

NBER WORKING PAPER SERIES

GETTING PEGGED: COMPARING THE
1879 AND 1925 GOLD RESUMPTIONS

Michael D. Bordo
Tamim Bayoumi

Working Paper 5497

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 1996

This paper was written while Michael Bordo was a visiting scholar at the IMF, whose hospitality he gratefully acknowledges. For helpful comments and suggestions we would like to thank Forrest Capie, Lawrence Officer, Angela Redish, Hugh Rockoff, Peter Kenen, and Anna Schwartz. This paper is part of NBER's research programs in the Development of the American Economy, International Finance and Macroeconomics, and Monetary Economics. Any opinions expressed are those of the authors and not those of the International Monetary Fund, or the National Bureau of Economic Research.

© 1996 by Michael D. Bordo and Tamim Bayoumi. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

GETTING PEGGED: COMPARING THE
1879 AND 1925 GOLD RESUMPTIONS

ABSTRACT

We compare the resumption of convertibility into gold by the United States in 1879 and Britain in 1925 to ascertain the degree to which the outcomes reflected differences in strategies adopted by the authorities or in the external environment. It is concluded that external factors were the most important determinant of the very different outcomes of the two episodes.

Michael D. Bordo
International Finance Section
Department of Economics
Princeton University
Princeton, NJ 08544-1021
and NBER

Tamim Bayoumi
Research Department
International Monetary Fund
700 19th Street, NW
Washington, DC 20431

I. Introduction

Prospects for European Monetary Union (EMU) and experiences with the Exchange Rate Mechanism of the European Monetary System (ERM) have focused interest on the issues involved in joining a fixed exchange rate system. In the case of the ERM, the focus has been on the parity at which to enter the system (for example, whether to choose an appreciated rate in order to bring downward pressure on the inflation rate) and on the role of market forces in determining the time of entry. In the case of EMU, in addition to these factors, the advisability of announcing the final parities ahead of time has been debated.

This paper provides some historical perspectives which may be of value in understanding these issues. We focus upon two cases in which major countries returned to the fixed exchange rate gold standard at the original parities--the resumption of specie convertibility by the United States on January 1, 1879, and of gold convertibility by Britain (at the pre-World War One parity of \$4.86) on April 28, 1925.

These cases are of interest for several reasons. On both occasions the authorities rejoined a system with the expectation that exchange rate parities would be maintained for the foreseeable future. In this respect, the gold standard was closer to the constraints implied by a Monetary Union than are fixed-but-adjustable-exchange rate systems exemplified by the Bretton Woods exchange rate system or the ERM.

The two resumptions were carried out in very different ways. In the case of the United States both the time and the parity at which to resume as well as the policies required, were fixed by legislation significantly

before the event. By contrast, after World War One, the British authorities announced their intention to resume gold convertibility at the prewar parity but were unwilling to commit to either a date for resumption or to a set of policies to achieve it. Rather, they opted for a flexible approach, leaving it to the authorities to announce resumption when they were convinced that it was consistent with economic fundamentals.¹

Finally, the two resumptions had very different long-term outcomes. The dollar remained convertible into gold at the same parity for 54 years (from 1879 to 1933, excluding a brief embargo on gold exports during World War One). Sterling, by contrast, maintained its peg for only 6 years--until the devaluation of September 1931, which preceded the general collapse of the interwar gold exchange standard. These different experiences have led to very different assessments of the resumptions, with dollar resumption generally deemed a success, and sterling resumption often deemed an important macroeconomic error by the government.

It is striking that two episodes which appear in many respects very similar have led to such different assessment of their effectiveness. This paper compares the two experiences in order to examine the degree to which their success or failure reflected the exchange rate strategies themselves, in terms of both the chosen parities and the policies to achieve them, or the external environment in which the resumptions occurred. We do this by examining a common set of macroeconomic fundamentals, including the real

¹Another difference may have been the policy making environment. The United States did not have a central bank over the period, although the U.S. Treasury did, on occasion, pursue an active monetary policy (Timberlake, 1993).

exchange rate and trade balance, monetary and fiscal policies, and the behavior of real activity and unemployment across both episodes, so as to identify the important similarities and differences in underlying behavior.

To anticipate our conclusions, we find striking parallels in the behavior of many of the fundamentals around the time of resumption. The main difference is in the behavior of real activity. In the United States output grew significantly before, during, and after resumption. In Britain, by contrast, there was a large decline in real output and rise in unemployment in the early 1920s, in part reflecting tight monetary policies aimed at achieving resumption, followed by a recovery until 1925. Upon resumption a temporary relapse in output and unemployment occurred, but this was reversed from 1927-29. Analysis using a structural vector autoregression indicates that although a lack of aggregate demand, associated with government monetary and exchange rate policies, may have been a contributing factor in the recession of the early 1920s, it was not a significant handicap to real activity in the mid or late 1920s.

We conclude that the monetary and exchange rate policies that were pursued were not the dominant factor in explaining the economic problems of the British economy in the late 1920s, although they may have been more important in the early 1920s. Rather, the very different external environments the two countries faced appear to have been critical to the success or failure of the strategy. The United States was a rapidly emerging, but not yet dominant, economic power which rejoined a well-functioning international gold standard at a time of economic prosperity. By contrast, Britain restored parity at the prewar rate in 1925 at a time of

considerable economic turbulence.² This turbulence, although in abeyance for several years, eventually overwhelmed the system, which was unable to withstand the shock of the Great Depression. In short, the external environment appears to have been the dominant factor in producing the contrasting outcomes of the two episodes.

The plan for the remainder of this paper is as follows. The next section describes the historical background of the two resumptions in more detail. Section 3 examines and analyzes the evolution of a common set of macroeconomic variables for each episode, while section 4 reports a decomposition of aggregate demand and supply factors based on structural vector autoregressions. Section 5 contains conclusions and lessons for EMU.

II. Historical Background

2.1. The United States

The American Civil war began in April 1861. The Federal government originally intended to finance its operations solely through borrowing and taxation but by the end of 1861 found it difficult to sell its bonds at favorable rates. Beginning in early 1862 it began issuing paper money--the greenbacks (non-interest-bearing notes denominated in dollars and declared to be legal tender). Under the Legal Tender Acts, the dates and provisions for convertibility of greenbacks were not specified. In January 1862 the commercial banks suspended specie convertibility and the dollar began a

²Britain was the first of the major first World War belligerents (except for the United States) to restore a form of gold convertibility. In several other cases the continental European countries that followed suit did so at a lower parity than they had maintained prior to the World War. The most notable example being France.

rapid depreciation against sterling, peaking in 1865 at slightly over double the prewar parity.

Shortly after the war, the government made clear its intentions to resume payments at the prewar parity in the Contraction Act of April 12, 1866, which provided for the limited withdrawal of U.S. notes. Declining prices from 1866 to 1868 led to a public outcry and to repeal of the Act in February 1868. Over the next seven years a fierce debate raged between the hard-money factions--advocates of rapid resumption--and soft-money factions, some of whom were opposed to restoring the gold standard, others favored resumption at a devalued parity, and yet others opposed undue deflation and favored allowing the economy to grow up to its money supply (Unger (1964), Sharkey (1959)). Triumphs of the conflicting factions were manifest in legislation, the Public Credit Act of 1869 contracting the greenback issue, the reissue of \$26 million of retired greenbacks in 1873 expanding it and in Supreme Court decisions, initially declaring the Legal Tender Acts unconstitutional (Hepburn vs. Griswold, February 1870), and then reversing the decision (Knox vs. Lee, May 1871). Finally, the decision to resume convertibility on January 1, 1879, was made in the *Resumption Act* of January 14, 1875, which the lame-duck Republican Congress passed by a majority of one.

In addition to proclaiming the date of resumption and the original parity, the Act authorized the Treasury to use its surplus revenues and the proceeds of bond sales to accumulate a gold reserve. The Act also removed the aggregate limit on national bank notes and linked the retirement of greenbacks to the expansion of national bank notes. According to Friedman

and Schwartz (1963), the achievement of successful resumption in 1879 had little to do with Treasury policies.³ Restoration of prewar purchasing power parity in 1878 was achieved by the real economy growing up to a relatively constant money supply.⁴

Despite the announcement of resumption and the steps taken by the Treasury to accumulate a gold reserve and to retire greenbacks, the bitter election of 1876 was fought between Cooper, the Greenback candidate, who was opposed to resumption; Tilden, a soft-money Democrat; and Hayes, a hard-money Republican. Hayes won by one electoral vote. Yet, had Tilden won, according to one authority, resumption would not have been prevented; only the date might have been postponed (Unger, 1964, pp. 310-11).

As Calomiris (1988) points out, the credibility of the restoration of the gold standard rule was likely established six years before the Resumption Act, by the Act of March 18, 1869, which guaranteed redemption and principal in gold, and the Supreme Court decision in *Venzie Bank vs. Fenno*, which supported the constitutionality of gold clauses (Calomiris, 1988, p. 208fn).⁵ Both Roll (1972) and Calomiris (1988 and 1993) present evidence of expected greenback appreciation based on a negative interest

³Indeed they argue that the gold purchase policy was counterproductive since it raised the premium on gold, the opposite of what was required.

⁴Timberlake (1975) disagrees with Friedman and Schwartz on the role of Treasury policy. He argues that the Resumption Act allowed the Secretary of the Treasury to retire greenbacks equal to the gross amount of national bank notes issued without accounting for voluntary retirement of national bank notes by the commercial banks. Successive secretaries of the Treasury took advantage of this provision to reduce high powered money.

⁵According to Calomiris (1988), following Mitchell (1903) and Roll (1972), the pace and timing of resumption depended solely on fiscal news-- legislation and policy announcements affecting the government's budget. Rolnick and Wallace (1984) also view interpretation of this episode as dependent only on overall government fiscal expectations.

differential between bonds that were paid in greenbacks and those paid in gold.⁶

Restoration of convertibility to gold at the original parity was a success for the United States, with the price of gold remaining fixed at \$20.67 per ounce until 1933.⁷ The commitment to parity however was not totally without threat. In the ensuing 17 years after resumption in 1879, although the United States was back on a gold basis, the battle between hard- and soft-money factions continued over the issue of free coinage of silver.

The free-silver forces succeeded in passing two pieces of legislation that increased the outstanding stock of silver coins: the Bland Allison Act of 1878 and the Sherman Silver Purchase Act of 1890. The latter increased the stock of high-powered money sufficiently to threaten convertibility into gold (Friedman and Schwartz, 1963). As Grilli (1989, Figure 3) shows, however, the probability of a speculative attack on the gold dollar at the height of the agitation over silver in 1893 (before the repeal of the Sherman Silver Purchase Act) was not much greater than 6 percent.

⁶Calomiris (1993) calculates the appreciation forecast error on a semi-annual basis from January 1869 to December 1878, defined as the difference between his calculation of expected appreciation and actual appreciation. The errors are close to zero for most of the period, with two exceptions: January to June 1869, when the error is 1.53, and January to June 1876, when it is -1.46. The former positive exchange-rate surprise reflects the credibility of the government's commitment to the redemption of bond principal in gold; the latter negative surprise reflects the temporary threat to resumption posed by the election of 1876.

⁷There was a brief two-year gold embargo between 1917 and 1919, which affected external but not internal convertibility. Gold ownership by U.S. residents was prohibited by an executive order in April 1933. At the same time, Franklin Delano Roosevelt began to raise the price of gold, that was eventually fixed at \$35 per ounce in the Gold Standard Act of January 31, 1934.

2.2 Great Britain

Britain resumed gold convertibility seven years after the end of World War One at the prewar parity of \$4.867. Unlike the case of U.S. resumption in 1879 post-World War I misalignment was limited because all belligerents had adopted inflationary monetary policies to finance the war. A second key difference with the U.S. case was that from the beginning of hostilities in August 1914 until March 1919, Britain was still formally on the gold standard. However, the monetary authorities made it difficult for private parties to convert paper claims into gold, and pegged the pound at \$4.76 by extensive intervention. After hostilities ceased, termination of the controls and intervention precipitated massive gold outflows. This led Britain to suspend the free export of gold by an order in Council of March 29, 1919, which became official with the Gold and Silver (Export Control) Act of 1920.

Although the exchange rate was allowed to float, official circles expressed a strong commitment to resume gold payments at the original parity. The first clear statement was in the Cunliffe Report of 1918, followed in subsequent years by other official documents. The key argument for resumption at the old parity was the need to maintain credibility. It was widely believed that this would restore the prewar glory of the City of London.⁸ Vociferous opposition to resumption at the original parity before and after the fact was voiced by J.M. Keynes in his tract the Economic Consequences of Mr. Churchill (1925). He was supported by other academics,

⁸Another argument was to restore the prewar sterling system in the face of pressure from the Southern Dominions (Presnell, 1978).

by labor (but not the official Labor party), and by industry groups. Most of the opposition, however, with the principal exception of Keynes, was centered not on resumption at the old parity per se but on the deflationary policies that were adopted to attain it.⁹

Keynes' argument was that sterling was overvalued relative to the dollar and other currencies and that resumption would require considerable deflation to make British exports competitive. In the face of downward wage inflexibility, massive unemployment would result. The ensuing debate, which has continued for seventy years, revolves around: (1) how to measure purchasing power parity to determine overvaluation; and (2) forces other than deflation which could explain the persistence of high unemployment in the 1920s. These issues are discussed further below.

Although the monetary authorities wanted immediate resumption after the war, they were unwilling in 1919 to follow the requisite tight monetary policies. The subsequent boom (which was worldwide) was ended by a very contractionary monetary policy in Britain (in part reflecting the desire to return to the pre-war gold parity), the United States, and several other countries in early 1920, which led to a serious recession ending in 1921. Thereafter sterling appreciated close to the old parity by December 1922 but the appreciation was reversed and resumption was delayed because of unfavorable events on the Continent (the Germans' refusal to pay reparations and the Belgian-French occupation of the Ruhr (Pollard (1970))), the unsuccessful attempt by the framers of the Genoa conference to arrange a

⁹See Pollard (1970, editor's introduction), and especially Brown (1929), Sayers (1960), and Hume (1963).

coordinated international restoration of the gold standard, and the unwillingness of the United States to follow an inflationary policy, as was expected by the British authorities (Eichengreen 1992). By early 1924 the exchange rate began a steady appreciation toward parity. The authorities waited until the market had pushed sterling close to \$4.86 before officially announcing resumption on April 28, 1925.

Recent debate has focused on whether the final path to resumption reflected the behavior of fundamentals, including tight monetary policy (Smith and Smith, 1990) and the successful conversion of short-term to long-term debt, thereby averting a potential funding crisis (Eichengreen, 1992); or, alternatively, anticipation by speculators that resumption was likely to occur in 1925 since the Gold and Silver (Export Control) Act was due to expire at year-end (Miller and Sutherland 1992, 1994).

According to most measures, following resumption, purchasing power parity was reached by 1929. After a brief recession in 1926, the British economy grew at about 2 percent per year until the beginning of the Great Depression in 1929 (see Section 3 below). British adherence to the reconstructed gold exchange standard, however, lasted only six years. During that period the Bank of England faced speculative attacks against sterling in 1927 and 1929. The former reflected a gold drain following the Banque de France's return to gold at an undervalued parity; the latter massive capital flows to the New York stock market (Cairncross and Eichengreen 1983). More fundamental, however, for sterling's ultimate departure from gold convertibility in September 1931 were serious flaws of the gold exchange standard.

The gold exchange standard was an attempt to restore the favorable features of the classical gold standard (exchange rate and price level stability, rapid and automatic balance of payments adjustment, stabilizing capital flows) while at the same time it also attempted to economize on gold reserves by restricting the use of gold to central banks and by encouraging the substitution of foreign exchange.

As is well-known, the gold exchange standard suffered from a number of problems (Kindleberger, 1973, Eichengreen, 1992, Temin, 1989), including the use of two reserve currencies (sterling and the dollar), the absence of leadership by a hegemonic power, the failure of cooperation between key members, and the unwillingness of the United States and France to follow the "rules of the game." They exerted deflationary pressure on the rest of the world by persistent sterilization of balance of payment surpluses. The gold exchange standard collapsed but, according to Friedman and Schwartz (1963), Temin (1989), and Eichengreen (1992), not before transmitting deflation and depression across the world.

III. Comparing Fundamentals

This section compares the behavior of salient macroeconomic fundamentals in each resumption episode: money supplies, price levels, exchange rates, fiscal policies, interest rates, trade balances, and real activity.¹⁰ Such a direct contrast provides useful insights on their underlying similarities and differences. The behavior of money supplies,

¹⁰Data sources are given in an appendix. The data are available on a diskette upon request.

price levels, and exchange rates provides information on monetary policies and the competitiveness of the two economies upon resumption; fiscal policies and interest rates tell us about the associated financial behavior of each government; external balances illustrate the policy impact of resumption upon the traded goods sector; while real activity shows the impact on the economy as a whole. Each comparison provides a different angle on the causes and consequences of the return to gold.

There are some obvious similarities in these experiences. In both cases the original suspension of gold convertibility occurred at the outset of a damaging and costly war, which also involved exceptional levels of monetary expansion and government borrowing.¹¹ In addition, in both cases gold convertibility was resumed at the prewar parity. Hence, the change in the real exchange rate between suspension and resumption can be measured by comparing price levels before and after these two events. At the same time, an important difference involves the length of time involved. In the United States, resumption took place almost 18 years after the start of the Civil War. By contrast, the interval between the start of World War One and the resumption of convertibility of sterling was just over 10 years. To aid comparison, all figures are reported over a 20-year period running from before the relevant war to after resumption, 1860-1880 in the case of the United States and 1910-1930 for Britain, implying a significantly longer period after resumption for Britain. The reason for choosing this longer post-resumption period is that the impact of the resumption on real activity

¹¹As discussed earlier, in the case of Britain the formal suspension of convertibility occurred after the war, however, in practice gold convertibility was constrained during the war.

in the late 1920s has long been an important issue in assessing the impact of resumption on the British economy.

Money, Prices, and Exchange Rates

Chart 1 reports the path of the two countries' money supplies over the appropriate periods. A similar pattern is observed in both countries, with a large expansion during the war (reflecting inflationary monetary finance), followed first by a contraction and then by a period during which the money supply is approximately constant at around 200 percent of the pre-Civil War level for the United States and 250 percent of the pre-World War One level in Britain.

Chart 1 also reports domestic GNP deflators,¹² together with the GNP deflator of a major trading partner, Britain in the case of the U.S. dollar and the United States in the case of sterling.¹³ Domestic prices almost doubled during the war in both cases. The end of the U.S. Civil war witnessed a gradual reduction in the domestic price level which continued relatively consistently through the late 1860s and 1870s, so that by 1879 prices were back to their prewar levels. By contrast, the end of World War One saw a further increase in the price level in Britain (as well as in the

¹²The national income account numbers for Britain are relatively uncontroversial, with Feinstein (1972) providing figures for the entire period. By contrast, considerable controversy surrounds the U.S. national accounts, with at least three series for 1869-1928. However, for the period 1860-68 we are aware of only one published source, namely, Berry (1988). Although his estimates are open to legitimate criticism, for the sake of comparison it was important to provide consistent and comprehensive data for both historical periods. Accordingly, we use Berry's figures for the entire 1860-80 period.

¹³Authorities who use GNP deflators for these comparisons include Officer (1984) for the United States and Redmond (1984) for Britain. It is the broadest measure of the overall price level. In earlier work consumer prices and wholesale prices have been used to make these calculations.

United States), reflecting the easing of price controls, an overhang of demand for civilian goods and services, and loose monetary policy. This price bubble was followed by a swift decline in prices between 1920 and 1922, and a more gradual reduction subsequently. By 1925, however, the price level was still over 80 percent above its pre-war value. This reflects both the shorter period before resumption and the more anemic performance of real activity in Britain, which reduced the deflationary impact of an approximately constant money supply.

External competitiveness depends upon prices in the home country relative to those elsewhere; so it is necessary to compare domestic prices at the time of resumption with their foreign counterparts. The period from 1861 to 1879 saw little change in the GNP deflator in Britain (a major trading partner of the United States), and the two price levels appear to have been closely aligned in 1879.¹⁴ The precise competitive position of Britain after resumption in 1925 has been in dispute. World War One was a much more generalized conflict than the U.S. Civil War, and the GNP deflator in the United States--one of the belligerents--in 1925 was over 70 percent higher than in 1913.¹⁵ Our estimates indicate that relative prices in

¹⁴This calculation involves significant uncertainties. Officer (1984) (using an earlier GNP series also produced by Berry) estimated that in 1878, the year before resumption, prices in the United States were 6 percent lower than in Britain. By contrast, Friedman and Schwartz (1963), for a similar calculation using wholesale price indexes, concluded that the U.S. price level was 12 percent higher than the British counterpart at resumption.

¹⁵Three different series of U.S. GNP are available for the 1869-1929 period. The first is the original Gallman-Kuznets set of estimates. More recently, Romer (1989) and Balke and Gordon (1989) have provided new, updated, and competing calculations. We use the Balke and Gordon series for the 1910-30 period, as they appear to have adopted a methodology similar to that used by Feinstein, the source of our British series.

Britain were about 5 percent higher compared to 1913 than those in the United States at the time of resumption. This result, however, depends upon a particular set of estimates of GNP, while other series imply an overvaluation closer to 14 percent. This range is similar to that given by Redmond (1984), relying on a wide range of alternative price indexes and including trading partners other than the United States.¹⁶ These calculations tend to indicate that sterling was overvalued against the U.S. dollar in 1925 both in absolute terms and compared to the value of the U.S. dollar relative to sterling in 1878, but that the difference using our data is not particularly large.¹⁷

Non-price factors may, however, have exacerbated the overvaluation of sterling. World War One hurt the British economy in many ways. It disrupted trade connections, thereby reducing the competitive edge of British exporters in many parts of the globe. It also led to a significant reduction in Britain's foreign assets holdings. The resulting fall in net income from abroad implied a need to improve the balance on merchandise trade. Finally, the decision by France, a major competitor, to join the gold exchange standard in 1926 at a relatively depreciated rate may have increased the overvaluation of sterling against exchange rates other than the dollar in the late 1920s.

¹⁶His results also indicate that the calculation are sensitive to the type of price index used, with retail prices indicating larger overvaluations.

¹⁷The increase in the domestic price level relative to that of the partner country was significantly smaller for sterling than for the U.S. dollar at the earlier date. Hence, while the absolute rise in the price level between 1913 and 1920 was larger than the comparable rise in the United States during the Civil War, the change relative to the partner country, which is probably a better gauge of the size of the disturbance, was considerably less.

The impact on the paths of nominal and real exchange rates of the different strategies used to achieve resumption are shown in Chart 2. In the 1870s the U.S. dollar gradually moved to its old parity, particularly after the passage of the Resumption Act of 1875. No significant changes in competitiveness resulted immediately prior to, or upon, resumption. The path of sterling in the early 1920s, by contrast, was significantly more unstable. Resumption coincided with a significant appreciation of the real exchange rate, which rose by over 7 percent between 1924 and 1925.

Fiscal Policy and Interest Rates

The behavior of fiscal policy and interest rates is also important for the analysis. Fiscal profligacy is unlikely to generate the nominal stability required to maintain an unvarying exchange rate parity in the long term. As each resumption occurred after a costly war, the path of public debt would appear to be a particularly important fiscal factor in assessing the commitment to resumption. Interest differentials are useful in assessing market views on the return to gold. Prior to resumption, domestic interest rates should be lower than those of competitors if the commitment is fully credible, as the anticipated exchange rate appreciation should raise yields for foreigners. After resumption, positive interest rate differentials may indicate a lack of confidence in the policy, and the associated need to attract capital in order to buttress the parity.

Chart 3 shows government spending, revenues, and debt for both episodes, measured as a percentage of GNP. The picture is similar to that found for the money stock, with comparable overall policies but subtly different underlying outcomes. Both governments ran significant budget

deficits during the war and balanced budgets before and after, although the scale of these deficits, and hence the associated rise in government debt, differed. U.S. federal government spending peaked at 20 percent of GNP during the Civil War, as opposed to almost 50 percent of GNP for the British government during World War One. The path of debt after the war also differed. U.S. government debt fell steadily as a ratio to GNP as the economy expanded over the late 1860s and 1870s. By contrast, despite balanced budgets, the debt ratio in Britain was essentially unchanged after 1922 as slow growth in real output combined with price deflation kept nominal GNP level over time.

Chart 4 shows the path of domestic and foreign interest rates. Over the 1860-80 period yields on U.S. greenback railroad bonds are compared with British consol yields.¹⁸ Greenback interest rates on private sector bonds stayed above the British consol rate over the entire floating period, falling steadily as resumption neared and continuing to fall for a long period after resumption occurred (Bordo and Rockoff, 1995). Apparently, the uncertainties and need for capital inflows associated with resumption were large enough to perpetuate a premium on greenback loans, albeit a diminishing one, even after the Resumption Act of 1875.

Over the 1910-30 period British short- and long-term interest rates (bank bills and consols) are reported, together with differentials from equivalent U.S. rates (railroad bonds and commercial paper). British short rates rose sharply in 1920, and the severity of the contractionary monetary

¹⁸The observed spread between the two instruments may reflect the greater risk of a private sector than a government instrument.

policy is illustrated by the rise in differentials with the United States. After falling in the early 1920s, short rates rise again in the mid-1920s close to the time of resumption. Part of this increase presumably reflects the unwinding of market anticipations, as well as cooperation between the U.S. Federal Reserve and the Bank of England at the time of resumption, with the Federal Reserve conducting an expansionary monetary policy in part to induce capital inflows to Britain. After resumption, high interest rates were also needed to defend the exchange-rate peg, particularly after 1926 when the French restored gold convertibility for the franc below its pre-1914 parity.¹⁹ These active policies in the 1920s are in contrast to the relatively passive ones pursued before and after the U.S. resumption. This difference between the two episodes may, in part, reflect the absence of a central bank in the United States. The consequences of monetary policy over the late 1920s for the British economy will be discussed further below.

External Balances and Real GNP

Chart 5 shows the behavior of merchandise exports and imports, net property income from abroad, and the current account, all measured as a percentage of GNP.²⁰ The United States was less dependent upon trade than was Britain, implying a smaller role for changes in the exchange rate to affect overall economic activity. Exports and imports were less than 10 percent of U.S. GNP in the 1860s and 1870s, compared to a ratio of over 15 percent of GNP for Britain after World War One. Ratios before 1914 were even higher,

¹⁹Cairncross and Eichengreen (1983).

and the decline may well reflect the disruption in trade patterns and increasing external competition created by the War.²⁰

In both cases the onset of the war led to some compression of the export ratio and, with a lag, a fall in the import ratio. There is a gradual recovery in the export ratio in the United States until 1878, resulting in a steady expansion of the merchandise trade surplus. Between 1878 and 1880 this movement is reversed, and the surplus falls by somewhat less than 2 percent of GNP. While the association between the reversal and the return to gold makes it tempting to associate the two events, the decline in the trade surplus was more likely related to the economic expansion of the late 1870s and early 1880s.

The merchandise trade balance in Britain is in significant deficit throughout the 1910-30 period. Before the war these deficits were offset by inward flows of property income and a surplus in trade in services. These income flows fell significantly after the war, thereby weakening Britain's overall external position. As in the case of the United States, resumption appears associated with a deterioration in the trade balance. From an average of 2 1/2 percent of GNP between 1920 and 1924, the merchandise trade deficit rose to 7 percent in 1926, and then averaged about 5 percent between 1927 and 1929. As domestic demand was not strong over this period, the decline appears likely to be related to restoring the gold parity. However, the 2 1/2 percentage point deterioration in the trade balance as a percentage of GNP between 1920 to 1924 and 1927 to 1929 does not appear to be a sufficiently large drag on the economy to generate a dramatic

²⁰Eichengreen (1992).

deterioration in economic prosperity. If the gold parity was crucially important in explaining Britain's economic problems in the late 1920s, the main impact must have come through government policies to deflate demand rather than through the trade balance itself--through expenditure reducing policies, not expenditure switching ones.

U.S. real GNP, reported in Chart 6, stayed relatively flat during most of the war,²¹ however, on the cessation of hostilities, the economy entered a long period of robust output growth, with real GNP growing at an estimated average rate of 4 1/2 percent per annum between 1865 and 1880. Hence, resumption took place at a time of economic expansion and prosperity.

The experience of Britain was very different.²² Real GNP is estimated to have risen by about 10 percent during the war, followed by a precipitous fall in activity. By 1921 real output had fallen over 10 percent below its 1913 level. Despite some recovery, it remained below its 1913 level until 1925. There was another recession in 1926, when real GNP fell by some 5 percent due to the general strike and impact of the real appreciation associated with resumption. In 1927-29 output recovered again, although at a slower pace than in the early 1920s.

We also have relatively reliable unemployment data for this period, which are reported in Chart 6.²³ After World War One unemployment was below 4 percent. In 1921, however, it rose dramatically to over 11 percent

²¹Berry's estimates, which we use, indicate a significant rise in output in 1864, near the end of the Civil War. However, this increase is open to considerable doubt as other accounts of the period (Engerman (1971) and Goldin and Lewis (1975)) imply a considerably more anemic performance.

²²The Irish Republic gained independence in 1921. All series are spliced to take account of this change.

²³The series in the graph come from Feinstein (1972), Table 57.

of the labor force. Despite a subsequent fall, it was never below 6 1/2 percent for the rest of the decade, a level considerably higher than immediately before and after World War One.²⁴ Unemployment reached double digits in 1930, at the onset of the Great Depression.

The role of monetary policy, interest rates and the exchange rate in explaining the path of real output and unemployment in Britain in the 1920s, both immediately after the war when the decision to resume at the pre-war parity was made and from 1926 on after the parity was achieved, is central to any interpretation of the impact of resumption policies on Britain. The preceding analysis has indicated that the underlying policies with respect to money supply and fiscal policy were remarkably similar across both resumptions. If Britain's return was a policy error, it must be because the chosen parity was sufficiently overvalued to enforce contractionary policies and prevent current account improvement, thereby driving output significantly below potential. It is to this topic that we now turn.

IV. Aggregate Demand and Supply

There is an extensive literature on the causes and consequences of British's anemic growth performance of the 1920s.²⁵ Debate hinges on differing estimates of the relative importance of supply factors, in particular the increase in the replacement ratio, and of insufficient

²⁴Comparable levels of unemployment, however, were experienced in 1908 and 1909.

²⁵However, Matthews et al (1982) estimate that the growth of British real GDP per annum at 2.3 percent in the interwar period (1924-37) was considerably higher than the previous decade (1913-24, at 0.2 percent) and the succeeding period (1937-51, at 1.5 percent). As average rates of growth are provided only over these periods, it is not possible to consider Britains' performance in the late 1920s alone.

aggregate demand attributed to an overvalued exchange rate and high interest rates. The traditional consensus view on high and persistent British unemployment in the interwar period has attributed it to insufficient aggregate demand (Thomas 1986). This view, however, has been challenged by Benjamin and Kochin (1979 and 1982) who emphasize the rise in the natural rate of unemployment caused by the increase in the replacement ratio (the ratio of unemployment benefits to wages). Their approach was, in turn, strongly challenged by several authors, and the recent consensus view gives the replacement ratio a relatively minor role over the period (Eichengreen 1987). The role of other supply factors such as structural changes in international markets, declining productivity, and declining hours of work, has also been stressed in the recent literature (Aldcroft (1968), Richardson (1970), Matthews (1982), and Broadberry (1986)).²⁶

This section uses structural vector autoregressions to identify the underlying factors behind the evolution of real output during the period, and, in particular, to distinguish between the role of aggregate demand and supply factors.²⁷ The methodological point of departure is the aggregate demand-aggregate supply model. Aggregate demand is downward sloping in price-output space, reflecting the fact that lower prices raise real money balances and therefore product demand. The short-run aggregate supply curve is upward sloping under the assumption that capacity utilization can be

²⁶The most recent attempt to distinguish supply from demand determinants by Dimsdale and Horsewood (1995) finds a weak impact from the replacement ratio and identifies a decline in real import prices as a key determinant of the high level of unemployment.

²⁷For earlier work using this model on historical data see Bayoumi and Eichengreen (1995) and Bayoumi and Eichengreen (1994), and references they cite.

varied in the short run to exploit the profit opportunities afforded by changes in aggregate demand. In the long run, however, aggregate supply is assumed to return to potential.

This model can be estimated using a procedure proposed by Blanchard and Quah (1989) for distinguishing temporary from permanent shocks to a pair of time-series variables, as extended to the present case by Bayoumi (1992).

The Appendix describes and discusses the statistical methodology.

Basically, shocks which have a temporary impact on real output are identified as changes in aggregate demand, while those with permanent effects on real output are identified as changes in aggregate supply. We estimate structural VARs for both the United States from 1860-80 and Britain from 1910-30, although we focus mainly on the results for Britain.²⁸

Chart 7 shows the estimated responses of output and the price level to an average aggregate demand and aggregate supply disturbance in Britain over the 1910-1930 period,²⁹ derived from a vector autoregression including two lags of the growth in the logarithm of real GNP and its associated

²⁸The statistical assumptions required for such a regression to be well-specified are accepted. Dickey-Fuller tests over two sample periods (1910-30 and 1880-38) confirm that the logarithm of the level of output and of the price level were both nonstationary, and were not cointegrated. The same tests generally indicated that growth in output and inflation were stationary. The exception was the test for inflation between 1910-30, where the estimated coefficient was large but not significant at conventional levels, presumably reflecting the low power of the test. The results are reported at the end of the appendix explaining the methodology.

²⁹More precisely, they are the impulse responses to a unit shock to aggregate demand and to aggregate supply. The standard deviations of both shocks is normalized to one in the estimation, so they reflect an average disturbance.

deflator.³⁰ A positive aggregate demand disturbance raises both output and the price level in the short-run. As the disturbance to output is temporary by assumption, this shock to output returns to zero over time, a change which is associated with a further rise in the price level. By contrast, a positive supply shock is associated with a rise in output and a fall in prices (all of these responses also involve a certain amount of cycling over the medium-term). These responses, in particular with respect to the price level, are in close accord with those predicted by the aggregate-demand-aggregate-supply framework.

The implied path for aggregate demand and aggregate supply shocks from 1910-1930 are also shown in the Chart. The expansion in output during World War One is estimated to be largely driven by aggregate demand, plausibly reflecting the pressures of a war-time economy. The recession of the early 1920s appears to reflect two factors. One is a large negative aggregate supply disturbance in 1920, consistent with supply-side stories such as the Benjamin and Kochin hypothesis that the large increase in benefits and coverage associated with the Unemployment Insurance Act of 1920 played a significant role in explaining the subsequent rise in unemployment. The other is the series of negative aggregate demand disturbances from 1919-21, which could reflect the restrictive government policies imposed, at least partially, in response to the decision to return to the pre-war gold parity. The decomposition also identifies a large negative aggregate demand disturbance in 1926, presumably reflecting the deflationary effects of high

³⁰Different samples such as the entire 1880 to 1938 period or 1910-38 produced essentially similar results. The Schwartz Bayesian criterion was used to choose the number of lags, which was found to be two in all samples.

levels of exchange rates and interest rates and the general strike, but the aggregate demand disturbances in 1927 and 1928 are positive. Aggregate supply also appears to have performed well over the late 1920s.

An alternative way of analyzing the results is to calculate the underlying path of real output implied by the estimated aggregate supply shocks. The path implied by aggregate supply disturbances provides an estimate of the movement of supply potential over time. Deviations of actual output from this path, therefore, represent the impact of aggregate demand disturbances on the level of output.

Chart 6 compares the actual path of output with this estimate of underlying potential. Aggregate demand factors are estimated to have been the main factor behind the rise in real output during World War One. They are also an important contributing factor in the subsequent recession. Output gradually returns to the level defined by supply potential between 1921 and 1925, falls again in 1926, after which it remains close to supply potential until 1929. After 1925, therefore, the only significant fall in output due to aggregate demand is the negative shock in 1926, plausibly reflecting the joint impact of the general strike and the appreciation of the real exchange rate due to resumption. This evidence, then, indicates that aggregate demand was a more important factor in explaining the path of real output in the early 1920s than later in the decade.

As a check on the robustness of these results, the vector autoregressions were rerun over a number of alternative sample periods. Similar results are found using data over 1910-38 and 1880-1938, indicating

that they are not dependent on the specific time period chosen.³¹ The implication of this analysis is that if the resumption policy was an important factor in explaining the path of economic growth, then its impact was felt more through the monetary contraction and recession of the early 1920s than through problems later in the decade. In the early 1920s, however, it is difficult to disentangle the impact of domestic policies and external factors, as the recession of 1921 was a wide-spread phenomena in the industrial world.

Results using the U.S. data (not reported) are less satisfactory. The price response to an aggregate supply shock is positive rather than the negative relationship predicted by the aggregate-demand-aggregate-supply framework. This may well reflect the unsatisfactory nature of the underlying estimates of real and nominal GNP.³² Aggregate demand disturbances are found to have only a fleeting impact on output. It suggests that prices were relatively flexible and output was largely determined by aggregate supply factors. This "classical" result can be clearly seen in Chart 6, which shows that almost all of the movements in real output over the 1860-80 period reflects changes in aggregate supply, with a very minor role for aggregate demand. An implication of this analysis is that one of the reasons for the greater turbulence in Britain's economy after World War One compared to the economy of the United States

³¹When World War One is excluded from the analysis by examining the 1920-38 period, the results become considerably more classical, in the sense that output follows supply potential quite closely even in the early 1920s.

³²This result has been found by others looking at the gold standard period. See Bayoumi and Eichengreen (1995) for a discussion of possible reasons, and solutions, to this problem.

after the Civil War may have been the increasing impact of nominal rigidities on aggregate fluctuations.³³

V. Conclusions

This paper has looked at the historical lessons from the resumption of convertibility to gold of the United States in 1879 and of Britain in 1925. Such a comparison is of particular interest given the very different perceptions of the success of the two episodes, with the U.S. resumption being widely regarded as a success and Britain's resumption a failure. We analyzed a variety of possible reasons for this very dissimilar outcome. In particular, we have considered the degree to which the outcomes reflected differences in strategies adopted by the authorities or differences in the external environment. The former include factors such as announcing the date of resumption before hand and the macroeconomic policies adopted to validate the exchange rate peg. The latter involve the growth in output in the rest of the world and the stability of the international financial system.

We found more similarities than differences in the overall behavior of the authorities as regards the performance of the money supply, price levels, real exchange rates, and fiscal policies. In both cases the money supply was contracted somewhat immediately after the war and then left reasonably constant over time, balanced budgets were followed, and domestic prices trended down in such a manner that the real exchange rate on

³³This increase in nominal rigidities is also found using the same methodology on a much wider set of countries, as reported in Bayoumi and Eichengreen (1995).

resumption was not very far from its pre-suspension value. At the same time, the resumption policy appears to have caused larger changes in monetary policy in Britain, with short-term interest rates rising significantly in both 1920 and around the date of resumption.

It is with respect to the behavior of real activity, however, that the main difference appears. The 1860s and 1870s were a period of considerable prosperity for the United States, with real output growing at a robust rate both well before and immediately after resumption. In Britain, by contrast, output growth was anemic in the 1920s, with a recession in 1921 followed by a recovery, and another downturn and subsequent recovery in 1926. While monetary policy and the chosen parity may have had some part in this moribund performance, particularly with respect to the 1921 recession, our analysis indicates that this was in all probability a secondary factor, particularly from 1924 on.

The combination of similar overall policy stances but different paths for real output leads us to the conclusion that external factors were the most important determinant of the different outcomes of the two episodes. The United States was a rapidly emerging, but not yet dominant, economic power when it returned to the gold standard, which was functioning smoothly in a prosperous world environment. By contrast, Britain was a major economic player whose return occurred at a time of considerable worldwide economic uncertainty caused by the aftermath of the war, the recessions experienced by many economies in the early 1920s, the damage to pre-1914 trading relations, and the wrangling over reparations payments. The exchange rate system was also in disarray, with most countries still

maintaining floating exchange rates and many unwilling to return to the gold exchange standard at their pre-1914 parities. Indeed, the subsequent failure of France to return to the gold exchange standard at its pre-1914 parity and the pursuit (along with the United States) of a gold hoarding policy played an important role in undermining the viability of the system, generating destabilizing capital flows and fostering lack of cooperation across countries. Not surprisingly, the gold exchange standard collapsed in the face of the onset of the Great Depression. However this appears to have been a function of the instability of the system in general, not the policies of Britain in particular.

What does this analysis have to say about the path to EMU? The basic message appears to be that tactics--announcing and setting the parities, timing the entry, and following consistent macroeconomic policies--may be less important than fundamentals such as the underlying path of output growth. In addition, Britain's 1925 resumption illustrates the costs from lack of international cooperation. Prosperity, and cooperation, appear to be the keys to the success of a single European currency.

References

- Aldcroft, D.H. (1970). *The Interwar Economy: Britain 1919-39*. London: Batsford.
- Balke, Nathan S. and Robert J. Gordon (1989). "The Estimation of Prewar Gross National Product: Methodology and New Evidence." *Journal of Political Economy*, 97, 1, (February), pp. 38-92.
- Bayoumi, Tamim (1992), "The Effects of the ERM on Participating Economies," *IMF Staff Papers*, June, pp. 330-356.
- Bayoumi, Tamim and Barry Eichengreen (1994), "Macroeconomic Adjustment under Bretton Woods and the Post-Bretton-Woods Float: An Impulse Response Analysis," (1994) *Economic Journal* Vol. 104: 813-28.
- Bayoumi, Tamim and Barry Eichengreen (1995), "The Stability of the Gold Standard and Evolution of the International Monetary System," forthcoming in Tamim Bayoumi, Barry Eichengreen, and Mark P. Taylor (editors) *Modern Perspectives on the Gold Standard* Cambridge: Cambridge University Press.
- Benjamin, Daniel and Levis Kochin. (1979). "Searching for an Explanation of Unemployment in Interwar Britain." *Journal of Political Economy*, 87, pp. 441-78.
- Benjamin, Daniel and Levis Kochin. (1978). "Unemployment and Unemployment Benefits in 20th Century Britain: A Reply to our Critics." *Journal of Political Economy*, 90, pp. 410-436.
- Berry, T.S. (1988). *Production and Population Since 1789: Revised GNP Series in Constant Dollars*. Richmond: Bostwick Press.
- Blanchard, Olivier and Danny Quah (1989), "The Dynamic Effects of Aggregate Demand and Aggregate Supply Disturbances," *American Economic Review* 79, pp. 655-673.
- Blanchard, Olivier and Danny Quah (1993), "Reply to Comment on The Dynamic Effects of Aggregate Demand and Aggregate Supply Disturbances by Lippi and Reichlin," *American Economic Review* 83, pp. 653-658.
- Bordo, Michael and Hugh Rockoff (1995) "The Gold Standard as a 'Good Housekeeping Seal of Approval'" NBER Working Paper No. 5340.
- Broadberry, S.N. (1986) "Aggregate Supply in Interwar Britain." *Economic Journal*, 96, pp. 407-481.
- Brown, W.A. (1929) *England and the New Gold Standard, 1919-1926*. New Haven: Yale University Press.

- Cairncross, Alexander and Barry Eichengreen (1985). *Sterling in Decline*. Oxford: Basil Blackwell.
- Calomiris, Charles (1993). "Greenback Resumption and Silver Risk: The Economics and Politics of Monetary Regime Change in the United States, 1862-1900." In Michael D. Bordo and Forrest Capie (eds.) *Monetary Regimes in Transition*. Cambridge: Cambridge University Press.
- Calomiris, Charles (1988). "Price and Exchange Rate Determination During the Greenback Suspension." *Oxford Economic Papers*, December.
- Capie, Forrest and Alan Webber (1985) *A Monetary History of the United Kingdom 1870-1982* London: Allen and Unwin.
- Dimsdale, Nicholas H. and Nicholas Horsewood (1995). "Fiscal Policy and Employment in Interwar Britain: Some Evidence From a New Model." *Oxford Economic Papers*, 47, pp. 409-496.
- Eichengreen, Barry (1992a). "The Gold Standard Since Alec Ford." In S.N. Broadberry and N.F.R. Crafts (eds.) *Britain in the International Economy, 1870-1939*. Cambridge: Cambridge University Press.
- Eichengreen, Barry (1992b). "Golden Fetters: The Gold Standard and the Great Depression, 1919-1939." New York: Oxford University Press.
- Eichengreen, Barry and T.J. Hatton (1988). (eds) *Interwar Unemployment in International Perspective*. Centre for Economic Policy Research. Boston: Kluwer Academic Publishers.
- Eichengreen, Barry (1987). "Unemployment in Interwar Britain: Dole or Doldrums?" *Oxford Economic Papers*, 38, No. 21. (December). pp. 597-623.
- Engerman, Stanley L. (1971). "The Economic Impact of the Civil War." *Explorations in Entrepreneurial History*, Second Series, 3, Spring/Summer 1966, pp. 179-99. Reprinted with revisions in *The Reinterpretation of American Economic History*, eds. Robert W. Fogel and Stanley L. Engerman. New York: Harper & Row, pp. 369-79.
- Feinstein, C.H. (1972) *National Income, Expenditure and Output of the United Kingdom 1855-1965*. Cambridge: Cambridge University Press.
- Friedman, Milton and Anna J. Schwartz (1963). *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press.
- Friedman, Milton and Anna J. Schwartz (1970). *Monetary Statistics of the United States*. New York: Columbia University Press.
- Friedman, Milton and Anna J. Schwartz (1982). *Monetary Trends in the United States and United Kingdom*. Chicago: University of Chicago Press.

- Goldin, Claudia D. and Frank D. Lewis (1975). "The Economic Cost of the American Civil War: Estimates and Implications." *Journal of Economic History*, 35, (June), pp. 299-326.
- Grilli, V. (1989). "Managing Exchange Rate Crises: Evidence from the 1890s." NBER Working Paper No. 3068, August.
- Hume, L.J. (1963). "The Gold Standard and Deflation: Issues and Attitudes in the Nineteen Twenties." *Economica*, 30, pp. 225-242.
- Keynes, J.M. (1925) (1972). "The Economic Consequences of Mr. Churchill." In *The Collected Writings of John Maynard Keynes, Vol. IX. Essays in Persuasion*. London: Macmillan.
- Kindleberger, C.P. (1973). *The World in Depression, 1929-1939*. University of California Press, Berkeley.
- Lippi, Marco and Lucrezia Reichlin (1993) "Comment on The Dynamic Effects of Aggregate Demand and Aggregate Supply Disturbances," *American Economic Review* 83, pp. 644-652.
- Matthews, K.G.P. (1986a). "Was Sterling Overvalued in 1925?" *Economic History Review* 2nd ser. XXXIX, 4, pp. 572-587.
- Matthews, K.G.P. (1986b). *The Interwar Economy: An Equilibrium Analysis*. Gower-Aldeshot.
- Matthews, R.C.O., C.H. Feinstein and J.C. Odling-Smee (1982) *British Economic Growth 1856-1973* Stanford: Stanford University Press.
- Macaulay, Frederick R. (1938) *The Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856* New York: National Bureau of Economic Research.
- Miller, Marcus and Alan Sutherland (1994). "Speculative Anticipations of Sterling's Return to Gold: Was Keynes Wrong?" *Economic Journal*. (July).
- Miller, Marcus and Alan Sutherland (1992). "Britain's Return to Gold and Entry into the ERM." In Paul Krugman and Marcus Miller (eds.) *Exchange Rate Targets and Currency Bands*. Cambridge: Cambridge University Press.
- Mitchell, Brian (1988) *Abstract of British Historical Statistics* Cambridge: Cambridge University Press.
- Mitchell, W.C. (1903) *A History of the Greenbacks*. Chicago: University of Chicago Press.

- Officer, Lawrence H. (1984). "The Floating Dollar in the Greenback Period: A Test of Theories of Exchange -Rate Determination." *Journal of Economic History*, (June) pp. 629-650.
- Officer, Lawrence H. (1985). "Integration in the American Foreign Exchange Market, 1791-1900." *Journal of Economic History*, XLV No. 3 (September) pp. 557-581.
- Pollard, S. (1970). (ed.) *The Gold Standard and Employment Policies Between the Wars*. London: Methuen.
- Presnell, L.S. (1978) "1925: The Burden of Sterling," *Economic History Review* Vol. 1, pp. 67-88.
- Redmond, J. (1984). "The Sterling Overvaluation in 1925: A Multilateral Approach." *Economic History Review*. 2nd ser. XXXVII, pp. 520-532.
- Richardson, H.W. (1967). *Economic Recovery in Britain 1932-39*. London: Weidenfeld and Nicholson.
- Roll, R. (1972). "Interest Rates and Price Expectations During the Civil War." *Journal of Economic History*, XXXII.
- Rolnick, A.J. and Wallace, N. (1984). "Suspension and the Financing of the Civil War: A Critique of Newcomb and Mitchell." Federal Reserve Bank of Minneapolis Working Paper No. 265.
- Romer, Christina D. (1989). "The Prewar Business Cycle Reconsidered: New Estimates of Gross National Product, 1869-1908." *Journal of Political Economy*, 97, 1, (February) pp. 1-37.
- Smith, W.S. and Smith, R.T. (1990). "Stochastic Process Switching and the Return to Gold." *Economic Journal*, 100 (March), pp. 164-175.
- Temin, P. (1989). *Lessons from the Great Depression*. Cambridge: M.I.T. Press.
- Thomas, T.J. (1981). "Aggregate Demand in the United Kingdom 1918-45." In R. Floud and D.N. McCloskey (eds). *The Economic History of Britain Since 1700*, 2. Cambridge: Cambridge University Press.
- Timberlake, Richard H. (1975). "The Resumption Act and the Money Supply." *Journal of Economic History* 43, 3 (September), pp. 729-39
- Timberlake, Richard H. (1993) *Monetary Policy in the United States: An Intellectual and Institutional History*, (Chicago: University of Chicago Press).
- Unger, I. (1964). *The Greenback Era: A Social and Political History of American Finance, 1865-1879*. Princeton: Princeton University Press.

U.S. Department of Commerce. (1975). *Historical Statistics of the United States*. Washington, DC.

Appendix: The Blanchard-Quah Methodology

Consider a system where the true model can be represented by an infinite moving average representation of a (vector) of variables, X_t , and an equal number of shocks, ϵ_t . Using the lag operator L , this can be written as:

$$\begin{aligned} X_t &= A_0\epsilon_t + A_1\epsilon_{t-1} + A_2\epsilon_{t-2} + A_3\epsilon_{t-3} \dots \\ &= \sum_{i=0}^{\infty} L^i A_i \epsilon_t \end{aligned} \quad (3.1)$$

where the matrices A_i represent the impulse response functions of the shocks to the elements of X .

Let X_t be made up of change in output and the change in prices, and let ϵ_t be demand and supply shocks. Then the model becomes:

$$\begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix} = \sum_{i=0}^{\infty} L^i \begin{bmatrix} a_{11i} & a_{12i} \\ a_{21i} & a_{22i} \end{bmatrix} \begin{bmatrix} \epsilon_{dt} \\ \epsilon_{st} \end{bmatrix} \quad (3.2)$$

where y_t and p_t represent the logarithm of output and prices, ϵ_{dt} and ϵ_{st} are independent supply and demand shocks, and a_{11i} represents element a_{11} in the matrix A_i .

The framework implies that while supply shocks have permanent effects on the level of output, demand shocks only have temporary effects. (Both have permanent effects upon the level of prices.) Since output is written in first difference form, this implies that the cumulative effect of demand shocks on the change in output (Δy_t) must be zero. This implies the restriction:

$$\sum_{i=0}^{\infty} a_{11i} = 0. \quad (3.3)$$

The model defined by equations (A.2) and (A.3) can be estimated using a vector autoregression. Each element of X_t can be regressed on lagged values of all the elements of X . Using B to represent these estimated coefficients, the estimating equation becomes,

$$\begin{aligned} X_t &= B_1 X_{t-1} + B_2 X_{t-2} + \dots + B_n X_{t-n} + e_t \\ &= (I - B(L))^{-1} e_t \\ &= (I + B(L) + B(L)^2 + \dots) e_t \\ &= e_t + D_1 e_{t-1} + D_2 e_{t-2} + D_3 e_{t-3} + \dots \end{aligned} \quad (3.4)$$

where e_t represents the residuals from the equations in the vector autoregression. In the case being considered, e_t is comprised of the residuals of a regression of lagged values of Δy_t and Δp_t on current values of each in turn; these residuals are labeled e_{yt} and e_{pt} , respectively.

To convert (A.4) into the model defined by (A.2) and (A.3), the residuals from the VAR, e_t , must be transformed into demand and supply shocks, ϵ_t . Writing $e_t = C\epsilon_t$, four restrictions are required to define the four elements of the matrix C in the two-by-two case considered. Two are simple normalizations, which define the variance of the shocks ϵ_{dt} and ϵ_{st} . A third comes from assuming that demand and supply shocks are orthogonal.

The final restriction, which uniquely defines the matrix C , is that demand shocks have only temporary effects on output. This implies equation (A.3). In terms of the VAR:

$$\sum_{f=0}^{\infty} \begin{bmatrix} d_{11f} & d_{12f} \\ d_{21f} & d_{22f} \end{bmatrix} \begin{bmatrix} c_{11} & c_{12} \\ c_{21} & c_{22} \end{bmatrix} = \begin{bmatrix} 0 & . \\ . & . \end{bmatrix} \quad (3.5)$$

This allows C to be uniquely defined and the demand and supply shocks to identified. Note from equation (A.4) that the long run impact of the shocks on output and prices is equal to $(I-B(1))^{-1}$. The restriction that the long-run effect of demand shocks on output is zero implies a simple linear restriction on the coefficients of this matrix.

This is where our analysis, based on Blanchard and Quah (1989), differs from other VAR models. The usual decomposition assumes that the variables in the VAR can be ordered such that all the effects which could be attributed to (say) either a_t or b_t are attributed to whichever comes first in the ordering, which is achieved by a Choleski decomposition.

The Blanchard-Quah procedure has also come in for some criticism. Lippi and Reichlin (1993), in a comment on the Blanchard-Quah paper, point out that the procedure includes the assumption that the error terms in the model are fundamental, and that nonfundamental representations can give different results. As noted by Blanchard and Quah (1993) in their reply, however, this is a very general issue which is not specific to VAR representations, but covers virtually all dynamic analysis. Hence, while acknowledging that the assumption that the errors are fundamental is important to our procedure, we would note that this is a very general assumption in applied time-series work.

Dickey Fuller Tests of Stationarity		
	1910-1930	1880-1938
Log of Output	-1.54	-1.31
Log of Prices	-1.43	-0.41
Residual from a Cointegrating Regressions	-1.93	-1.27
Δ Log of Output	-3.34*	-6.44**
Δ Log of Prices	-2.17	-3.53*

Notes: One and two asterisks indicate that the hypothesis of stationarity can be accepted at the 5 and 1 percent significance level, respectively. The reported coefficients are the t-statistics from a regression of the form $\Delta x = \alpha + \beta x(-1)$, where x is the variable being tested. The residuals from the cointegrating regression are the residuals from a regression of the form $y = \alpha + \beta p + \epsilon$, where y and p are the logarithms of output and prices, respectively.

Data Sources

US Data, 1860-80 (unless otherwise indicated).

Money supply. High powered money: 1860-66 Friedman and Schwartz (1970) Table 13; 1867-80 Friedman and Schwartz (1963) Table B.3.

Nominal and real. Berry (1988) Table 3 (nominal) and Table 7 (real).

Price level. Implicit GNP deflator from Berry (1988). 1910-30 Balke and Gordon (1985).

Exchange Rate. Sterling-dollar rate. Officer (1985), Friedman and Schwartz (1982).

Federal government revenue, expenditure, deficit, and debt. U.S. Department of Commerce (1975), Series Y335-338.

Merchandise exports, imports, and deficit. U.S. Department of Commerce (1975), Series U2-4.

Interest rates. Railroad bonds, 1860-80 and 1910-30 and commercial paper 1910-30, Macaulay (1938).

UK Data, 1910-30 (unless otherwise stated).

Money supply. M3 Capie and Weber (1985) Table 1.(3).

Nominal and Real GDP. Feinstein (1972) Tables 3 (nominal) and 5 (real).

Price level. Implicit deflator from Feinstein (1972) above. 1860-70 interpolated using data from Table 1.

Unemployment. Feinstein (1972), Table 57.

Exchange Rate. Sterling-dollar rate. Officer (1985), Friedman and Schwartz (1982).

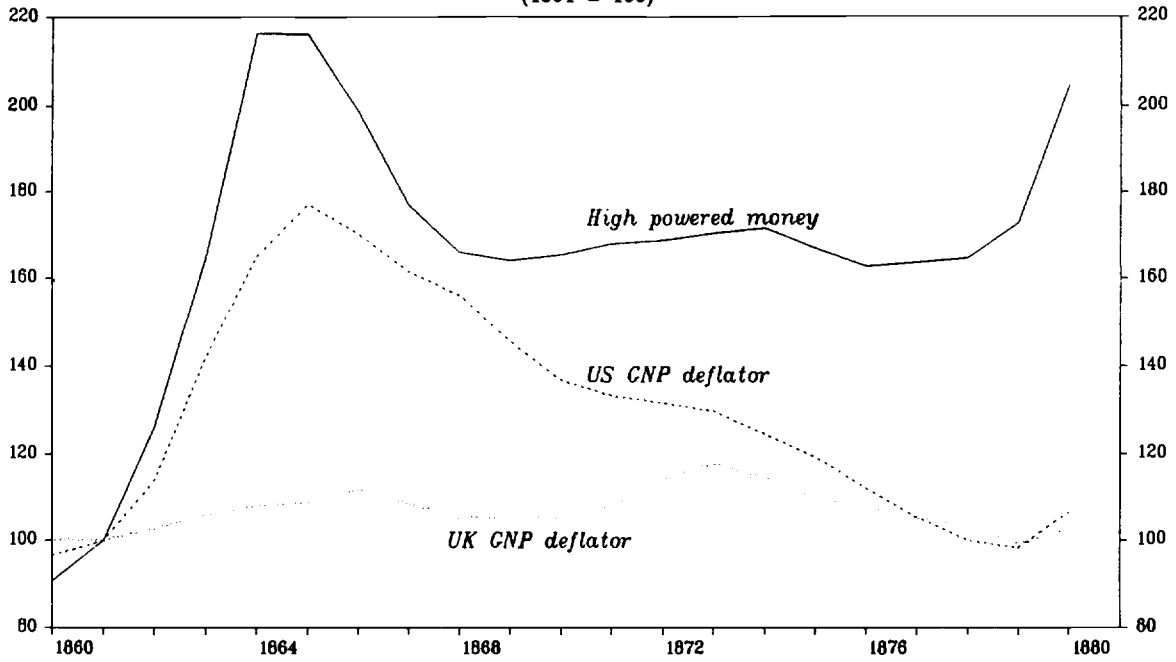
Gross public income, expenditures, and debt. Mitchell (1988), Public Finance Tables 3, 4, and 7.

Merchandise exports, imports, and deficit. Feinstein (1972), Table 37.

Interest rates. Consols and prime bank bills, Capie and Weber (1985) Table III.10. Consols 1860-80 Mitchell (1988) Financial Institutions, Table 13.

Chart 1.

U.S. Money and Prices: 1860-80 (1861 = 100)



U.K. Money and Prices: 1910-30 (1913 = 100)

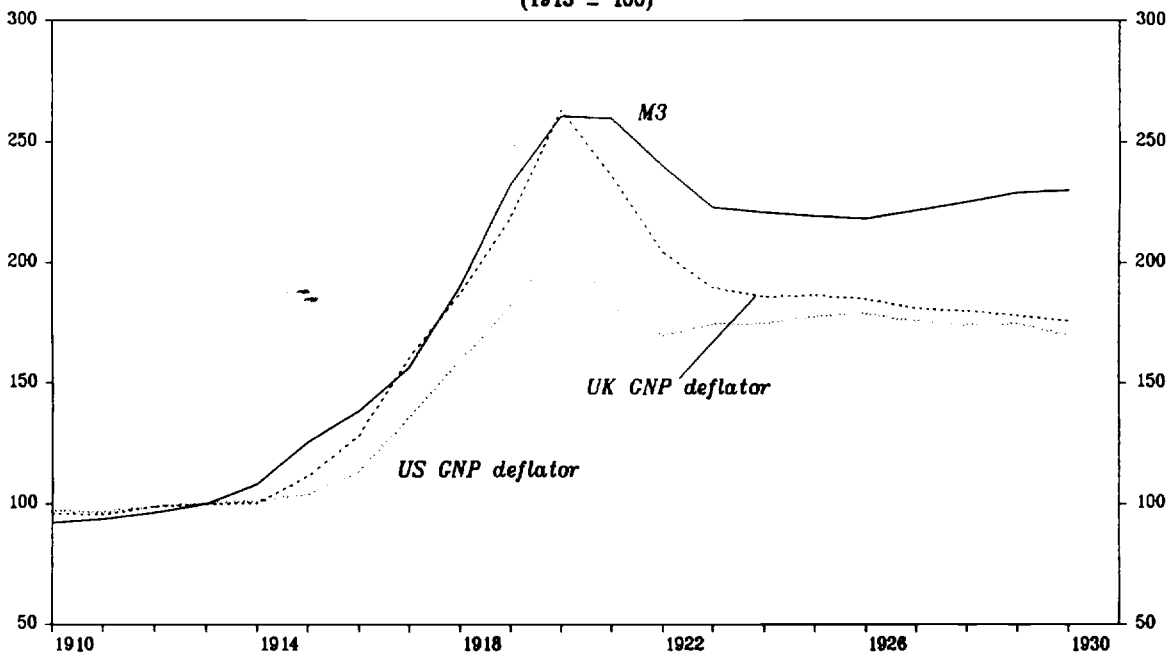
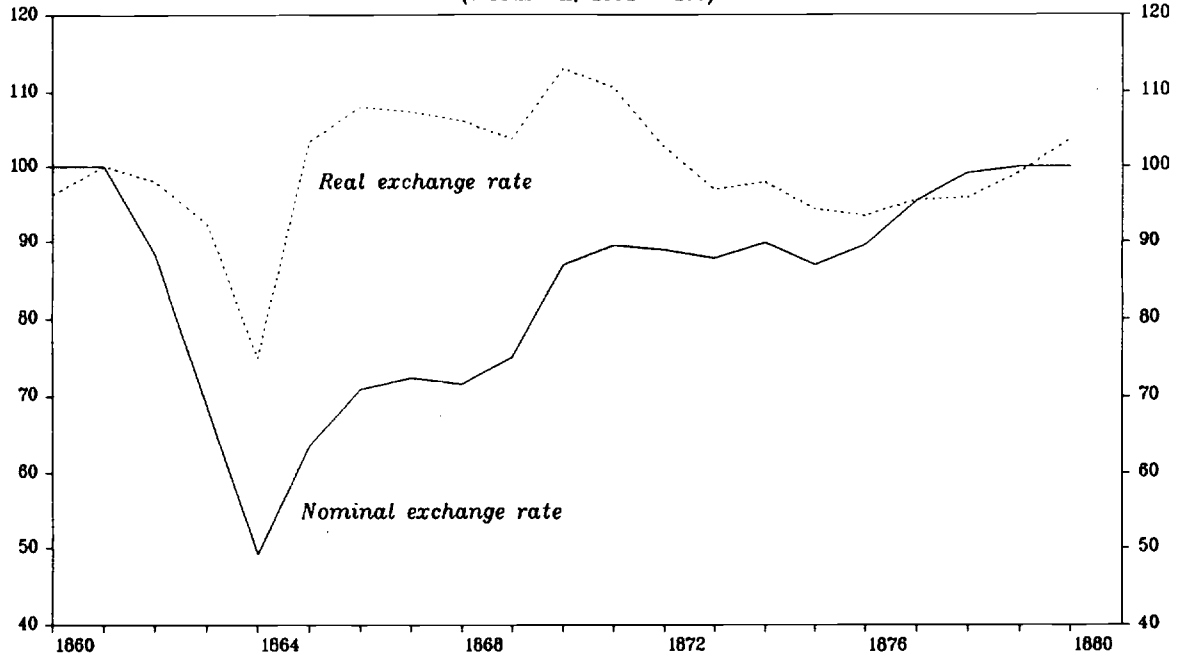


Chart 2.

U.S. Exchange Rates: 1860-80

(Versus UK, 1861 = 100)



U.K. Exchange Rates: 1910-30

(Versus US, 1913 = 100)

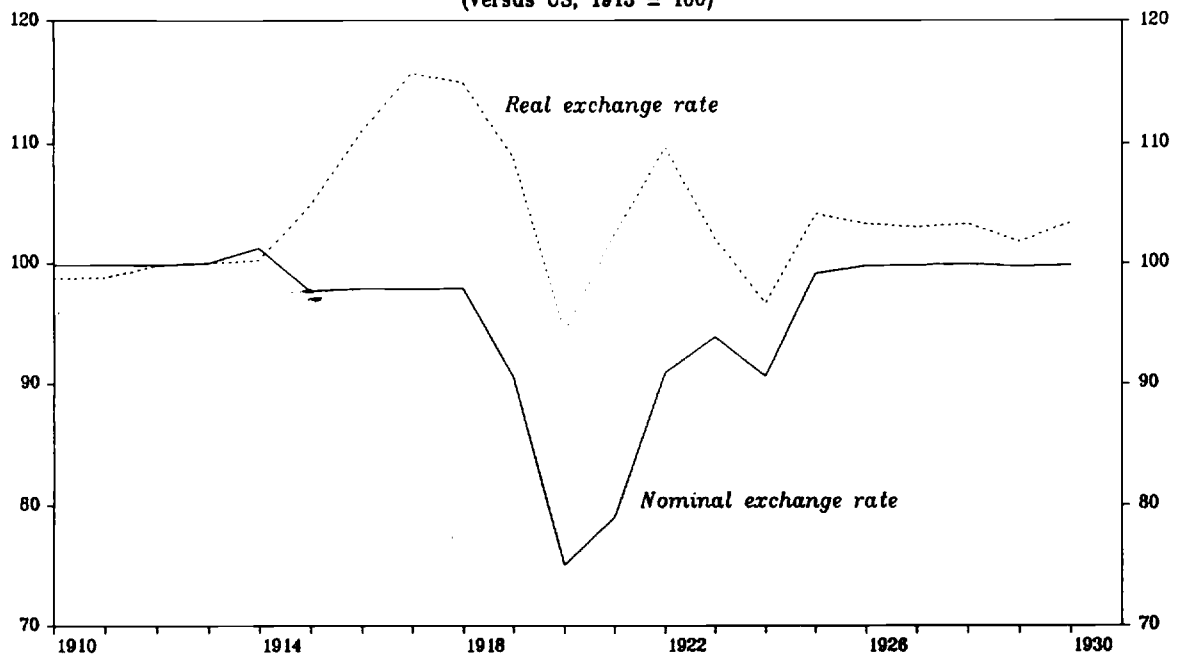
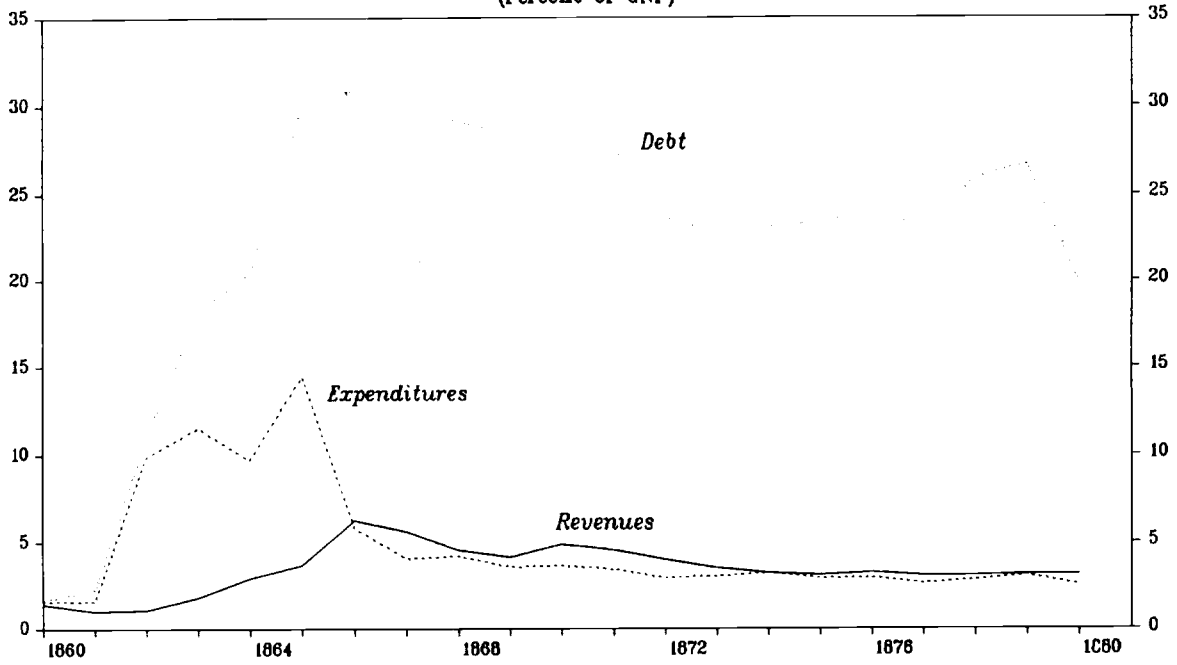


Chart 3.

U.S. Federal Fiscal Policy: 1860-80 (Percent of GNP)



U.K. Fiscal Policy: 1910-30 (Percent of GNP)

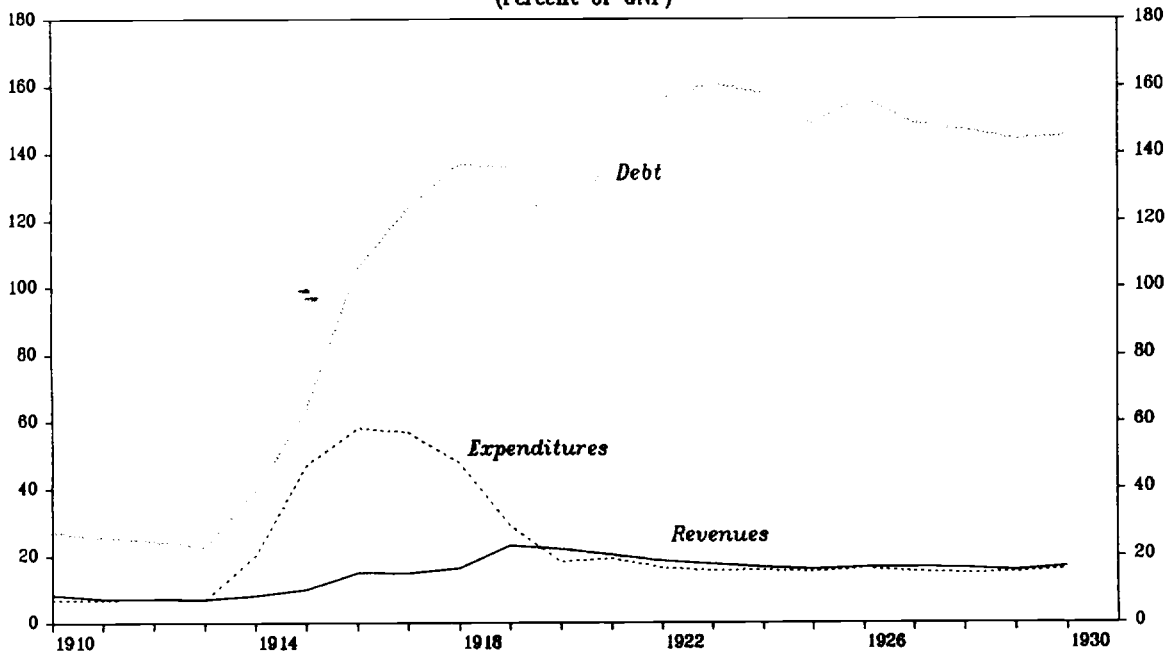


Chart 4.

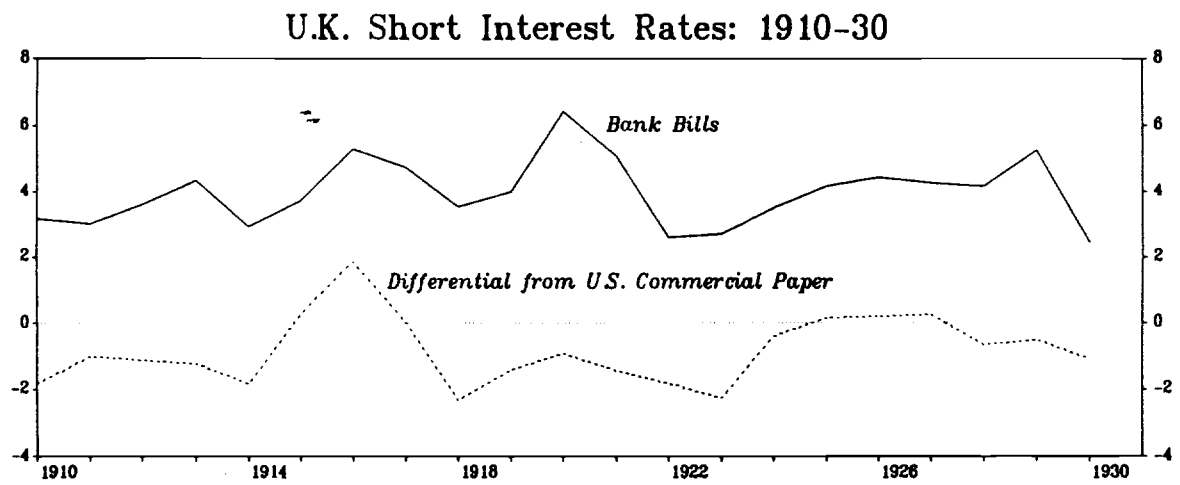
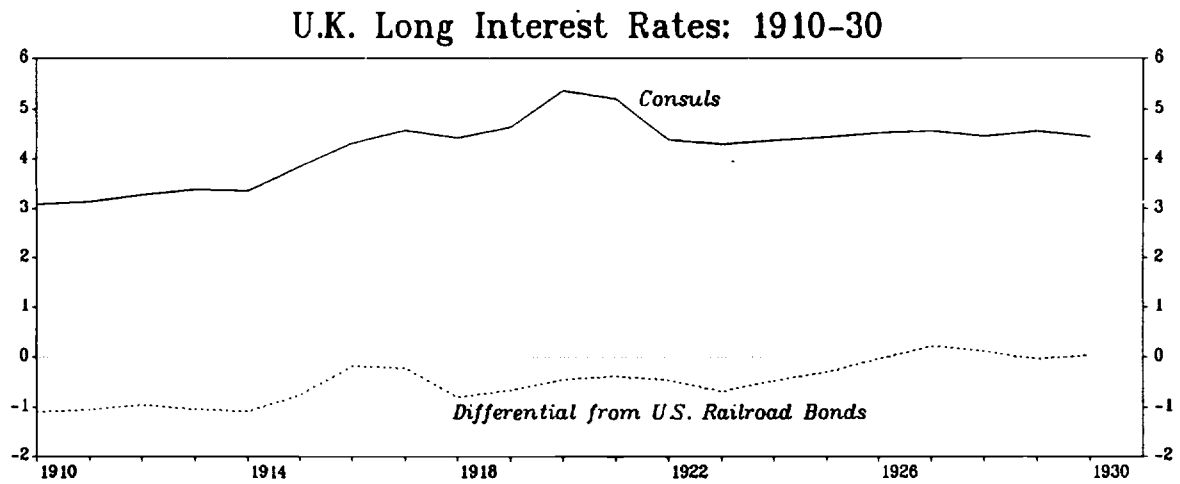
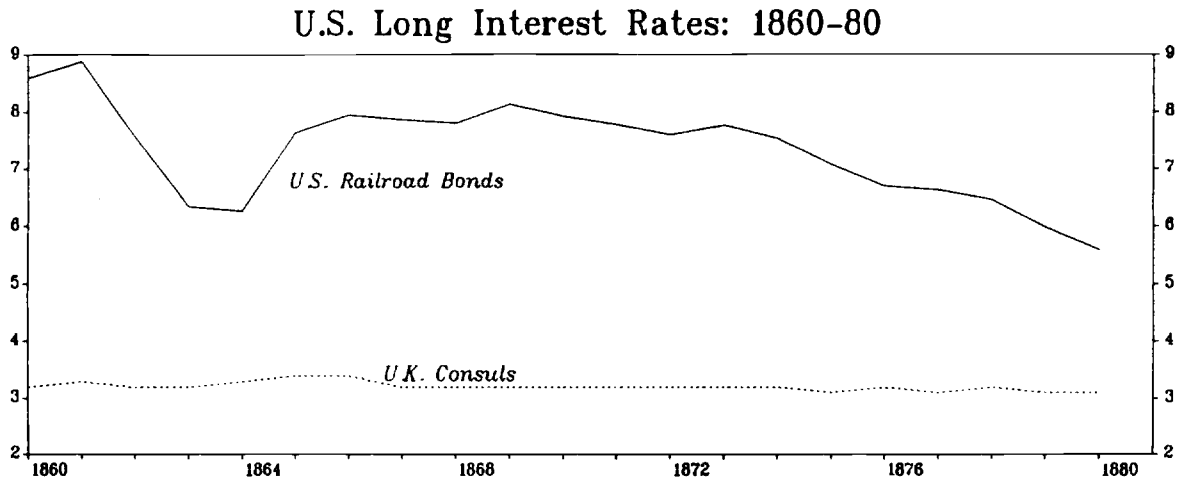
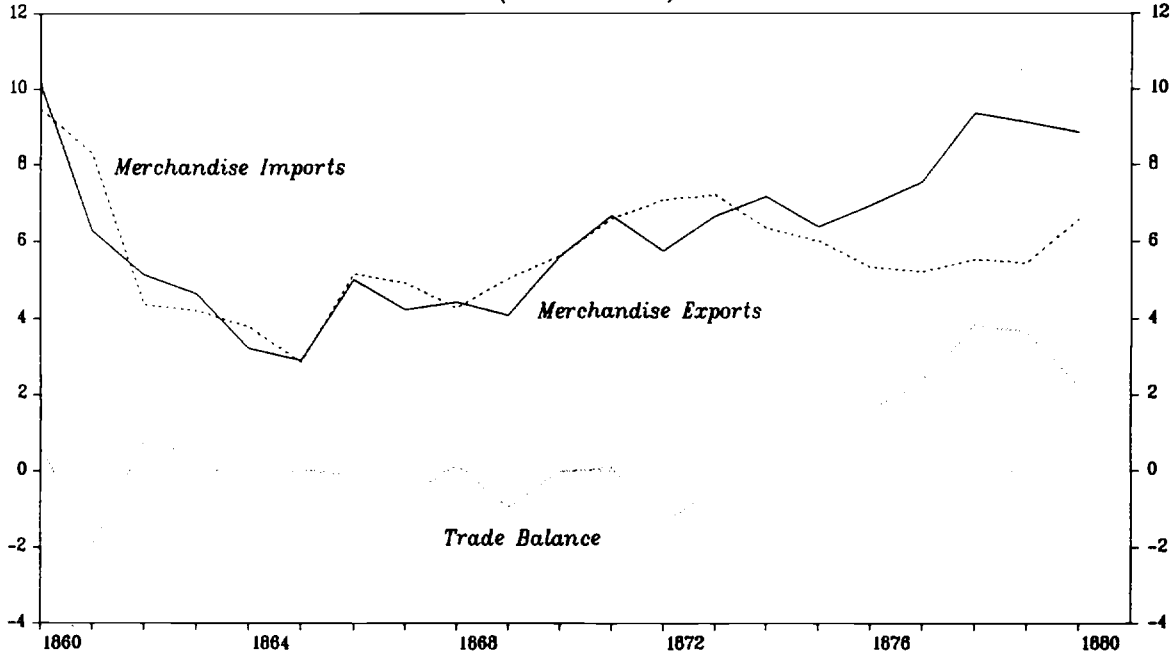


Chart 5.

U.S. External Position: 1860-80

(Percent of GNP)



U.K. External Position: 1910-30

(Percent of GNP)

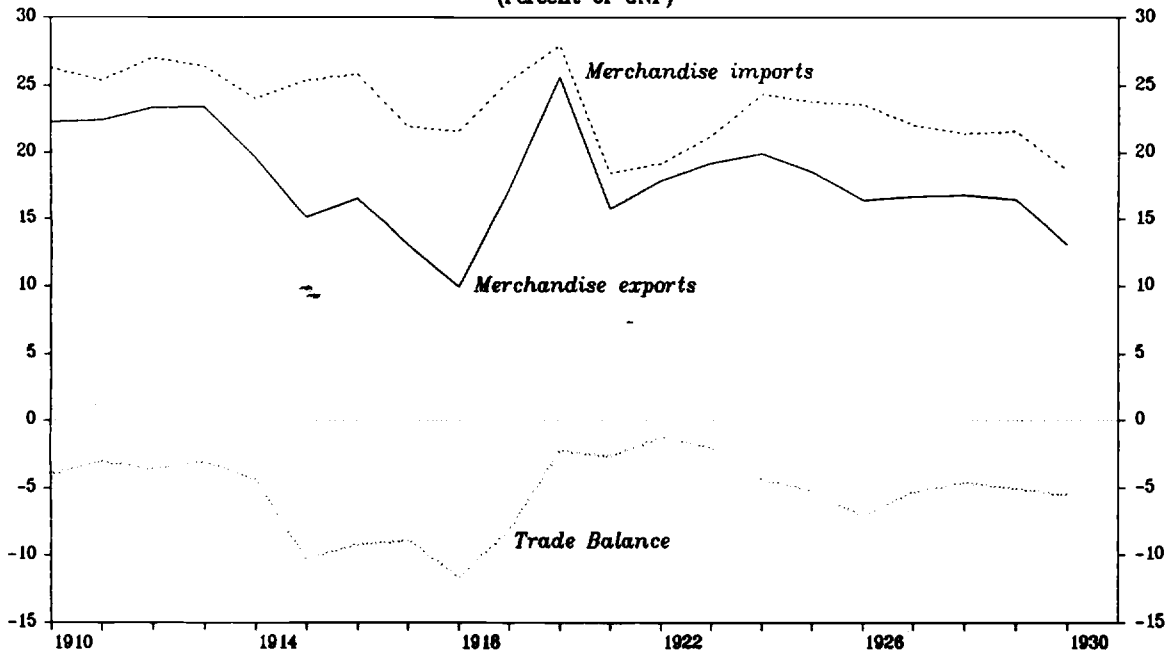
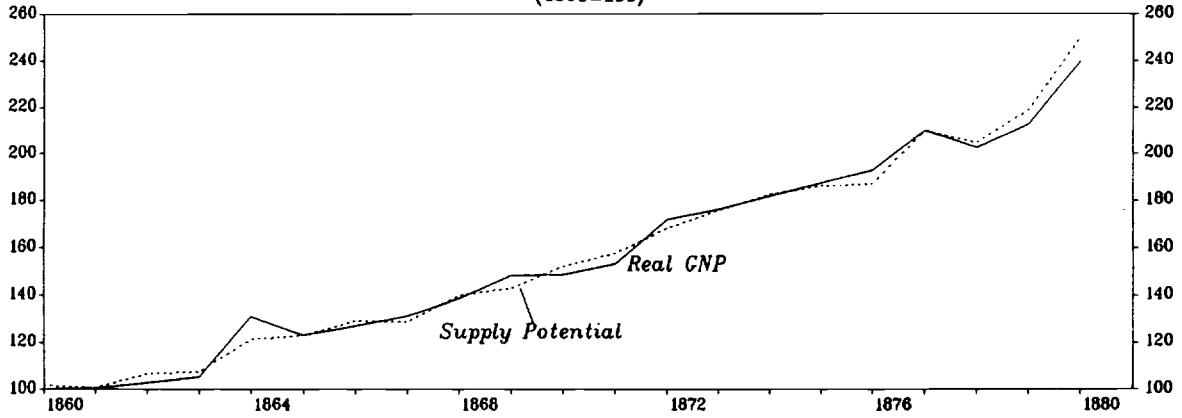
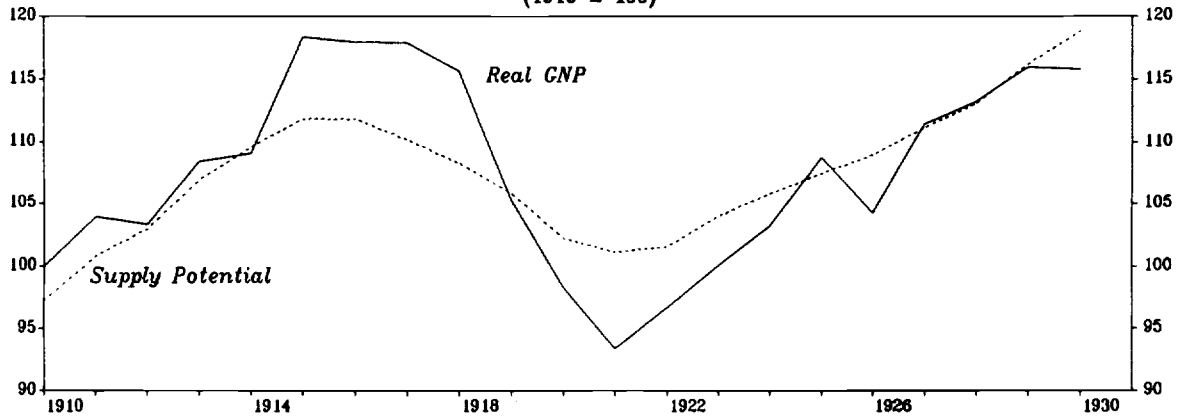


Chart 6.

U.S. Real Activity: 1860-80 (1860=100)



U.K. Real Activity: 1910-30 (1910 = 100)



U.K. Unemployment Rate: 1910-30 (Percentage rate)

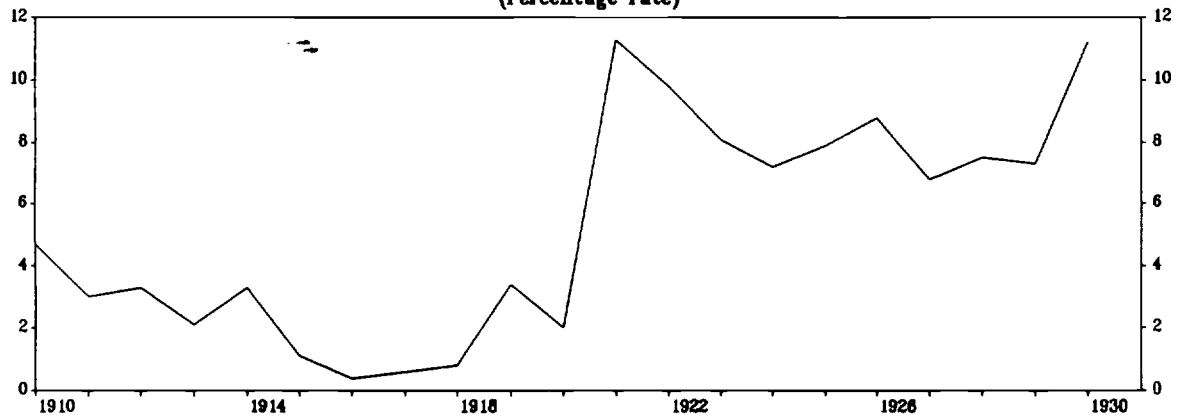
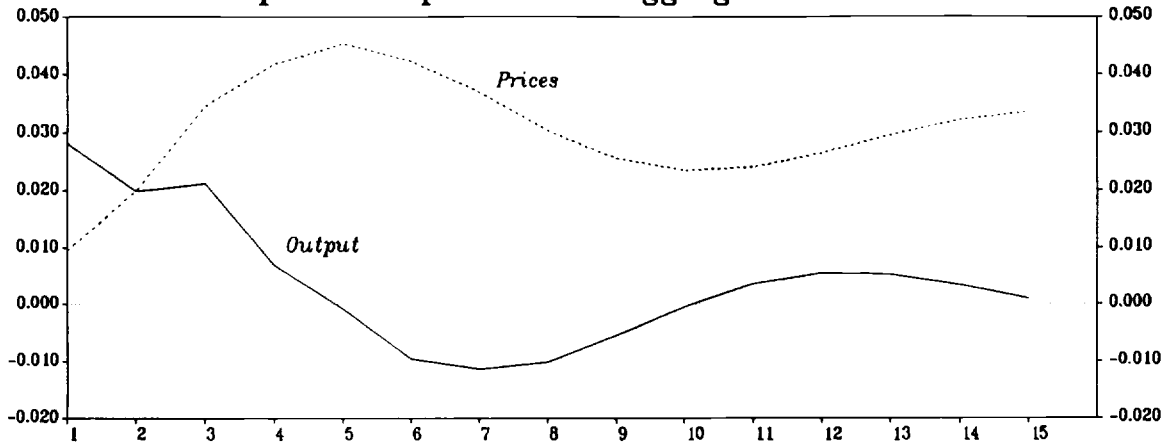
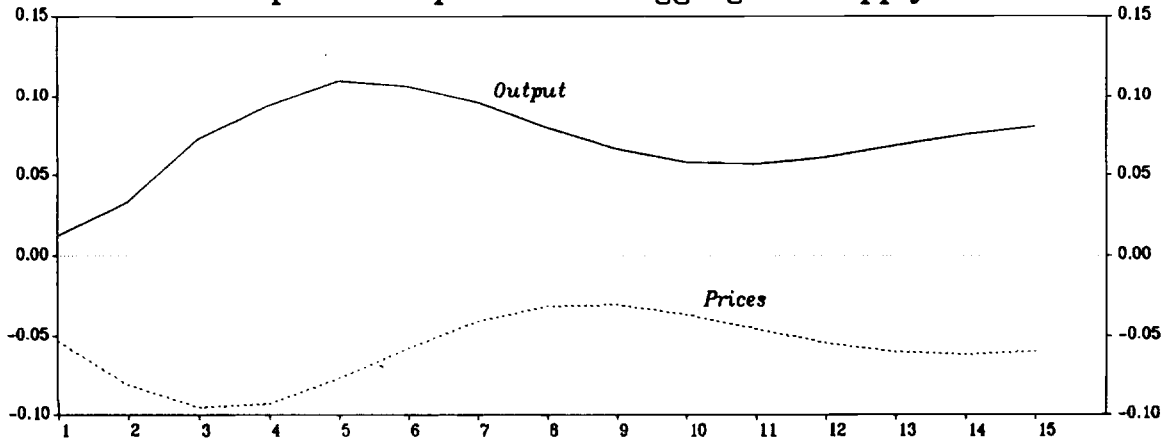


Chart 7.

Impulse Responses for Aggregate Demand



Impulse Responses for Aggregate Supply



Estimated Demand and Supply Disturbances

