*A Note on Interest Rate Policy during the Great Depression**

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1 Introduction

This note presents some analyses of interest rate policy in Europe and the United States during the Great Depression from 1929 to 1938. The main purpose of the paper is 1) to evaluate the discretionary nature of interest rates during that time, 2) to present evidence on the real interest rate shocks and 3) to discuss the consequences of interest rate policy for the Great Depression.

The literature has thus far paid rather little attention to the role of interest rates in the Great Depression (see e.g. Berstein (1987), Brunner (1981), Kindleberger (1987) and Saint-Etienne (1984)). This is somewhat surprising because monetary factors have been analyzed quite extensively and, moreover, the effects of deflation have generally been emphasized (see e.g. Friedman and Schwartz (1963)). The Friedman and Schwartz view, which has gained wide acceptance, emphasizes the role of a rapid fall in the supply of money in worsening the general economic contraction. The fact that reductions in money supply in this period seem quantitatively insufficient to explain the subsequent fall in output has provoked other ways of explaining the severity of the Great Depression. Also, the international linkages in the propagation mechanism of the Great Depression cannot he explained very well in the framework of Friedman and Schwartz (see

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e.g. Temin (1976) and Fremling (1985)). Quite recently, much attention has been paid to Bernanke's (1983) explanation, which stresses the financial crisis in the form of debtor bankruptcies and failures of banks and other lenders in the propagation of the depression.

Still, there is surely a case for discussing only interest rate policy. Although interest rates decreased considerably after 1929 and although the real interest rates shocks were mainly caused by precipitous deflation, there was still some room for interest rate policy. How much room there was is difficult to say because we know relatively little about determinants of interest rates — both short and long rates — in this period. It is even unclear to what extent market interest rates were determined by discretionary policy actions. Even less is known about how interest rates affected various demand components and how interest rates (directly and indirectly) affected prices and wages.

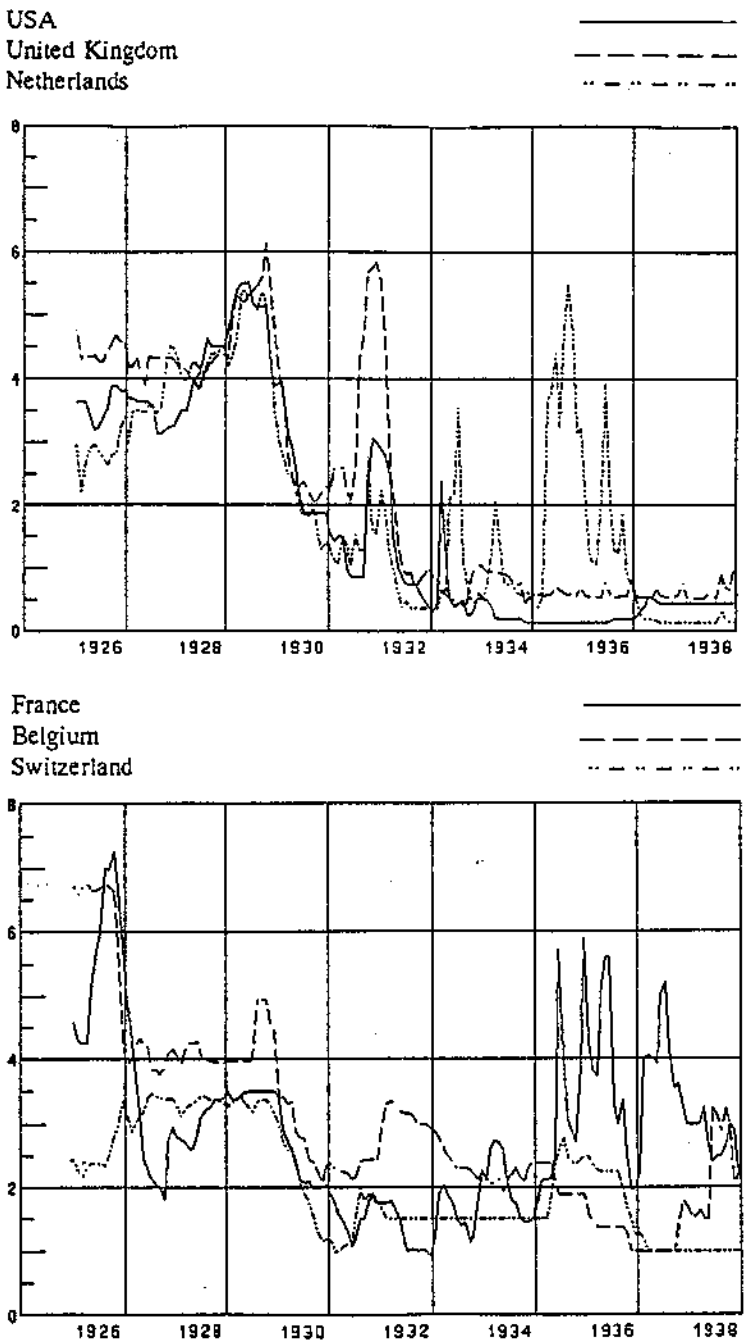
Even though we are not able to give affirmative answers to all of these questions, we present some information below which suggests that interest rate policy might have been of crucial importance in deepening the depression and delaying the recovery.

2. Some Stylized Facts

This study makes use of monthly data from six countries: Belgium, France, the Netherlands, Switzerland, the United Kingdom and the United States. The data cover the period 1926-1938 three interest rate series are scrutinized: the private discount rate (rs) the central bank discount rate (rd) and the government bond yield (rb). [1]

[1] To be more precise, for the UK and the USA rs = interest rate on banker's acceptances (3 months). For the USA rd = Federal Reserve Bank discount rate in New York. All interest rates are expressed as annual percentages and as a rule they represent averages of daily or weekly rates. The data are derived from the following sources: rs and rd from Banking and Monetary Statistics, the Federal Reserve System, Washington D.C., 1943, and rb from the Statistical Yearbook of the League of Nations, Geneva

Figure 1. **Short-term interest rates**



The price level is measured by the wholesale price index; the rest of the data are described in footnote 4 below.

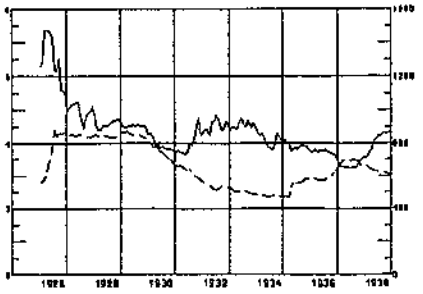
We can get some idea of the basic trends in the data by taking a look at Figure 1, which contains the graphs of the short-term rates (rs) for these six countries. Though there are some slight differences between countries, the basic trends are very similar: the timing of changes is about the same and the degree of contemporaneous correlation is rather high (see the correlation coefficients presented in Table 5). Market rates were about 4 per cent until 1930, then fell to about 1 per cent and stayed at that level until the end of the sample period.

In 1931, following the financial crisis in Europe and the collapse of the gold standard (and the devaluation of the pound and several other currencies), interest rates experienced a short, but in some cases sharp, rise. In March 1933, a similar episode was experienced in the United States as a result of the banking crisis but after that short-term U.S. rates settled down at a very low level until the end of the 1930s (in fact, until the early 1950s; see e.g. Homer and Sylla (1993) for details). UK rates behaved very much according to U.S. rates but the gold bloc countries' experience was somewhat different, particularly towards the end of the 1930s. Thus, short rates in these countries were rather volatile, particularly in 1935-1936 (see, for instance, the Dutch and French short rates). After September/October 1936 when the gold standard *de facto* ceased to exist interest rates also came down in the gold bloc countries. France constitutes, however, some sort of exception here. The situation did not stabilize before the free float in June 1937 and even after that interest rates failed to settle down in the same way as in other countries. This, in turn, can be explained by the failure of French governments to stabilize the economy (cf., for instance, the relatively high inflation rates shown in Table 1 and in Figure 2).

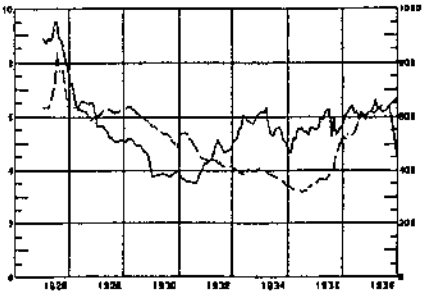
1927 to 1939. Notice that the Federal Reserve banks discount rates were not the same for this period. The rates of the New York Federal Reserve Bank were, in fact, considerably lower than the rates charged by other banks (see Table 115 in the Banking and Monetary Statistics for details).

Figure 2. **Government bond yields (____) and the price level (----)[1]**

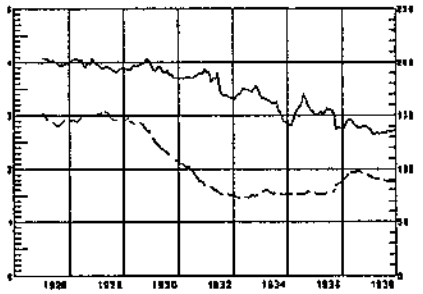
Belgium



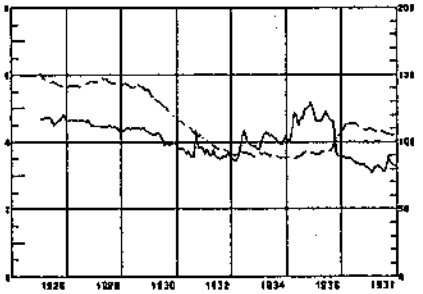
France



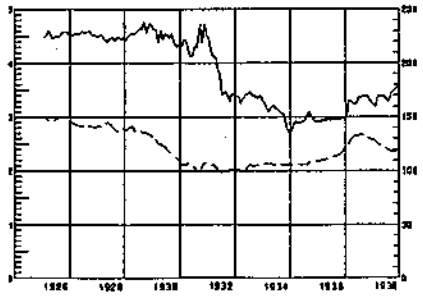
Netherlands



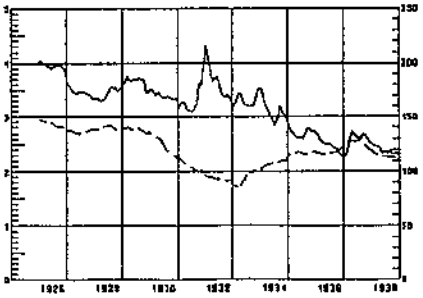
Switzerland



United Kingdom



USA



[1] The yields are measured on the left scale, the price level on the right scale

TABLE 1

WHOLESALE PRICE INDEX (SEP. 1929 = 100)

Country	lowest level of index	corresponding period	price level in Dec. 1938
Belgium	55	Nov. 1934	72
France	52	Sep. 1935	112
Netherlands	50	Apr. 1934	62
Switzerland	61	Mar. 1935	75
U.K.	80	Mar. 1933	94
U.S.A.	61	Mar. 1933	79

As far as the long-term interest rates are concerned, their behaviour is quite different from the short rates (see Figure 2). The long rates did not fall to one or half a per cent as the short rates did towards the end of the 1930s. On the contrary, the long rates stayed persistently at the level of 3-4 per cent over the whole of the 1930s. It is somewhat surprising to notice that the long rates showed very little sensitivity with respect to inflation. In fact, one cannot really establish a positive relationship between long-term interest rates and the actual inflation rate.

Not surprisingly, real interest rates became very high (and volatile). In the late 1920s, this was mainly due to relatively high nominal rates but after 1929 this was mainly due to deflation (see the numbers in Table 2) [2]. Towards the end of the 1930s real rates started to decrease and even became negative because of very low nominal rates and raising prices. The crucial question is, however, why deflation was so severe and why nominal rates failed to decrease in 1929-1932.

[2] The Belgian value for the first period clearly deviates from the general pattern. The explanation is the very rapid inflation which took place in 1926. Except for this year, the Belgian experience is similar to other sample countries. (For more details of the Belgian pre-Depression episode, see Aldcroft (1987)).

TABLE 2

SAMPLE AVERAGES OF EX-POST REAL INTEREST RATES (RS-P)

Country	Feb. 1926-Sep. 1929	Oct. 1929-Dec. 1932	Jan. 1933-Dec. 1938
Belgium	-6.59	17.74	-0.60
France	5.40	13.20	-5.10
Netherlands	5.72	20.95	-1.16
Switzerland	5.01	15.05	-0.73
U.K.	7.46	12.00	-2.05
U.S.A.	5.95	14.77	-3.17

As far as prices are concerned, the interesting question is whether we can blame monetary shocks or (real) demand and/or supply shocks for the deflationary spiral. As mentioned above, the monetarist tradition (see, in particular, Hamilton (1987)) emphasizes the direct link between the monetary squeeze and the fall in prices. Empirical evidence of this kind of link is not, however, very convincing. Unfortunately, the alternative theories (see e.g. Temin (1976) for details) also have problems with the data and we cannot really identify the propagation mechanism of deflation during the Great Depression.

As regards the reasons behind deflation we have to ask why nominal rates did not fall rapidly during this period and why, instead, they increased in 1931. In addition, we could also ask why nominal rates did not respond to relatively rapid inflation after 1935. As far as the first question is concerned, we must, of course, remember that nominal rates cannot decrease without limit.[3] Thus, in general, they cannot become negative — provided that there are money balances which earn a zero interest rate in nominal terms. But in this case, and particularly for the

[3] It is true that there existed some negative bond yields in the United States during the Great Depression period. These perverse observations can be explained by the «exchange privilege» premium, which, in turn, resulted from the Treasury's floating procedure; see Cecchetti (1988) for details.

period 1929-1932, there was really no question of negative or zero interest rates. This can be seen from Figures 1 and 2. The figure for the long rates (i.e. Figure 2) is especially revealing. Although prices fell more than 10 per cent per year the long rates even increased!

First, we have to assess the interest rate (discount rate) policy of central banks during these years. It is noteworthy that discount rates were kept above short-term market rates for most of the time. (This can be seen, for instance, from Table 3, which contains data on the minimum values of various interest rates during the whole sample period 1926-1938). And in 1931, discount rates were increased to a record high level to rescue the gold standard and the existing exchange rates. Thus, the decision of the Bank of England to raise the discount rate from 2.5 to 4.5 per cent before going off gold in September (and to 6 per cent after that) and the Federal Reserve's discount rate rise from 1.5 to 3.5 per cent in October should be mentioned. Had discount rate policy placed greater emphasis on domestic demand considerations, this would surely have produced lower market rates and — as will be pointed out in the next section — higher demand and output.

The behaviour of real long-term interest rates clearly represents some sort of puzzle. Why did the long rates stay so much higher than the short rates (see the last column in Table 3), especially when the price level continued to decrease at a rate of 10-20 per cent per year?

TABLE 3

MINIMUM VALUES OF INTEREST RATES, 1926-1938

Country	min rs	min rd	min rb	average rb-rs
Belgium	1.00	2.00	3.25	1.40
France	0.91	2.00	3.48	2.70
Netherlands	0.13	2.00	2.65	1.39
Switzerland	0.99	1.50	3.08	2.04
U.K.	0.36	2.00	2.68	1.52
U.S.A.	0.13	1.00	2.27	1.38

The positive interest rate margin (rb-rs) reflects the well-known liquidity preference phenomenon, which was dominant for the prewar period. The problem is that it is very difficult to provide a good explanation for this persistent interest-rate margin. Not surprisingly, an «expectations hypothesis» — based model $\Delta rb = \alpha + \beta(rb_{.1} - rs_{.1}) + \varepsilon$ performs really very badly with the prewar data (a set of results are available upon request from the author). Regardless of the way we consider the liquidity preference hypothesis we should, of course, provide some answer to the question of why the long rates did not react to inflation (see Figure 2 and the subsequent empirical analyses in Section 3). One explanation which has recently been put forward is that deflation was largely unexpected. Hamilton (1987) provides some evidence on this proposition using commodity futures market prices. The problem with this explanation is, of course, that it is hardly consistent with any model of expectation formation. Moreover, if forecasting errors were of this magnitude (see, e.g., Table 1), we would have difficulties in explaining both policy makers' and individual agents' behaviour. If, indeed, deflation was mainly unexpected, that would imply that real rates were very low indeed in 1929-1932, or even negative, and thus they did not constitute an obstacle for investment and consumption demand. Clearly, the question of the nature of deflation is of crucial importance in explaining the severity of the Great Depression.

Here, we cannot solve the question of whether deflation (and inflation) was expected or not. What we do is to examine whether the movements of market interest rates were determined by discount rates, or by inflation, or money supply, or output. If everything depends on discount rate policy, one could argue that central banks could have achieved some output gains by lowering the level of interest rates (which, in turn, might have dampened the deflationary process and thus helped to restore lower real rates).

3. An Econometric Analysis of Interest Rate Determination

The above conclusion can be reached merely by examining the

graphs of rs, rd and rb. Perhaps more affirmative proof can be obtained by using the following simple reduced-form interest-rate equation (see e.g. Wilcox (1983) for derivation of this kind of model) as a frame of reference:

$$rs_t(rb_t) = b_0 + b_1 rd_t + b_2 p_t + b_3 m_t + b_4 q_t + u_t \,, \qquad (1)$$

where p = actual rate of inflation, m = the log of real money stock, q = the log of industrial production and u = stochastic error term. [4]

This equation was estimated from monthly data covering the period February 1926 — December 1938. The estimation results are presented in Table 4. [5]

The tabulated results clearly show that in the sample period the determination of the private discount rate is dominated by the central bank's discount rate policy. Other variables seem to be of marginal importance. The coefficient of the inflation rate variable is of correct sign although it cannot be estimated very precisely; the coefficient of the liquidity variable is also of correct sign (except for France and

[4] Because of deficient data m is proxied here by notes and coin in circulation. The monthly industrial production (index) series were not available for the Netherlands or Switzerland. Thus, the unemployment rate was used for these countries. The data derive mainly from the Statistical Yearbook of the League of Nations (from 1927-1939). In addition, the following data sources were used: Bulletin Mensuel de l'Office Permanent, Institut International de Statistique, the Hague, 1927-1932, Industrial and Financial Statistics, Bank of England, London, 1927-1939, Federal Reserve Bulletin, Federal Reserve Board, Washington D.C., 1930-1939, Reports Presented by the President and Commissaries to the General Meeeting of Shareholders, the Netherlands Bank, Amsterdam, 1926-1939, Rapport fait par le Gouverneur, au nom du Conseil de Régence sur les operations de l'exercice, Banque Nationale de Belgique, Brussels, 1926-1938, Compte rendu au nom de Conseil Général de la Banque, de France, Paris, 1926-1938, and Geschäftsbericht, Schweizerische Nationalbank, Berne, 1926-1938. The data used in estimation were seasonally adjusted. Further details are given in an unpublished data appendix which (together with a printout of the data) is available upon request from the author.

[5] In this connection we pay very little attention to possible endogeneity problems, which are obviously relevant in estimating equation (1) because, basically, all right-hand side variables are endogeneous. This is partly because the use of monthly data may diminish the importance of this problem and partly because the computed Hausman-Wu test statistics (see Hausman (1978)) did not indicate any simultaneity bias (the corresponding marginal significance levels were all above 10 per cent). On the other

Switzerland) while the coefficient of the output variable does not permit conclusions to be drawn. As far as the government bond yield is concerned, the results are not equally clear. The coefficient of the discount rate is typically closer to zero than unity. Inflation, liquidity and output play an even smaller (and clearly more ambiguous) role.

One arrives at a similar conclusion even if the discount rate variables are excluded from the estimating equation. Similarly the bivariate relationships between variables reveal that the discount rate is very dominant with respect to short-term market rates but the role of inflation, for instance, is very weak. Perhaps the most convenient way of demonstrating this fact is to scrutinize the variables in the frequency domain. Thus, coherency between rs and rd is typically different from zero (clearly for low frequencies but not necessarily for short 2-3 month cycles) while the corresponding measure with respect to rs and p obtains very low values which fail to exceed the standard significance levels. This can be seen from Figure 3, which contains unweighted averages of coherencies computed for individual countries. [6]

Thus, one can conclude that central banks were able to control short-term interest rates rather well by discount rate policy and also by controlling liquidity. With long rates, discount rate policy could not achieve complete control. From the policy perspecive, the puzzling fact is that long rates apparently did not follow any simple rule like, for

hand, the computed Jarque-Bera test statistics (not displayed) suggested that the OLS residuals are not normal. This observation made us check whether the results are crucially affected by some outlier observations. Thus, as one check a robust regression estimation experiment was carried out using the Huber M-estimator (for details, see Huber (1981)). The results were very much in accordance with those in Table 1 and they did not lend support to the idea that some clear outliers dominate the data.

[6] The coherencies have been computed using the Tukey-Hanning window. The lag length is 40 and the number of observations 154. The variables are expressed in first differences. If one tests the hypothesis of zero (squared) coherency, the approximate cutoff value at the 5 per cent level of significance is .50. In the case of coherency between rs and rd this value is exceeded by the following percentage of coherency points: Belgium 37, France 68, the Netherlands 54, Switzerland 11, the United Kingdom 71 and the United States 63. For details of the corresponding test procedure see Koopmans (1974) and Groves and Hannan (1968).

instance, the Fisher parity). Although one cannot say that data-consistent interest rate equations could be easily derived for the post-war data, the pre-war data represent a real puzzle.

TABLE 4

OLS ESTIMATION RESULTS OF THE INTEREST RATE EQUATION

	Constant	rd	p	m	q	R2	SEE	DW
dependent variable rs								
Belgium	7.19	.68	.19	-.84	-.83	.87	.50	.27
	(1.6)	(5.6)	(1.0)	(2.5)	(1.1)			
France	-13.77	.95	.20	.87	1.88	.72	.72	.59
	(1.6)	(11.8)	(1.0)	(1.5)	(1.6)			
Netherlands	.54	1.28	.36	-1.20	.00	.91	.51	1.40
	(0.6)	(23.8)	(1.5)	(2.8)	(0.0)			
Switzerland	-3.08	1.36	.78	.78	-.01	.89	.28	.40
	(3.2)	(12.7)	(2.9)	(2.2)	(0.6)			
U.K.	2.54	1.12	.10	-1.36	-.48	.97	.34	.60
	(1.6)	(14.1)	(0.4)	(1.8)	(1.1)			
U.S.A	2.56	.95	.96	-1.61	1.61	.72	.72	.59
	(1.0)	(13.1)	(3.0)	(2.8)	(1.8)			
dependent variable rb								
Belgium	7.23	.49	.38	.06	-1.00	.85	.30	.75
	(2.8)	(6.2)	(2.0)	(0.3)	(2.6)			
France	37.86	.44	.36	-1.79	-5.28	.70	.69	.39
	(6.2)	(4.9)	(1.4)	(3.7)	(6.5)			
Netherlands	2.51	.16	.02	.61	-.04	.73	.24	.24
	(5.1)	(3.6)	(0.1)	(2.4)	(6.5)			
Switzerland	1.22	.85	-.06	.16	.06	.76	.25	.49
	(1.4)	(7.7)	(0.3)	(0.5)	(2.5)			
U.K.	8.20	.25	-.65	-1.31	-.78	.86	.25	.37
	(5.5)	(6.1)	(3.7)	(3.5)	(2.7)			
U.S.A.	11.9	.27	.04	-.79	-1.44	.79	.23	.25
	(8.1)	(7.1)	(0.2)	(3.2)	(8.9)			

SEE is the standard error of the estimate and DW the Durbin-Watson test statistics for first-order autocorrelation. Numbers inside parentheses are t-statistics, which have been computed using the Newey-West heteroskedasticity and autocorrelation (with order 4) consistent covariance matrix. Notice that for the Netherlands and Switzerland, the unemployment rate is used instead of q (i.e. the log of industrial production).

Hence, with the long rates we are left with some sort of risk-premium argument (cf. the liquidity preference hypothesis). Alternatively, we could argue that international considerations — capital movements and the interest rate parity — explain the interest rate movements rather than some variable related to a closed economy. True, there seems to be a relatively high correlation between interest rates in various countries (see Table 5 for details). But it seems that the short rates are more correlated than the long rates. The problem is that prices, money and output (or unemployment) are even more correlated across countries. A notable example is France. In her case interest rates are almost uncorrelated with the U.S. rates but prices and money follow the foreign counterparts rather closely.

TABLE 5

CORRELATIONS COEFFICIENTS BETWEEN VARIABLES FOR THE U.S. AND OTHER COUNTRIES

	rd	rs	rb	rsr	P	p	M	m	Q	q
Belgium	.71	.77	.69	.25	.82	.24	.85	-.04	.83	.13
France	.32	.30	.08	.18	.71	.17	.81	.17	.46	.14
Netherlands	.70	.74	.89	.45	.87	.44	.26	.14	.87	.08
Switzerland	.85	.79	.34	.44	.86	.43	.82	.44	.82	.15
United Kingdom	.85	.93	.76	.51	.93	.48	.85	.32	.36	.24

Capital letters denote level form variables and small letters the corresponding one month log differences. rsr is the real ex post interest rate in terms of rs. The unemployment rate is used for Q and q in the case of the Netherlands and Switzerland (and, in these cases, also the United States).

4 Concluding remarks

Nowadays, there is wide agreement that the Great Depression was very much due to misguided monetary and fiscal policies. The

same argument surely applies to interest rate policy. Although it is not entirely clear how the central banks could have controlled long-term interest rates it is quite obvious that the central banks were not completely powerless as regards the huge real interest rate shocks. It can be argued that, particularly during the initial depression years, the failure to lower nominal rates contributed to the slowdown of economic activity (which showed up in the wave of bankrupties, for instance). But can something more precise be said about the magnitude of this real interest rate effect? This is a very difficult question because there are relatively few empirical models available for assessing the magnitude of the effect. One possibility is, of course, to use some parameter values which have been estimated from the postwar period as crude approximations (see, for instance, Chouraqui et al (1988) and Virén (1986)). Thus, we can take some sort of «average value» for the elasticity of GDP with respect to the real interest rate, which is about —.5. Even this figure indicates that lowering nominal interest rates by just 2 percentage points in 1930-1932 might have increased GDP by 1 per cent per annum. That is not very much but it might have helped to break the vicious circle of deflation and a slowdown in production and investment.

Clearly, real rates were so high, particularly in 1929-1932, that either nominal rates should have been made negative (e.g. by levying some sort of nominal balance tax) or, more obviously, the deflation rate should have been lowered. Unfortunately, very little was done — or even tried — in this respect. Perhaps this merely reflects the fact that the importance of monetary factors, and real interest rate effects in particular, was not recognized at that time.

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