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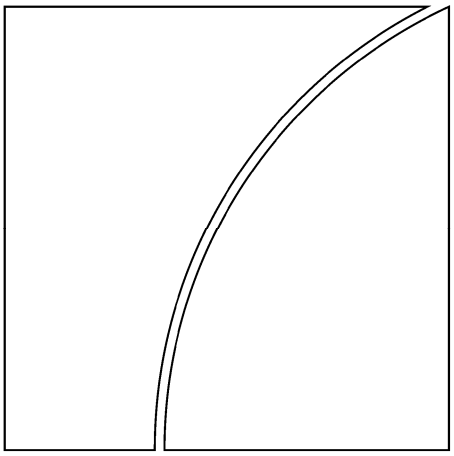

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Monetary and Economic Department

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JEL classification: E58, F31, N1.

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Banking Crises and the International Monetary System in the Great Depression and Now[1]

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Abstract

We compare the banking crises in 2008-09 and in the Great Depression, and analyse differences in the policy response to the two crises in light of the prevailing international monetary systems. The scale of the 2008-09 banking crisis, as measured by falls in international short-term indebtedness and total bank deposits, was smaller than that of 1931. However, central bank liquidity provision was larger in 2008-09 than in 1931, when it had been constrained in many countries by the gold standard. Liquidity shortages destroyed the international monetary system in 1931. By contrast, central bank liquidity could be, and was, provided much more freely in the flexible exchange rate environment of 2008-9. The amount of liquidity provided was 5 ½ - 7 ½ times as much as in 1931. This forestalled a general loss of confidence in the banking system. Drawing on historical experience, central banks, led by the Federal Reserve, established swap facilities quickly and flexibly to provide international liquidity, in some cases setting no upper limit to the amount that could be borrowed.

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1. Introduction

The global financial crisis of 2008-09 was a rare event. There have been many localised financial crises, especially since the 1980s[2], but there has been no financial crisis of comparable geographical scope since 1931.

It would be premature, at the time of writing in 2010, to declare that the crisis is now over. However, it is clear that optimism has returned; for example, the IMF is forecasting (in October 2010) global GDP growth of 4.8% in 2010, after estimated contraction of 0.6% in 2009. Therefore there has been at least a lull in the crisis, and a relapse would in some sense be a new event[3].

The crisis of 1931, like that of 2008-09, was truly global in scope. The 1931 crisis led to disaster, in that it led to the intensification and globalisation of the Great Depression, and to all its many associated evils. Our purpose in this paper is to compare the banking crises of 1931 and 2008-09, in order to identify similarities and differences, both in the scale and nature of the crises and in the central banks' policy response.

The timing of the banking crisis in relation to the downturn in the real economy was different in the two episodes. Almunia, Bénétrix, Eichengreen, O'Rourke and Rua (ABEOR), in an interesting paper presented in October 2009, compare the early stages of the recession that was set off by the recent financial crisis with the Great Depression of the 1930s. In the earlier episode, the peak in industrial production, which ABEOR place in June 1929, occurred nearly two years before the banking crisis took a decisive turn for the worse with the collapse of Creditanstalt in Vienna in May 1931. ABEOR place the recent peak in industrial production in April 2008. This was several months after the early signs of the banking crisis, such as the drying up of liquidity in inter-bank deposit markets in August 2007 and the run on Northern Rock in the UK in September 2007, and it was just five months before the failure of Lehman Brothers, after which output declined precipitously. ABEOR show that 'the decline in manufacturing globally in the twelve months following the global peak in industrial production, which we place in early 2008, was as severe as in the twelve months following the peak in 1929', that 'global stock markets fell even faster than 80 years ago', and that 'world trade fell even faster in the first year of this crisis than in 1929-30'. They also argue that 'the response of monetary and fiscal policies […] was quicker and stronger this time'[4].

Our purpose is narrower than that of ABEOR, in that we concentrate on comparing the banking crises, and do not look at 'real economy' data. Our justification for this narrower focus is that it is now widely agreed that the contraction of liquidity caused by bank failures was largely responsible for the propagation and intensification of the Great Depression[5]. On

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[2] See IMF (2002), page 134.

[3] The Greek financial crisis and its repercussions have provoked the reopening in May 2010 of the Fed swap lines with foreign central banks which had been allowed to lapse earlier in the year.

[4] See Almunia, Bénétrix, Eichengreen, O'Rourke and Rua (2009).

[5] Friedman and Schwartz (1963) presented a monetary interpretation of the Great Depression. Bernanke and James (1991) presented empirical evidence from the Great Depression that industrial production was much weaker in countries which had experienced banking panics than in those which had not, indicating the importance of banking panics in propagating the depression. In a similar vein, Ritschl (2009) asserts that the Great Depression analogue of the collapse of Lehman Brothers in September 2008 was the collapse of

that view, understanding the banking crises and how they were managed is important in itself. Our ability to understand is however constrained by the availability of data, especially as regards the 1931 crisis.

Bordo and James (2009) discuss the analogy between the recent recession and the Great Depression. They comment (page 25) that:

'There are many lessons from the Great Depression that can and should be learnt in respect to the management of our current crisis. The most important one – where the lesson to be drawn is most obvious – is concerned with the avoidance of the monetary policy error of not intervening in the face of banking crises. The policies of the major central banks – the Federal Reserve, the European Central Bank, the Bank of England – suggest that this is a lesson that has been in the main learnt.'

We agree with that conclusion and note that in the early 1930s, the gold standard inhibited the kind of monetary policy intervention that the economic situation required.

We begin by comparing the scale of the two crises in Sections 2 and 3. We discuss official reactions to the crises in Section 4, and factors behind the differences in official reactions in Section 5. Finally, Section 6 concludes.

2. The magnitude of the crises

2.1. Introduction

There is no single measure of the magnitude of a financial crisis. Indeed, even in concept, it is difficult to think of a measure which is completely satisfactory. For example, a crisis which might have had massively adverse effects if inadequately managed may nevertheless have only small effects if it is well managed. In other words, there is an inescapable inverse relationship between the observed scale of a crisis and the skill with which it is handled.

All we can do is to compare observable indicators of the scale of the two crises, recognising that we cannot separately identify the effects of the original shock and of the efforts made to contain those effects. Indeed, we would not be confident that we could specify exactly what the original shock was in each case.

We look at two observable indicators: short-term international credit and total bank deposits, both domestic and external. The choice is partly dictated by the limitations on the availability of data from 1931.

Creditanstalt in Vienna in the summer of 1931, not the stock market crash of 1929. This is also consistent with B. DeLong's view that "If there is one moment in the 1930s that haunts economic historians, it is the spring and summer of 1931 – for that is when the severe depression in Europe and North America that had started in the summer of 1929 in the United States, and in the fall of 1928 in Germany, turned into *the* Great Depression." (as cited in Ahamed (2009)), and with Ahamed (2009)'s view that "The currency and banking convulsions of 1931 changed the nature of the economic collapse".

2.2. Short-term international credit

The scale of the withdrawal of short-term international credit during the Great Depression can be gauged by the data on short-term international indebtedness (gross liabilities) of the United States and European countries shown in Table 2.1, which decreased from CHF 70 billion at end-1930 to CHF 45 billion at end-1931, a decrease of 36% within a single year. The Swiss franc, like the U.S. dollar, was not devalued against gold during 1931; but if international indebtedness were to be measured in pounds sterling, for example, the percentage fall during 1931 would be smaller.

Table 2.1

Gross amount of short-term international indebtedness (gross liabilities) of the United States and European countries, in billions of Swiss francs

End of	Total (1)	Total excluding central bank holdings of foreign exchange (2)	External liabilities of Germany (3)	External liabilities of the UK (4)	External liabilities reported by banks in the United States (5)
1930	70	56	20	18	12
1931	45	38		7	7
1932	39	35		8	4
1933	32	28.5		9	1

Sources and notes: (1) 4th BIS Annual Report 1933/34. (2) and (3) Conolly (1936). (4) Williams (1963), and United Kingdom (1951). The UK data include banks' net external liabilities, and British government securities held by UK banks for overseas account. (5) Board of Governors of the Federal Reserve System (1976) table 161, "Short-term foreign assets and liabilities reported by banks in the United States". The reported external liabilities of the UK and the USA have been valued in Swiss francs using exchange rates derived from League of Nations Statistical Yearbook 1936/37. The data in columns (1) – (3) are mutually consistent, but not consistent with the data in columns (4) and (5), which are of later vintages and from different sources.

Conolly (1936) provides rough estimates of how the fall of CHF 25 billion in short-term international debts during 1931 came about. He estimates that a fall of CHF 3.5 billion was due to depreciation of currencies; that CHF 6.5 billion were liquidated from central bank foreign exchange reserves of gold and foreign exchange; CHF 5 billion via relief credits granted by central banks and others; and the remaining CHF 10 billion in other ways, including from foreign exchange reserves of commercial banks, by sales of securities, shifts in trade financing, and losses. Excluding the decrease of CHF 3.5 billion estimated by Conolly (1936) to have been due to depreciation of currencies, as a rough valuation adjustment for exchange rate changes, short-term international indebtedness of the United States and European countries decreased by CHF 21.5 billion between end-1930 and end-1931, a decrease of 30.7% within a single year.

Conolly (1936) also roughly estimates the composition of short-term international indebtedness (see Table 2.2). He estimates that short-term international indebtedness related to trade financing constituted only 31% of the total at end-1930, and that it decreased by 32% between end-1930 and end-1931. He notes that the 'Other' category includes '[…] such classes of funds as those of Australian and Irish banks in London, which to a certain extent supplement the sterling reserves of the Commonwealth Bank and the Irish Currency

Commission, but it also comprises the abnormal short-term lending of the post-war period […]'. Excluding Conolly's estimates of central bank holdings of foreign exchange (see Table 2.1), short-term international indebtedness decreased from CHF 56 billion at end-1930 to CHF 38 billion at end-1931, a decrease of 32 % within a single year.

Table 2.2

Gross amount of short-term international indebtedness (gross liabilities) of the United States and European countries, in billions of Swiss francs

	End of 1930	End of 1931
Trade financing	22	15
Central bank holdings of foreign exchange	14	7
Foreign debt service	4	3
Other	30	20
Total	70	45

Sources: Conolly (1936).

Notes: Foreign debt service estimated by Conolly (1936) roughly at three months' interest, using special table in League of Nations memoranda on balance of payments, with estimates made for missing data.

As table 2.1 shows, the fall in short-term international indebtedness had by no means finished at the end of 1931. Deleveraging in international short-term credit markets continued into 1933, and by the end of 1933 the amount had fallen by 54% in Swiss franc value from the end of 1930.

In one important respect these figures understate the fall in short-term international indebtedness during the 1930s. In many cases, the resolution of the financial problems of commercial banks included so-called 'standstill agreements' with creditors, under which creditors agreed not to demand immediate repayment. Thus in many cases, short-term debts became, in substance if not in form, longer-term debts and were no longer liquid.

For the 2008-09 crisis, BIS data on international banking and securities markets can be used to estimate the extent of the fall in international short-term indebtedness, which is taken to mean the total of international bank deposits and international debt securities outstanding with maturity up to one year. The relevant data are shown in table 2.3 below.

The fall in total international short-term indebtedness from the peak (at the end of 2008Q1) to the end of 2009Q4 was $4,847 billion, or about 15% of the peak level of indebtedness[6]. On

[6] International debt securities with maturity up to one year include both money market instruments and longer-term debt securities with a residual maturity of less than a year (eg Eurobonds). Arguably, for the purpose of the present paper, the fall in international short-term indebtedness should be calculated so as to exclude longer-term debt securities with a residual maturity of less than a year. In fact, it does not make much difference. On the alternative calculation, the fall in international short-term indebtedness from the end of 2008Q1 to the end of 2009Q4 was $4,925 billion, or 16.1% of the peak level.

this measure, the percentage contraction was clearly much less severe in 2008 – 09 than in 1931. Moreover there are no significant standstill agreements in operation.

Table 2.3

International short-term indebtedness, 2008 – 09 (in $ billions)

	International bank deposits		International debt securities with maturity up to one year		Total international short-term indebtedness	
	At end quarter	Change during quarter (adjusted for exchange rate changes)	At end quarter	Change during quarter (partly adjusted for exchange rate changes)	At end quarter	Change during quarter (partly adjusted for exchange rate changes)
2007Q4	27,131		3,744		29,378	
2008Q1	29,322	+1,113	4,247	+454	32,229	+1,566
2008Q2	28,088	-1,157	4,391	+148	31,074	-1,008
2008Q3	26,838	+10	4,149	-159	29,696	-149
2008Q4	24,342	-1,692	3,944	-157	27,155	-1,849
2009Q1	23,068	-777	3,735	-179	25,771	-956
2009Q2	23,396	-487	3,934	+145	26,311	-343
2009Q3	23,478	-281	4,128	+175	26,528	-106
2009Q4	23,100	-231	3,917	-205	26,085	-436
2010Q1	22,881	+397	3,821	-60	25,756	+337

Sources: BIS locational international banking statistics table 3A, BIS international securities statistics tables 14A and 17B. See data appendix for further information.

2.3. Total bank deposits

While data on international short-term indebtedness provide an indication of the scales of the international aspects of the two banking crises, international banking is only part of the totality of banking. Total bank deposits therefore provide another indicator of the scales of the two crises.

Data published in the League of Nations Statistical Yearbooks[7] provide information about the evolution of commercial bank deposits during 1931, country by country. They show percentage changes in total commercial bank deposits calculated in national currencies.

[7] Available at http://www.library.northwestern.edu/govinfo/collections/league/stat.html .

Table 2.4

Commercial bank deposits 1930 - 35

	Stock of deposits at end of 1929 (USD million)	Percentage changes in:					
		1930	1931	1932	1933	1934	1935
USA	44,441	+0.5	-8.4	-22.8	-11.8	+15.3	+11.4
Canada	2,697	-7.8	-4.7	-5.2	-0.1	+5.3	+8.4
Argentina	3,765	+1.4	-11.1	+0.2	-1.6	-1.1	+0.6
Japan	4,592	-6.0	-5.6	-0.5	+7.3	+7.2	+5.6
India	746	+3.9	-7.1	+10.3	+1.6	+2.8	
UK	10,904	+3.1	-7.5	+12.8	-1.5	+1.4	+5.6
Austria	382	+18.3	-47.3 (1)		-14.3	-5.3	+0.2
France	1,862	+4.3	-3.1	-2.4	-11.8	-5.6	-10.6
Germany	4,042	-7.3	-25.6	-11.5	-5.5	+6.7	
Hungary	334	+0.3	-16.1	-7.5	+1.1	-4.7	+4.6
Italy	2,223	-2.5	-12.1	-8.3	-2.5	-2.7	-8.4
Spain	1,340	+7.6	-18.0	+5.2	+2.9	-1.2	+8.7
Poland	155	+2.2	-30.3	-7.7	-6.4	+11.9	-2.6

(1) Change in 1931 and 1932. Data for end 1931 are not available.

Source: League of Nations, Statistical Yearbook 1933 – 34, Table 106 (exchange rates at the end of 1929); Statistical Yearbook 1936 – 37, Table 129 (commercial bank deposits in national currencies).

Countries are included in table 2.4 if they meet either of the following criteria:

- Their estimated real GDP in 1931, as measured in 1990 international Geary-Khamis dollars[8] by Angus Maddison for the Groningen Growth and Development Centre[9], was among the eleven largest in the world, excluding China, the USSR and Indonesia, for which no bank deposit data are available. Those eleven countries accounted for 78.5% of the aggregate GDP in 1931 of countries other than China, the USSR and Indonesia for which estimated GDP data are available.
- They experienced a serious banking crisis (Austria, Hungary).

We have not attempted to construct any global aggregate of bank deposits. Total commercial bank deposits fell in every country included in table 2.4 in 1931, and, not surprisingly, they

[8] For an explanation of the Geary-Khamis method of aggregation, see http://unstats.un.org/unsd/methods/icp/ipc7_htm.htm .

[9] See http://www.ggdc.net/maddison/.

fell by very large percentages in Germany, Hungary and (over 1931 and 1932) Austria, where there were very serious problems of bank solvency in 1931.

It is not a simple matter to calculate changes in bank deposits in 2008-09. Statistical information is available in great detail, but it is not consistent across countries. Care has to be taken in determining which aggregates to analyse. It is clear that inter-bank deposit markets contracted during the crisis, but the reduction in inter-bank depositing cannot have reduced the funding resources available to the banking industry as a whole[10]. Our objective has therefore been to measure the change in deposits from non-bank sources. Accordingly, we use consolidated banking statistics where they are available, since, for each country, they net out deposits placed by one domestic bank with another. However, consolidated banking statistics typically do not distinguish between deposits from foreign banks and foreign non-banks, or between loans to foreign banks and foreign non-banks. Therefore, where we use consolidated banking statistics[11], the deposit totals that we analyse include deposits from foreign banks. Our calculations for the recent crisis are summarised in table 2.5, which shows, for each country in the table, the percentage changes in the domestic-currency value of deposits with commercial banks located in that country in the years September 2007 – August 2008 and September 2008 – August 2009 (ie in the years just before and just after Lehman Brothers failed). Also, in the cases of countries where there was an appreciable fall in deposits during the crisis period[12], the table shows the changes in bank deposits from peak to trough in the period 2008 – 2009, and the dates of the peaks and troughs. In some cases the recorded troughs are in the very recent past and it is of course possible that there will be further outflows of deposits in some countries additional to those recorded in table 2.5.

The recorded differences between the domestic currency value of total deposits at two different dates reflect not only the flow of deposits between those two dates but also the change in value of foreign currency deposits as at the start date that is accounted for by changes in exchange rates. In countries where foreign currency deposits constitute a significant proportion of total deposits, these valuation effects can be important. Where the available data make it possible, we have adjusted the data so as to exclude the valuation effects and obtain an estimate of the flow of deposits. In cases where we have been able to make no adjustment, because the data are not available, but where we think that the effects of exchange rate changes are likely to be significant, we have italicised the data in table 2.5.

[10] However the ease with which banks could borrow funds from each other was greatly reduced, so that banks' demand for liquid assets became larger.

[11] The euro area, the UK and Denmark in table 2.4.

[12] For our purposes, an 'appreciable fall' is a fall which either persists for at least three consecutive months or whose cumulative magnitude exceeds 5%.

Table 2.5

Changes in bank deposits in and around the 2008-09 financial crisis

(percentage changes measured in national currencies)

Country	Total deposits at end-2007 (US$ billion)	Percentage change in bank deposits Sep 2007 – Aug 2008	Percentage change in bank deposits Sep 2008 – Aug 2009	Date of peak deposits (end month)	Date of maximum outflow (end month)	Cumulative outflow as % of peak deposit level
USA	6,714	+7.8 (a)	+9.3 (b)	N/A		
Canada	1,604	+9.5	+0.2 (c)	N/A		
Euro area	13,209	+0.5	-0.6	N/A		
UK	11,063	+3.2	-6.5	Mar 2008	Dec 2009	-10.6
Switzerland	1,155	-9.7	-1.1	May 2007	Dec 2009	-15.3 (d)
Hong Kong	752	+6.8	+10.8	Oct 2007	Aug 2008	-7.8
Singapore	1,147	*+13.8*	*-6.3*	October 2008 (total liabilities)	October 2009 (total liabilities)	-10.8
Australia	1,381	*+18.4*	*+5.4*	N/A		
Russia	428	+32.8	+14.5	Aug 2008	Nov 2008	-5.4
Japan	4,956	+2.0	+1.6	N/A		
China	5,251	+15.8	+29.0	N/A		
Korea	680	+14.7 (e)	+14.0 (e)	N/A		
India	760 (f)	+22.0 (g)	+20.5 (h)	N/A		
Brazil (i)	430	*+33.9*	*+17.4*	N/A		
Mexico	201	+12.0	+12.1	N/A		
Denmark	221	+6.9	-0.2	N/A		
Iceland	47	+30.8	N/A	Foreign deposits (66% of total deposits at end-September 2008) immobilised as of 10 October 2008. No data are available for dates after end-September 2008.		

Notes: (a) 29 August 2007 to 27 August 2008; (b) 27 August 2008 to 26 August 2009; (c) Sep – Dec 2008 only. Comparable data are not available beyond the end of 2008; (d) Liabilities to customers; (e) Year beginning end-September; (f) As at 4 January 2008; (g) 31 August 2007 to 29 August 2008; (h) 29 August 2008 to 28 August 2009; (i) The data relate to 'deposit money banks'. See data appendix for further discussion.

Economies (the Euro area is treated as a single economy for this purpose) are included in the table if they meet any of

the following criteria: (i) Their 2008 GDP calculated at PPP exchange rates was among the eleven largest in the world. Those eleven countries accounted for 73.9% of global GDP calculated at PPP exchange rates, according to the IMF[13]; (ii) they have a large international financial industry (including Switzerland, Hong Kong, Singapore, Australia); (iii) hey had an exchange rate commitment which represented a contingent claim on their foreign exchange reserves (Russia, Denmark); (iv) they were forced to impose exchange controls because the banks could not meet deposit outflows (Iceland).

Details of the data sources and calculations are given in the data appendix.

The salient features of the deposit flows summarised in table 2.5 are:

a. There were outflows of deposits from banks in the UK, Switzerland, Russia, Hong Kong and, apparently, Singapore[14]. Although the five outflow countries included four large international banking centres, nevertheless, a comparison of tables 2.4 and 2.5 shows that the falls in deposits that occurred in 2008-09 were not nearly as widespread, or as large, as they were in 1931. This is likely to have been to a considerable extent due to the existence of deposit insurance schemes, as well as the strengthening of such schemes in a number of countries in the recent crisis to help prevent bank runs (as discussed in Section 4 below).

b. The country whose banks fared worst was Iceland, where foreign deposits were immobilised in October 2008. However, total deposits in Icelandic banks were relatively small - just $47 billion at the end of 2007 (and $42 billion at the end of September 2008).

c. In some countries, such as the United States, deposit growth was stronger in the year after the Lehman failure than in the year before. Nevertheless, some banks in such countries did experience liquidity problems.

d. Denmark and Russia were particularly vulnerable to deposit flight because their central banks were committed to maintain their exchange rates within particular limits (in the case of Denmark, against the euro, and in the case of Russia, against a basket of dollars and euros). Danish banks however did not experience any aggregate outflow of deposits. In Russia there was an outflow of deposits amounting to 5.4% over three months.

e. There was no sign of the crisis having any effect on Chinese bank deposits.

2.4. Summary

On our first metric, international short-term indebtedness, the recent crisis appears to have been, so far at least, substantially less severe than the one which began in 1931, particularly in view of the fact that the data in table 2.1 understate the post-1931 contraction because the use of standstill agreements meant that apparently liquid deposits were in practice frozen.

On our second metric, total bank deposits, the recent crisis also appears to have been less severe than that of 1931. In 1931, bank deposits fell in every large country for which data are

[13] See IMF World Economic Outlook database, April 2010.

[14] The data for Singapore do not distinguish between deposits and other bank liabilities, so it is not possible to be sure that there was an outflow of deposits there.

available. In 2008-09, they fell only in the U.K., Russia, Switzerland, Hong Kong and Singapore. The widespread falls in bank deposits in 1931 were only the beginning of the story and they were followed in most countries by further falls in 1932 and 1933.

The conclusion from these two metrics is clear, namely that the 1931 crisis was much worse than the recent one. However we should add that these metrics are not the only possible ways of measuring a liquidity crisis. Some countries were affected by the recent crisis even though bank deposits continued to rise. One immediate source of liquidity pressure in 2008-09 was that banks' lending commitments crystallised suddenly as other credit markets dried up and back-up lines were drawn on; in addition, some implicit lending commitments from special purpose entities were brought on-balance sheet by banks (BCBS 2009). Thus an interesting statistic would be the amount of pre-committed lending facilities that were drawn in a particular period, and the amount of implicit lending commitments due to special purpose entities brought on-balance sheet. Unfortunately we are aware of no available data, either for the 1931 crisis or the recent one.

Another source of pressure in the recent crisis was collateral margin calls on commercial banks and securities dealers who had used repurchase agreements to finance their holdings of securities, such as mortgage-backed securities, which had fallen in price. However we are aware of no data on the scale of the liquidity pressures arising from this source.

3. Official reactions to the crises

3.1 Official reactions in 1931

The theory of the functioning of the gold standard that was widely accepted while the gold standard was in general operation was the so-called price-specie flow mechanism attributed to David Hume and developed by others[15]. According to the theory, adjustment to equilibrium would be automatic. If an initial equilibrium was disturbed by an exogenous surge in the supply of credit in country A, then country A would lose gold. The credit expansion would lead to an expansion of domestic demand and a rise in the general price level in country A relative to other countries. Because of the expansion of domestic demand and because its costs of production would become relatively high by international standards, country A would develop an external trade deficit and would experience an outflow of gold to other countries as a result. The outflow of gold would lead to a contraction of money supply and credit in country A, which would lead to a contraction of domestic demand and a reversal of the initial rise in prices.

It was also recognised that this trade balance mechanism could be augmented by capital flows. The expansion in the supply of credit in country A would be accompanied by a fall in interest rates in that country, at least to some borrowers, because interest rates would need to fall in order to stimulate the demand for credit to expand sufficiently to meet the additional supply. If so, interest rates would fall in country A relative to other countries, and capital would flow abroad, entailing an outflow of gold. The outflow of gold would constrain the availability of credit in country A and interest rates would rise again (reversing the earlier fall)

[15] For a fuller account see Eichengreen (1995, pp 32-42), on which this exposition draws heavily.

so as to ration the reduced amount of available credit. And the central bank of country A could take action by increasing its discount rate as it lost gold so as to accelerate the natural increase in market interest rates that the outflow of gold would cause. The 'rules of the game' included raising discount rates when gold was flowing out, and lowering them when gold was flowing in. By following the rules, central banks could reinforce the automatic functioning of the gold standard[16].

It is now widely accepted that this account of the working of the gold standard was only loosely related to reality[17]. It is true that there were periodic banking crises in gold standard countries, apparently caused by over-exuberant or otherwise imprudent credit expansion. However, rather than leaving the price-specie flow mechanism do its corrective work undisturbed, the local central banks typically acted as 'lender of last resort' by providing emergency liquidity assistance as required, in order to offset the outflow of gold and thereby contain the consequences of the banking crisis for the 'real economy'. There was a discretionary limit to the scope of the automatic working of the gold standard.

Of course, by providing liquidity in this way, the central banks ran the risk of violating their legal obligation under the gold standard to maintain gold backing for their liabilities. In practice, the potential conflict was made less likely to occur by an increase in the central bank discount rate[18], consistent with the 'rules of the game'. However the residual risk, when it was significant, was removed by bending or breaking the rules in one or other of two ways:

- International borrowing to supplement temporarily the central bank's gold reserves and thereby decrease the likelihood of a conflict. Thus after its reserves had been depleted by its provision of liquidity during the Baring Crisis in 1890, the Bank of England borrowed gold from the Banque de France, and sold Exchequer bonds in Russia[19].
- An assurance from the government that the central bank would be temporarily relieved of its gold standard obligation by law if necessary. This technique was used in the U.K. in 1847, 1857 and 1866.[20]

In both cases the resolution was temporary only; foreign loans had to be repaid; and if the central bank was relieved of its obligation to redeem banknotes and deposits in gold for a period, the obligation had to be re-assumed at some future date.

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[16] The theory of the gold standard also drew a distinction between an external drain of gold from the central bank, caused by an adverse trade balance, which could only be cured by an adjustment of domestic demand relative to output, and an internal drain, which might be caused by rising demand for gold coins for transactions purposes as the domestic economy grew. Such an internal drain could be cured more easily, eg by the issue of additional paper money. See Hawtrey (1947, pages 55 – 59). This aspect of the theory did not, however, discuss the consequences of a loss of confidence in the sustainability of the gold standard such as occurred in 1931.

[17] See Eichengreen (1995), chapter 2.

[18] Consistent with Bagehot's prescription that, in a crisis, a central bank should lend freely, against good security, and at a high rate of interest. See Bagehot (1892), page 199 - 200.

[19] See Clapham (1966), page 330.

[20] See Clapham (1966), pages 208-9, 232, 266.

These devices were effective in the nineteenth century, but not in 1931. Their effectiveness depended on the belief that the crisis was temporary, so that interest rate differentials would have a reliable influence on private international capital flows, and so that any international loans would be repaid in full and on time and any suspension of the gold standard would be purely temporary. Obviously, emergency international lending was possible only if there were no over-riding political obstacles.

Those conditions were not met in 1931. If a central bank's gold holdings were close to the legally-prescribed minimum, then it could not lend to commercial banks with liquidity problems (or indeed to anyone else) without breaking the rules. In the prevailing circumstances, with large commercial banks failing in several countries where gold reserves were only modest, a suspension of the rules could not have been credibly represented as temporary. This made it impossible for many central banks to provide liquidity to domestic commercial banks while remaining on the gold standard.

Because of this conflict, the credibility of the gold standard was undermined in many countries and central bank discount rates ceased to be effective in influencing international capital flows. Table 3.1 shows central bank discount rates as at the end of December 1930 and the end of July 1931. The average interest rate differential between four gold-rich and four gold-poor countries widened by 4.4% during the first seven months of 1931 but this widening did not succeed in averting the crisis by directing flows of gold to where it was most needed. No plausible interest rate levels could have attracted money into currencies which might go off gold, or repelled it from safe havens.

Table 3.1

Central bank discount rates in 1930 - 31(in percent)

	End-December 1930	End-July 1931
USA (New York)	2	1.5
France	2.5	2
Netherlands	3	2
Switzerland	2.5	2
Average of four gold-rich countries	2.5	1.9
UK	3	4.5
Austria	5	10
Germany	5	10
Hungary	5.5	7
Average of four gold-poor countries	4.6	8.4

Source: League of Nations Statistical Yearbook 1930-31 table 114 and 1931-32 table 129.

Official international liquidity provision was subject to the same gold constraint as the provision of liquidity to domestic banking systems, and it was hampered in addition by political obstacles. Austria was the first country to experience a banking crisis in 1931, with

the collapse of Creditanstalt, which was the country's largest commercial bank[21]. After some delay, an international loan was extended to Austria to finance liquidity support to the banking system, but it was insufficient. A second loan might have prevented further contagion (though it is also possible that Austria's financial situation was so bad that liquidity support alone would not have helped), but, as Toniolo (2005) reports, the negotiations were difficult and protracted, and the second loan was not made. Political differences between France and Austria were a major obstacle, with France demanding that Austria abandon a proposed customs union with Germany as a condition of the loan, on the grounds that it would violate the Treaty of St Germain. France was gold-rich and her participation in the loan was very important. And the United States, which had $4.2 billion of gold reserves at the end of 1930, or 38% of the world total, provided only $356 million in official international loans during 1931[22].

According to BIS estimates, emergency help granted during 1931 to debtor countries by central banks, the BIS, principal capital centres and by Treasuries amounted to around CHF 5 billion[23] (see see Bank for International Settlements 1932), which was roughly 7% of the total amount of international short-term indebtedness of the United States and European countries at the end of 1930 (see table 2.1).

The gold standard always represented a potential obstacle to liquidity provision, in both the domestic and international operations of central banks. In 1931 it represented an insuperable obstacle.

It had been recognised since the end of the First World War that gold supplies would be less ample relative to demand than they had been before the war, mainly because the price level had risen during the war. Measures had therefore been taken to economise on gold. In many countries gold coins had been withdrawn from general circulation so that the available gold could be concentrated on central bank reserves. And increasingly official international reserves had been held in foreign currencies as well as gold.

This latter expedient did not survive for long, however. By the end of 1932, foreign exchange holdings of central banks had fallen to 25% of the amount before the outbreak of the crisis in spring 1931 (see Graph 3.1, which is taken from Bank for International Settlements 1933). The reduction in net foreign exchange holdings of central banks was attributed by the BIS to two factors. First, the central banks of countries which had short-term international debts used foreign exchange reserves to meet foreign payments. The BIS estimates this use to have amounted to around CHF 2.5 billion. Second, central banks converted foreign exchange into gold. The BIS estimates that these conversions amounted to around CHF 5 billion (see Bank for International Settlements 1933). In addition, the value in gold and gold-linked currencies (including the Swiss franc) of foreign exchange reserves held in sterling

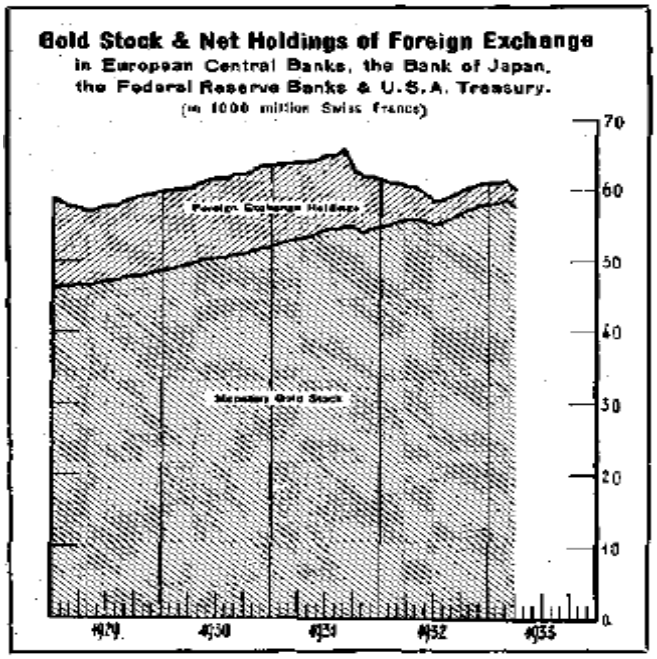
[21] For an impression of the importance of Creditanstalt to the Austrian economy, see Mosser and Teichova (1991). Gil Aguado (2001) provides evidence that the Austrian National Bank had known of Creditanstalt's difficulties for a long time and had been providing covert financial support since 1929. He also suggests that France was involved in precipitating outflows of funds from Austria after the collapse of Creditanstalt.

[22] Authors' calculation, based on Toniolo (2005) table 4.1 (loans organised through or with the participation of the BIS) and Sayers (1976) appendix 22 (loans to the UK).

[23] See Bank for International Settlements (1932). We do not know how the BIS calculated this amount.

and other currencies that left the gold standard during the period will have fallen (by the end of 1932, sterling had depreciated by 32.5% against its earlier gold parity).

Graph 3.1



Source: 3rd BIS Annual Report 1932/33.

The build-up of foreign exchange reserves in the 1920s will have added to the supply of credit in those countries in whose currencies the foreign exchange reserves were denominated. Conversely, the 1931-32 conversions of foreign exchange reserves into gold, and their use to make payments in place of gold, will have had a contractionary effect on credit markets in the countries whose liabilities the reserves had been held. Thus they will have aggravated the effects of the banking crisis. Central bank foreign exchange reserve management thus acted pro-cyclically, strengthening the boom and intensifying the downturn.

It is possible to measure the amount of liquidity that central banks supplied to their domestic economies in 1931, whether by purchases of gold, purchases of other assets, or lending. The available data are stocks of gold held by central banks at the end of each year, stocks of foreign exchange held by central banks at the end of each year[24], and the total of discounts, loans and advances, and holdings of government securities ('domestic paper assets') held at the end of 1930 and the end of 1931[25]. We assume that the amount of liquidity supplied by each central bank is equal to the change in gold and foreign exchange holdings, less any revaluation effects[26], plus the change in the total of domestic paper assets[27].

[24] The Bank of Spain also held silver reserves. We have added them to foreign exchange.

[25] The data were published in the League of Nations Statistical Yearbook, various issues.

[26] In other words, net purchases of gold, valued in domestic currency, can be measured as the difference between the domestic currency value of each central bank's gold holdings at the end of 1931 and 1930, minus

The amount of liquidity supplied by each central bank is measured in units of its domestic currency. How can the amounts supplied by various central banks be compared and aggregated? We have used three different methods:

a. By expressing the amount of liquidity supplied by each central bank during 1931 as a percentage of the domestic currency value of that central bank's gold, foreign exchange and domestic paper assets as at the end of 1930. An aggregate indicator of central bank liquidity provision can then be constructed by calculating a weighted average of these percentages, the weights being the dollar value of each central bank's gold and paper assets as at the end of 1930.

b. By expressing the amount of liquidity supplied by each central bank during 1931 as a percentage of the domestic currency value of commercial bank deposits in its territory as at the end of 1930[28]. A second aggregate indicator of central bank liquidity provision can then be constructed by calculating a weighted average of these percentages, the weights being the dollar value of each country's commercial bank deposits as at the end of 1930.

c. By expressing the amount of liquidity supplied by each central bank during 1931 as a percentage of its country's nominal GDP in 1931. A third aggregate indicator of central bank liquidity provision could in principle then be constructed by calculating a weighted average of these percentages, the weights being the dollar value of each country's GDP in 1931. However, estimates of nominal GDP in 1931 are available for only a few countries and we do not think that a weighted average of those for which the data are available would have any useful meaning.

The amounts of funds supplied by central banks, calculated according to the methods described in the previous paragraph, are shown in table 3.2 below.

In some countries, such as Austria, Germany and Hungary, banking crises made it imperative for the central bank to commit large amounts of funds to bank rescues. In each case, there were substantial outflows of gold and foreign exchange from the central bank and the country imposed exchange controls to limit the outflow. Other countries, such as the U.K., abandoned the gold standard to escape the risk of a banking crisis, according to James's plausible interpretation (see James, 2001, chapter 2), as well as to avoid raising interest rates and thereby worsening the depression. Even so, bank deposits fell in the U.K. in 1931, and the central bank's assets did not grow. For countries that remained on the gold standard, the restrictions it imposed were a serious obstacle to the pursuit of financial stability in a period of turmoil.

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the effect of any currency depreciation during 1931 on the domestic currency value of the end-1930 holding. Foreign exchange holdings will also have been subject to revaluation effects, but we cannot measure them because we do not know the currency composition of foreign exchange holdings.

[27] This assumption is discussed further in the data appendix.

[28] Data on commercial bank deposits was also published by the League of Nations.

Table 3.2

Changes in central bank assets in 1931 (1)

Country	As % of central bank gold, foreign exchange and and paper assets at end-1930			Total change in gold, f e and paper assets as % of			Status
	Gold	Foreign exchange	Domestic paper assets	Gold, f e and domestic paper assets of central bank at end-1930	Commercial bank deposits at end-1930	GDP in 1931	
Canada	-2.9	0	-1.1	-4.0	-3.4	-1.8	Off gold 19/10/1931
USA	-3.1	0	+8.1	+4.9	+0.6	+0.4	
Japan	-22.1	0	+15.7	-6.4	-1.4	-0.9	Off gold 13/12/1931
Germany	-21.5	-15.5	+32.3	-4.8	-3.0	-0.5	Exchange control 15/07/1931
Austria	-2.0	-52.3	+61.7	+7.4	+2.9		Exchange control 09/10/1931
France	+15.1	-4.7	+1.5	+11.9	+23.9	+3.2	
Hungary	-10.5	-7.4	+22.8	+4.9	+1.5		Exchange control 17/07/1931
Italy	+2.6	-12.1	+5.3	-4.1	-1.8	-0.6	
UK	-7.2	0	+3.0	-4.2	-1.0	-0.5	Off gold 21/09/1931
Brazil	-8.4	-4.4	+17.7	+4.9	+1.8		Devalued in 1929; exchange control 18/05/1931
Chile	+6.9	-31.3	+17.7	-6.8	-3.1		Exchange control 30/07/1931
India	+8.0	-12.4	-4.1	-8.5	-6.7		Off gold 21/09/1931
Denmark	-8.7	-19.5	+12.8	-15.5	-3.2		Exchange control 18/09/1931; off gold 29/09/1931
Spain	-4.7	+0.1	+14.4	+9.9	+12.5		Devalued in 1920; exchange control 18/05/1931
Netherlands	+55.6	-19.3	-0.5	+35.8	+20.3	+5.2	
Poland	+2.0	-11.1	+3.5	-5.6	-7.2		
Switzerland	+120.4	-25.0	-2.7	+92.7	+8.4		
Weighted average				+3.8	+1.0		

Notes: (1) For each country, the table shows, in the first column, the change in the domestic-currency value of the central bank's

gold reserves, in the second column, the change in its paper assets, in the third column, the change in the sum of the first two columns. In each case, the changes are shown as a percentage of total gold reserves and paper assets as at end-1930; (2) In countries whose currencies depreciated in 1931, the change in gold holdings has been adjusted so as to exclude the increase in the domestic currency value of the stock of gold held at the end of 1930.

Sources: Exchange rates and gold holdings: League of Nations Statistical Yearbook 1936/37, tables 119 and 123. Paper assets: League of Nations Statistical Yearbook 1931/32 table 125. Available at http://www.library.northwestern.edu/govinfo/collections/league/ .

Other countries, such as France, the Netherlands and Switzerland, gained gold reserves during 1931, though in each case the rise in gold was partly offset by a fall in foreign exchange reserves. As the table shows, their discounts, loans, advances and holdings of government securities changed little during the year. They did not sterilise the gold inflow, but they did not significantly expand their domestic assets, though their central banks maintained their discount rates at levels well below those of the countries which were losing gold.

The result was that the expansion of central bank assets was only moderate during 1931. As table 3.1 shows, using the first method of measurement described above, additional average liquidity provision amounted to 3.8% of the stock of identified central bank assets (gold, foreign exchange and domestic paper assets) as at the end of 1930. Using the second method, additional average liquidity provision amounted to 1.0% of the stock of commercial bank deposits as at the end of 1930. However, as table 2.3 shows, bank deposits fell by much more than that in many countries in 1931.

Economic historians have debated extensively why the gold standard malfunctioned during the 1930s. Some cite a global supply of gold which was insufficient to support economic activity after the inflation of the First World War. Thus Wood (2009) claims that the deflation of 1929 – 1933 was inevitable because the supply of gold had not kept pace with the rise in prices. Eichengreen (2008, page 62) points out that 'the ratio of central bank gold reserves to notes and sight (or demand) deposits dropped from 48 percent in 1913 to 40 percent in 1927'. As noted above, a shortage of monetary gold was foreseen and measures were taken in the 1920s to economise on gold so as to try to mitigate its effects, but some of the measures, such as the withdrawal of gold coins from public circulation and the use of foreign exchange as a reserve asset, were not sufficient or did not succeed.

Some economic historians also blame the distribution of gold among central banks and the behaviour of the gold-rich countries (see Bordo and Eichengreen 2001)[29]; France had 19% of world gold reserves at the end of 1930, and the United States had 38%[30]. They point out in particular that the Banque de France did not recycle the very large amount of gold that it had acquired after France had returned to the gold standard in 1926 at a depreciated parity, either by substantial expansion of its domestic assets or by international lending. Irwin (2010), in a paper entitled 'Did France cause the Great Depression', goes as far as to conclude that the answer is 'yes', though he attaches some blame to the United States as well. He calculates that over the period 1929 – 1932, France and the United States could

[29] Wood (2009) dismisses this explanation, however.

[30] Source: League of Nations Statistical Yearbook 1936/37 table 123, authors' calculations.

have released 13.7% and 11.7%, respectively, of the world's gold stock, and still have maintained their banknote cover ratios at their 1928 levels. On our calculations, 25.4% (equal to 13.7% plus 11.7%) of the stock of monetary gold as at the end of 1928 was $2,534 million, or 12.3% of total central bank gold, foreign exchange and domestic paper assets as at the end of 1930, so that Irwin's arithmetic implies that central banks could have provided roughly four times as much support in 1931 as they actually did, had France and the United States behaved differently. However, Bernanke and James (1991) and Eichengreen (1995) say that the Banque de France lacked the legal power to engage in expansionary open-market operations, as a result of a law adopted in 1928. Mouré (1991, page 143) has his doubts about this point. He comments that:

'The 1928 reform had given the Bank, at its request, two means to effect open market operations. The statutes were an obstacle when the Bank wished them to be.'

Moreover, as already noted, France refused for political reasons to participate in a proposed second international loan to Austria; political tension between France on one side and Austria and Germany on the other obstructed the functioning of the international monetary system.

The data in table 3.2 suggest that the Netherlands and Switzerland, too, did not recycle the gold that they accumulated in 1931.

The United States, too, has been widely criticised for pursuing too restrictive a monetary policy. For example, Bordo, Choudri and Schwartz (2002) claim that the Federal Reserve could have pursued a more expansionary policy between October 1930 and February 1931, and between September 1931 and January 1932, without endangering the dollar's convertibility into gold. Their argument is based on a monetarist model which allows for expansion of the Federal Reserve balance sheet to affect international gold flows; it does not distinguish between the various ways in which the Federal Reserve balance sheet might be expanded. Warburton (1952) makes a different point, namely that the Fed aggravated the depression by its choice of assets, specifically by rejecting risky assets. He says (page 535):

'In the early 1930s the Federal Reserve Banks virtually stopped rediscounting or otherwise acquiring "eligible" paper. This was not due to lack of eligible paper…It was due directly to a combination of lines of action which must have been deliberately pursued by the Federal Reserve authorities, for they could not have been adopted in any other way.'

Warburton's point is echoed by Stella (2009, appendix I), who notes that the Federal Reserve took 'almost no risk on to the balance sheet' during the Great Depression. But Ahamed (2009) states that prime commercial bills used to finance trade, which were eligible for backing 60% of the currency, were scarce in 1931 as trade stagnated, so that the Federal Reserve had to rely on gold to back its currency beyond the 40% share required to be backed by gold. Wells (2004, p. 53) similarly states that since commercial paper was scarce in 1931, the additional backing had to be in gold. There therefore seems to be no consensus on whether the reason why the Federal Reserve did not expand its balance sheet in 1931 by purchasing eligible commercial bills was its risk aversion, or the scarcity of such bills. In February 1932, US government securities also became eligible assets for backing currency, which allowed the Federal Reserve to inject more liquidity at a later stage in the crisis (Wells (2004), Ahamed (2009)).

Kindleberger (1987, especially pages 295-296) claims that the gold standard malfunctioned because no country was both willing and able to play a leadership role in the crisis. The

United Kingdom had acted as a leader before the First World War but was no longer able to do so because its own financial position was weak. In the United States, which did have the power to act as a leader by lending freely to other countries, isolationist attitudes prevailed. Another way of expressing the same point would be to say that the United States took an excessively narrow view of its own interests and failed to perceive that the consequences of its failure to act would do enormous damage to those interests.

Whatever the merits of the criticisms that France and the United States hoarded gold during the later 1920s and 1930, international flows of funds in the year 1931 in particular were highly volatile, and the risk that they would be reversed in short order was high. It would surely have been imprudent for any central bank receiving such 'hot money' inflows to place the funds in anything but highly liquid assets, if it was committed to the gold standard. Irwin (2010) is particularly critical of the Banque de France's actions in 1931 and 1932, but in view of the volatility of capital flows in those years, this aspect of his criticism seems overstated.

In one specific way, the fragmentation of the gold standard itself paradoxically damaged the prospects for international lending. The newly-established BIS refused applications for credit by central banks following the collapse of sterling, partly since the BIS' own working resources had diminished due to the collapse of sterling, the Hoover moratorium, and the withdrawals of deposits by central banks (see Bank for International Settlements 1932). Central banks' balances at the BIS fell from CHF 870 million on 31 August 1931 to CHF 464 million on 31 December 1931. Moreover, by Article 21 of the BIS's statutes, the BIS could no longer use currencies which had left the gold standard. Consequently, the departure of sterling and Scandinavian currencies from the gold standard diminished the BIS's usable resources.

It is clear that the reactions of central banks to the banking crisis were modest, and, in the light of the results, manifestly inadequate. In many cases, the constraints of the gold standard inhibited adequate easing of monetary policy. And the volatility of international flows of funds in 1931 itself represented an additional unfortunate influence in favour of caution in monetary policy.

3.2 Official reactions in 2008-09.

Floating exchange rates prevailed in 2008-09, so that monetary policies did not need to be internationally co-ordinated and interest rates could be determined by reference to domestic economic objectives. Thus there were large reductions in official interest rates in nearly all the countries shown in table 3.3 in the last four months of 2008. In Russia, however, the main policy concern in the last few months of 2008 was to maintain the rouble's exchange rate and interest rates were increased (they fell in 2009 however). And in Hungary, the failure of Lehman Brothers, together with market concerns about the sustainability of domestic policies, had led to such a heavy depreciation of the currency[31] that interest rates had to be raised there, too.

[31] For an explanation of how the failure of Lehman Brothers caused some currencies to depreciate, see Allen and Moessner (2010).

Table 3.3

Central bank official interest rates in 2008 (in percent)

	End of August	End of December
USA	2.00	0.00 – 0.25
Euro area	4.25	2.50
UK	5.00	2.00
Switzerland	2.25 – 3.25	0.00 – 1.00
Canada	3.00	1.50
Japan	0.50	0.10
Russia	11.00	13.00
Australia	7.25	4.25
Denmark	4.60 (1)	3.75 (1)
Norway	5.75	3.00
Sweden	4.50	2.00
Hungary	8.50	10.00
Poland	6.00	5.00
Korea	5.03 (2)	3.02 (2)

Sources: National central bank internet sites.

Notes: (1) CD rate; (2) Call rate.

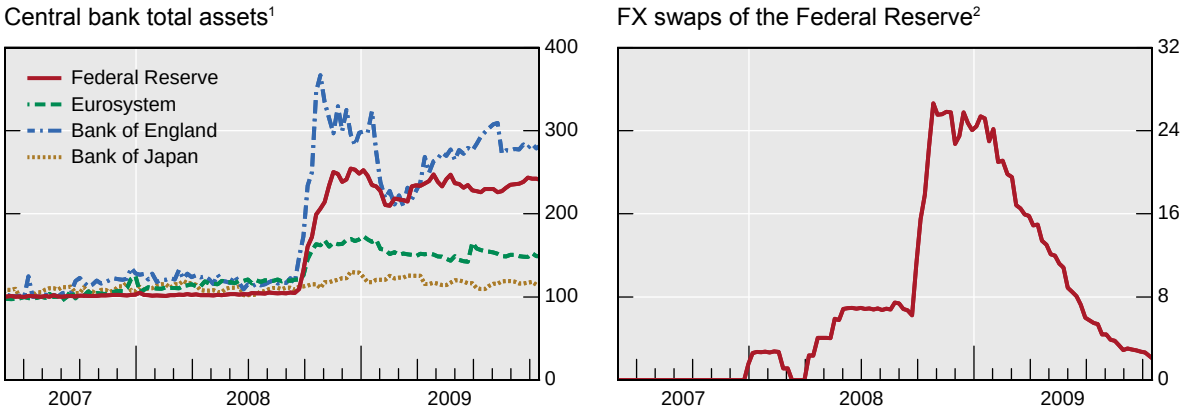
During the recent crisis liquidity was provided on a large scale. The expanded liquidity support was reflected in an enormous expansion in central bank balance sheets, which provide a measure of both domestic and international liquidity support by central banks. The range of assets that central banks were willing to accept as collateral for loans was in some cases greatly widened[32]. And the range of financial institutions that received support was also widened in some countries, notably the United States, where for example the Treasury offered to insure the value of the liabilities of money market mutual funds. These changes were the result of national decisions, though the decisions have been driven by a common cause. Issues related to the expanded liquidity support by central banks during the recent financial crisis are discussed in Turner (2010).

[32] See BIS (2009), 79th Annual Report, Chapter VI, Graph VI.5.

There are grounds for thinking that specifically international liquidity was provided less generously in 2008-09 than in 1931. As noted in section 3.1 above, the BIS estimated in 1932 that total emergency help granted during 1931 to debtor countries by central banks, the BIS, principal capital centres and by Treasuries amounted to around CHF 5 billion, or about 7% of total short-term international indebtedness as calculated by the BIS. We do not know how this figure was calculated and what 'emergency help' was included; nor do we know exactly how 'international short-term indebtedness' was defined. Nevertheless, in 2008, international liquidity provision through central bank swaps peaked at about 2% of total international short-term indebtedness (including inter-bank debts) at the end of 2007. Emergency measures in 2008-09 by governments in the form of recapitalisations of banks, guarantees of banks' debts, and asset purchases or guarantees (see Panetta et al. 2009), as well as the existence of and strengthening of deposit insurance schemes in a number of countries, may have contributed sufficiently to stabilisation that large deposit flight and capital outflows were prevented, reducing the need for international emergency help. As of early June 2009, total commitments and outlays (not including the existence and strengthening of deposit insurance) by Australia, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, Switzerland, the United Kingdom and the United States amounted to around €5 trillion or 18.8% of GDP, and €2 trillion or 7.6% of GDP, respectively (Panetta et al. 2009). Total commitments and outlays (excluding deposit insurance) as of early June 2009 by these 11 countries as a percentage of banking sector assets at end-2008 were 8.3% and 3.3%, respectively (see Panetta et al. 2009, Table 1.2 and Figure 1.1). International liquidity provision – ie liquidity provision to foreign central banks or governments – is only one aspect of global liquidity provision, which is the main subject of this section.

Graph 3.2

Central bank balance sheets and FX swaps



[1] In national currency; mid-2007 = 100. [2] In per cent of total assets of Federal Reserve.

Sources: Datastream; national data.

Central bank assets increased suddenly and massively after the failure of Lehman Brothers on 15th September 2008 and the subsequent freezing-up of financial markets (see Graph 3.2). More detail is provided in table 3.4, which shows the expansion in central bank assets, country by country, measured according to each of the three methods described in section 3.1. The first column shows the increase in central bank assets in the year from end-August 2008 expressed as a percentage of the level of such assets at the end of August 2008, but the percentage depends significantly on the initial size of the central bank's balance sheet.

Table 3.4

Changes in central bank assets in 2008-09

Country	Change in central bank assets in year beginning end-August 2008		
	As % of central bank assets as at end-August 2008	As % of commercial bank deposits at end-2007	As % of GDP in 2008
Canada	37.8	1.3	1.3
USA	125.1	17.5	8.1
China	9.7	5.0	6.1
Japan	6.6	1.3	1.4
Korea	22.3	11.1	6.9
India	0.8	0.4	0.2
Singapore	5.2	0.8	4.9
Australia	2.8	0.2	0.2
Russia	4.8	6.9	1.8
Euro area	25.7	4.1	4.1
UK	136.2	2.0	8.8
Switzerland	67.8	6.0	16.5
Denmark	23.0	9.1	5.9
Iceland	58.1	14.7	31.0
Brazil	22.7	22.0	5.7
Mexico	34.9	19.2	3.5
Hong Kong	36.7	8.8	30.8
Weighted average	28.5	5.5	5.4

Source: National data; for details please see data appendix.

Countries are included in this table if they publish data on central bank assets and if they meet any of the following criteria: (i) Their 2008 GDP calculated at PPP exchange rates was among the eleven largest in the world. Those eleven countries accounted for 73.9% of global GDP calculated at PPP exchange rates, according to the IMF[33]; (ii) they have a large international financial industry (including Switzerland, Hong Kong, Singapore, Australia); (iii) they had an exchange rate commitment which represented a contingent claim on their foreign exchange reserves (Russia, Denmark); (iv) they were forced to impose exchange controls because the banks could not meet deposit outflows (Iceland).

[33] See IMF World Economic Outlook database, April 2010.

For example, the Bank of Russia, which has the nation's large foreign exchange reserves on its balance sheet, has much larger assets relative to total bank deposits or GDP than, for example, the Bank of England, which has only a small amount of foreign exchange reserves on its balance sheet.

Some salient features of table 3.4 are:

- The amounts of liquidity provided were substantially larger than in 1931 (see below).
- Countries which are relatively large financial centres tended to provide large amounts of liquidity (eg the USA, the UK, Switzerland, Hong Kong)
- Of the countries in the table, only Iceland was driven to impose exchange controls to protect its banks from unfinanceable deposit withdrawals.

There are grounds for thinking that central bank reserve management policies have been procyclical in recent years, as they were in the 1920s and early 1930s, and that they added to foreign-currency liquidity shortages in 2008-09. Pihlmann and van der Hoorn (2010) estimate that, after a period in which they had been willing to take increasing amounts of risk in pursuit of additional returns, reserve managers pulled out at least the equivalent of US$500 billion of deposits and other investments from the banking sector, mainly in an effort to protect their investments from default risk. The unsecured deposits withdrawn from commercial banks by central bank reserve managers will have largely been replaced by secured loans provided by the home central banks of the commercial banks concerned. The net effect on will have been to drain collateral from the commercial banking system.

The central banks' response to the widespread shortages of foreign-currency liquidity was to set up swap facilities so that the home central bank of the currencies in short supply could provide those currencies to the commercial banks outside the home country that needed them. They did so indirectly, using as intermediaries the central banks of the commercial banks that were short of liquidity. In effect, they used foreign central banks to extend the geographical scope of their liquidity-providing operations. Alternatively or in addition, some central banks (such as in Brazil and Korea) used some of their own foreign exchange reserves to provide foreign-currency liquidity, converting them into the required currency if necessary by means of market transactions (see Allen and Moessner 2010).

The most heavily used swap network was established by the Federal Reserve. In addition, euro, Swiss franc and Asian and Latin American swap networks were established by other central banks (see Allen and Moessner 2010). At its peak, on 17th December 2008, the Federal Reserve swap network provided $583.1 billion in US dollars to other central banks. At end-2008, total drawings on the Federal Reserve swap network amounted to $553.7 billion. Swap lines could be set up quickly without the need for extensive negotiation, and could draw on experience with the use of swap lines in the past.

In addition to the additional liquidity provided by central banks, which may have amounted in total to around $2.7 trillion[34], governments in many countries facilitated banks' acquisition of

[34] This is calculated as 28.5% (see table 3.2) of the total dollar value of the assets of the central banks of the countries listed in table 3.2 as at the end of August 2008, which was $9.7 trillion.

liquid assets by providing (in exchange for a fee) guarantees of bonds issued by banks. The total of such bond issues between October 2008 and May 2009 was about EUR 700 billion, or roughly $1 trillion (see Panetta et al, 2009, page 49 and graph 3.1).

3.3 Historical use of swap lines

Central bank currency swaps were also used before the financial crisis of 2008-09. Starting in the 1920s, currency swaps between central banks, in which one central bank was ready to provide its own − or sometimes a third − currency to another central bank, and vice versa, were occasionally used on an ad hoc basis (Toniolo 2005). Such swap lines were usually for a limited duration of three months, in order to reduce foreign exchange risk and limit the time during which reserves were immobilised; at the end of its duration, a swap line could be cancelled or put on standby for later reactivation (Toniolo 2005). There had also been a swap arrangement between the Federal Reserve Bank of New York and the Bank of England of $200 million of US gold against sterling in 1925, when sterling returned to the gold standard (Coombs 1976, Sayers 1976).

Already in October 1955 the BIS offered to accept dollars from the Swiss National Bank in exchange for gold under a swap transaction with a maturity of three or six months, demonstrating that "knowledge of such swap transactions had been preserved at the BIS during the years of bilateralism" (Bernholz 2007). At the end of 1959, the Swiss National Bank conducted gold/dollar swaps with the BIS and the Bank of England for US$ 50 million and US$ 20 million, respectively. These gold/dollar swaps helped fund window-dressing dollar/franc swaps over the year-end by the Swiss National Bank with Swiss commercial banks, so that Swiss commercial banks' balance sheets could show larger amounts of liquid Swiss franc assets; and they contributed to higher reported gold holdings in Switzerland to meet the prescribed cover for note issue (Bernholz 2007).

In February 1961, Iklé from the Swiss National Bank proposed gold/dollar swaps to Coombs of the Federal Reserve Bank of New York at a monthly BIS meeting of central bankers, as well as in a follow-up letter (Bernholz 2007). Iklé had been worried about decreasing US gold reserves during 1960, which could threaten the gold convertibility of the US dollar (Bernholz 2007). Following the revaluation of the German Mark on 3 March 1961, which put strong downward pressure on sterling, the Swiss National Bank entered into gold/sterling swaps with the Bank of England (Bernholz 2007). Since the revaluation of the German Mark also led to some speculation against the US dollar, the Bundesbank proposed a dollar/German Mark swap to the Federal Reserve Bank of New York, which was implemented in 1961 (Bernholz 2007).

In the course of 1961 a series of bilateral support measures were set up between the Bank of England and other central banks as well as the BIS under the 'Basel Agreement' in order to counter speculative attacks on the pound sterling. Total support under the Basel Agreement peaked at $904 million at end-June 1961, with the BIS contributing $154 million in gold swaps in June 1961 (Toniolo 2005).

Starting in 1962, the Federal Reserve developed the use of central bank swap lines further by establishing a network of swap lines involving Western central banks as well as the Bank

for International Settlements (Toniolo 2005). The swap arrangements were usually for three months, and could be renewed or maintained on stand-by if both parties agreed (Coombs 1976).[35] The central bank swap network established by the Federal Reserve grew rapidly from around $2 billion at the end of 1963 (involving eleven foreign central banks and the BIS at end-November 1963), to $10 billion and $30 billion at the end of 1969 and 1978, respectively, and it was not dismantled with the breakdown of the Bretton Woods system. These swap lines were maintained until the late 1990s, when the Federal Reserve allowed all its swap lines except those with the central banks of Canada and Mexico to lapse, in the light of the introduction of the euro and their disuse for the preceding 15 years[36].

There were four main purposes of the swap network. Its first main purpose was to support the US dollar exchange rate against temporary fluctuations. It was established "to help safeguard the value of the dollar in the international exchange markets" (as stated in the FOMC's authorization of 13 February 1962, see FOMC 1962). The swap network was seen as "the perimeter defence line shielding the dollar against speculation and other exchange market pressures" (Coombs 1976), and according to a BIS paper its purpose was "to counter speculative attacks on the dollar or cushion market disturbances that threaten to become disorderly" (BIS G10 1964).

A second purpose of the swap network was to avoid large drains on gold holdings by the United States due to central banks converting temporarily large dollar balances into gold: "To offset or compensate, when appropriate, the effects on U.S. gold reserves or dollar liabilities of those fluctuations in the international flow of payments to or from the United States that are deemed to reflect temporary disequilibriating forces or transitional market unsettlement" (FOMC 1962); "to avoid a bunching of gold losses resulting from rapid accumulation of excess dollar balances by foreign central banks – especially if these accumulations were likely to be reversed within a foreseeable period; swap arrangements were not, however, designed to avoid gold losses resulting from a persistent payments deficit" (BIS G10 1964). The swap network was described as a "temporary alternative to international gold settlements in the form of central bank credit facilities" (Coombs 1976).

A third purpose of the swap network was to enhance international monetary cooperation between central banks and international institutions and avoid adverse effects on foreign exchange reserves positions: to "further monetary cooperation with central banks of other countries maintaining convertible currencies, with the International Monetary Fund, and with other international payments institutions" (FOMC 1962), to "supplement international exchange arrangements such as those made through the International Monetary Fund" (FOMC 1962), "Together with these banks and institutions, to help moderate temporary imbalances in international payments that may adversely affect monetary reserve positions" (FOMC 1962).

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[35] In 1963 the FOMC approved a one-year limit for the repayment of credits extended under the Federal Reserve swap network. If this one-year limit could not be met, the US Treasury could issue certificates or bonds in the foreign central bank's currency to provide medium-term financing (see Coombs 1976).

[36] See Minutes of the Federal Open Markets Committee, 17th November 1998, http://www.federalreserve.gov/fomc/minutes/19981117.htm . The swap lines with Canada and Mexico were retained because they were associated with the North American Framework Agreement, in which the Federal Reserve participated.

A fourth purpose of the swap network was to aid in the provision of international liquidity in the longer term: "In the long run, to provide a means whereby reciprocal holdings of foreign currencies may contribute to meeting needs for international liquidity as required in terms of an expanding world economy." (FOMC 1962); "in the longer run, when the US balance of payments had returned to equilibrium, to provide a means whereby reciprocal holdings of foreign currencies might contribute meeting needs for international liquidity" (BIS G10 1964). The fourth purpose of contributing to meeting the needs for international liquidity was similar to the purpose of the swap network established in the financial crisis of 2008-09.

Other central banks also used this central bank swap network to support their currencies, for example the Bank of Italy in support of the Italian lira in March 1964; they also used them to manage seasonal pressures arising in foreign exchange markets, for example due to operations of commercial banks at year-end (Toniolo 2005). The Federal Reserve also entered into some swap lines with the BIS where the Fed could convert one foreign currency into another without affecting foreign exchange markets by large transactions (BIS G10 1964).

Following 11 September 2001, the Federal Reserve established temporary central bank swap lines for a duration of 30 days with the ECB and the Bank of England, and temporarily increased an existing swap line with the Bank of Canada.[37] Their purpose was different from that of the swap network established during the financial crisis of 2008-09, in that they were set up to provide emergency US dollar liquidity following disruptions in the financial infrastructure. For example, the press statement accompanying the swap line for $30 billion established between the Federal Reserve and the Bank of England on 14 September 2001 specified that "The U.S. dollar proceeds, would, if necessary, be made available to banks in the United Kingdom to facilitate the settlement of their U.S. dollar transactions."

4. What were the differences in central banks' reactions between 1931 and 2008, and what explains them?

In this section, we analyse the differences between the experiences of 1931 and 2008, and consider possible explanations of some of the differences between the monetary policy responses to the two crises. There are strong grounds for thinking that the policy reaction was more effective in 2008-09. As we have shown in section 4, liquidity creation by central banks was much less inhibited in 2008-09 than it had been in 1931.

4.1. Economic fundamentals.

We have made no attempt to explore or compare the fundamental causes of the two banking crises that we have discussed. It is entirely plausible that the fundamental disequilibria present in 1931 were so great that no amount of liquidity provision by central banks could on its own have prevented a crisis. At that time, the international financial scene was still dominated by unsettled issues related to war reparations. Moreover the successor states of

[37] See Press releases by the Federal Reserve,
http://www.federalreserve.gov/boarddocs/press/general/2001/20010913/default.htm ,
http://www.federalreserve.gov/boarddocs/press/general/2001/20010914/default.htm and
http://www.federalreserve.gov/boarddocs/press/general/2001/200109144/default.htm .

the Austro-Hungarian empire, notably Austria itself, had not fully adjusted their new situations[38]. Nevertheless, there has for many years been a consensus that the Great Depression was not inevitable, and that more expansionary macro-economic policies, whether fiscal or monetary, could have prevented it, or at least contained it and turned it into a much less serious recession. More generous liquidity provision by central banks would certainly have been an essential part of such a policy programme, and its absence in 1931 was therefore a matter of great importance.

At the time of writing in the middle of 2010, it is too soon to say whether the policy measures that have been taken during the recent crisis will prove to have been effective in enabling the world economy to return to growth rates comparable with those that prevailed before the crisis. Nevertheless, large-scale liquidity provision by central banks has been a necessary component of the policy programmes pursued to support economic activity after the recent financial crisis.

4.2. The scale of the liquidity problem.

Our measurements show clearly that the contraction of international lending and of bank deposits was considerably smaller in 2008-09 than in 1931. This does not however imply that the initial disturbance was smaller. It is possible that the initial disturbance was as large or even larger, but that the policy reaction was more effective by a sufficient margin that the financial contraction was smaller, and that the real-economy effects of the initial disturbance were better contained. In particular, as already noted, it seems to us extremely likely that the fact that deposit insurance schemes were widespread in 2008, whereas they did not exist in 1931, was crucial in limiting the outflow of deposits from commercial banks and thereby containing the effects of the 2008 crisis[39]. And it is surely significant that several governments extended the coverage of their deposit insurance during 2008, in some cases by providing complete deposit guarantees[40] (see the section below). It is in any case beyond the scope of the present paper to identify, discuss and compare the underlying causes of the two crises; rather, our purpose is to compare the policy responses and to explain the differences.

4.3. Existence of deposit insurance and guarantees

The falls in deposits in 2008-09 were not nearly as widespread, or as large, as they were in 1931. This is likely to have been to a considerable extent due to the existence of deposit insurance schemes, as well as the strengthening of deposit insurance schemes in a number of countries in the recent crisis to help prevent bank runs. Deposit insurance schemes were strengthened in the recent crisis in many countries in the European Union, in Switzerland,

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[38] See Brown (1940) pages 923 – 926.

[39] Tallman and Wicker (2010), writing about the Unites States, suggest that the analogy between the recent crisis and the Great Depression is flawed because there were no widespread depositor withdrawals in the recent crisis. We, like they, think that deposit insurance explains the relative stability of bank deposits, but we do not think that the analogy is meaningless.

[40] For details see, for example, Reserve Bank of Australia (2009) pages 43 – 46.

Australia, and New Zealand[41]. In addition, for reasons that are not clear to us, subordinated debt issued by banks was effectively protected during the recent crisis. The first official deposit insurance scheme had been introduced in the United States in 1933, in order to prevent bank runs and deposit flight in future.

However, there is a danger that deposit guarantees by governments could lose credibility if their countries' fiscal positions should deteriorate strongly. If that should happen, deposit flight could be triggered despite the existence of deposit guarantees.

4.4. No binding constraint on central bank liquidity provision.

In 1931, central bank liquidity provision was constrained by the gold standard. The countries in which domestic imperatives compelled large amounts of liquidity provision were relatively short of gold, and standstill agreements and exchange controls had to be imposed to contain the resulting outflow of gold. Other countries left the gold standard to avoid the conflicts it created with their domestic objectives.

The constraints imposed by the gold standard bore on international liquidity provision just as they did on liquidity provision to domestic borrowers. International initiatives to provide assistance to the countries worst affected by the crisis were unsuccessful. For example, the international loan to Austria arranged in 1931 was disappointing both as regards its size, which was plainly insufficient to Austria's needs, and because it took too long to arrange. Moreover a second loan, which might have helped to stabilise the situation, proved impossible to agree[42]. One of the main difficulties was that the prospective lenders, such as the United Kingdom, were concerned that lending to Austria would weaken their own defences against the financial crisis[43].

By contrast, in the recent crisis, there was no comparable constraint on liquidity creation by central banks. This was evident in both the speed and the scale of liquidity provision. In most countries, the required funds were provided quickly, so that they contained the crisis in its early stages and provided reassurance that the authorities had no doubts about providing liquidity.

The amounts of liquidity provided in the two crises, measured according to the three methods described in section 3.1, are compared in table 4.1 below. The data include provision of liquidity to both domestic and external borrowers. The amount provided in 2008-09 was 5 ½ to 7 ½ times as much as in 1931, depending on the choice of scale. In the recent crisis, it was clear that more would have been provided if more had been needed. In the international field, nothing illustrates the difference between 1931 and 2008 more clearly than the fact that the swap lines extended by the Fed to the ECB, the Bank of England, the Swiss National Bank and the Bank of Japan were unlimited as to amount after 13 - 14 October 2008.

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[41] See Reserve Bank of Australia (2009), p. 43 – 46 .

[42] See Toniolo (2005), pp 90 – 96.

[43] Was it the gold standard, or just the institution of fixed exchange rates, that created the constraint on liquidity provision? The question as put is under-specified, because the non-gold standard fixed exchange rate system of 1931 whose hypothetical existence the question assumes would have needed some means whereby monetary policies were co-ordinated. If it had been possible to secure a co-ordinated easing of monetary policies, then a fixed exchange rate system might have survived, but not otherwise.

Table 4.1 Central bank liquidity provision in the two crises			
	As % of central bank assets (1)	As % of commercial bank deposits (2)	As % of GDP (3)
1931	3.8	1.0	N/A
2008-09	28.5	5.5	5.4
Notes: (1) Central bank assets as at the end of 1930 and the end of August 2008, respectively; (2) Commercial bank deposits as at the end of 1930 and the end of 2007, respectively; (3) GDP in 2008. Sources: Tables 3.2 and 3.3.			

4.5. Size and distribution of reserves.

Total gold and foreign exchange reserves at the end of 1931 were $13.4 billion, or roughly 100% of total short-term international indebtedness, according to the BIS estimate. At the end of 2007 they were $6,716 billion, or about 18% of total short-term international indebtedness, as estimated in table 2.2. Therefore reserve stocks in 1931 were much larger in relation to international indebtedness than in 2008.

Even if reserve stocks in 1931 appeared substantial according to this criterion, they were in the wrong place. The countries that most needed reserves, such as Austria, Germany and the U.K., did not have enough; while those that had plenty, such as France, the Netherlands Switzerland and the U.S.A., had more than they needed.

Official reserves were much lower relative to short-term international indebtedness in 2008 than in 1931. And it could be said that, as in 1931, they were concentrated in the places where they were least needed. For example, China alone accounted for over a quarter of the world's official reserves, but China was little affected by the crisis. And some of the international banking centres which, in the event, needed international liquidity most, had only small reserves of their own. For example, the U.K.'s reserves were only $41.7 billion at the end of August 2008.

The provision of swap facilities by the Federal Reserve in particular rendered reserve adequacy wholly irrelevant for countries receiving these swap lines. Countries which had swap lines were able to provide the necessary foreign currency liquidity to their banks by drawing on the swap facilities and in most cases left their own reserves entirely untouched.

4.6. Reserve management

One common feature of the two banking crises is that, in each case, central bank reserve management appears to have acted pro-cyclically, adding to the supply of credit during the boom and subtracting from it during the downturn.

4.7. Politics and international leadership.

As noted in section 3.1 above, political differences, such as those between between Austria and France, set back any chances there were that official international co-operation might

have contained the effects of the liquidity crisis of 1931. Moreover, as Kindleberger (1987) pointed out, isolationist attitudes prevented the United States from providing the leadership that might have resolved the crisis.

By contrast there were no political obstructions to the provision of necessary swap lines in 2008. Moreover, the United States perceived that it was in its own interest to provide liquidity freely to other countries, despite some financial risks and despite some opposition within Congress[44]. Had the political climate been less benign, or had the United States adopted an isolationist attitude, the global crisis would surely have been a great deal worse than it actually was.

5. Conclusion

The gold standard limited the amount of credit that central banks could create; that was its purpose. In the 19th century, central banks developed techniques which enabled them to protect their economies from the harshest aspects of its automatic workings. Those techniques failed to work in 1931. The constraints imposed by the gold standard on liquidity creation made it impossible for central banks to provide liquidity in amounts that might have been sufficient to contain the global crisis. At the same time, in the countries where large banks got into distress, domestic political imperatives dictated that liquidity be provided to prevent losses to domestic depositors and the economic collapses that such losses would have caused. Official international lending was obstructed by political obstacles, and more generally by the fact that no country was both willing and able to provide liquidity to others on a scale commensurate with the problem. The result was that the gold standard, the international monetary system of the time, was destroyed. Some countries imposed exchange controls to prevent gold outflows, while others allowed their exchange rates to float. Exchange controls, the standstill agreements imposed on some international short-term debts, and the spread of protectionism all caused output and employment to become further depressed as the 1930s wore on.

By 2008, lessons had been learned from the experience of the Great Depression. Deposit insurance (introduced in the United States in 1933) meant that in most countries, commercial banks did not experience outflows of deposits. In some countries, governments strengthened deposit guarantee schemes during the crisis. And managed currencies and flexible exchange rates enabled central banks to create new liquidity freely, and thereby limit the spread of the crisis. Perhaps most importantly, there was a widespread understanding that the main priority of central banks in a banking crisis was to provide liquidity freely.

Moreover, political conditions were fortuitously not such as to inhibit international lending, and, despite some Congressional resistance, the Federal Reserve, in the enlightened pursuit of the United States' interests, provided large amounts of dollars to support the global banking system through swap lines. The result seems, at the time of writing, to be a much happier outcome than might have been feared.

[44] See Allen and Moessner (2010, section 9).

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Data appendix

This appendix provides the sources of some of the data quoted in the paper.

Table 2.3

The data on bank deposits come from table 3A of the BIS international banking statistics (amounts outstanding and exchange-rate-adjusted quarterly changes). The data on international debt securities with remaining maturity up to a year come from table 17B of the BIS international securities statistics (amounts outstanding only). The partly exchange-rate-adjusted quarterly changes in international debt securities are calculated by the authors as the sum of:

- Net issues of international money market instruments (from table 14A of the BIS international securities statistics), which are exchange-rate-adjusted, and
- The differences between successive quarterly amounts outstanding of international debt securities with remaining maturity up to a year other than international money market instruments, calculated by subtracting the amounts outstanding in table 14A from those in table 17B. The estimated quarterly changes in international debt securities with remaining maturity up to a year other than international money market instruments are thus not exchange-rate-adjusted.

Table 2.5

U.S.A.

The data are taken from Federal Reserve table H8.1.

Canada

Bank of Canada Monthly Statistical Bulletin Table C4 shows the end-month Canadian dollar deposits of the chartered banks for months up to December 2008, but not beyond. The data are consolidated, so that inter-bank deposits among the chartered banks are netted out. Table C9 shows the foreign currency deposits of chartered banks, wherever booked. Again the data are available only up to December 2008. We assume that all foreign currency deposits are denominated in US dollars. On that assumption, we calculate the USD value of each month-end total and then convert the month-to-month changes back into CAD using monthly-average exchange rates. The changes in total deposits that we quote are the sum of the changes in Canadian dollar-denominated deposits from table C4 and the calculated changes in foreign currency-denominated deposits (from all sources) from table C9.

Euro area

Total deposits of MFIs (monetary financial institutions) from non-MFIs are to be found in ECB table 2.2 (consolidated balance sheets of euro area MFIs). We use the transactions data, cumulated from the end of August 2008, since these data do not include the effects of exchange rate fluctuations on the euro value of pre-existing positions. The MFI sector includes the Eurosystem (ie the ECB and the national central banks of the euro area). The total deposits of the Eurosystem from non-MFIs are to be found in table 2.1 (aggregated balance sheets of euro area MFIs). There are no transactions data in table 2.1, so we simply deduct the differences between the end-month stocks from the total MFI transactions data in table 2.2 to get an estimate of the changes in deposits of MFIs outside the Eurosystem, accepting that there may be some pollution from any exchange rate and other valuation effects that are present in the data for the Eurosystem (any such pollution is likely to be very small in scale because deposits of the Eurosystem from non-MFIs are only 1.3% of total MFI deposits from non-MFIs)

UK

We use essentially the same technique as in the case of the euro area. The data come from Bank of England table B 2.1 (MFIs' consolidated balance sheets). The data for the Bank of England itself (from table B 2.2) are subtracted from the data for all MFIs so as to obtain data for MFIs other than the Bank of England. The published data for changes are used, so as to exclude changes in the value of outstanding balances that result from exchange-rate-induced changes in the sterling value of those balances and not from flows.

Switzerland

The basic data come from the Swiss National Bank Monthly Bulletin of Banking Statistics table 1B, in which the data are reported by banking group. The groups are 'all banks', 'big banks' (of which there are only two), 'cantonal banks', 'regional banks and savings banks' and 'foreign banks'. Because 'all banks' includes the Swiss National Bank, we use the sum of the data for the other four groups, unless otherwise specified. The figures quoted in the table are for the sum of 'money market instruments issued' , 'liabilities to customers in the form of savings and deposits' and 'other liabilities to customers', and for 'liabilities to customers in the form of savings and deposits' and 'other liabilities to customers'. The data are quoted in table 1B as totals across all currencies, but the CHF values of the components denominated in CHF, USD and EUR, and in some cases, precious metals are shown separately. In order to estimate transactions flows we calculated the values of the USD and EUR components at each end-month in their respective own currencies, using end-month exchange rates, and from those data calculated the monthly changes. We then converted the monthly changes back into CHF using monthly average exchange rates. We performed analogous calculations on the precious metal mounts assuming that the precious metal accounts were in fact all gold accounts.

Hong Kong

The data are from Hong Kong Monetary Authority table 3.2.

Singapore

The data are from Monetary Authority of Singapore table I.10.

Australia

The data are from Reserve Bank of Australia table B3. No account is taken of the effect of changes in the exchange rate of the Australian dollar on the value of foreign currency deposits.

Russia

Data from Haver Analytics; ultimate source is Central Bank of Russia Bulletin of Banking Statistics Table 1.16.

Japan

The data are from the Bank of Japan website. The relevant codes are FA'FAABK_FAAB2DBEL01
for the deposits of domestically-licensed banks and FA'FAFBK_FAFB2L1 for the deposits of foreign
banks.

China

The data are from Peoples Bank of China statistical table 'Depository Corporations Survey', http://www.pbc.gov.cn/english/diaochatongji/tongjishuju/2008.asp .

India

The data are from Reserve Bank of India Data Warehouse table Commercial Bank Survey.

Brazil

The data are from the central bank's 'time series management system' (https://www3.bcb.gov.br/sgspub/consultarvalores/telaCvsSelecionarSeries.paint), and the series included are #1883, #1884 and #1886. The all relate to 'deposit money banks', and therefore include the deposits of the central bank. However, the central bank's balance sheet records deposits only from financial institutions and international organisations, the latter being very small. Therefore the changes in the deposits of 'deposit money banks' should be close to the changes in the deposits of commercial banks.

Mexico

The data are from the Banco de Mexico table 'Agregados monetarios y flujo de fondos'. In calculating flows of deposits we assume that all foreign currency deposits are denominated in US dollars.

Denmark

The data are from Danmarks Nationalbank table DNSEKT1.

Iceland

The data are from Central Bank of Iceland 'Accounts of Deposit Money Banks'. In calculating flows of deposits we assume that all foreign currency deposits are denominated in euros.

Table 3.2

As noted in the text, we assume that the amount of liquidity supplied by each central bank is equal to the change in gold and foreign exchange holdings, less any revaluation effects, plus the change in the total of domestic paper assets (discounts, loans and advances, and holdings of government securities), as published by the League of Nations. The League of Nations Statistical Yearbooks do not provide comprehensive central bank balance sheets, however. Our assumption amounts to assuming that the three classes of central bank assets for which the League did publish statistics are the only ones that mattered, ie that any other assets (such as land and buildings) were small in amount or that they did not change much in 1931.

We can test this assumption for countries for which we have comprehensive central bank balance sheet data. Appendix table 1 below contains the relevant data.

GDP data

Canada:	Thelma Liesner, One Hundred Years of Economic Statistics, The Economist, 1989, table C1.
USA:	National data via BIS DBS database
Japan:	Global Financial Database
Germany:	Global Financial Database
France:	CEPII http://www.cepii.fr/francgraph/bdd/villa.htm,
Italy:	Liesner table It1
UK:	Global Financial Database
Netherlands:	National data via BIS DBS database

Appendix table 1

Central bank assets: tests of comprehensiveness of estimates based on League of Nations data

Country	Units	Date of observation	Estimate of central bank assets based on League of Nations data	Total assets reported by national source	Difference of levels end-1930 (%)	Change in total assets reported by national source (%), end-1930 to end-1931; (pp difference to estimate based on League of Nations data in brackets)
USA	USD millions	End of 1930	5,570	5,201 (1)	-6.6	9.1 *(4.1)*
France	FRF millions	End of 1930	99,958	103,886 (2)	3.9	11.5 *(-0.5)*
Switzerland	CHF millions	End of 1930	1,338	1,392 (3)	4.0	91.1 *(-1.6)*
Germany	RM millions	End of 1930	5,687	6,253 (4)	10.0	-6.2 *(-1.4)*
Austria	ATS millions	End of 1930	1,264	1,538 (5)	21.7	8.5 *(-2.0)*
UK	GBP millions	End of 1930	546	562 (6)	2.9	-0.9 *(-8.7)*
Japan	JPY millions	End of 1930	1,852	2,175 (7)	17.5	-8.9 *(-8.8)*

Notes:

(1) Source: Federal Reserve Board Banking and Monetary Statistics 1914 – 1941, available at http://fraser.stlouisfed.org/publications/bms/ .

(2) Source: Banque de France: situation hebdomadaire 1898-1974, http://www.banque-france.fr/fr/statistiques/base/annhis/html/idx_annhis_fr.htm. Figure is for 1st January 1931.

(3) Source: Swiss National Bank, Historical Time Series, http://www.snb.ch/en/iabout/stat/statpub/histz/id/statpub_histz_actual .

(4) Source: Deutsche Bundesbank, Deutsches Geld- und Bankwesen in Zahlen 1876-1975, Table C I 1.01..

(5) Source: Wirtschafts-Statistisches Jahrbuch 1930/31, Kammer für Arbeiter und Angestellte in Wien (Herausgeber)..

(6) Source: Federal Reserve Board Banking and Monetary Statistics 1914 – 1941, available at http://fraser.stlouisfed.org/publications/bms/, which provides the balance sheets of both the Issue and Banking departments of the Bank of England. In calculating the figure of £562 million, we have added the total assets of the two departments and subtracted from the total the amount of banknotes (Issue Department liabilities) included in the assets of the Banking Department.

(7) Source: Information provided to the authors by the Bank of Japan. We are very grateful to Takamasa Hisada for translating it into English.