange standard; 827 banks are suspended with deposit losses of $705 millions; public increases hoarding by $393 millions; crisis became national[c]
October 1931	Italy	Secret agreement between Banca Commerciale Italiana and the monetary authorities that provide a rescue loan of about one billion lire.The three large "mixed" banks, Banca Commerciale Italiana, Credito Italiano and Banco di Roma were absorbed by government owned Istituto Ricostruzione Industriale in January 1933.[d]
February March 1933	USA	Fourth banking crisis that ends with a panic and bank holiday (March 6).[c]
1934	France	106 banks failed; altogether from October 1929 to September 1937, 670 banks failed.[b]

Source: see Data Appendix.

Table 5: Banking crises in the GFC

Date	Country	Description
February 2007	US	ABX index signals an increase in subprime mortgage defaults[f].
June 2007	US	Bear Sterns injects $3.2 billions to cover for margin calls of two of its hedge funds.[g]
July 2007	US	Market for ABCP begins to dry up.
July 2007	Germany	Subprime difficulties spread to Europe as German IKB reveals that it cannot cover . for the failure of its conduit to roll over ABCP
August 9, 2007	France	BNP Paribas stops redemptions for three investment funds
August 9, 2007	Global	Following Paribas event, counterparty risk emerges; illiquidity soars in interbank market, prompting an intervention of billion of euro by ECB and $24 billions by Fed.
August 17, 2007	US	Run on Countrywide, subprime originator
September 9, 2007	UK	Run on UK bank Northern Rock.
January 19, 2008	US	Fitch downgrades insurer Ambac specializing in guaranteeing municipal bonds and MBS.
March, 2008	US	Run on Bear Stearns when hedge funds do not roll over their liquidity funding. Later, JPMorgan Chase acquires Bear Sterns through the auspices of Fed of New York.[h]
July 11, 2008	US	US Treasury makes an explicit government guarantee for Fannie Mae and Freddie Mac.
September 15, 2008	US, Global	Failure of the highly connected Lehman Brothers
September 16, 2008	US	AIG receives a bailout of $85 billions by the Fed (two others will follow in October and November).[i] Money market fund Reserve Primary Fund "breaks the buck" after writing off $785 millions of debt issued by Lehman.
September 19, 2008	US	Treasury provides temporary guarantee of MMMFs and Fed launches ABCP-MMMF liquidity facility

Source: Data Appendix.

to the public sector (Fratianni and Marchionne, 2013). Bank concentration has risen and with it a mounting concern that the largest mega institutions in the world may now be too big to save. Finally, regulation and supervision of the banking industry has experienced big swings: from the high levels reached immediately after the GD to the low levels before the GFC and the high level again after the crisis (Philippon and Reshef, 2012). The differences between the aftermath of the two crises are that nowadays the degree of globalization and interconnectedness in banking and finance are much higher than after the GD; and that the regulatory response is evolving along a path of extreme complexity whose effects on the regulated industry are yet to be understood.

Bank failures and money multipliers

Bank failures in the 1930s was a common occurrence, with some notable exceptions like the United Kingdom and Canada, countries with a banking structure characterized by few large banks and extensive branch systems.[22] Tables 4 and 5 give details for our group of five countries. The United States experienced the largest number of failures: by the end of 1933 the number of functioning banks was approximately half of the number operating in 1929; failures, primarily, but also mergers accounted for this dramatic shrinkage (Bernanke, 1983, p. 259). Very significant bank failures occurred also in Germany and Austria. France had a relatively high number of failures but of lesser economic significance. Italy had relatively few failures because government and Banca d'Italia rescued them, and for the two largest, Banca Commerciale Italiana and Credito Italiano, the rescue was done under a cloud of secrecy (Guarino and Toniolo, 1993, pp 73-94). Furthermore, Italy made extensive use of lender of last resort, although organized in an unorthodox manner to preserve the fiction that the central was adhering to classic Bagehot principles. [23]

In their *Monetary History of the United States* (1963), Milton Friedman and Anna Schwartz attribute banking crises to an increase in the public's preference for currency relative to bank deposits, in turn leading to a contraction of the money stock. To make their point, these authors compare the

[22] Canada and the United States offer the sharpest contrast in this respect: both countries were on the gold standard and had similar macroeconomic performance. Yet the United States, populated by a preponderance of unit and undiversified banks, suffered massive bank failures, whereas Canada, with few large banks and wide branching, did not (Grossman, 1994).

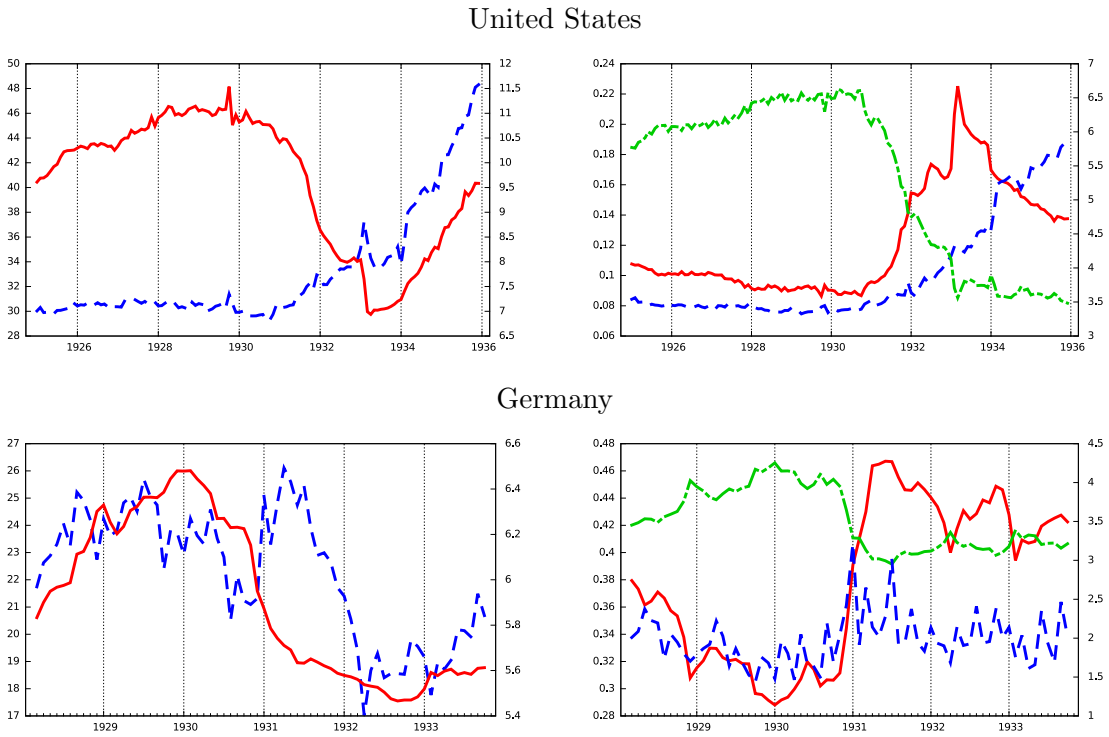
[23] For a discussion of these two points, see Fratianni and Spinelli (2004, pp 232-235).

banking crisis of 1907 with that of 1929-1933 in the United States (see page 167). In the first, there were no significant bank closings because banks refused to convert deposits into cash. In the second, instead, massive currency withdrawals led to a complete shutdown of the banking system. The difference between the two episodes is in the effects on the monetary base. This point is further elaborated by Schwartz (1986) who makes the distinction between "real" and "pseudo" financial crises. A real financial crisis is "fuelled by fears that means of payment will be unobtainable at any price and, in a fractional-reserve banking system, leads to a scramble for high-powered money" (p. 11). The public becomes distrustful of banks and converts deposits into currency, which in turn lowers the money multiplier and the money stock. Deprived of liquid funding, banks are forced to liquidate their non-marketable assets. Asset prices fall and interest rates rise. Bank insolvencies rise, further heightening the public's mistrust in the banking system. In sum, a sharp rise in the currency-to-deposits ratio, k, is an indicator of a banking crisis. Figures 10 and 11 show the level of the M2 money stock (M), the monetary base (MB), the money multiplier (m), the currency to deposits ratio (k), and the bank reserves to deposits ratio (r) for the United States, the United Kingdom, Germany, and Italy. The money multiplier, which is defined as the ratio of the money stock to the monetary base, is equal to $(1 + k)/(k + r)$. Increases in k and r reduce m.

The impact of bank failures on the money stock in the United States is well known. M declined steadily from 1929 to 1933, despite an increase in MB. The collapse in m is the reason for this decline, which was driven by the distrust of the public in the banks and manifesting itself with a sharp upward movement in the k ratio. Banks as well had no confidence in the economic environment and reacted by raising the ratio of bank reserves to deposits, which further contributed to the decline in m. Friedman and Schwartz call the monetary developments of this period a major policy failure, based on the assumption that monetary authorities were aware of the relationship between M, MB, m, k and r.[24] The German money stock and its proximate determinants behaved qualitatively like the US counterparts over the same period. The movements of M, m, and k approximately match those in the United States. On the other hand, MB moves, overall, in the opposite direction of the US MB.

[24]Wicker (1996) disagrees that the Fed was aware of the working of the money multiplier.

Figure 10: M and MB (left panel), m, k and r (right panel), US and Germany, GD



Source: Data appendix. US: Monetary base (blue line, dashed, right axis), Monetary aggregate (red line, left axis), currency-deposits ratio (red line, left axis), reserves-deposits ratio (blue line, dashed, left axis), money multiplier (green line, dashed, right axis). Germany: currency-deposits ratio (red line, left axis), reserves-deposits ratio (blue line, dashed, right axis, percentage), money multiplier (green line, dashed, right axis).

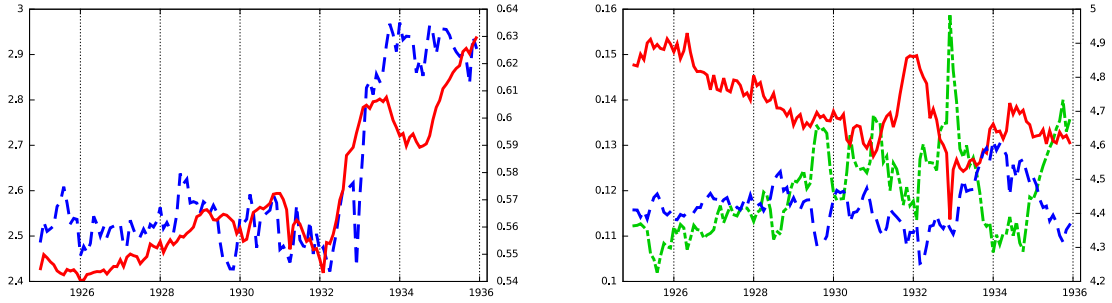
Here too we have a major policy failure. France behaved qualitatively like Germany but with a lag. Starting in 1931, M, driven by a falling MB and m, contracted from 170 billion francs in 1931 to 145 billion francs in 1936. It is the period during which the Banque de France refused to accommodate gold inflows with an expansion of the domestic monetary base. The German money stock and its proximate determinants behaved qualitatively like the US counterparts over the same period. The movements of M, m, and k approximately match those in the United States. On the other hand, MB moves, overall, in the opposite direction of the US MB. Here too we have a major policy failure. France behaved qualitatively like Germany but with a lag. Starting in 1931, M, driven by a falling MB and m, contracted from 170 billion francs in 1931 to 145 billion francs in 1936. It is the period during which the Banque de France refused to accommodate gold inflows with an expansion of the domestic monetary base (Figure 11.

The UK story is significantly different from the US, German, and French experiences (Figure 11) . MB and M remained stable until 1932 and then exploded, a consequence of having abandoned god convertibility. The expansion of the monetary base more than compensated the negative impact on the money stock of a declining multiplier. The rapidly rising monetary aggregates are consistent with the observation that the United Kingdom did relatively better than countries than stuck to gold standard. Italy did also relatively better than other gold-standard countries despite its formal commitment to gold. The decline in the Italian M was very moderate and so was the rise in k (Figure 11). The end result was that the increase in MB almost compensated the moderate decline in m. According to (Fratianni and Spinelli, 2004, p. 230):

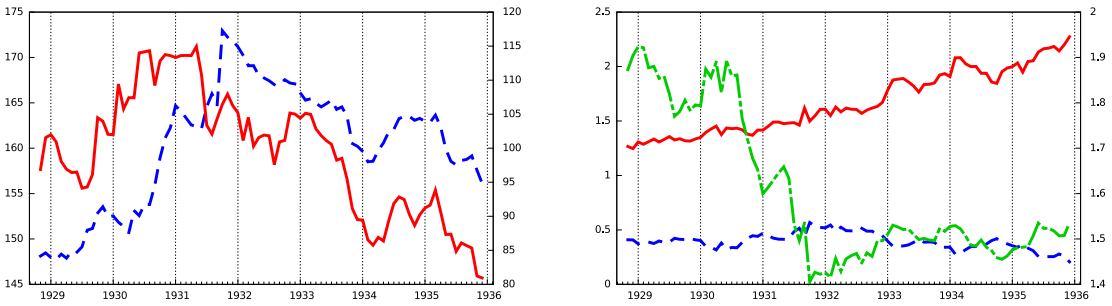
> "[The Banca d'Italia] acted often and massively as the lender of last resort under the tutelage and the fiscal backing of the Italian government, which kept some of the rescue operations in total secrecy. The public, although clearly aware of the high-risk environment of the times, felt on the whole that its bank deposits were safe and never produced a serious run on banks. The behavior of the Italian k reflected this state of relative calm of the public. In addition, the actual decline in the money multiplier was more than offset by changes in the monetary base. Government budget deficits were a potent source of monetary base creation. On average, from 1927 to 1933, 84 percent of budget deficits were monetized... The policy failure in Italy was restraining [Banca d'Italia's] bank lending, which in turn buffered the growth of the Treasury component of the monetary base. This is evidence is consistent with the hypothesis that the authorities were committed to the gold-exchange standard. The net outcome, however, was that, although Italian money growth declined drastically in this period relative to the previous period, its decline was a small fraction of the U.S. money stock decline."

Figure 11: M and MB (left panel), m, k and r (right panel), UK, France and Italy, GD

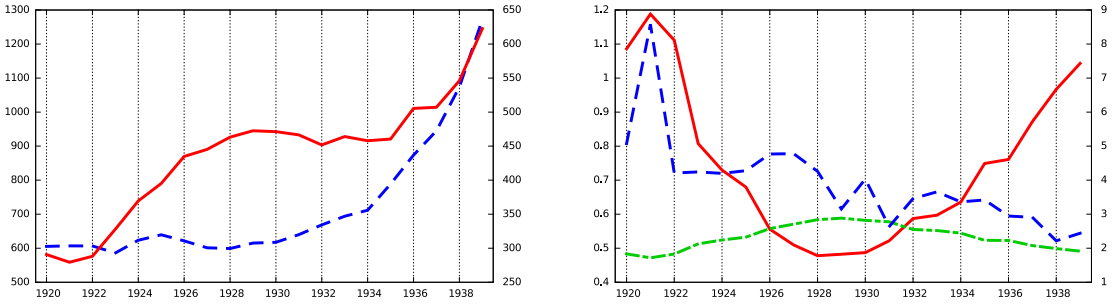
United Kingdom



France



Italy



Source: Data Appendix. UK and France: Monetary base (blue line, dashed, right axis), Monetary aggregate (red line, left axis), currency-deposits ratio (red line, left axis), reserves- deposits ratio (blue line, dashed, left axis), money multiplier (green line, dashed, right axis). Italy: Monetary base (blue line, dashed, right axis), Monetary aggregate (red line, left axis), currency-deposits ratio (red line, left axis), reserves-deposits ratio (blue line, dashed, right axis, percentage), money multiplier (green line, dashed, right axis).

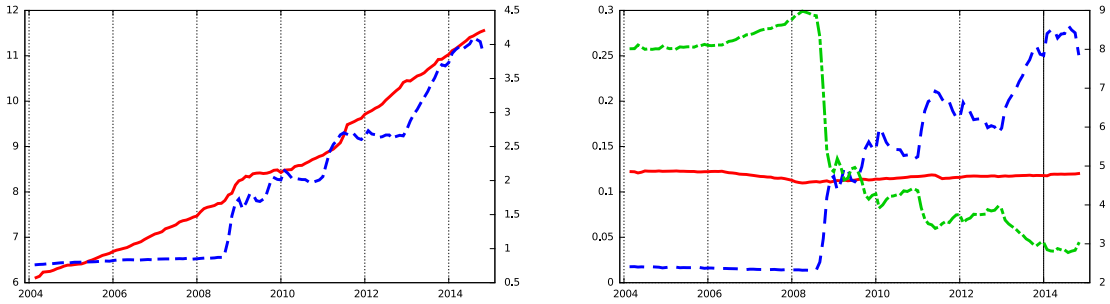
In sum, of the five countries in our sample, the United States, Germany and France had a worse economic performance than the United Kingdom and Italy. The first three remained on gold and had larger monetary contraction than the United Kingdom, which left gold in 1931, and Italy, which remained officially on gold but fudged its commitment with an extensive lender-of-last-resort use.

Figure 12 shows that the money stock, after the failure of Lehman, continued its trend in the United States and did not decline in the Eurozone, despite the collapse of the money multiplier, whose statistical pattern is very similar to the pattern of the US and German m during the GD. The explanation for this outcome is that the monetary authorities had learned the lesson of the 1930s: they were bold in creating monetary base at unprecedented rates. Furthermore, unlike in the 1930s, the movement of the money multiplier cannot be ascribed to changes in k. In fact, this ratio in the second crisis either remained virtually flat, as in the United States, or rose mildly, as in the Eurozone. The big reason for the collapse of m, this time was not k, but r. Part of the reason for the behavior of r had to do with the deleveraging process that was forced on banks due to collapsing asset prices. Another reason stems from rising counterparty risk, which was putting a lot of sand in the wheels of the interbank market. In fact, Figure 13a shows the substitution of US banks' excess reserves for interbank loans and Figure 13b indicates that the big surge in the LIBOR-OIS spread in 2008 coincides with the start in the ascension of bank excess reserves. In essence, the environment around the peak of the crisis appeared as extremely uncertain for banks; their reaction was to hoard liquidity.

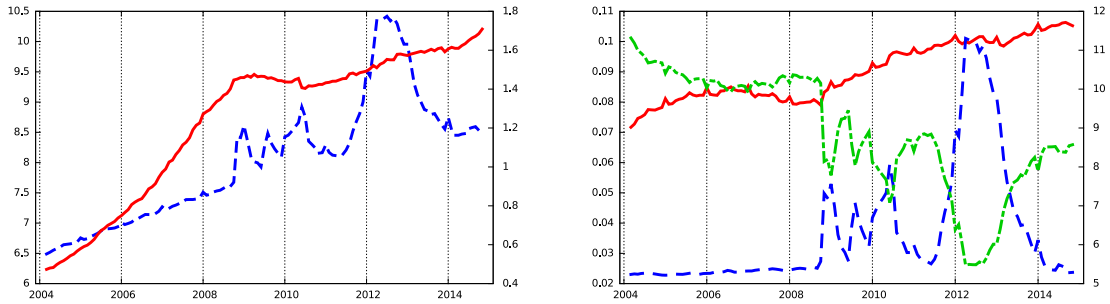
There is a striking contrast between the monetary policy failure of the 1930s and the behavior of the monetary authorities in response to the GFC. In the immediate aftermath of the GFC the monetary authorities pumped the necessary liquidity to restore the normal functioning in the interbank market. When it became clear that the GFC was much more than a simple liquidity crisis, drastic measures were taken to prevent a fall of the money stock. The first action was an aggressive cut of policy interest rates. The zero interest rate policy, a theoretical concept until 2007, suddenly became the new paradigm of monetary policy. But it was not enough to counteract the negative effects of the GFC. To the zero interest rate the monetary authorities added an unconventional monetary policy, called quantitative easing or QE. It was launched first by the Fed and then by the Bank of England and

Figure 12: M and MB (left panel), m, k and r (right panel), US and Eurozone, GFC

US



Eurozone

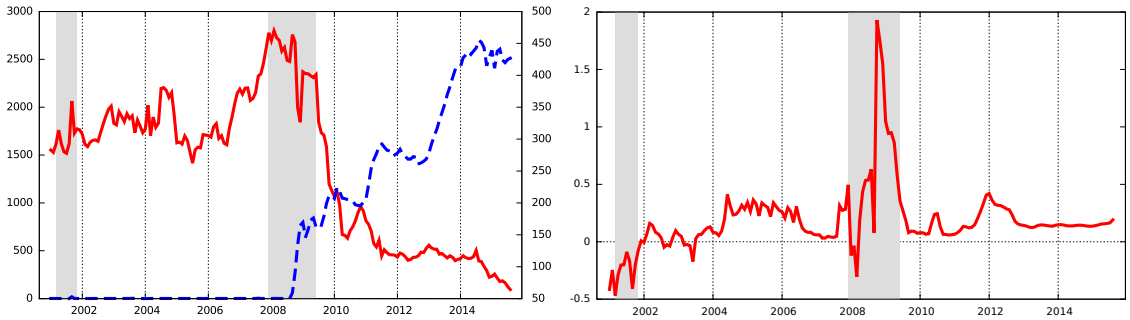


Sources: Data appendix. Monetary Base (blue line, dashed, right axis), Monetary aggregate (red line, left axis), currency-deposits ratio (red line, left axis), reserves- deposits ratio (blue line, dashed, left axis), money multiplier (green line, dashed, right axis).

Figure 13: Interbank loans, excess reserves and money market spread, US and dollar, GFC

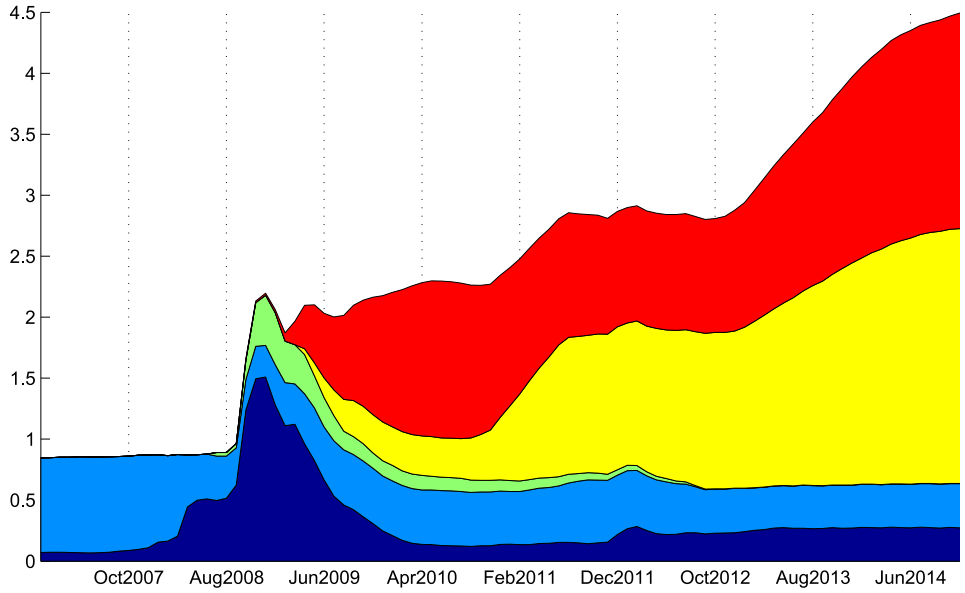
(a) Intbank loans -Excess reserves

(b) 3M Libor - OIS spread



Source: see Data Appendix. Interbank loans (red line, left axis) and excess reserves (blue dashed line, right axis), Grey bars are NBER recessions .

Figure 14: Fed assets, 2007- 2015, dollar trillions



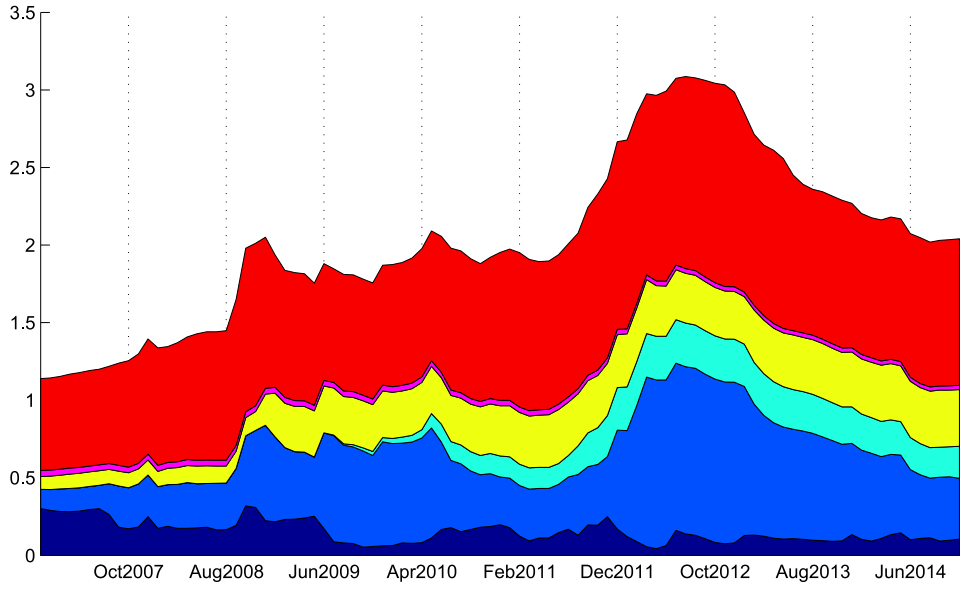
Source: see Data Appendix. Dark blue = *Lending to financial institutions*, light blue = *Traditional securities holding*, green = *liquidity to key credit market*, yellow = *long term treasury purchase*, red = *agency debt and mortgage backed securities*

eventually by the ECB. QE produced an unprecedented expansion of central banks' balance sheets, which is reflected in the noted behavior of the monetary base.

Massive injections of liquidity were effected by purchasing, not only traditional assets, but also "troubled" assets like mortgage-backed securities. The Fed (see Figure 14) and the Bank of England became "buyers of last resort" so as to provide, not only additional liquidity to the banking system, but also a support to the prices of risky assets. ECB actions instead were limited, in the beginning, by its binding objective of achieving medium-term price stability. Although the assets side of the ECB doubled between 2007 and 2012, ECB purchases remained confined to direct lending to banks. Later, in response to the sovereign debt crisis that broke out in 2010, the ECB launched the Securities Market Program aimed at supporting the prices of public debt of the Southern countries and of Ireland; see Figure 15.

In sum, modern unconventional monetary policy seems to have contained the upside potential of the recession. Considering that the prevailing fiscal regime in the Eurozone was one of austerity, monetary policy carried the day and might be credited for making the GFC a not-so-bad outcome in

Figure 15: ECB assets, 2007- 2015, euro trillions



Source: see Data Appendix. Dark blue = *Main refinancing operations*, light blue = *Long term refinancing operations*, green = *Securities held for monetary policy purposes*, yellow = *other securities*, purple = *General government debt*, red = *other assets*.

relation to the GD (Table 1). Alternatively, we can look at monetary policy in the period 1929-1933, and hence at the authorities' attachment to the gold standard, as totally unprepared to manage a crisis of the magnitude of the GD.

Credit boom and bust

The GFC contains both old and new themes. Among old themes, this crisis, like many others before, finds its roots in a long credit boom and rising asset prices (Fisher, 1933; Minsky, 1977; Kindleberger, 1978). A credit boom starts with a profit-altering shock that triggers a process of debt accumulation aimed at exploiting expected future capital gains. In the GFC, the profit-altering shock were rising house prices in the early part of the 21st century. Optimism, low-risk aversion, and herd-like behavior drove the up-leveraging process. Boom are often preceded or accompanied by an expansionary monetary policy (Kindleberger, 1978, ch. 4). In the years preceding the GFC, as we have noted, monetary policy was very expansive, popularly known as Greenspan's put (Figure 1). In the boom phase, banks and other financial institutions expand lending and credit; their leverage rises like that of the public.

The boom is further fed by capital inflows that tries to exploit profit opportunities. The boom comes to an end with a second, negative, shock such as a reversal in monetary policy driving up interest rates or the failure of a critical, highly connected, financial institution. The counter-shock has to be big enough to convince investors that expected net cash flows from projects financed with borrowed funds will become negative. In the United States, the counter-shock hit in 2006, in the Eurozone approximately a year later (Figure 1).

With the counter-shock comes deleveraging that sets in motion a vicious circle of asset price declines, debt liquidation, financial failures, rising risk aversion, and rush to liquidity. With current and expected future rates of inflation declining, debtors suffer a decline in the value of their net worth (Fisher, 1933, pp. 342-343). Credit risk rises; but even without disinflation, falling asset prices force debtors to come up with more security to buttress the collateral underlying their bank borrowing. Debtors' difficulties spill over onto banks' balance sheets. With a rising proportion of loans becoming "non-performing," banks face a decline in net worth and consequently become riskier. Bank assets tend to be opaque. An outsider has no reliable information on the quality of these assets. Crises accentuate this informational asymmetry and distrust spreads. The interbank market, with its unsecured lending and borrowing, relies on the trust that the counterparty is in good shape and can honor its obligations. With distrust, faith in honoring one's obligations is shaky; the interbank market, then, fails to perform the critical function of distributing liquidity from cash-rich to cash-poor banks. The demand for liquidity by each bank surges. The aggregate demand for liquidity rises also in reaction to the public's rising risk aversion, due to the crisis, and news of a sudden funding withdrawal from a financial institution. At this point, the risk of insolvency is added to the risk of illiquidity, the two reinforcing each other in the cloudy atmosphere of a financial crisis (Eichner et al., 2010). The above stylized sequence cannot be generalized across all credit-boom-and-bust episodes. Like wars, each financial crisis has its novel features. The GFC, as with other crises, has had its own: an expansion of banking activities from traditional banking to shadow banking, the creation of complex and opaque assets, the failure of rating agencies to properly assess the risk of these new assets, and a regulatory system that fell behind banking evolution.

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Shadow banking

Shadow banking is banking in the traditional sense of extending credit and effecting maturity transformation, done however by financial institutions specialized in securitization and in the use of secured funding (Pozsar et al., 2013). Shadow banking is a creature of liberalization and has been fostered by regulatory arbitrage. Unlike traditional banks, shadow banks have no direct access to central bank funding, that is they neither hold reserve deposits with the central bank nor can they acquire monetary base through the discount window or the marginal lending facility. This missing link with the central bank is an obvious source of fragility. The world of shadow banks consists of a host of non-bank financial institutions such as broker-dealers, hedge funds, insurance companies, mortgage institutions, pension funds, and mutual funds. Banks as well can do shadow banking when they create off-balance sheet investment entities. One such a vehicle is the special purpose vehicle, or SPV, to which a bank transfers pools of loans, the very first leg of the originate-to-distribute process. The SPV, in turn, creates a liability that is backed by those assets (ABS for asset-backed securities) which are sold either to the investing public or to another special purpose vehicle, a collateralized debt obligation or CDO. The CDO, in turn, creates more complex liabilities, by slicing the pools of ABS, according to different credit risk levels (*tranches*), that are sold to the investing public; for a very informative diagram of the securitization process, see Gorton and Metrick (2012, p. 431). A critical aspect of this process is that the activity of assembling and re-assembling loans is financed with repurchase agreements or repos. Repos serve to provide the collateral required by large funding providers and are the equivalent of deposit insurance in traditional banking. [25] Collateralization is subject to "haircuts", measured

[25] For example, a money market fund deposits liquidity with a broker-dealer guaranteed by a bond collateral.

by the difference between the market value of the collateralized asset and the amount of the received funding.

A brief account of the way the GFC erupted goes as follows. An index of equally weighted haircuts of nine asset classes started to rise in August of 2007 and triggered a run on repos. According to Gorton (2010, pp. 46-50) and Gorton and Metrick (2012, p. 429), this run was the equivalent of a significant cash withdrawal in traditional banking. House prices in the United States had stopped rising in July of 2006 (Figure 1). Early in 2007, a market index of credit default swap contracts gave clear signs of credit deterioration in the residential mortgage-backed security market [26]. Difficulties continued in the first half of the year and spread to Europe. In July, 2007 German IKB revealed that it could not cover for the failure of its conduit to roll over asset-backed commercial paper. On August 9, 2007, the interbank bank became illiquid as BNP Paribas stopped the redemptions of three investment funds. LIBOR-OIS spread on AAA-rated ABS and on other collateralizable assets rose; see the first spike in Figure 13b. The second big spike occurred in connection with the date of Lehman's failure.[27] Counterparty risk surged as the quality of the collateralized assets was perceived as being doubtful; asymmetry of information made everyone distrustful of where the doubtful assets were located. In this climate haircuts went up. Borrowers lost equity capital and disposed of assets. If sales occur under distress conditions, price declines further reduce the value of the unsold assets and equity. Deleveraging reinforces the vicious circle (Adrian and Shin, 2010; Brunnermeier, 2009, pp. 92-94) .[28]

Our account suggests that runs on financial institutions are still an essential feature of a financial crisis. In the 1930s, the run was on the traditional bank. When the public became distrustful of banks, he ran to cash his deposits. He would try to be early on the line even if he believed the

[26] This deterioration is measured by a rise in the ABX index; cf. Table 5.

[27] LIBOR is the London Interbank Offered Rate and OIS is the overnight index swap. Spreads are shown in Gorton and Metrick , 2012, Fig. 9).

[28] Define the balance sheet identity A = D + E, where A = value of assets, D = value of debt and E = value of equity. If A is marked to market and D is relatively fixed, any change in A is reflected in changes in E. This implies that the slope of leverage, L = A/E = A/(A-D), with respect to A is negative for a given D. Indeed, for U.S. households there is an inverse empirical correlation between the growth of A and the growth of L. But Adrian and Shin (2010, Figure 2.5) find that such a correlation is positive for U.S. security dealers and brokers who must mark to market their assets. One way to rationalize this outcome is to assume that such intermediaries target their leverage levels. In this case, as A increases, D must also increase to preserve the desired leverage value. The testable consequence is that asset prices are positively correlated to debt, a correlation that becomes even stronger if leverage tends to behave procyclically.

bank was fundamentally sound. A sound bank, but short of liquidity, would be forced to liquidate its non-marketable assets at fire-sale prices, which endanger bank solvency. The public's mistrust in the banking system of the early 1930s was grounded on the perception that the bank was a fragile institution. Deposit insurance and a central bank acting as a lender of last resort made the bank more secure by guaranteeing that rescue would come when a bank was illiquid but solvent. In fact, following the policy correction after the GD, runs on banks became rare events, including the years of the GFC. The same cannot be said about financial institutions that do banking without access to deposit insurance and to a lender of last resort. The deposit of liquid funds against collateral provides a reliable guarantee to the lender if the collateral is safe (eg, T-bills). With less than perfectly safe assets –such as ABS and RMBS—the haircut-equity loss spiral cannot be ruled out. Shadow banking does not have the umbrella protection of either deposit insurance or lending of last resort. On the other hand, the noted policy of the Fed to act as a market maker of risky assets is evidence of the importance to restore stability in the repos market.

VI Conclusions

In our comparison of the two great crises, we have underlined similarities and dissimilarities. We briefly review them in order. The first similarity is that tight money was the proximate trigger of the crises. Expansive policies were followed by sharp reversals in both great crises, especially in the United States. In 1928, money tightness was directed at a potential bubble in the stock market and at discouraging capital outflows. The rest of the world imitated, to different degrees and timing, US policy. In 2006, higher interest rates burst the house price bubble. The second similarity is that the price-specie flow mechanism has worked in the wrong direction. In the GD, money stocks were declining, not only in the United States, but elsewhere, evidence of a generalized deflationary regime. In the Eurozone, the South, with a systematic excess of domestic absorption over domestic production from 1999 to 2012, has had consistently higher inflation rate, money growth and credit than Germany's. The third similarity is the importance of sudden arrest in capital flows in precipitating balance-of-payments crises and deflationary macro adjustments under fixed exchange rate regimes. In 1928, a sudden stop

of capital to Germany forced the country to embarked on a very deep economic contraction to preserve the fix. The sudden capital stop to the Southern countries in 2008-2010 forced these countries into a rapid, deflationary, correction of their current-account deficits. The fourth similarity is the difficulty to achieve international cooperation under fixed exchange rates so as to prevent a deflationary bias due to asymmetric adjustments to external imbalances. The rules of the game in the gold standard were that a surplus country needs to reinforce inflows of international reserves with an expansionary monetary policy (or more generally with an expenditure increase), while the opposite had to be done in a deficit country. The actual practice was that the adjustment fell disproportionately on deficit countries, for which the consequences of taking no corrective action was an exit from the gold standard, whereas for a surplus country an over-heating economy could be avoided by sterilizing the inflows of international reserves. A similar mechanism worked in the Eurozone during the sovereign debt crisis. The burden of adjustment fell disproportionately on the current-account-deficit South. The current-account-surplus North continued to accumulate more surpluses measured in terms of relative to GDP.

The role of banks in the two crises offers similarities and dissimilarities. The similarity is that a banking crisis, regardless of the timing, has a big impact on the real economy. The difference is that in the 1930s banking crises occurred after the implosion of the real economy, whereas in 2007-2009, the banking (financial) crisis occurred before the recession.

Moving to the differences, the first is the large number of bank failures in the 1930s. One consequence of these failures was to create a climate of distrust in banks, which induced the public to cash large amounts of deposits. Banks, in turn, were also fearful of the economic environment and reacted by raising the ratio of bank reserves to deposits as a precautionary strategy. The end result was a sharp decline in the money multiplier, the main driver of the collapse of the money stock in the United States and Germany. In the GFC, on the other hand, there was no manifestation of the public's distrust in banks because of the protection of deposit insurance and the currency-deposit ratio remained virtually unchanged. An even more significant difference is the monetary policy reaction in the two crises. In the 1930s, the monetary authorities either failed to counteract the collapse of the money multiplier with sufficiently large injections of monetary base or failed to understand the

process of money creation. Either way, it is a gross negligence. Not such a negligence has occurred in the GFC. The monetary authorities had learned the lesson of the 1930s and were not reticent to create monetary base at unprecedented rates. A third difference is in the bigger role of finance in the GFC than in the GD. Modern finance creates complex and difficult-to-understand products that are sold through relatively long chains of intermediation that tend to accentuate informational asymmetries and the emergence of distrust in financial markets. The interbank market, with its unsecured lending and borrowing, is a good example of what may go wrong when distrust reigns: it fails to perform the critical function of distributing liquidity from cash-rich to cash-poor banks and triggers a rush to liquidity.

Two themes we have not explicitly treated in our paper are the massive government rescue of banks and financial institutions during and in the aftermath of the GFC and the regulatory response to the GFC. The reason for omitting them is that, beside space, their impact on the economy is still ongoing and little can be said definitely about long-term effects. The massive rescue of banks and financial institutions have confirmed the protected-view of banking, in particular the TBTF principle. One likely consequence is that bank concentration will rise and that the largest financial institutions may grow further and become eventually too big to save. Regulation and supervision of the banking industry, while high at the moment, is still expanding in scope and complexity, with uncertain long-run effects on the industry and the economy at large.

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Data appendix

World series in growth rates.
The world is defined as the aggregate of 14 countries, as in Schularick and Taylor (2012): Australia, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The world series are the sum of the individual country's series, expressed in growth rates, multiplied by its world weight. The country's world weight is calculated on the basis of real GDP, taken from Maddison (http://www.ggdc.net/maddison/maddison-project/data.htm), and adjusted every twenty years to reflect significant changes in relative shares. For **Figure 5** on world output growth, the series is per capita real GDP, also from Madison for the period 1900-2008 and the IMF, WEO database for the period 2009-2014. For **Figure 6**, the rate of inflation is defined in terms of the consumer price index, for which the source is Schularick and Taylor (2012) for 1900-2008 and the WEO database for 2009-2014. **Figure 7**: the rate of growth of money is defined in terms of either M2 or M3, as measured by Schularick and Taylor (2012) up to 2008 and ECB and FRED database for 2009-2014. The rate of growth of credit is defined either in terms of total domestic currency loans and banking institutions to firms and households (simply bank loans) or total domestic currency assets of banks and banking institutions, as measured by Schularick and Taylor (2012) up to 2008 and ECB and FRED database for 2009-2014.

Figure 1 on monetary policy and house prices in the United States and the Eurozone, 2000-2013. The house price index in the United States is the Case-Shiller index. and in the Eurozone is the ECB house price index, The policy interest rate is the Federal funds rate in the United States and Eonia (Euro over night index average) in the Eurozone. The sources are FRED for the United States and the ECB database for the Eurozone. Frequency: monthly for the United States, quarterly for the Eurozone.

Figure 2 on capital flows and long-term interest rate spreads relative to Germany. For data on bilateral foreign bank assets, see (BIS), for spreads ECB database (www.ecb.stat.eu/stats/money/long/html/index.en.html).

Figure 3 on monetary policy and stock prices in the US, France, UK and Germany, 1925-1935. The source is the NBER historical database. For UK data, we used the open market rates of discount, London, %, NSA, and the price index of industrial stocks; for France, the discount rate, open market, Paris, NSA, %, and the index of stock prices, 1913=100, NSA ; for the US, Banker's acceptance rates, NY city, %, NSA. and the S&P index; for Germany , Private discount rate, prime banker's acceptance, open market, Berlin, %, NSA.

Figure 4 on net capital flows of the US, UK, Germany, France and Italy, 1920-1939. Net capital flows are computed as the negative value of the sum of current account balance and net flows of international reserves (gold and foreign exchange reserves). The sources are Historical Statistics of the United States 1789-1945 (1949, Series M 14-41) for the United States; Cairncross and Eichengreen (1983, p 35) for the United Kingdom; Nurkse (1944, p 108) for Germany; Rist and Schwob (1939) for France; and Falco (1995) for Italy.

Figure 8 on central bank assets, 1928-1934. The source for the Fed, Bank of England, Banque de France and Reichsbank are from Board of Governors of the Federal Reserve System (1943, p. 638-643) ; for Italy, Fratianni and Spinelli (1997). For Italy, gold and foreign exchange assets are combined.

Figure 9 on the current-account balance as a per cent of GDP, North vs. South of the Eurozone, 1999-2014. The North here consists of Austria, Belgium, Finland, Germany, and the Netherlands; the South of Greece, Italy, Portugal and Spain. The source of the data is the WEO database of the IMF as of April, 2015.

Figures 10 and 11 on money stock, monetary base, money multiplier, and k and r ratios, 1920s and 1930s. The sources are Friedman and Schwartz (1963) for the United States, James (1984) for Germany, Fratianni and Spinelli (1997) for Italy, Capie and Webber (1984) for the United Kingdom and Patat and Lutfalla (1990) for France. The data are monthly for the United States, Germany and the United Kingdom, France and yearly for Italy. The money stock is defined as the sum of currency held by the public plus the public's sight and time bank deposits (M2); for UK money is (M3); the monetary base is the sum of currency held by the public plus total bank reserves (required plus excess). The units for money and the monetary base are billions of billions of local currencies. The money multiplier is the ratio of money to the monetary base. The ratio of currency held by the public to deposits defines k, and the ratio of total bank reserves defines r.

Figure 12 on money stock, monetary base, money multiplier, and k and r ratios, 2004-2014. The sources are FRED, Federal Reserve Bank of St. Louis for the United States and ECB for the Eurozone. The units for money and the monetary base are trillions of local currencies. For measurements Figures 10-11.

Figure 13 on Interbank loans, banks' excess reserves and money market spread, 2001-2015. The source for US interbank loans and banks' excess reserves is FRED; for the three-month LIBOR and OIS is IBA, which available through FRED.

Figure 14 Fed assets, 2007- 2015, dollar trillions. Source: Federal Reserve Bank of Cleveland.

Figure 15 ECB assets, 2007- 2015, dollar trillions. Source:Ecb database.

Table 1 on per-capita output growth and inflation in five countries in the Great Depression and the Great Financial Crisis. The source for the per capita real GDP up to 2008 is Maddison, http://www.ggdc.net/maddison/maddison-project/data.htm. The inflation rate up to 2008 is computed as the percentage change in the CPI from Schularik and Taylor (2012). The percentage changes in per capita real GDP and the inflation after 2008 are from the IMF, World Economic Outlook database 2015.

Table 2 on growth broad money in five countries, 1927-1939. "Row for US" is defined as the world money growth minus the US money growth. Broad money is either M2 or M3, as in Schularik and Taylor (2012). For the construction of the world series, see above.

Table 3 on cumulative growth rates of money, bank loans and total bank assets of France, Italy and Spain relative to Germany's, 2000-2007. The data are from Schularick and Taylor (2012).

Table 4 and 5 on banking crises in the Great Depression and in the Great Financial Crisis. The sources are: a = Bemanke and James (1991), b = Lescure (1995), c = Wicker (1996), d = Guarino and Toniolo (1993), e = James (1984), f = Brunnermeier (2009, p 83), Gorton and Metrick (2012, p 434-435), g = Brunnermeier (2009, p 84); h = Brunnermeier (2009, p 88), i = Brunnermeier (2009, p 89-90). The ABX index uses credit default swap contracts covering 20 equally weighted subprime residential mortgage-backed securities (RMBS) tranches (Gorton and Metrick, 2012, Appendix A); ABCP= asset-backed commercial paper, MBS = mortgage-backed securities, Fannie Mae = Federal National Mortgage Association, Freddie Mac = Federal Home Loan Mortgage Corporation, AIG = American International Group, MMMF = money market mutual fund.