

**THE GERMAN DEPRESSION AND THE STOCK MARKET CRASH
OF THE THIRTIES**

The Role of Macropolicies and of the International Business Cycle*

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The paper analyses the main causes of the German depression of the late 1920s and compares the developments of the German stock market with those abroad.

The economic slowdown started in Germany about one year earlier than in the U.S. and the stock market had been on a declining trend since early 1927. The main reasons of the slowdown were the fall in profit margins due to excessive real wage growth and the large German borrowing abroad. In addition a sharp drop in U.S. long term lending to Germany in late 1928 and 1929 resulted in a tightening of German monetary policy.

The 1929 U.S. slowdown only aggravated a recession that was already under way, while there is no evidence that the decline of the German stock market exerted a significant influence on economic activity.

In the second part of the paper a two equation model of German nominal income and the balance of payments is presented. Its aim is to measure the impact of domestic fiscal and monetary policy and of U.S. income on German income from 1925 to 1929.

1. Introduction

In the economic literature there are two different explanations of the origin, the causes, and the length and depth of the 1929-1933 world depression. The first one affirms that the depression had a single cause, namely, errors in carrying out monetary policy in the United States. This point of view is best represented by Friedman and Schwartz (1963). They

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argue that the origin of the depression was in the United States rather than in Europe, its causes were monetary rather than real, and that they originated from policy rather than from the nature of institutions, both national and international. According to them the strong and prolonged decline in prices and real output in the world economy is to be attributed mainly to an unprecedented decline in the quantity of money in the United States.

Meltzer (1976) also argues that the inappropriate Federal Reserve System policy in 1929–1931 was at the origin of the strong decline in the quantity of money, which induced the decline in output and prices in the United States and with a lag in the rest of the world. According to Meltzer, inappropriate monetary policy was due to the Federal Reserve System focusing on nominal interest rates and member banks borrowing as a measure of ease and tightness of policy.

Hawtrey (1947) also held the view that restrictive monetary policy in the U.S. and in the United Kingdom in 1928–1929 were at the origin of the world depression. He maintained that France's large gold acquisitions in those years had a major influence on the degree of restriction of monetary policy in the two reserve currency centres.

A second point of view¹ rejects the previous one as the dominant cause of the depression, and insists on the failure of the international monetary system to offset the events which pushed the world economy in the direction of the depression.

According to this point of view, it was not the gold standard which failed, but rather the way in which it was operated in the twenties and early thirties. It maintains that the explanation of the depth of the world depression was the inability of the United Kingdom to continue its role as underwriter to the system, which it had performed up to 1913, and the reluctance of the United States to take up that function.

The purpose of this article is that of analysing the causes of the German depression in the early thirties in the light of the above mentioned theories. The first section of this paper will analyse the domestic and external disturbances to the German economy from 1925 to 1933 with the aim of highlighting the likely effects of particular disturbances on the income level and the balance of payments. The second section presents a small model analysing the effects of domestic monetary and fiscal policy and of the international business cycle on the developments of German nominal income and the balance of payments. The main conclusion of this paper is that, although international developments were a major determinant of the German depression, monetary and exchange rate policies in Germany were also major factors determining the length and depth of the depression.

¹This point of view is best represented by Kindleberger (1973).

Table 1
Nominal and real wages in Germany
(1925=100).^a

	Nominal wage rate	Real wage rate
1925	100.0	100.0
1926	104.2	104.0
1927	113.2	108.5
1928	123.3	115.3
1929	130.8	120.4
1930	131.7	126.1
1931	120.7	125.7
1932	104.0	122.3
1933	100.8	121.2

^aSource: Hoffman: *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19. Jahrhunderts* (1965).

International developments were dominated by the inability of the United Kingdom and the unwillingness of the United States to provide counter-cyclical lending or an open market for goods. These developments affected Germany in two different ways. First, they were behind the halt of international lending to Germany in 1928–1929; second, in 1929 Germany was particularly affected by international lending developments because the authorities were unwilling to devalue the mark, owing to inflationary fears, in the presence of a large current account deficit. The German authorities reacted to balance of payments developments with a policy of monetary and fiscal deflation, which was particularly destabilizing in the second half of 1929 and in 1930. The inability of the German authorities to reflate the economy in the face of a mounting unemployment in 1930–1931 and the adoption of further deflationary measures in 1931 were the main causes of the length and depth of the depression in Germany.

2. The German economy from 1925 to 1933: A brief overview

In the second half of the twenties, the German economy was subjected to a number of structural disturbances. One of these disturbances was a substantial increase in real wages (table 1), largely as a result of internal pressures towards income redistribution. From 1925 to 1930 real wages increased by 4.6 percent a year on average. There was also a deterioration of German industry's international competitiveness. Unit labour costs in industry increased on average by 2.6 percent per year from 1925 to 1930 against a

Table 2
Government budget deficit (in percent of NNP).^a

	Government expenditures		Government revenues		Government budget deficit	
	Reich	Public sector ^b	Reich	Public sector ^b	Reich	Public sector ^b
	1925	16.4	—	17.2	—	-0.8
1926	17.5	38.5	16.1	38.0	1.4	0.4
1927	17.9	39.2	17.8	38.3	0.1	0.9
1928	19.6	43.6	18.9	41.7	0.7	1.9
1929	23.0	47.4	21.1	45.4	1.9	2.0
1930	25.9	48.0	24.9	46.6	1.0	1.4
1931	21.2	42.3	20.3	41.0	0.9	1.3
1932	17.2	38.3	16.2	37.0	1.0	1.3
1933	18.7	39.2	17.0	38.0	1.7	1.2

^aSource: Institut für Konjunkturforschung: *Konjunktur statistisches Handbuch* 1933; and Hoffman, *ibid.*

^bReich, Länder and Gemeinden.

decline of about 2 percent and 7 percent respectively in the United States and the United Kingdom.²

Despite the strong deterioration in competitiveness, the German authorities were unwilling to devalue the mark, because of inflationary fears which developed from the experience of the floating exchange rate during the hyperinflation in the early twenties. However, the German export share grew in the second half of the twenties,³ thus, despite the strong deterioration in competitiveness during this period, German industry was able to retain market shares at the cost of a large squeeze in profit margins.

The second major economic disturbance was related to the rapid increase in spending activities of local governments (table 2). The latter was due to the modification of the fiscal law of February 1924, whereby the local governments became again more independent from the Reich.⁴ This constituted a major departure from the fiscal law of March 1920, which had greatly reduced the autonomy of local governments. Not only were their tasks increased but also they were granted financial autonomy through increased sources of revenues allocated to them and the possibility of accessing the capital markets both domestically and internationally. The strong demand for capital, not only from industry, but also from the federal and local governments and the insufficiency of domestic saving made for

²Data for the United States refer to the period from 1925 to 1929, while those for the United Kingdom refer to the period from 1921 to 1931. See Sommariva and Tullio (1987, table 1.18, p. 46).

³From 1925 to 1930 the export share of Germany increased by 8.2 percentage points. The export share has been calculated as the ratio of German export of goods to the sum of exports of goods of France, Germany, Italy, the United Kingdom and the United States.

⁴See Schmolders (1970).

almost continuous tensions in the German money markets in the years under analysis.

The decision of the monetary authorities to remain with a system of fixed exchange rates made it also very difficult to control the money supply. Capital movements, particularly short term capital movements, tended to offset movements in the domestic component of the monetary base. When the Reichsbank expanded the domestic component of the monetary base by lowering its discount rate, the differential between foreign and domestic rates was reduced and capital tended to flow out. On the other hand, when it raised its rate in order to check domestic monetary expansion, the interest rate differential widened, and foreign capital tended to enter Germany partly offsetting the restrictive monetary policy, making the German economy more sensitive to foreign disturbances. Finally, war reparations were another disturbing factor which made the German balance of payments more vulnerable to foreign capital inflows and aggregated the severity of the depression.

2.1. A description of the causes of the great depression in Germany

In the second half of the twenties, the German economy experienced two downturns:⁵ one in 1925–1926 and the other one starting in 1928–1929. The causes of the first recession were domestic, while the causes of the second were mostly international. The first recession was caused mainly by the tightness of monetary policy in Germany in 1924–1925. In March 1924 the Reichsbank initiated a tight stance of monetary policy, following the rapid increase in economic activity and fears of inflation.⁶ The Reichsbank kept a maximum limit to the outstanding short term credit to the private sector at the level reached at the end of March 1924. In 1925, monetary policy continued to be tight and the monetary base increased only by about 3 percent. Real interest rates increased sharply at the end of 1925 (table 3) and the tight monetary policy was continued in 1926 (table 4). This policy led to a decline in inventory investments and a sharp fall of investment in 1926.

After the 1925–1926 recession economic activity grew at a very rapid pace until the first half of 1928. In 1928 nominal interest rates were high enough with respect to foreign markets to attract sufficient capital from abroad. German international reserves increased and the growth rate of the monetary base was limited to 11.0 percent owing to a negative contribution of the domestic component (table 4).

Although the general monetary conditions in Germany in 1928 suggest a return to stability after the disruptions of the early twenties, such a

⁵See Schmidt (1934) and Stöpler (1940).

⁶See Bresciani-Turroni (1937) and Stucken (1964).

Table 3
Nominal and real short and long term interest rates.^{a,b}

		Short ^c		Long ^d	
		Nominal	Real	Nominal	Real
1925	I	11.26	-0.31	-	-
	II	10.68	-1.30	-	-
	III	10.59	-1.39	-	-
	IV	10.29	6.1	-	-
1926	I	6.78	5.09	-	-
	II	5.77	4.18	-	-
	III	6.23	8.23	-	-
	IV	7.39	5.27	-	-
1927	I	7.28	2.51	-	-
	II	8.24	3.12	-	-
	III	8.28	4.69	-	-
	IV	9.05	4.13	-	-
1928	I	7.89	3.96	6.89	2.96
	II	8.07	5.56	7.01	4.51
	III	8.70	5.16	7.13	3.59
	IV	8.89	7.96	7.19	6.26
1929	I	7.65	3.73	7.24	3.33
	II	10.00	8.68	7.39	6.07
	III	9.74	8.89	7.44	6.59
	IV	9.35	9.42	7.54	7.61
1930	I	6.93	11.91	7.42	12.40
	II	4.96	8.74	7.04	10.82
	III	4.89	9.25	7.03	11.39
	IV	7.36	14.57	7.25	14.46
1931	I	6.41	13.81	7.16	14.56
	II	7.04	13.68	7.38	13.92
	III	9.11	17.89	8.52	17.30
	IV	9.59	17.50	-	-
1932	I	7.48	18.59	-	-
	II	6.48	18.38	9.93	21.83
	III	6.27	17.09	8.90	19.72
	IV	5.79	14.99	7.86	17.06

^aSource: Institut für Konjunkturforschung, *Konjunktur statistisches Handbuch*, 1933.

^bLast month of quarter. Real interest rates were computed as $r - \pi$, where r is nominal interest rate and π is the rate of inflation during the preceding twelve months. The rate of interest used is based on the cost of living index from the Institut für Konjunkturforschung (1933).

^cMonatsgeld.

^dRendite der 6% Wertpapiere. Data are not available before 1928.

Table 4
Domestic and external components of the monetary base
(change in percent).^a

	Monetary base ^b	Domestic component ^c	External component ^c
1925	3.4	-0.3	3.7
1926	6.2	-6.3	12.5
1927	17.8	27.3	-9.5
1928	11.0	-5.2	16.2
1929	1.4	4.0	-2.6
1930	-7.1	-5.3	-1.8
1931	0.4	28.9	-28.5
1932	-25.1	-21.2	-3.9
1933	4.8	3.7	-8.9
1934	11.9	21.3	-9.4

^aSource: Deutsche Bundesbank, *Deutsches Geld und Bankwesen in Zahlen 1876-1975* (1976).

^bDefined as the sum of international reserves held by the Reichsbank (IR), Reichsbank advances to banks and the private sector (A), and claims on the government sector (MF).

^cContributions to the growth of the monetary base, in percent; calculated as absolute change in the components as percent of the monetary base at the end of the previous years.

conclusion would be premature. At the end of 1928, the German economy was still not able to finance the increased Federal and local government budget deficits and the war reparation payments without a further large inflow of funds from abroad.

The halt of capital inflows from abroad at the end of 1928 and especially in 1929 together with the higher interest rates needed to protect the balance of payments led to a substantial decline in aggregate domestic demand and in economic activity during 1929. The halting of capital inflows and the increased degree of restrictiveness of monetary policy resulting from it occurred at a time when domestic demand and especially consumption were already declining at a moderate pace, since the peak of the business cycle which had occurred in the first half of 1928. The beginning of the depression in 1929 can therefore be attributed to the halting of the capital inflows. In 1929, long term capital inflows into Germany totaled only 0.3 billion Reichsmark, compared to 1.4 billion Reichsmark in 1928 (table 5). Total capital inflows, including errors and omissions, declined to 2.3 billion Reichsmark from about 4.1 billion in 1928. German long term borrowing in New York had already declined drastically in the second half of 1928 and declined again substantially in 1929. Since the United States had become one of the major international financial markets after the first world war, conditions prevailing in that market were of dominant importance, particularly for Germany.

Apparently in 1928 and 1929 there was a shift in the demand for money in

Table 5
Capital movements (in billion of RM).^a

	Long term capital movements		Short term capital movements	
	Total	Government	Total	Banks
1925	1.1	1.1	0.1	-
1926	1.5	1.4	0.2	-
1927	1.4	1.3	1.8	1.8
1928	1.4	1.3	1.3	1.2
1929	0.3	0.3	0.8	0.5
1930	1.1	1.1	0.1	-0.4
1931	0.4	0.3	0.5	-0.2
1932	0.1	-	-0.8	-0.2
1933	-	-	-0.7	-

^aSource: Deutsche Bundesbank, *Deutsches Geld und Bankwesen in Zahlen 1976-1975* (1976).

the United States, owing to the boom in the stock market. Field (1984) argues that the increase in the volume of asset exchange associated with the speculation in the stock market raised the transaction demand for money in the United States. Using monthly data over the period 1919-1929 he finds that the level of trading on the New York stock market had significant effects on the demand for narrow money, holding income and interest rates constant. Thus, according to Field, the inability of the Federal Reserve System to recognize the effects of stock exchange transactions on the demand for narrow money and the contractionary policy resulting from it, was an important factor in precipitating the depression in the United States. As Meltzer (1976) has pointed out, the Federal Reserve System focused on nominal interest rates and member banks borrowing in setting its monetary policy, ignoring the distinction between nominal and real interest rates. Thus falling nominal interest rates after the stock market crash of 1929 were misinterpreted as evidence of ease, while they actually reflected deflationary expectations. These developments were important in determining a halt of net U.S. capital outflows and thus triggering the recession in Germany. Moreover, the restrictive U.S. monetary policy led to a sudden collapse of business, commodity prices and imports in the United States in the second half of 1929.

The speculation in the U.S. stock market has been mentioned before as a factor contributing to the increased demand for money in the U.S. and hence to a greater degree of restrictiveness of U.S. monetary policy in 1929. Apart from this indirect effect, the behaviour of the stock market has not been a major factor contributing to the great depression either in the United States, or in Germany. The October 29 Wall Street crash is often wrongly considered as the beginning of the great depression in the United States and even more wrongly as the cause of the great world depression.

Table 6
Leads and lags of stock market index with respect to the business cycle.^a

	Peak of industrial shares index	Peak of business cycle	Percentage drop in index from peak to June 1931
Germany	April 1927	1st-3rd quarter 1928	-61.7
U.S.	September 1929	3rd quarter 1929	-59.7
U.K.	January 1929	1st quarter 1930	-45.0
France	February 1929	2nd quarter 1930	-55.7

^aSource: Société des Nations, *La situation économique mondiale 1931-32*, Genève, 1932 *Le Cours et les phases de la dépression économique mondiale*, Genève, 1931.

The wealth effect resulting from the crash probably had some negative effects on private consumption in both countries and the increase in the cost of equity capital some negative effects on investment; the crash also increased uncertainty, but overall the stock market index was an endogenous variable determined by the interaction of monetary and real factors and expectations thereof.

The analysis of the behaviour of the stock market in the U.S. and Germany can contribute, however, to the understanding of the causes and dynamics of the depression. Four main questions will be addressed. First, did the stock market crash precede or follow the beginning of the depression? Second, what were the main proximate determinants of the crash? Is there evidence that private consumption was affected negatively by the crash, and fourth, how did banking shares behave in relation to industrial shares in the course of the depression?

Table 6 contains the dates of the peak of the industrial share index and the business cycles in Germany, the U.S., the U.K. and France. The League of Nations (1932), from which table 6 is drawn maintains that the business cycle in Germany peaked in the first quarter of 1928. In that quarter unemployment reached its lowest level and the production of consumer goods its highest. However total industrial production peaked in the third quarter of the year and was unchanged for the average of 1928 with respect to 1927. The growth of NNP slowed down to 1.7 percent. Therefore some caution is necessary in placing the beginning of the depression in Germany in one specific quarter.

In Germany the stock market peaked in April 1927 and preceded by about a year the peak of the business cycle as indicated by the League of Nations. In the U.S. instead, it lagged by about one quarter the peak of the business cycle. In the U.K. and France the stock index, like in Germany, peaked about one year before. The table suggests that one cannot establish a clear order of precedence between the behaviour of the share index and the

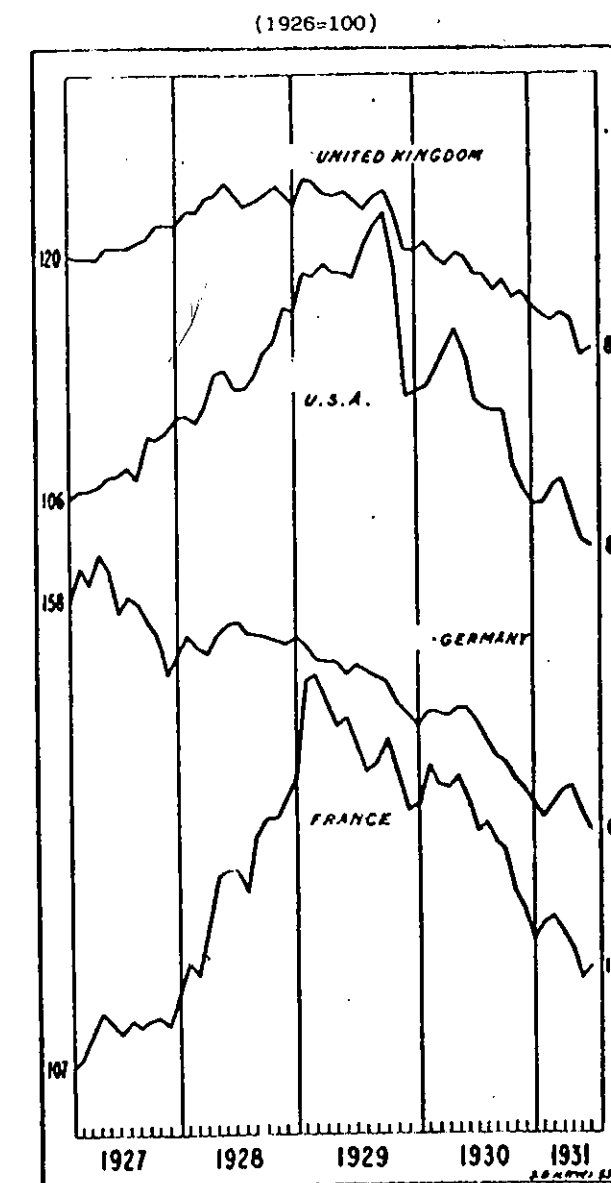
business cycle and casts doubts on the hypothesis of a causal link going from the crash to the depression.

Fig. 1 shows the development of the industrial share index in the four countries considered from 1927 to June 1931. In the United States and France there is evidence of a speculative bubble that led to a sharper drop when it burst, compared to Germany and the United Kingdom where there is less evidence of such a bubble. Another interesting aspect of the figure is that the short run synchronization of stock markets was not very high at the time.

The proximate determinants of the reversal of the industrial share index in Germany in April 1927 were the worsening current account position of the country and the loss of international reserves coupled with the expectation of a tightening of monetary policy. International reserves fell by about 300 million Reichsmarks in the first quarter of 1927 and about 200 in the second. The almost complete halt of capital inflows in the first half of 1927 was the result of a quite expansionary monetary policy and of the decision taken on December 4, 1926, to suspend the exemption of German issues of bonds placed abroad from the capital income tax. In the second half of the year interest rates were raised and the reserve outflow was partly reserved. Despite the change in monetary policy towards a more restrictive stance, real NNP grew, for the year as a whole, by 13.9 percent, real private consumption by 13.6 percent and net investment more than doubled. As a result the current account of the balance of payments recorded a deficit of 2.7 billion Reichsmarks as opposed to a surplus of 1.2 billion in 1926. Hence the proximate cause of the reversal in the stock market had more to do with the overheating of the economy facing an external constraint than with fears of an impending depression.

The third point to be discussed is the importance of a negative wealth effect arising from the drop in share prices. The growth of real private consumption slowed down considerably from 13.6 percent in 1927, to 1.4 percent in 1928, despite a 4.3 percent increase in real wages in 1927 and a 6.3 percent increase in 1928. After deflation with the consumer price index the industrial share index fell in 1928 by only 10 percent. This fall may have had an effect on private consumption, but it is likely that it was rather modest, for two reasons. First a 10 percent drop in a volatile component of wealth is not large by any standard and second because stock market wealth was probably more concentrated than today. It seems rather that the increase in unemployment in the course of the year and the uncertainty caused by labour unrest at the end of 1928 played a more significant role in discouraging consumption.

An interesting aspect of the depression in both Germany and the United States was the severity with which banks were hit. This had partly to do with the severity of the depression itself in these two countries compared for



Source: *Bulletin mensuel de Statistique de la Société des Nations*.

Fig. 1. Price index of industrial shares, 1927-1931.

Table 7
Ratio of index of bank shares to index of industrial shares (1929=100).^a

		Germany	U.S.	U.K. ^b	France
June	1930	102	87	123	105
June	1931	124	81	159	118
June	1932	97	78	182	107
June	1933	66	50	152	108
December	1933	n.a.	35	148	116

^aSource: Société des Nations, *Les banques commerciales, 1925-33*, Geneva, 1934.

^bBanks and discount companies.

instance to France and the United Kingdom,⁷ and partly with the greater role the banking crisis played in the propagation of the depression. The universal bank in Germany and local branch banking in the U.S. may have contributed to the greater vulnerability of banks. Table 7 shows the ratio of the index of bank shares to the index of industrial shares in the four countries considered. From 1929 to June 1933 the ratio fell by 33 percent in Germany, 50 percent in the U.S., while in the U.K. and France it increased by 52 and 8 percent, respectively.

2.2. *The factors influencing the length and depth of the depression*

The almost simultaneous reduction of imports and lending of the United States was exactly the opposite of what happened in the U.K. during the pre-1914 gold standard.⁸ During the pre-1914 gold standard, U.K. domestic economic activity and foreign lending generally moved in the opposite direction. Declining economic activity stimulated U.K. foreign lending while expanding economic activity was accompanied by declining U.K. foreign lending and higher imports which provided an export stimulus abroad. In this way countercyclical lending stabilized the international system. In 1929 the U.S. economy failed to provide such countercyclical lending. Furthermore, the U.S. restricted the access to its goods market by introducing trade

⁷The index of industrial production fell much less in France and the United Kingdom;

	1925-29	Lowest quarter	March 1934
Germany	100	48	68
U.S.	100	33	55
U.K.	100	85	99
France	100	99	80

⁸See O. Morganstern (1959).

restrictions in 1930 (Smoot-Hawley Tariff Bill), following the further strong decline in economic activity.

The German economy was severely hit by these developments because of the need of financing a large current account deficit and war reparations. The contractionary effect of the fall in foreign lending was not offset by an increase in exports and a tendency of the current account deficit to widen appeared in Germany. In order to restore the external balance the German authorities were then faced with the alternative of either departing from the gold standard and the fixed exchange rate system and maintaining full employment, or deflating their economy; fears of inflation led the monetary authorities to follow the second alternative. Nominal short term interest rates were raised sharply in the second quarter of 1929. Real short term interest rates reached 9.4 percent in the last quarter of 1929 and 14.6 percent in the last quarter of 1930. They remained between 13.7 percent and 18.6 percent until the end of 1932. Nominal and real short term interest rates in Germany remained substantially higher than in the U.S. from 1929 to 1932. The uncertainty over the political situation in Germany and fears that the collapse of the Kredit Anstalt in Vienna would influence the stability of German banks reduced considerably the sensitivity of foreign capital to interest rates differentials.

The international downturn of the business cycle in 1930 was followed by further deflationary policies in Germany. Such policies arose out of fear of inflation and German obligations under the Young Plan.⁹ In 1930 the German government initiated a policy of balancing the budget. Taxes on income, turn-over and beer were raised, while new taxes were imposed on unmarried persons, warehouses and mineral water. Expenditures were also substantially reduced. Following these developments and the severe downturn of the international business cycle,¹⁰ German industrial production declined by 17.8 in 1930, by 22.1 percent in 1931 and by 11.3 percent in 1932. Real NNP declined substantially in those years with the largest drop recorded in 1931 (11 percent). The unemployment rate rose from 5.8 percent in the fourth quarter of 1929 to 17.6 percent in the fourth quarter of 1932.

In 1931 other external shocks produced further deflationary effects on the German economy: first, the depreciation of sterling and the consequent response of the gold block and, second, the introduction of higher tariffs on imports elsewhere. At the end of 1932 the pound was almost 30 percent lower vis-à-vis the Reichsmark, compared to the end of 1930. The appreciation of the mark with respect to sterling also involved an appreciation of the mark against those currencies which had followed sterling off the gold standard. This included the Swedish and the Danish Krona, the currencies of two countries which were particularly important for German foreign trade.

⁹See K.E. Born (1967).

¹⁰See B. Ohlin (1931).

In the months from October 1931 to March 1932, the U.K., Denmark, Sweden, the Netherlands, France, Belgium and Switzerland applied across-the-board tariffs and imposed quotas, and, in the case of Switzerland, a trade agreement with Germany was repelled. At that time, there were suggestions in Germany for devaluation and credit expansion which, however, were rejected out of hand by the German government.¹¹

In May 1932, the Brüning government fell. His successor, Von Papen, adopted expansionary monetary and fiscal policies. They included provisions to pay for public works with tax certificates that could be used by companies to pay taxes to the Reich in the years 1934–38, when they would have been paid out by planned budget surpluses. These certificates were negotiables and eligible for discount at the Reichsbank. In addition to these certificates, the government undertook public works on the basis of bills issued to government organizations and also eligible for rediscount at the Reichsbank. In June and July 1932 war reparations were cancelled de facto at the Lausanne Conference, removing one of the factors that had been at the origin of the crisis in 1929.¹² During the course of 1933 and 1934, the monetary base increased by about 5 and 12 percent respectively after having declined by 7.6 percent on average in the period 1929–1932. Real interest rates declined sharply in 1933. In 1933, Germany started to recover from the depression.

Industrial production which had already increased in the first quarter, rose by 16.6 percent in 1933 as a whole and NNP by 13.4 percent.

This brief description of economic events in the second half of the twenties and early thirties suggests that, although the origin of the depression in Germany was the halt in international lending in 1928–1929 and the drop in U.S. output in 1929–1930, there were several factors aggravating the impact of the U.S. recession on German output. These were the high real wages at the start of the U.S. recession, the imbalance between domestic saving and investment, and the ensuing large current account deficits, the general government budget deficit and war reparations. Instead, the German industrial share index, which started falling at a moderate pace in 1927, did not play an important role in aggravating the depression.

The description of subsequent events seems to indicate that the inability of the German authorities to reflate the economy and eventually to depart from the gold standard and the fixed exchange rate regime, and thus the lack of adequate monetary, fiscal and exchange rate policies was the major factor behind the severity of the recession. The next section of this paper will try to determine through more analytical methods the relative importance of

¹¹There were several economists who recommended the adoption of expansionary policies at the end of 1931. The more representative among them was W. Lautenbach, whose ideas were adopted later on by the Von Papen government. See Lautenbach (1952).

¹²See H. Schacht (1931).

monetary policy, fiscal policy and the U.S. business cycle in influencing the depression in Germany.

3. Effects of monetary and fiscal policy on the level of nominal income

This section analyses by means of simple regression techniques the relative importance of monetary policy, fiscal policy and of the international business cycle in the determination of the depression in Germany in the early thirties. The analysis is carried out by estimating a three equation model of income, money and international reserves. The equilibrium level of income is determined by combining the traditional IS-LM curves. The level of nominal income is then determined by the money stock, proxied here by currency in circulation, government expenditures, and foreign income:

$$\hat{Y} = \gamma_1 BU^{\beta_1} G^{\beta_2} Y_{us}^{\beta_3}, \quad (1a)$$

where BU is currency in circulation, G government expenditures and Y_{us} the level of U.S. nominal income.

Currency in circulation is defined as the sum of international reserves and the domestic counterpart of currency in circulation:

$$BU = IR + BUD, \quad (3)$$

where IR are international reserves and BUD the domestic counterpart of currency in circulation. This last one is assumed initially to be exogenous and under the control of the monetary authorities. International reserves are assumed to be determined by a demand function of the following type:

$$IR = \gamma_2 Y^{\beta_4} e^{-\beta_5 mr} e^{\beta_6 \sigma_{IR}}, \quad (2a)$$

where σ_{IR} is a measure of variability of international reserves and mr is the import-income ratio. The introduction of a measure of international reserves variability, provided by the variance of four quarterly deviations of IR from its trend, is justified by the role of international reserves as a buffer stock to accommodate fluctuations in international payments and receipts. The expected sign of mr is negative, implying that the cost of not having reserves, and hence the demand for reserves, is inversely related to the marginal propensity to import. The rationale for the negative relationships between the demand for international reserves and the marginal propensity to import is related to the fact that it costs less in terms of forgone output to balance the external account in the face of a decline in international receipts when the marginal propensity to import is high.

Eqs. (1a) and (2a) can be estimated simultaneously to measure the relative importance of monetary and fiscal policies in determining the level of

Table 8

A model of money and nominal income.^a

1. Nominal income
 $D \ln Y = \alpha_1 \ln(\hat{Y}/Y)$ (1)
 $\hat{Y} = \gamma_1 BU^{\beta_1} G^{\beta_2} Y_{t-1}^{\beta_3}$ (1a)
2. International reserves
 $D \ln IR = \alpha_2 \ln(\hat{IR}/IR)$ (2)
 $IR = \gamma_2 Y^{\beta_4} e^{-\beta_5 MR} e^{\beta_6 \sigma_{1R}}$ (2a)
3. Currency in circulation
 $BU = BUD + IR$ (3)

^aAdjustment parameters are denoted by α_i , structural parameters by β and other parameters by γ_i . A circumflex above a variable indicates a desired or partial equilibrium quantity.

nominal income. However, eqs. (1a) and (2a) assume that the economy is always on its long run equilibrium path. In order to allow short run deviations from the long run equilibrium, a disequilibrium system is introduced.

$$D \ln Y = \alpha_1 \ln(\hat{Y}/Y) \quad (1)$$

$$D \ln IR = \alpha_2 \ln(\hat{IR}/IR) \quad (2)$$

where \hat{Y}_t and \hat{IR}_t denote respectively the partial equilibrium level of income and the desired level of international reserves described by eqs. (1a) and (2a).

Eqs. (1) to (3) are summarized in table 8. The model has been estimated simultaneously by using a full information maximum likelihood estimator.¹³ A full information maximum likelihood estimator is perhaps the most satisfactory since it enables non-linear within and across equations restrictions to be imposed on the system. The equations were estimated for the period 1925–1932, using quarterly data. The estimates of the parameters of the model are presented in table 9. Estimates of the adjustment parameters indicate that the authorities were relatively fast in adjusting the level of reserves to their desired level. The α_2 parameter implies a mean adjustment lag of about 1 quarter. The private sector adjusted with similar lags to the disequilibrium between the actual and the partial equilibrium level of income. All the parameters of the demand for international reserves turn out to be significantly different from zero and with the correct signs with the exception of the import–output ratio. However, the variable which should be intro-

¹³The iterative procedure is Newton–Raphson followed by quasi-Newton once the gradient is small or the likelihood is almost stationary.

Table 9

Empirical estimates of the model (1st quarter 1925–4th quarter 1932).

Estimated parameters	Asymptotic standard errors	Mean adjustment lags (in quarters)
α_1	0.967	0.391
α_2	0.962	0.199
β_1	0.480	0.261
β_2	0.012	0.167
β_3	0.673	0.104
β_4	0.763	0.217
β_5	2.242	1.961
β_6	0.776	0.079
Chi-square value of the log-likelihood ratio	50.212 ^a	
Carter–Nagar chi-square of the over-identified model	95.303 ^b	
Carter–Nagar R^2 of the over-identified model	0.606	

^aThe approximate critical value of chi-square distribution with 10 degrees of freedom at 1 percent level is 23.2, so that the hypothesis that the overidentifying restrictions are consistent with the sample must be rejected.

^bThe approximate critical value of chi-square distribution with 10 degrees of freedom at 1 percent level is 33.4, so that the hypothesis that the model is not consistent with the data must be rejected.

duced in the demand for international reserves in the marginal propensity to import rather than the average propensity to import, as used in the present estimates. The coefficient of the average propensity to import appears with the wrong sign in several other estimates of demand for international reserves. Using an adjustment mechanism, which emphasizes the role of relative prices, the price level and the demand for money, Frenkel (1974) has shown that under certain conditions the demand for reserves is positively associated with the average propensity to import. Several authors argue that the average propensity to import should not be used as proxy for the cost of output adjustment but rather as a proxy for the openness of the economy, thus measuring the extent to which an economy is vulnerable to external disruption and explaining the positive relationships with the demand for reserves. However, the absence of data on the marginal propensity to import meant that the average propensity to import had to be used in the present estimates.

Table 10
Ex post root mean squares errors of
forecast (in percent).

	Root mean squares errors
ln <i>Y</i>	0.663
ln <i>IR</i>	0.487
ln <i>BU</i>	0.219

Table 11
Stability analysis.

Eigenvalues Real part	Standard errors Real part
-1.247	0.325
-0.667	0.181
-0.072	0.013

Estimates of eq. (1) indicate that the monetary policy variable significantly affected the level of nominal income while government expenditures did not. According to present estimates a change of 1 percent in currency in circulation would have induced a change of about 0.5 percent in the level of nominal income. The estimated elasticity of domestic income with respect to foreign income is about 0.7 and significantly different from zero. The estimates of the parameter of currency in circulation in eq. (1) indicate that countercyclical monetary policy could have more than compensated the negative effect of the downfall in the international business cycle in the same quarter. As already remarked in section 2, the unwillingness of the authorities to implement countercyclical policies was a major determinant of the long and severe recession in Germany in the early thirties. But a more expansionary monetary policy would have required flexible exchange rates.

The chi-square statistics of the log-likelihood ratio indicates that the hypothesis that the overidentifying restrictions are consistent with the data must be rejected. However, it has to be noted that the chi-square statistic of the log-likelihood ratio is an asymptotic test and that it is biased toward rejection in small samples. The Carter-Nagar system R^2 and the Carter-Nagar chi-square statistic of the over-identified model, indicate that the model is consistent with the data. The ex post root mean square errors (RMSE) of the static forecast are presented in table 10. Since all the variables are in logarithms, the RMSE gives the average errors as a proportion of the observed levels of the variables. The RMSE of the static forecast is about 0.7 percent for nominal income, 0.5 percent for international reserves and about 0.2 percent for currency in circulation. The estimated model is dynamically stable as all the real parts of the eigenvalues are negative (table 11).

One problem which has so far been neglected is whether the authorities in Germany actively used monetary policy in order to achieve a desired level of international reserves or at least prevent reserves from falling further below the desired level. The review of economic and policy developments in section 2 seems to indicate that the monetary authorities in Germany were constrained by the war reparations and the fixity of exchange rates and that they actively changed the domestic counterpart of currency in circulation to try to prevent further falls in reserves. One simple way to test this hypothesis is to make the counterpart of currency in circulation endogenous and test whether its changes were determined by the gap between desired and actual international reserves:

$$D \ln BUD_t = \gamma_3 (IR/\widehat{IR}), \quad (4)$$

where \widehat{IR} is the level of desired international reserves as defined by eq. (2a).

Eq. (4) has been added to the model described in table 8. The model has been estimated again by using a full information maximum likelihood estimator. Estimates of the parameters of the extend model are presented in table 12. The estimate of parameters α_1 turns out to be similar to that of table 9 while the estimate of parameter α_2 is much smaller. It implies a mean time lag of about 1.5 quarters.

The parameter γ_3 turns out to be about 0.15 and significantly different from zero, implying that 15 percent of the discrepancy between actual and desired reserves was reflected on the domestic counterpart of currency in circulation within the same quarter. The other estimated parameters in eq. (1a) turn out to be similar to the ones in table 9 and indicate that monetary policy was a significant variable in determining nominal income, while government expenditures were not.

The chi-square statistic of the log-likelihood ratio indicates that the hypothesis that the overidentifying restrictions are consistent with the data must be rejected while the Carter-Nagar statistics indicate again the model is consistent with the data. The ex post root mean square errors (RMSE) for the static forecast are very similar to those presented in table 10 and are in general very low. The estimated model is dynamically stable as all the real parts of the eigenvalues are negative.

Important information about the dynamics of the system is given by the effects of parameter changes on the stability of the system. The sensitivity of real eigenvalues with respect to parameter changes is presented in table 13. The derivatives of the eigenvalues with respect to parameter γ_3 indicate that small changes in this parameter have important effects on the overall stability of the system. An increase in the parameters β_1 and β_4 also tend to make the system more unstable reducing the real parts of the second eigenvalue.

Table 12

Empirical estimates of the model (1st quarter 1925-4th quarter 1932).

Estimated parameters		Asymptotic standard errors	Mean adjustment lags (in quarters)
α_1	0.971	0.385	1.030
α_2	0.698	0.148	1.433
γ_3	0.149	0.074	
β_1	0.515	0.238	
β_2	-0.003	0.166	
β_3	0.671	0.103	
β_4	0.451	0.204	
β_5	0.367	1.056	
β_6	0.804	0.073	
Chi-square value of the log-likelihood ratio		52.422 ^a	
Carter-Nagar chi-square of the over-identified model		158.772 ^b	
Carter-Nagar R^2 of the over-identified model		0.631	

^aThe approximate critical value of chi-square distribution with 15 degrees of freedom at 1 percent level is 30.6, so that the hypothesis that the overidentifying restrictions are consistent with the sample must be rejected.

^bThe approximate critical value of chi-square distribution with 12 degrees of freedom at 1 percent level is 26.2, so that the hypothesis that the model is not consistent with the data must be rejected.

Table 13

Sensitivity analysis with respect to the parameters of the system.^a

Parameters	Real	Eigenvalues	
		real	Real
α_1	0.971	-1.021	-0.637
α_2	0.698	-0.895	-0.106
γ_3	0.148	-0.275	-0.729
β_1	0.515	-0.386	-0.376
β_2	0.451	-0.083	0.105
β_4	0.451	-0.094	0.119

^aA positive sign indicates that an increase in the parameter would tend to make the real part less negative and the system less stable.

The estimates presented in tables 9 and 12 indicate that the gap between the desired and actual level of international reserves was a major factor in the determination of monetary policy in Germany in the period under analysis. They also indicate that, although the system was stable, a higher elasticity of the domestic counterpart of currency in circulation to the gap between actual and desired international reserves would have made the system dynamically unstable. Finally, they also support the hypothesis that the inability or unwillingness of the authorities in Germany to adopt a more steady monetary policy and to change the exchange rate regime were major determinants of the length and depth of the depression in Germany in the early thirties.

4. Conclusions

Going back to the original question of what produced the German depression in 1929, this paper has provided some evidence about the important role of international lending and the subsequent fall in U.S. output. The inability or the unwillingness of the United Kingdom and the United States to provide countercyclical lending and open markets for goods was a very significant factor in starting the recession in Germany and turning it into a major depression. The monetary policy responses of the German authorities to these developments were other main factors behind the depth and length of the depression in Germany, as shown by the historical account of section 2 and the empirical tests in section 3.

Although making historical comparisons can be misleading, the experience of the 1930s has some relevance for today's developments. On the one hand, in the early eighties, the increasing U.S. budget deficits and the monetary policy adopted there threatened the ability of the United States to provide countercyclical lending in case a world recession should occur and have increased the danger of protectionism. On the other hand, it is not yet clear that the European Economic Community will be able to provide the necessary leadership, should the United States be unable to provide it.

There are important exceptions to the free entry of goods in the European market, particularly in agriculture, in textiles, iron and steel and in other sectors. In addition there is still a long way to go before the European Community, as a block, could appropriately stabilize the international flows of capital countercyclically, notably because of the lack of monetary integration in Europe and of a common capital market. Extrapolation of the future course of events is very difficult. However, the experience of the 1930s indicates that a possible outcome in which the United States is unable to provide the leadership to the world economy and the European Community is unwilling or not yet able to do it is certainly not desirable.

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