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1 British macroeconomic history 1870–1939: overview and key issues

S.N. BROADBERRY and N.F.R. CRAFTS

During the 1950s and 1960s, research on the prewar British economy was influenced strongly by ideas from Keynesian macroeconomics. A central figure here was Alec Ford, who produced a widely used introductory macroeconomics textbook (1971) and also wrote extensively on British economic fluctuations and the gold standard. After more than two decades of onslaught on Keynesian macroeconomics, it is important to reexamine this period of history, asking to what extent the Keynesian vision still offers useful insights into the behaviour of the economy at this time.

As well as changes in macroeconomic thought, there have been major changes in quantitative techniques during the last twenty years or so. Since many of the chapters in this volume make use of modern time series methods, a separate chapter is provided by Terry Mills as an introduction to time series analysis for economic historians.

In the rest of this chapter we provide an overview of British macroeconomic history 1870–1939, paying particular attention to the issues on which modern macroeconomic analysis has shed new light. We see that a modified Keynesian approach continues to yield useful insights into this period of history. In particular, in the face of wage and price rigidities, shocks to aggregate demand were an important source of fluctuations in real output and unemployment. Furthermore, rigid attachment to simple rules rather than the exercise of discretion in policy making is seen to have had serious costs in the disturbed environment of the interwar period. Hence, Ford's emphasis on the special circumstances that permitted the smooth functioning of the pre-1914 gold standard continues to have relevance.

Great Britain and fluctuations under the gold standard 1870–1914

Alec Ford's major contribution to the analysis of fluctuations in Britain during the period 1870–1914 is very firmly in the Keynesian tradition.

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2 S.N. Broadberry and N.F.R. Crafts

Growing out of his classic work on the gold standard (1962), Ford's (1969) analysis of fluctuations was based on an examination of the major categories of expenditure, drawing in particular on earlier papers concerning exports (1963) and overseas lending (1965). Although monetary factors were considered, they were clearly seen as passive and what modern macroeconomists now call supply factors did not play a role in Ford's analysis. Fluctuations in output and employment were seen as determined by fluctuations in aggregate demand, resulting in involuntary unemployment.

As economists have come to see monetary and supply side factors as increasingly important during the 1970s and 1980s, these aspects have received attention in the historical literature. The three chapters in the first part of this volume clearly reflect these developments. They also reflect developments in quantitative techniques.

It will be helpful to briefly restate Ford's conclusions and the methods that he used. In Ford's view, the key determinant of fluctuations in Britain during the 1870–1914 period was exports, although he allowed a supporting role for investment as a 'junior partner' (1969: 143). A typical boom, then, can be seen as export-led, with home investment also rising through an accelerator mechanism. The current account of the balance of payments thus improved. Despite this, Ford noted, Bank Rate typically rose during booms. This can be understood in terms of the Bank of England's desire to maintain the external value of the pound on the gold standard. Bank Rate was raised when the Bank was experiencing strain on its reserves or felt the reserves to be inadequate (1969: 138). Although during the boom exports rose and the current account improved, thus lessening the external drain on reserves, there were two offsetting factors. First, the rise in home incomes led to an internal drain, since there was an increase in the transactions demand for sovereigns and notes. But secondly, and more importantly, there was an external drain through the capital account as overseas investment also tended to rise in booms.

Ford was at pains to argue that if Bank Rate was raised in a boom, it did not cause the subsequent slump. Thus monetary factors could be regarded as purely passive. In support of this view, he argued that home investment was not very sensitive to interest rates (1969: 141–2), although he acknowledged a closer link between overseas investment and Bank Rate (p. 142). Importantly, Ford viewed the money supply as endogenous, adjusting passively to demands for accommodation (pp. 143–4). Although this was not particularly emphasised by Ford, writing in the hey-day of the Radcliffe Report era when the quantity theory of money was out of fashion, it was later to be taken up enthusiastically by proponents of the monetary approach to the balance of payments (McCloskey and Zecher, 1976).

British macroeconomic history 1870–1939

3

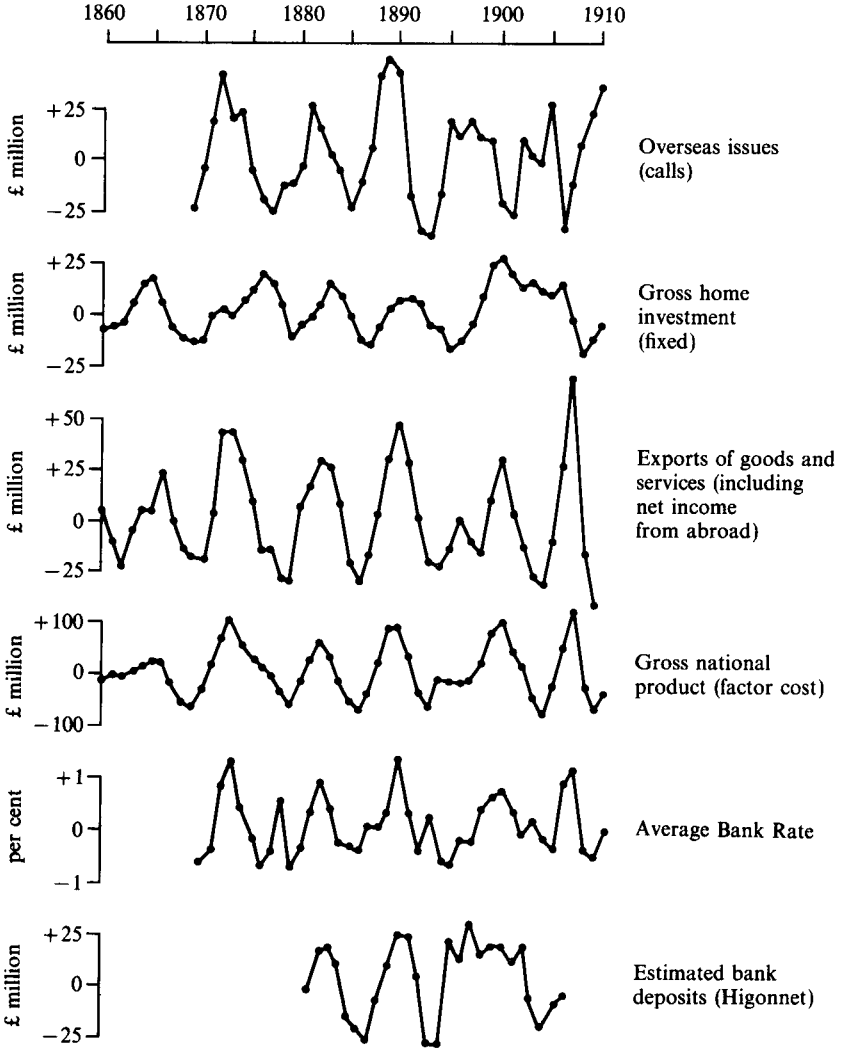


Figure 1.1 Absolute deviations of overseas issues, home investments, exports, GNP, Bank Rate and bank deposits from 9-year moving averages (current values) UK 1860–1910. Source: Ford (1981).

Ford's view of the cycle can be summarised graphically as in figure 1.1, taken from Ford (1981). The key determinants of cycles in GNP were exports and to a lesser extent home investment, exports were significantly affected by overseas issues and Bank Rate moved procyclically as the Bank of England moved to defend the gold parity.

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Breaking down the export cycle by geographical areas, Ford noted that Europe was the most important region in terms of both the amplitude of fluctuations and the timing of turning points, thus casting doubt upon the importance attached to the 'North Atlantic economy' in much of the literature on fluctuations (Thomas, 1973). He also noted that British exports were influenced to some extent by fluctuations in overseas investment, although he was careful to point out that in the short 7–10 year cycles, home and overseas investment tended to move together rather than at the expense of each other as in the long 18–20 year cycles.

Ford thus agreed with Keynes in his emphasis on 'animal spirits' affecting home and overseas investment. He also sympathised with Robertson's view that British fluctuations were 'linked with affairs on far-off Prairies and Pampas' (Ford, 1969: 158–9), although he also felt that the European contribution had been undervalued relative to the North American.

Turning to methods, Ford's identification of cycles depended on a filtering of the raw data using 9-year moving averages. Although there appeared to be 18–20 year swings in home and overseas investment in the smoothed data, Ford was sceptical of these cycles since they disappeared when home and overseas investment were added together (1969: 133). Rather, Ford concentrated on the shorter 7–10-year cycles which were apparent in the detrended series, or absolute deviations from 9-year moving averages.

It is clear that Ford was concerned about the possibility of spurious cycles being introduced by the filtering procedure (hence his scepticism about long swings). Modern time series analysis provides a solution to this problem. In Part I of this volume, all three chapters use modern time series methods to filter the data in a way that is statistically admissible. The cyclical properties of the time series are thus extracted from rather than imposed upon the data (Mills, this volume).

Another feature of Ford's analysis was that it was conducted mainly with series in current prices. Since the key variables were exports and investment, cycles could be seen as due to fluctuations in nominal aggregate demand. In a classical model, fluctuations in nominal demand could be consistent with continuous full employment if wages and prices adjusted to ensure continuous market clearing. Ford must be implicitly assuming, then, that there were nominal rigidities so that nominal demand fluctuations were translated into real fluctuations.

Ford's view of fluctuations as arising from exogenous shocks to a weak multiplier-accelerator mechanism is consistent with the standard Keynesian view of the 1950s and 1960s, after it had been realised that the conditions for endogenous cycles in a deterministic framework were

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Excerpt

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5

extremely restrictive (Matthews, 1959; Evans, 1969). More recently, whilst retaining the stochastic environment, ‘real business cycle’ theorists have stressed the importance of shocks to aggregate supply rather than aggregate demand. Shocks to aggregate supply generate fluctuations in real output and employment, with continuous market clearing (Plosser, 1988). It should be noted, however, that in an open economy a supply shock abroad translates into a demand shock from the viewpoint of the domestic economy, through the change in exports.

An important book by Edelman (1982) extends Ford’s analysis. Ford emphasised the role of overseas rather than home investment. A rise in overseas investment was seen as stimulating exports, which in turn stimulated home investment through an accelerator relationship. Edelman provides a detailed evaluation of the interaction between home savings (S), home investment (I^h) and overseas investment (I^o). All three variables are seen as functions of the rate of interest (i), but with each function also subject to shifts reflecting pressures at home and pressures abroad. Income (Y) and wealth (W) are the shift factors for the home savings function, home investment shifts with the marginal efficiency of domestic capital (MEC^h) and the overseas demand for investment funds shifts with the marginal efficiency of overseas capital (MEC^o) and overseas savings behaviour (Z). The model is illustrated in figure 1.2. In this simple equilibrium model, overseas investment can increase if the home savings function moves outwards, if the home investment function moves inwards or if the overseas investment function moves outwards. By seeking to identify such shifts over time, Edelman attempts to locate periods when pull or push factors were dominant.

Edelman examines the issue of whether fluctuations in home investment can be treated as exogenous rather than as occurring in response to movements in overseas investment. This is analysed using Granger causality tests, which essentially check whether the turning points in one series precede the turning points in the other series. If home investment typically peaked just before overseas investment, we can treat home investment as the exogenous variable determining overseas investment, while we would not be justified in treating overseas investment as the exogenous variable determining home investment. Edelman’s finding that home investment Granger-caused overseas investment suggests that push factors were of some importance in determining overseas investment. In addition, he suggests that pull factors were important, but varied by region over the period 1850–1914. He finds that the American pull on British savings was strongest during the period 1854–71 and had all but disappeared by 1900. The Australian pull was strongest during the 1860s and 1880s but again had all but disappeared by the turn of the century. The

6 S.N. Broadberry and N.F.R. Crafts

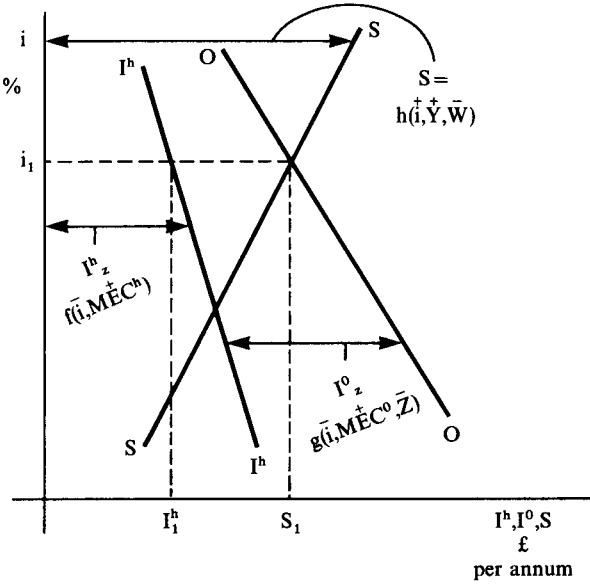


Figure 1.2 The process of savings and investment: a partial model. Source: Edelstein (1982).

Canadian pull was especially strong in the early twentieth century as the prairies were settled. Edelstein’s book, then, can be seen as extending Ford’s analysis in several ways. As well as clarifying the interactions between home and overseas investment with a simple equilibrium model, Edelstein confirms the importance of overseas factors in British fluctuations and provides clear evidence of an exogenous role for home investment. Edelstein’s work also provides an early example of the use of modern time series techniques in economic history, with the Granger causality tests.

Turning now to the papers in Part I, Barry Eichengreen provides a survey of work on the operation of the classical gold standard published since Ford’s (1962) major work, before drawing upon this literature to present his own ‘Ford-like’ model of how the gold standard worked. Eichengreen places more emphasis than Ford on monetary management by the Bank of England and rather less emphasis than Ford on the linkages between British overseas investment and exports.

As Eichengreen notes, Ford’s (1962) study predated the open economy IS/LM/BP model and the monetary approach to the balance of payments. This work clarified the issues surrounding the endogeneity of the money supply under a fixed exchange rate regime. If the central bank tried to

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Excerpt

[More information](#)**British macroeconomic history 1870–1939**

7

expand the money supply, this would lower the domestic interest rate and hence lead to a capital outflow. The resultant excess supply of domestic currency would force the central bank to intervene in foreign exchange markets to maintain the value of the currency. This would require the central bank to run down its reserves of gold and foreign currency, which it would sell in exchange for domestic currency. Hence, the amount of domestic currency in circulation would fall, offsetting the initial expansion of the money supply. Although it was possible for the central bank to offset these forces by buying bonds and hence offsetting the contraction of the money supply, such ‘sterilisation’ could only occur over the short run, as eventually the central bank would run out of reserves. This analysis would provide a rationale for Ford’s treatment of the money supply as endogenous and his playing down of the role of the Bank of England’s monetary policy.

However, such a vision of the gold standard as an anonymous, self-equilibrating balance of payments adjustment mechanism with no possibility of monetary autonomy fits uneasily with Keynes’ graphic description of the Bank of England as ‘the conductor of the international orchestra’ (1930: II, 307). Indeed, McCloskey and Zecher (1976), applying the monetary approach to the balance of payments in their study of how the gold standard worked, concluded that ‘the Bank was no more than the second violinist, not to say the triangle player, in the world’s orchestra’ (1976: 359).

Eichengreen, however, retains a leading role for the Bank of England by considering the strategic interactions between central banks. In an earlier important paper, Eichengreen (1987) showed that the reserve currency status of sterling provides a rationale for leadership by the Bank of England under the gold standard. There is a simple intuition behind this result. Each central bank is assumed to care about its share of the world’s gold reserves and domestic economic conditions. In a symmetric two-country world, a change in the discount rate by the domestic central bank would be matched by a change in the foreign central bank’s discount rate, since both banks care about their gold reserves. Changes in prices and output in the two countries would also be symmetric, determined by interest rate changes. Hence, there would be no advantage in adopting a leadership role. Suppose, however, that the foreign country holds part of its international reserves in the form of interest-bearing assets denominated in the domestic country’s currency. Now if the discount rate changes in both countries there are different effects in the two economies. If the discount rate rises in both countries, there is an incentive for the foreign central bank to augment its stock of interest bearing foreign exchange reserves. The supply of money available to domestic residents is correspondingly reduced, requiring a

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Excerpt

[More information](#)

8 S.N. Broadberry and N.F.R. Crafts

reduction in domestic money demand through a fall in domestic prices and income. Similarly, a discount rate fall leads to a greater rise in nominal income in the domestic economy. Hence, there is an incentive for the domestic central bank to act as leader. It is also clear that the domestic central bank exercises a more powerful pull over gold flows, since if both central banks raise their discount rates, the foreign central bank increases its holding of foreign exchange reserves rather than gold. Hence, the international reserve status of sterling is sufficient to explain both the leadership role of the Bank of England and the powerful effects of Bank Rate on gold flows. This also fits in with Ford's (1962) emphasis on the different experiences of the gold standard at the centre and at the periphery.

Eichengreen examines the interaction between time series on a number of key variables, very much in the spirit of Ford's (1969) trade cycle analysis, but using modern time series techniques. Eichengreen estimates a vector autoregression (VAR) for exports, imports, the terms of trade, Bank Rate, gold reserves and overseas lending. Each variable is regressed on three own lags and three lags of each of the other variables. Causality can be investigated by examining F-statistics for the joint significance of lagged values of an explanatory variable. Eichengreen here builds on his earlier work which established a key causal role for the money supply (1983). He finds that despite a high contemporaneous correlation between overseas lending and exports, overseas lending did not statistically cause exports.

To focus on the general equilibrium repercussions, the VAR system is subjected to random shocks. One of the equations is perturbed and the impact on the other variables is traced through. The results suggest a greater role for monetary management by the Bank of England and a smaller role for the linkage between overseas lending and exports than in the work of Ford. However, many of the Keynesian features of the Ford approach are supported. In particular, Eichengreen sees adjustment of real variables as an important part of the balance of payments adjustment mechanism.

The monetary statistics available to Ford during the 1960s were very rudimentary and subsequent scholarship has provided improved estimates, particularly for the money supply. Forrest Capie utilises the data set constructed by Capie and Webber (1985) to examine the role of money in British economic fluctuations. Capie analyses the cyclical behaviour of money, real income and prices using a number of techniques. In the simplest approach, the series are detrended using polynomial trends. A second technique, based on the work of Barro (1984), calculates the shortfall of a variable in a trough by extrapolation forward of the trend during the five years before the previous peak. In addition to these *ad hoc* approaches to the identification of cycles, Capie also reports results

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Excerpt

[More information](#)**British macroeconomic history 1870–1939**

9

obtained with the Kalman filter (see Mills, this volume). In all cases, Capie fails to detect a significant relationship between fluctuations in money and real income. Indeed, using the Kalman filter, the money data show no evidence of cyclicity at all.

This absence of cyclicity in the money data and hence the absence of a causal relationship between money and real income for Britain before the First World War is in marked contrast to the situation for the same period in the US (Friedman and Schwartz, 1963). Capie speculates that the key difference between the two countries was the absence of banking panics or financial crises in Britain. He argues that in turn, this financial stability in Britain resulted from the lender of last-resort behaviour of the Bank of England and the structure of the British banking system, with its widespread branch network. The argument is strengthened by Collins' (1988) finding of a significant relationship between money and real income in the mid nineteenth century when British banks did fail. Dimsdale's (1990) analysis of fluctuations since 1830 also attributes a key role to financial crises before 1870 and emphasises real factors thereafter.

The paper by Nick Crafts and Terry Mills turns to the supply side of the economy, drawing upon the recent real business cycle literature (Plosser, 1988; Lucas, 1987). Fluctuations are seen as arising due to shocks to aggregate supply. Markets are assumed to clear instantaneously, so there is no involuntary unemployment. Fluctuations in real output and employment are explained by the intertemporal substitution of leisure. When there is a positive technology shock which raises the marginal product of labour above its long-run trend, the real wage rises and people choose to take less leisure, since this is a propitious time to work hard. Conversely, when the marginal product of labour is below trend, people choose to take more leisure. Hence, the model is consistent with the fact that unemployment is low in booms and high in slumps.

One advantage of the real business cycle approach is that it makes explicit the links between growth and cycles. Essentially cycles are caused by shocks to a neoclassical growth model. Short-run and long-run analysis are thus inextricably tied together. An interesting issue here is whether the time series on output is trend stationary or difference stationary, since in the trend stationary case shocks do not have a persistent effect on the level of output (see Mills, this volume). Recently, macroeconomists have come to view the world as predominantly difference stationary, with shocks having a persistent effect on the level of output. However, for the UK Mills (1991) finds that although GDP is difference stationary after the First World War, for the 1870–1913 period it is trend stationary. This would appear to cast some doubt on approaches such as that of Solomou (1987) which see the cycle as generated by shocks to growth trajectories.

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Excerpt

[More information](#)

10 S.N. Broadberry and N.F.R. Crafts

Crafts and Mills devote some time to explaining this ability to reject the unit root hypothesis, drawing on the work of West (1988). It turns out that the key factors are the slope of the short-run aggregate supply curve and the degree of monetary accommodation. If a shock is to have a persistent effect on output, so that the output series has a unit root, we require a relatively flat short-run aggregate supply curve or the main effect of shocks will be on the price level. Hence the finding of trend stationarity for pre-1914 Britain suggests a relatively steep short-run aggregate supply curve, which is consistent with Hatton's findings for the pre-1914 Phillips curve (this volume). In addition, if the central bank follows a money supply rule but does not offset previous errors, we would expect shocks to have persistent effects and hence produce the unit root result. For the case of pre-1914 Britain, however, the Bank of England could not follow such an accommodating policy, since it was required to maintain the gold standard parity of the pound. Hence, the relatively low degree of monetary accommodation by the Bank of England also plays a role in explaining the finding of trend stationarity for pre-1914 Britain.

Crafts and Mills find that the basic neoclassical growth model with serial correlation in technology shocks and trend stationary growth is a useful starting point for the analysis of pre-1914 fluctuations, but has a number of limitations.

One major problem is that the real business cycle approach requires procyclical real wages. Slumps are caused by negative technology shocks which lower the marginal product of labour and hence lower the real wage, thus inducing people to substitute more leisure for work. Thus real wages fall in slumps and rise in booms. This contrasts strongly with the Keynesian approach, which predicts countercyclical real wages. Slumps are caused by negative shocks to demand, which cause prices to be lower than expected. Given money wage rigidity, the real wage rises, causing a reduction in the demand for labour and hence a rise in involuntary unemployment. In fact, Crafts and Mills find virtually no correlation between output and real wages, which suggests that both demand and supply shocks were present, with neither dominant.

In addition, Crafts and Mills note that although the model is fairly successful in explaining the behaviour of output and consumption, it is rather less successful in explaining investment behaviour. Investment in pre-1914 Britain was substantially more volatile than predicted by the simple real business cycle model. They argue that this excess volatility in investment can be explained by excess volatility in share prices, affecting Tobin's q , the ratio of the stock market valuation of capital to the replacement cost of capital. They demonstrate the excess volatility of share prices by calculating an *ex post* rational price or 'perfect foresight' series, which is much more stable than the actual share price series. The excess