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THE BRETTON WOODS INTERNATIONAL MONETARY SYSTEM:
AN HISTORICAL OVERVIEW

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ABSTRACT

This paper presents an overview of the Bretton Woods experience. From an historical perspective, I analyze its performance relative to other international monetary regimes, its origins, its operation, its problems and its demise. In the survey I emphasize both issues deemed important at the time and raise questions which may be of interest for the concerns of the present. Part 2 compares the macro performance of Bretton Woods with preceding and subsequent monetary regimes. The descriptive statistics on nine key macro variables point to one startling conclusion -- the Bretton Woods system, in its full convertibility phase 1959-1971, was the most stable regime for both nominal and real variables in the past century. Part 3 surveys the origins of Bretton Woods: the perceived problems of the inter war period; the plans for a new international monetary order and the steps leading to the outcome -- the Articles of Agreement. Part 4 examines the preconvertibility period from 1946 to 1958; the problems in getting the system started including the dollar shortage and the weakness of the IMF; and how the system evolved to convertibility and the gold dollar standard. Part 5 analyzes the heyday of Bretton Woods 1959 to 1971 in the context of the gold dollar standard and the famous three problems: adjustment, liquidity, and confidence. Part 6 considers the emergence of a "de facto" dollar standard in 1968 and its collapse in the face of a massive U.S. induced inflation. Part 7 considers why Bretton Woods was so stable and yet so short-lived. It also considers the importance of adherence to credible rules in the design of an effective international monetary system.

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1. Introduction

After twenty years of floating exchange rates, there is now considerable interest, among those concerned over its perceived shortcomings, in an eventual return by the world to a fixed exchange rate regime. This interest has been enhanced by the apparent success of the European Monetary System and the prospects for European monetary unification. The Bretton Woods System was the world's most recent experiment with a fixed exchange rate regime. Although it was originally designed as an adjustable peg, it evolved in its heyday into a de facto fixed-exchange rate regime. That regime ended with the closing by Richard Nixon of the gold window on August 15, 1971. Twenty years after that momentous decision a retrospective look at the performance of the Bretton Woods System is timely.

This paper presents an overview of the Bretton Woods experience. I analyze its performance relative to earlier international monetary regimes, as well as the subsequent one; its origins, operation, problems and demise. In the survey I discuss issues deemed important during the life of Bretton Woods and some that speak to the concerns of the present. The survey is limited to the industrial countries—the G-10 and especially the G-7. I do not examine the role of the International Monetary Fund, the fundamental organization of Bretton Woods, in the economies and international economic relations of the developing nations.

Part 2 compares the macro performance of Bretton Woods with its predecessors and successor monetary regime. The descriptive statistics on nine key macro variables point to one incontrovertible conclusion. Both nominal and real variables exhibited the most stable behavior in the past century under the Bretton Woods system, in its full convertibility phase 1959-1971. While Bretton Woods was relatively stable, it was also very shortlived. From the declaration of par values by 32 countries on December 18, 1946 to the closing of the gold window August 15, 1971, it lasted twenty five years.¹ However most analysts would agree that until the Western European industrial countries made their currencies convertible on December 27, 1958, the system did not operate as intended. On this

calculation, the regime only lasted twelve years. Alternatively, if we date its termination at the end of the Gold Pool and the start of the two-tier system on March 15, 1968, it was in full operation only 9 years.

This raises questions about why Bretton Woods was statistically so stable and why it was so shortlived. To be more specific; (1) Was Bretton Woods successful in producing economic stability because it operated during a period of economic stability or did the existence of the adjustable peg regime produce economic stability? Alternatively was its statistical stability an illusion--belied by the presence of continual turmoil in the foreign exchange markets? (2) Why did the system crumble after 1968 and end (so far) irrevocably in August 1971? It is the hope of the conference organizers that answers to these questions and many others can be provided by this and other papers to be presented here.

Part 3 surveys the origins of Bretton Woods: the perceived problems of the interwar period; the plans for a new international monetary order and the steps leading to the adoption of the Articles of Agreement.

Part 4 examines the preconvertibility period from 1946 to 1958; the problems in getting started exemplified by the dollar shortage and the weakness of the IMF; and the transition of the system to convertibility and the gold dollar standard.

Part 5 analyzes the heyday of Bretton Woods 1959 to 1971 in the context of the gold dollar standard and its famous three problems: adjustment, liquidity, and confidence. I review both the problems and the many proposals for monetary reform.

Part 6 considers the emergence of a "de facto" dollar standard in 1968 and its collapse in the face of U.S. induced inflation.

Finally, Part 7 summarizes the main points of the paper, discusses some lessons learned from the Bretton Woods experience for the design of a fixed exchange rate regime and raises questions answered by the other papers in the conference volume.

2. The Performance of Bretton Woods in Comparison to Alternative Monetary Regimes.

The architects of the Bretton Woods System wanted a set of monetary arrangements that would combine the advantage of the classical gold standard--exchange rate stability--with the advantages of floating rates--independence to pursue national full-employment policies. They sought to avoid the defects of floating rates--destabilizing speculation and competitive beggar-thy-neighbor devaluations--and the defects of the fixed-exchange-rate gold standard--subordination of national monetary policies to the dictates of external balance and subjection of the economy to the international transmission of the business cycle. As a consequence they set up an adjustable peg system of fixed parities that could be changed only in the event of a fundamental disequilibrium.

The architects derived their views of an ideal international monetary arrangement from their perception of the performance of the pre-World War I classical gold standard and of the sequence of floating rates and gold exchange standard that characterized the interwar period. As background to the historical survey of Bretton Woods, I compare descriptive evidence on the macro performance of the international monetary regime of Bretton Woods with that of preceding and subsequent regimes. The comparison for the seven largest (non-communist) industrialized countries: (the United States, United Kingdom, Germany, France, Japan, Canada, Italy) is based on annual data, for Bretton Woods (1946-1970), the present regime of floating rates (1974-1989), and the two regimes preceding Bretton Woods: the interwar period (1919-1939) and the classical gold standard (1881-1913). The Bretton Woods period (1946-1970) is divided into two subperiods: the preconvertible phase (1946-1958) and the convertible phase (1959-1970).²

The comparison also relates to the theoretical issues raised by the perennial debate over fixed versus flexible exchange rates. According to the traditional view, adherence to a fixed-exchange rate regime, such as the gold standard, ensured long-run price stability for the world as a whole because the fixed price of gold provided a nominal anchor to the world money supply. Individual nations by pegging their currencies to gold, fixed their price levels to that of the world. The disadvantage of fixed rates is that individual nations were exposed to both monetary and real shocks transmitted from

the rest of the world via the balance of payments and other channels of transmission (Bordo and Schwartz 1989). Also, the common world price level under the gold standard exhibited secular periods of deflation and inflation reflecting shocks to the demand for and supply of gold (Bordo, 1981. Rockoff, 1984). However, a well-designed monetary rule could avoid the long-run swings that characterized the price level under the gold standard (Cagan, 1984). The advantage of floating exchange rates is to provide insulation from foreign shocks. The disadvantage is the absence of the discipline of the fixed-exchange-rate-rule--monetary authorities could follow inflationary policies.

Theoretical developments in recent years have complicated the simple distinction between fixed and floating rates. In the presence of capital mobility, currency substitution, policy reactions, and policy interdependence, floating rates no longer necessarily provide insulation from either real or monetary shocks (Bordo and Schwartz, 1989). Moreover, according to recent real business cycle approaches, there may be no relationship between the international monetary regime and the transmission of real shocks (Baxter and Stockman, 1989). Nevertheless, the comparison between regimes may shed light on these issues.

One important caveat is that the historical regimes presented here do not represent clear examples of fixed and floating rate regimes. The interwar period is composed of three regimes: general floating from 1919 to 1925, the gold exchange standard from 1926 to 1931; and a managed float to 1939.³ The Bretton Woods regime cannot be characterized as a fixed exchange rate regime throughout its history: the preconvertibility period was close to the adjustable peg envisioned by its architects; the convertible period was close to a de facto fixed dollar standard.⁴ Finally, although the period since 1973 has been characterized as a floating exchange rate regime, at various times it has experienced varying degrees of management.

Table 1 presents descriptive statistics on nine macro variables for each country, the data for each variable converted to a continuous annual series from 1880 to 1989. The nine variables are: the rate of inflation, real per capita growth; money growth; short-term and long-term nominal interest rates; short-term and long-term real interest rates; the absolute rates of change of nominal and real

exchange rates. The definition of the variable used, e.g., M_1 versus M_2 was dictated by the availability of data over the entire period. For each variable and each country I present two summary statistics: The mean and standard deviation. For inflation I also show (in parentheses) the standard deviation of the forecast error based on a univariate regression. For all the countries taken as a group, I show two summary statistics: the grand mean and a simple measure of convergence measured as the mean of the absolute differences between each country's summary statistic and the grand means of the group of countries.⁵ I comment on the statistical results for each variable.

Inflation (Panel a). The classical gold standard had the lowest rate of inflation and the interwar period displayed mild deflation. The rate of inflation during the Bretton Woods period was on average and for every country except Japan lower than during the subsequent floating exchange rate period. The average rate of inflation in the two Bretton Woods subperiods was virtually the same. However, this comparison conceals the importance of two periods of rapid inflation in the 1940's and 1950's and in the late 1960's. See figure 1.⁶ Thus the evidence based on country and period averages of very low inflation in the gold standard period and of a lower inflation rate during Bretton Woods than the subsequent floating period is consistent with the traditional view on price behavior under fixed and flexible exchange rates.

In addition, the inflation rates show the highest degree of convergence between countries during the classical gold standard and to a lesser extent during the Bretton Woods convertible subperiod compared to the floating rate period and the mixed interwar regime. This evidence also is consistent with the traditional view of the operation of the classical price specie-flow mechanism and commodity arbitrage under fixed rates and insulation and greater monetary independence under floating rates.⁷

The Bretton Woods convertible subperiod had the most stable inflation rate of any regime judged both by the standard deviation and the forecast error.⁸ By contrast the preconvertible Bretton Woods period exhibited greater inflation variability than either the gold standard or the recent float. However most of this difference can be accounted for by the high variability of inflation in Italy

during the 1940's and 1950's. The evidence of a high degree of price stability in the convertible phase of Bretton Woods is also consistent with the traditional view that fixed rate regimes provide a stable nominal anchor; however, the remarkable price stability during this period may also reflect the absence of major shocks.

Real per capita GNP (Panel b). Generally, the Bretton Woods period exhibited the most rapid growth of any monetary regime, especially the convertible period, and not surprisingly the interwar period the lowest (see figure 2). Output variability was also lowest in the convertible subperiod of Bretton Woods, but because of higher variability in the preconvertible period, the Bretton Woods system as a whole was more variable than the floating period. Both pre-World War II regimes exhibit higher variability than their post-World War II counterparts. The Bretton Woods regime also exhibited the lowest divergence of output variability between countries of any regime with the interwar regime the highest. The lower variability of real output in Bretton Woods than in other periods may reflect a lower incidence of real shocks, a lower incidence of monetary surprises, or may be the result of countercyclical monetary and fiscal policies.⁹ In turn the greater convergence of output variability under Bretton Woods may reflect the operation of the fixed exchange rate regime which created conformity between countries' business fluctuations (Bordo and Schwartz, 1989, and Darby and Lothian, 1989).

Money growth (M_2) (Panel c). It was considerably more rapid across all countries post-World War II than before the war. There is not much difference between Bretton Woods and the subsequent floating regime. Within the Bretton Woods regime, money growth was more rapid in the preconvertibility period than in the convertibility period. Money growth rates showed the least divergence between countries during the fixed-exchange-rate gold standard and the convertible Bretton Woods regime with the greatest divergence in the preconvertible Bretton Woods period and the interwar period. Of key importance for the viability of the Bretton Woods system, however, is the fact that money growth in the U.S., the center of the system, was considerably lower than the average of the G-7 in both subperiods but increased both absolutely and relatively between the two

subperiods (see figure 3 and figure 29).

Like inflation and real output variability, money growth variability was lowest in the convertible Bretton Woods period. This, however, was not the case for the preconvertible period which was the most variable of any regime. It also exhibited the greatest divergence in variability between countries. To the extent that one of the properties of adherence to a fixed-exchange-rate regime is conformity of monetary growth rates between countries, these results are sympathetic to the view that the Bretton Woods system really began in 1959.

Short-term and long-term interest rates (Panels d and e). The underlying data can be seen in figures 4 and 5. As in other nominal series, the degree of convergence of mean short-term interest rates is highest in the convertible Bretton Woods period. Long-term rates are most closely related in the classical gold standard with the convertible Bretton Woods period not far behind. These findings are similar to these of McKinnon (1988) who views them as evidence of capital market integration under fixed exchange rates. The lack of convergence in the preconvertibility Bretton Woods period reflects the presence of pervasive capital controls. Convergence of nominal interest rates would not be expected under floating exchange rates. Convergence of standard deviations is also highest in the gold standard period followed by Bretton Woods. Long-term rates were most stable and least divergent under the classical gold standard, followed by the two Bretton Woods subperiods, with floating exchange rates the least stable. The evidence that nominal interest rates are more stable and convergent between countries under fixed exchange rate regimes is consistent with the traditional view.

Real short-term and real long-term interest rates (Panels f and g). For the underlying data see figures 6 and 7. The real interest rates are ex post rates calculated using the rate of change of a consumer price index.¹⁰ Unlike the nominal series, the degree of convergence in means between real short-term interest rates is lowest in the floating exchange rate period, next lowest in the Bretton Woods convertible period, and highest in the preconvertible period. For long-term real rates, as in the case of nominal rates, convergence is highest under the gold standard followed by the Bretton

Woods convertible regime. It is lowest under preconvertible Bretton Woods. The real short-term interest rate is most stable across countries during the Bretton Woods convertible period and also shows the least amount of divergence in standard deviations. The same holds for real long-term interest rates.

The behavior of real interest rates across regimes is consistent with McKinnon's (1988) explanation. He argued that fixed exchange rates encourage capital market integration by eliminating devaluation risk. This reduces variability in short-term real interest rates. Similarly, real long-term interest rates are stabilized by pooling across markets which reduces capital market risk.

Nominal and real exchange rates (Panels h and i).¹¹ The lowest mean rates of change of the nominal exchange rate and the least divergence between rates of change occurred during the Bretton Woods convertible and gold standard periods, with the former exhibiting the lowest degree of divergence. Exchange rates during the preconvertibility Bretton Woods regime changed almost as much as during the floating period. This mainly reflected the major devaluations of 1949 (see figure 8 and table 2). Nominal exchange rates were least variable in the gold standard and convertible Bretton Woods periods and the most variable and most divergent in the Bretton Woods preconvertible period.

As with the nominal exchange rate the lowest mean rate of change in the real exchange rate across countries and the least divergence between countries was in the Bretton Woods convertible period with the gold standard period next in size of these measures (see figure 9). The highest rate of change was in the floating period. Similarly the lowest standard deviation across countries and the least divergence between standard deviations was the Bretton Woods convertible period with the gold standard again next in these rankings. The other regimes were characterized by much greater variability and divergence.

These results shed light on the relationship between the nominal exchange rate regime and the behavior of real exchange rates. Mussa (1986) presented evidence for the G-10 countries in the post-World War II period showing the similarity between nominal and real exchange rate variability under

floating rates. His explanation for greater real exchange rate variability under floating rates than under fixed rates is nominal price rigidity.¹² Alternatively, nominal exchange rate rigidity produces greater trade stability reflected in the real exchange rate, as is evident for both the Bretton Woods and gold standard periods. Yet as Eichengreen (1990a) points out, this could be explained by the fact that both periods were characterized by few shocks.¹³

Finally Grilli and Kaminsky (1991) provided evidence for the U.K. and the U.S. based on monthly data 1880-1986, which shows that, with the exception of the post-World War II period, no clear connection exists between the nominal exchange rate regime and the variability of real exchange rates. My results for the G-7 show a clear correlation between nominal exchange rate rigidity and lower real exchange rate variability for the gold standard and Bretton Woods convertible regime. For the preconvertible Bretton Woods period - de jure a type of fixed exchange rate regime - the correlation is not evident. We do not distinguish between fixed and flexible periods in the interwar as do Grilli and Kaminsky, hence that period cannot be used in the comparison.

The Bretton Woods regime exhibited the best overall macro performance of any regime. This is especially so for the convertible period 1959-1970.¹⁴ As the summary statistics in Table 1 show, both nominal and real variables were most stable in this period. The preconvertible period 1946-1958 was considerably less stable for the average of all countries for both nominal and real variables. Also both nominal and real variables did not vary nearly as closely together as in the convertible period. These differences likely reflect the presence of pervasive exchange and capital controls before 1958 and related to these, more variable and more rapid monetary growth. These data are limited. Although they show excellent performance for the convertible Bretton Woods regime, they do not tell us why it did so well--whether it reflected a set of favorable circumstances or absence of aggravating shocks or whether it reflected stable monetary policy by the key country of the system, the U.S. or whether it masked underlying strains to the system. They also do not tell us whether the system was dynamically stable i.e., whether it would endure or whether it was just a flash in the pan of history.

Part 3. The Origins of Bretton Woods

3.1. Perceived Problems of the Interwar Period

The planning that led to the creation of a new international monetary order at Bretton Woods was predicated on the belief that the mistakes of the interwar period were to be avoided. These mistakes included wildly fluctuating exchange rates after World War I; the collapse of the short-lived gold exchange standard; thereafter, the international transmission of deflation and the resort to beggar-thy-neighbor devaluations; followed by trade and exchange restrictions and bilateralism. The goal was the negotiation of an international monetary constitution, based on stable exchange rates, national full employment policies, and co-operation. Three issues dominated the perception of the interwar experience: the flaws of the gold exchange standard; the case against floating exchange rates; bilateralism. I survey each in turn.

3.1.1 The Gold Exchange Standard

The gold exchange standard began de facto in 1925 after Britain returned to the gold standard at the prewar parity, followed in the next two years by most countries. The case for "gold economy" was made at the Genoa conference in 1922. The world could avoid a massive gold shortage, produced in large part by wartime inflation, by two measures: first, by nations adopting a gold bullion standard and demonetizing gold as a national currency; second, by using foreign exchange (primarily pounds and dollars) as international reserves and stockpiling monetary gold in the key reserve centers of London and New York. The gold exchange standard lasted only six years. It ended with Britain's suspension of gold convertibility in September 1931. The subsequent literature focussed on the three problems that later plagued Bretton Woods: adjustment, liquidity, and confidence (Johnson 1972a), although Keynes and White, the architects of Bretton Woods, paid attention only to the first two (Dam (1982) chapter 3 and Eichengreen 1990b).

The adjustment problem involved two issues: first, asymmetric adjustment between deficit (Britain) and surplus countries (the U.S.), which led to a deflationary bias, and second, the failure by all countries to follow the rules of the game. The U.S. and France (with an undervalued gold parity after 1926 with the Bank of France by law prevented after 1928 from holding reserves other than gold against its domestic note issue) together absorbed 53% of the world's monetary gold reserves by 1924 (Eichengreen 1990c, Table 10.1). As surplus countries, they sterilized gold inflows and avoided expansionary monetary policy and inflation. At the same time, the steady gold drain from Britain (with an overvalued parity)¹⁵ and other deficit countries ultimately caused them to contract their money supplies. Sterilization by the surplus countries only worsened the gold drain from the deficit countries. In addition, according to Nurske (1944) and Eichengreen (1990b), virtually every central bank in an attempt to shield the domestic economy from foreign disturbances, actively or passively followed a policy of offsetting changes in international reserves by changes in domestic credit, hence breaking the "rules of the game." Such policies at best slowed the adjustment of relative national prices and incomes required to restore balance of payments equilibrium under the gold standard.

The interwar liquidity problem involved gold supplies (at the prevailing set of gold parities) inadequate to finance the growth of world output and trade and to serve as gold cover to back national currencies. To economize on gold, peripheral countries used the key currencies as international reserves, but as the ratio of their holdings of the key currency (especially the pound) rose relative to the center country's monetary gold stocks, the peripheral countries fearing a convertibility crisis, reduced their foreign exchange holdings (Triffin, 1960).

The interwar confidence problem involved two components: a shift of currency holdings between London and New York the two key centers (and to a lesser extent at the end of the period, a shift to Paris) and a shift between the key currencies and gold. Shifts of foreign currency balances from weak to strong reserve centers weakened the system because they increased the likelihood of a confidence crisis in the weak center, which, if it materialized, would then put pressure on the other center (Nurske 1944). A shift between the key currencies and gold occurred when foreign holders

of key currency balances, fearing the reserve centers' inability to convert their outstanding liabilities into gold at the fixed parity, staged a run on the "bank", precipitating a suspension of convertibility, as happened to Britain in September 1931 (Triffin 1960, chapter 6).

3.1.2. Floating Exchange Rates and Competitive Devaluations

Nurkse (1944) made the case against floating exchange rates based on interwar experience. "If there is anything that inter-war experience has clearly demonstrated, it is that paper currency exchanges cannot be left free to fluctuate from day to day under the influence of market supply and demand"... "If currencies are left free to fluctuate, speculation in the widest sense is likely to play havoc with exchange rates-speculation not only in foreign exchanges but also, as a result, in commodities entering into foreign trade" (pp 137-138). Nurkse argued, based primarily on the French experience with floating exchange rates 1922-26, that freely floating rates inevitably led to destabilizing speculation. The depreciating franc led speculators to anticipate a further decline, ensuring the outcome by speculative capital flight (Nurkse, p.118). At the same time a depreciating exchange rate worsened the balance of trade because importers anticipating a further devaluation and rise in import prices, imported more while exporters expecting the price of exports to rise held back sales to get a better price later (Nurkse, p. 120).

Furthermore, according to Nurkse, the devaluation of sterling in 1931 led to a spate of competitive devaluations involving considerable overshooting because of the destabilizing nature of speculative flows of hot money (Nurkse, p. 123). It was commonly believed that devaluations were intended to "beggar thy neighbor," although Nurkse (p. 124) pointed out that in a number of cases, when devaluation was accompanied by expansionary monetary policy, world trade increased.

3.1.3. Bilateralism and Exchange Controls

Like Nurkse (1944), the architects of Bretton Woods believed that the competitive devaluations and speculative flows of hot money in the 1930's inevitably led to a pervasive system of exchange controls, and in the case of Germany, a series of discriminating bilateral agreements (See Ellis 1941, Neal 1979).

3.1.4. The Case for an Adjustable Peg

Based on his interpretation of interwar experience, Nurkse (Chapter VII), envisioned a world monetary system very much like Bretton Woods.¹⁶ To avoid the evils of floating, he would have fixed exchange rates, but in the event of structural disequilibria in the balance of payments, changes in parity would be allowed rather than exchange controls on current transactions. In the case of short-run payments disequilibria international reserves would serve as a buffer. Also, exchange rates should be set by an international agreement rather than on a piecemeal basis by each country. Monetary and fiscal policy would be co-ordinated between countries to ensure full employment. Speculative capital flows would be avoided by pervasive capital controls. Finally, the deflationary bias of the gold exchange standard would be avoided by imposing discriminatory exchange controls against "scarce" currencies.

3.1.5. Was the Perception of the Interwar Experience Correct?

Many aspects of the perception of the flaws of the interwar system have been challenged. Friedman's (1953) essay on flexible exchange rates disputed Nurkse on both theory and evidence. He argued that every case of destabilizing speculation Nurkse documented involved a prospective change in government policies that would otherwise have changed the exchange rate--that the market just facilitated movement to the new rate (see Dam (1982). Eichengreen's (1982) examination of the French experience found no evidence for destabilizing speculation.¹⁷

In addition, Eichengreen and Sachs (1985) presented strong evidence against the prevalence of beggar-thy-neighbor devaluations in the 1930's. They showed that most devaluations were accompanied by expansionary monetary policy and those that were not did not significantly reduce income in other countries. In opposition to the perceived view, Eichengreen (1990b) showed that the breakdown of the gold exchange standard owed a lot more to inappropriate national policies by France and the U.S. than to the perceived structural flaws in the system. Nevertheless, for Eichengreen (1991a) adherence to gold convertibility during the Great Depression was a key determinant of the worldwide spread of deflation and depression.¹⁸

In conclusion, the perception of the flaws of the interwar international monetary system was crucial in the design of the Bretton Woods system. Yet subsequent studies suggest that a number of these perceptions were incorrect. One wonders how the system would have been designed had the architects been freed from misperceptions.

3.2. The Plans and the Outcome

The planning and the bargaining that took place leading to the Bretton Woods conference both in the U.S. and Britain during World War II reflected both a common vision of the future international monetary order and quite different national concerns. The architects on both sides of the Atlantic wanted a system that would avoid the defects of the interwar period and promote world peace. Common beliefs included a multilateral payments system, stable exchange rates and full employment. However, key differences in the positions of power and economic importance of the two allies dictated quite different national concerns.

The United States emerged as the strongest and richest power in the world. It expected to be a creditor nation. Britain's resources and power were greatly weakened by the war--it had liquidated most of its external assets and borrowed heavily from the Commonwealth and to a lesser extent the U.S. It expected to be a debtor nation. The Roosevelt Administration attached great importance to the elimination of discriminatory trade and exchange controls by the British, especially the system of Imperial Preference negotiated at Ottawa in 1931, and of bilateral agreements. Restoration of a multilateral payments system based on convertible currencies was paramount. The British were most concerned that the U.S. not repeat its deflationary policies of the 1930's. They wanted the freedom to pursue domestic full employment policies without concern over the state of the balance of payments. They also wanted the preservation of the British Commonwealth, assistance in wartime reconstruction, and relief on the repayment of outstanding sterling balances (Gardner, 1969, Chapters I and II).

Wartime negotiations leading to the Atlantic Charter, August 14, 1941, and the Mutual Aid Agreement, February 23, 1942, especially Article 7, led to a compromise between the two nations, which created the setting for the planning for Bretton Woods. The British agreed to accept a multilateral payments system with ultimate convertibility of sterling, in exchange for a U.S. commitment to maintain full employment, the preservation of the Commonwealth, generous terms on lend lease, and U.S. assistance in the postwar recovery. (Gardner 1969, Chapters III and IV).

Against this background of diplomatic negotiations, the British Treasury team of planners led by John Maynard Keynes and the American team led by Harry Dexter White drafted two competing plans for the postwar international monetary order. Each plan went through a series of drafts and the final versions known as the Keynes and White Plans were published in 1943.¹⁹ A compromise between the two plans, following an intense period of negotiations, led to the Joint Statement by Experts on the Establishment of an International Monetary Fund (April 1, 1944). The Joint Statement served as the working draft at the Bretton Woods conference and led directly to the Articles of Agreement of the International Monetary Fund, July 22, 1944.²⁰

The Keynes plan (Keynes, 1943) was designed to encourage the expansion of world trade and activity by the generous provision of international liquidity. It was also designed to shield the domestic economy from foreign disturbances via the provision of a buffer stock of international reserves. The essence of the plan was the establishment of a supernational central bank, the International Clearing Union (ICU) which would issue a new international money to be called bancor. The nominal value of bancor was to be fixed in terms of gold; every national currency would set its par value in terms of bancor.²¹ The central bank of each member nation would keep accounts with the ICU to settle balances between other members at par in bancor. Surplus nations would maintain credit balances earning interest. Deficit nations could settle their balances by obtaining overdrafts bearing interest which would be transferred to the credit of the surplus countries. Each country would be assigned a quota to determine the limit on resources it could obtain. The plan would provide generous liquidity facilities--between \$25 and \$30 billion. It also imposed extensive

regulations governing the balances of both debtors and creditors--debtors faced increasingly stiff penalties as they used up successive tranches of their quotas, the penalties including devaluation and the imposition of capital controls. Creditors were to take measures including expansionary domestic credit, appreciation of their currencies, cutting tariffs, and extending international development loans.²² Creditors would bear more of the burden of adjustment because there was no limit on the amount of bancor liquidity they would have to accept whereas debtors were limited by their quotas.²³ A final important aspect of the plan was the provision of permanent capital controls to prevent destabilizing speculation against the fixed parities.

The White plan (White 1943) put more emphasis in its design on exchange rate stability and less on the generous provision of international liquidity than its British counterpart. The key institution of the U.S. plan was the creation of a United Nations Stabilization Fund. Each member would contribute to the fund a quota consisting of gold and its own currency. The total subscription was \$5 billion. A deficit country, rather than running an overdraft with the ICU as in the Keynes plan, would draw resources from the Fund by selling its currency for that of another member. Consequently, its balances at the fund would increase while those of the member whose currency had been drawn would decline. Each member would declare a par value for its currency in terms of *unitas*, an international unit of account worth 10 gold U.S. dollars. Each member was obliged to maintain that par value except in the event of a fundamental disequilibrium in the balance of payments when it could be altered. In that case if the proposed change was less than 10% it could be made after consultation with the Fund. If larger, it needed approval by 3/4 of the members. Like the Keynes plan various penalties were imposed on debtor countries when their borrowings exceeded their quotas.²⁴ These included the Fund's suggestion of appropriate domestic policies to facilitate adjustment. Less pressure was placed on creditor countries. However, by the final draft of the plan, a scarce currency clause allowed the Fund to recommend rationing its use by exchange controls.²⁵ In the months that followed the publication of the two plans, a compromise was reached in the Joint Statement and further compromise by the time of the Articles (Dam, 1982). In the compromise the

British gave up the ICU, bancor, the overdraft system and the generous provision of liquidity, settling for \$8 billion in the Joint Statement, \$8.8B at Bretton Woods. The British gained greater national policy autonomy for members who were allowed discretion over changes in the exchange rate (with Fund approval required to correct a fundamental payments disequilibrium). They also gained the authorization of capital controls in the agreement. The Fund's discretion to intervene in domestic policy making to facilitate adjustment was eliminated from both plans as was explicit conditionality on credit drawings. The scarce currency clause was viewed as a solution to British concerns over the deflationary potential of the U.S. running a large surplus. Finally the British requests for postwar assistance were dropped from the negotiations although met in part by a transition clause allowing exchange controls on current account transactions for a number of years, by the exclusion of sterling balances from the convertibility requirements, and later by the Anglo American loan of \$3.75 billion on December 6, 1945.

A number of special conditions may have contributed to the successful outcome of the negotiations at Bretton Woods. First, the U.S. and Britain (with the aid of Canada) were able to work out an agreement which was a compromise between their two national interests without involving other countries who were either belligerents or under occupation. Second, as the strongest economic power, the U.S. was able to dominate the terms of the agreement.²⁶ Third, a strong sense of idealism prevailed in both countries--that as victors in a war to save democracy, they had an obligation to create a stable postwar international monetary order that would help secure the peace.²⁷ Fourth, the negotiators on both sides of the Atlantic were experts who shared a common set of perceptions of the problems of the interwar period, had common views on the importance of full employment and a liberal multilateral payments system, and had strong respect for John Maynard Keynes. These experts negotiated in an atmosphere conducive to co-operation and free of immediate political concerns (Ikenberry, 1990 and 1992).

3.3. The Articles of Agreement

The Articles of Agreement incorporated elements of both the Keynes and White plans although in the end, U.S. concerns predominated.²⁸ The objectives of the Fund were to promote international monetary co-operation, to facilitate the maintenance of full employment and rapid growth, to maintain stable exchange rates and avoid competitive devaluations, to provide a multilateral payments system and eliminate exchange restrictions, to provide resources to meet balance of payments disequilibria without resort to drastic measures and to shorten the duration and lessen the degree of payments disequilibria.

The main points of the articles were: the creation of the par value system; multilateral payments; the use of the Fund's resources; the Fund's powers; and its organization.

3.3.1 The Par Value System

Article IV defined the numeraire of the international monetary system as either gold or the U.S. dollar of the weight and fineness on July 1, 1944. All members were urged to declare a par value and maintain it within a one percent margin on either side of parity. Parity could be changed in the event of a fundamental payments disequilibrium at the decision of the member, after consultation with the Fund. However, the Fund would not disapprove the change if it was less than 10% and, if more than 10%, the Fund would decide within 72 hours. Unauthorized changes in the exchange rate could make members ineligible to use the Fund's resources and if they were to persist could lead to a member's expulsion. A uniform change in par value of all currencies (in terms of gold) required a majority of the total voting power and also had to be approved by every member with 10% or more of the total quota.

3.3.2 Multilateral Payments

Members were supposed to make their currencies convertible for current account transactions (Article VIII) but capital controls were permitted (Article VI.3). They were also to avoid discriminatory currency and multiple currency arrangements. The convertibility requirement applied to foreign balances accumulated by current account transactions, but exempted previously

accumulated balances (Article VIII.4). Presumably this clause was to protect the sterling balances accumulated at the end of World War II (Pressnell 1986). However, countries could avoid declaring their currencies convertible by invoking Article XIV which allowed a three year transition period after establishment of the Fund. During the transition period, existing exchange controls could be maintained. After the three-year grace period, the Fund was to report on the state of convertibility and after five years and every year thereafter, the members under Article XIV in individual consultation, had to justify their position to the Fund.

3.3.3 The Fund's Resources

As under the White plan, members could obtain resources from the Fund to help finance short- or medium-term payments disequilibria. The total Fund, contributed by members quotas, (25% in gold, 75% currencies) was set at \$8.8 billion. It could be raised every five years if the majority of members wanted to do so. The Fund set a number of conditions on the use of its resources by deficit countries to prevent it from accumulating soft currencies and from depleting its holdings of harder currencies.²⁹ It also established requirements and conditions for repurchase (repayment of a loan) including giving the Fund the right to decide the currency in which repurchase would be made. In the case of countries prone to running large surpluses, the scarce currency clause (Article VII) could come into play. If the Fund declared a currency scarce, i.e., its holdings of the currency were insufficient to satisfy the demand for it by other members, it could declare it scarce and then urge members to ration its use by discriminatory exchange controls.

3.3.4 The Powers of the Fund

The Fund had considerably less discretionary power over the domestic policies of its members than either of the architects wanted but it still had the power to strongly influence the international monetary system. These powers included its authority to approve or disapprove of: changes in parity; the use of multiple exchange rates and other discriminatory practices; the conditionality that was implicit in member's access to the credit tranches of their quotas and made explicit by 1952 (Diz, 1984); its authority to declare currencies scarce, its authority to declare members ineligible to use its

resources--used against France in 1948--and its ultimate authority to expel members. The Fund also had considerable power as the premier international monetary organization in consulting and co-operating with national and other international monetary authorities.

3.3.5 Organization

The Fund was to be governed by a Board of Governors appointed by the members. It would make the major policy decisions such as approving a change in parity. Operations of the Fund were to be directed by Executive Directors appointed by the members and a Managing Director selected by the Executive Directors. Major changes such as a uniform change in the par value of all currencies or the Second Amendment creating the SDR would require a majority vote by the members. The number of votes in turn was tied to the size of each member's quota, which was determined by its economic size.

3.3.6 How was the Bretton Woods System Supposed to Work?

The architects never spelled out exactly how the system was supposed to work. However subsequent writer have suggested a number of salient features.³⁰ First, currencies were treated as equal in the articles. This meant that in theory each country was required to maintain its par value by intervening in the currency of every other country--a practice which would have worked at cross purposes. In actual fact because the U.S. was the only country which pegged its currency in terms of gold (bought and sold gold) all other countries would fix their parities in terms of dollars and would intervene to monitor their exchange rates within 1% of parity with the dollar.

Second, countries would use their international reserves or draw resources from the Fund to finance payments deficits. In the case of surpluses, countries would temporarily build up reserves or repurchase their currencies from the Fund. In the event of medium-term disequilibria, they would use monetary and fiscal policy to alter aggregate demand. In the event of a fundamental disequilibrium, which was never defined, but presumably reflected either some structural shock or sustained inflation, a member was supposed to alter parity by an amount sufficient to restore external equilibrium. Third, capital controls were required to prevent destabilizing speculation from forcing

members to alter their parities prematurely or unintentionally.

The system that began operations after the Bretton Woods conference and the establishment of the IMF was different in many major respects from what the architects intended. One question that this raises is, had the world not evolved as it did into a gold dollar standard, how would the real Bretton Woods system have worked?

4. The History of Bretton Woods: Pre Convertibility 1946-1958

The international monetary system that began after World War II was far different from the system that the architects of Bretton Woods envisioned. The transition period from war to peace was much longer and more painful than was anticipated. Full convertibility of the major industrial countries was not achieved until the end of 1958 although the system had started functioning normally by 1955. Two interrelated problems dominated the first postwar decade: bilateralism and the dollar shortage.

4.1. Bilateralism

The legacy of World War II for virtually every country, except the U.S., was one of pervasive exchange controls and controls on trade. No major currencies except the dollar were convertible.³¹ Under Article XIV of the Bretton Woods agreement, countries could continue to use exchange controls for an indefinite transition period after the establishment of the IMF on March 1, 1947.³² In conjunction with exchange controls, every country negotiated a series of bilateral payments agreements with each of its trading partners.³³ The rationale given for the continued use of controls and bilateralism was a shortage of international reserves. After the war, the economies of Europe and Asia were devastated. To produce the exports needed to generate foreign exchange industries required new and improved capital. There was an acute shortage of key imports, both foodstuffs to maintain living standards and raw materials and capital equipment. Controls were used to allocate the scarce reserves.

The bilateral arrangements in each country typically consisted of licenses and quotas for imports and exports and the allocation of foreign exchange through the central bank, with commercial

banks acting as agents. Each central bank typically negotiated an agreement with its partners providing an overdraft facility in its currency called the "swing" up to a specified limit (similar in concept to international reserves) with settlement in foreign exchange beyond that. The U.K. developed a particularly complicated set of arrangements. Sterling was convertible for all transactions within the sterling area. A privileged group of countries were allowed transferable account status, whereby they could settle foreign balances in sterling earned from their exports and, in 1946-47 these balances could be used in settling dollar payments. A third group of countries had bilateral account status.

4.2 The Dollar Shortage

By the end of World War II, the U.S. held two thirds of the world's monetary gold stock (see figure 10). The gold avalanche in the U.S. in the 1930's was the consequence of both the dollar devaluation in 1934, when the Roosevelt administration raised the price of gold from \$20.67 per ounce to \$35.00, and capital flight from Europe. During the war, gold inflows continued to finance wartime expenditures by the allies. At the end of World War II, Europe's (and Japan's) gold and dollar reserves were depleted. Europe ran a massive current account deficit reflecting the demand for essential imports and the reduced capacity of the export industries.³⁴ The OEEC deficit, aggravated by the bad winter of 1946-47, reached a 1947 high of \$9 billion (Triffin, 1957, p. 32), (see figure 11), the amount of the U.S. current account surplus (see figure 12), since the U.S. as the only major industrial country operating at full capacity supplied the needed imports. The dollar shortage was likely aggravated by overvalued official parities by the major European industrial countries set at the end of 1946. See table 2. The IMF pressured its members to declare par values as soon as possible. It was argued that the balance of payments deficits facing most countries reflected the structural incapacity of their export industries rather than a lack of competitiveness. If the exchange rate chosen was inappropriate, it could be corrected later. The crucial test was the ability to export

at all (Black, 1991. Ch.3). Most countries adopted their prewar dollar parities on the assumption that wartime and postwar inflation did not seriously disrupt their competitive positions relative to the U.S. (Triffin, 1957, chapter 2).

The immediate postwar experience of massive payments deficits and depleted international reserves in Europe and the opposite situation in the U.S. led many to believe that the dollar shortage was permanent. Theories of a permanent dollar shortage abounded (see Kindleberger, 1950, McDougal, 1957, and for a critical appraisal Yeager, 1976, appendix to chapter 27). The key explanation for a permanent shortage was that the rate of productivity advance in the rest of the world would never catch up to that of the U.S.. Alternative explanations included inadequate raw materials, lower savings rates, political instability, and lack of entrepreneurial drive. Advocates of these theories recommended a series of policy proposals including discrimination against U.S. exports, massive U.S. aid, the encouragement of private capital flows to Europe, and devaluation.

4.3 How the System Evolved

By the mid 1950's both problems had been solved. The currencies of Western Europe were virtually convertible by 1955 and their current accounts were generally in surplus (see figure 13). The key developments in this progression were the Marshall Plan and the European Payments Union. Three other important developments in this period were the decline of sterling, the reduced prestige of the IMF, and the rise of the dollar as the key currency.

4.3.1 The Marshall Plan

The Marshall Plan funnelled approximately \$13 billion in aid (grants and loans) to Western Europe between 1948 and 1952 (See Milward, 1984 and Hoffman and Maier, 1984).³⁵It followed interim postwar U.S. and U.N. aid in 1947. The Economic Co-operation Act of 1948, creating the Marshall Plan, was designed to help the European countries expand their economies, restore their export capacity and by creating economic stability, preserve political stability. These results would follow by providing relief from the burden of financing a massive payments deficit. The Plan required the members to co-operate in the liberalization of trade and payments. Consequently, the

Organization for European Economic Cooperation (OEEC) was established in April, 1948. It presided over the allocation of aid to members based on the size of their current account deficits. U.S. aid was to pay for essential imports and to provide international reserves. Each recipient government provided matching funds in local currency to be used for investment in the productive capacity of industry, agriculture, and infrastructure. Each country also had a U.S. commission which advised the host government on the spending of its counterpart funds. The plan encouraged the liberalization of intra-European trade and payments by granting aid to countries which extended bilateral credits to other members. Finally, the European Payments Union was established in 1950, under the auspices of the OEEC, to simplify bilateral clearing and pave the way to multilateralism.

By 1952, in part thanks to the Marshall Plan, the OEEC countries had achieved a 39% increase in industrial production, a doubling of exports, an increase in imports by one-third, and a current account surplus (Solomon, 1976, p. 18) See figure 13. According to Eichengreen and Uzan (1991) the Marshall Plan permanently raised the growth rates of the recipients, but not through the traditional channels of investment, government spending, and the current account balance. It did so by improving productivity and investor confidence. This in turn was achieved by reducing the political instability associated with "the war of attrition" between workers and property owners and by filling the role usually played by foreign private investment.

4.3.2. The European Payments Union and the Return to Convertibility

It took twelve years from the declaration of official par values by thirty-two nations in December 1946, to the achievement of convertibility for current transactions by the major industrial countries as specified by the Bretton Woods Articles.³⁶ The Western European nations tried several schemes to facilitate the payments process before establishing the European Payments Union (EPU) in 1950 (See Kaplan and Schleiminger, 1989).

The EPU, established September 19, 1950 by the OEEC countries, initially was to run for two years, renewable thereafter on a yearly basis. It followed the basic principle of a commercial bank clearinghouse. At the end of each month, each member would clear its net debit or credit position

(against all other members) with the Union (the BIS acting as its agent). The unit of account for these clearings was the U.S. dollar. Settlement was made in dollars, gold or credit. The division between credit and dollars/gold depended on the quota allocated to each member, which in turn depended on its volume of trade. The Union was started with an initial fund of working capital of \$350 million provided by the U.S..

The EPU was highly successful in reducing the volume of payments transactions and provided the background for the gradual liberalization of payments, so that by 1953 commercial banks were able to engage in multicurrency arbitrage (Tew 1988, Yeager 1976). The EPU became the center of a world wide multilateral settlement area including the countries of the sterling and franc zones. In 1954, the U.K. extended transferable account status to all countries with which it had bilateral agreements, so that by 1955 the world was divided into two separate convertible areas separated by exchange controls: a soft area based on the EPU and sterling and a hard area based on the dollar. The final steps in closing the gap were achieved in February 1955, when the Bank of England extended its exchange market operations to pegging the exchange rate on transferable account sterling and the discount on sterling in the Zurich market moved closer to parity, and eight countries declared their currencies convertible for current account transactions on December 27, 1958.³⁷

4.3.3. The Decline of Sterling

In the interwar period, sterling shared the role of key currency with the dollar. It was expected that it would play an important role in the postwar period. As events turned out, sterling's importance declined throughout the Bretton Woods period. At the end of World War II, Britain as in the case of the other European countries, ran a massive balance of payments deficit especially in gold and dollars (see figure 14). Also Britain had an outstanding sterling debt of L3.7 billion amassed during the war by borrowing largely from its empire. Much of these balances were "blocked" i.e. made inconvertible into dollars.³⁸ In December, 1945, the U.S. and Britain negotiated the Anglo American Loan. It was ratified on July 15, 1946. In exchange for \$3.75 billion from the U.S. and a further \$1.25 billion from Canada, the British ratified the Bretton Woods Articles and promised to

restore current account convertibility in dollars, except for existing sterling balances, within one year. In 1946-47, transferable account sterling status was extended to all countries with bilateral agreements and, as promised, convertibility for current account transactions was restored on July 15, 1947. The ensuing run on sterling depleted the U.K.'s reserves by \$1 billion within a month and convertibility was suspended on August 20, 1947. Transferable account sterling again became subject to exchange controls. As a consequence of the unsuccessful 1946 agreement the return to convertibility by Western European countries, following the cautious reaction by the British, was likely delayed longer than it otherwise would have been. Sterling's role as a reserve currency was further weakened and that of the dollar (by default) strengthened.

A second event which further weakened sterling's credibility as a reserve currency, yet helped restore the international monetary system by reducing both European deficits and the U.S. surplus (and also strengthen the U.K. economy), was the devaluation of sterling in 1949. Although the U.K.'s balance of payments and current account deficits (against dollars and gold) were shrinking in 1948 and 1949, a U.S. recession reduced the demand for British goods in the second quarter of 1949 (Yeager 1976, p. 444). This, coupled with growing belief that sterling would be devalued, triggered a speculative run on the pound (Cairncross and Eichengreen 1983, chapter 4). Speculators evaded the exchange controls by means of leads and lags and took a strong position against sterling in the summer of 1949.³⁹ The Chancellor of the Exchequer, Sir Stafford Cripps, two weeks before the event, denied devaluation was imminent. On September 18, 1949, twenty-four hours after informing the IMF, the pound was devalued by 30.5% to \$2.80. Shortly thereafter, 23 countries reduced their parity by, in most cases, similar magnitudes. See table 2. The devaluation improved the current account deficit and the overall balance of payments of the U.K (in gold and dollars) although it deteriorated again in the following two years of Korean War inflation.⁴⁰ See figure 14.

The devaluations of 1949 were important for the Bretton Woods system for two reasons. First, they, along with the Marshall Plan aid, helped move the European countries from a current account deficit to a surplus, a movement important to the eventual restoration of convertibility. Second, they

revealed a basic weakness of the adjustable peg arrangement--the one-way option of speculation against parity. By only allowing changes in parity in the event of fundamental disequilibrium, the Bretton Woods system encouraged the monetary authorities to delay adjustment until they were sure it was necessary. By that time, speculators also would be sure and they would take a position from which they could not lose. If the currency is devalued, they win and if it is not, they just lose the interest (if any) on the speculative funds (Friedman 1953).

4.3.4 The Role of the IMF

A number of developments and events in the preconvertibility era had great significance for the prestige and subsequent role of the IMF. The IMF, by intention, was not equipped to deal with the postwar reconstruction problem. Although some limited drawings occurred before 1952, most of the structural balance of payments assistance in this period was provided by the Marshall Plan and other U.S. assistance, including the Anglo-American Loan of 1946. The consequence of this development is that new institutions such as the OEEC and existing institutions such as the BIS, the agent for the EPU, emerged as competing sources of international monetary authority (Mundell 1969a). Had the original Keynes I.C.U. plan been adopted at Bretton Woods the difference between the proposed resources of \$26 billion dollars and the original fund endowment of \$8.8 billion would have nearly equalled the \$13 billion given in Marshall Aid assistance.

Moreover, although a key precept of the Articles was multilateralism, little was done by the Fund to achieve that aim before 1952, when under Article XIV, it began consultation with individual members. The Fund did very little to speed up the process of achieving multilateralism because it felt it was not so empowered (DeVries, 1986, chapter 4). As a consequence another agency, the EPU, was set up to provide the clearinghouse which Keynes envisioned in the original I.C.U. plan (Triffin 1957, chapter 3).

Also, the Fund in part because of its opposition to floating rates and in part its eagerness to get the system going, has been criticized for seeking a declaration of par values too soon. The

resultant fixed parities then set in motion forces within each country to resist devaluation until it was too late and when they occurred in 1949, the changes were larger than necessary (Scammell, 1975, chapter 6).⁴¹ The crisis associated with the 1949 sterling devaluation in turn created further resistance by monetary authorities to changes in parity, which ultimately changed the nature of the international monetary system from the adjustable peg intended by the Articles to a fixed rate regime.

The Fund's prestige was dealt a severe blow by three events in the preconvertibility period (Mundell, 1969a). The first, was the French devaluation of January 1948 (see table 2) when France, in an attempt to economize on scarce hard currency, created a multiple exchange rate system. The arrangements consisted of a dual rate for hard currencies with the official rate of 214.39 francs per dollar for basic imports and a floating rate for tourist and financial transactions. The effective rate on hard currency was 260.26; for soft currencies it was the official rate. The Fund under Article IV, section 5, censured France for creating broken cross rates between the dollar and the pound thereby diverting exports to be re-exported to the U.S. via France (Horsefield, 1969, p. 203). France was denied access to the Fund's resources until 1952. France ended the broken cross rates in October 1948 and adopted a unified rate in the devaluation of 1949. See table 2. Since France had access to the Marshall Plan, the Fund's actions had little effect.

The second event was the sterling devaluation of September 1949. Although the Fund staff had earlier advised the British to devalue (Black, 1991, pp 67-68) the Fund was given only 24 hours notice and the size of the devaluation was larger than suggested. This was in marked contrast to Article IV, section 5, which required a member to consult with the Fund when a devaluation of greater than 10 % was being considered, with the Fund to be given more than 72 hours to concur or object.⁴² According to Mundell (1969a) this event revealed the Fund's inability to deter a major power from following its sovereign interest.

The third event was the decision by Canada to float its currency in September 1950. See Table 2. Faced with a massive capital inflow from the United States, the Bank of Canada decided to float the Canadian dollar rather than risk an inappropriate revaluation from the 90.9c parity.⁴³ The Fund

was highly critical of the action. The Canadian monetary authorities assured the Fund that the float was only temporary and that a new parity would be declared when a new equilibrium had been reached. The Canadian dollar floated until 1961. The fact that movements in the Canadian dollar rate were small (see figure 8) and there is no evidence of destabilizing speculation (Yeager, 1976, chapter 26), significantly weakened the case made against floating by the Fund in several annual reports.

Finally, the Fund's resources were inadequate to solve the emerging liquidity problem of the 1960's. The difference between the growth of international reserves required to finance the growth of real output and trade and avoid deflation and the growth in the world's monetary gold stock was met largely by an increase in official holdings of U.S. dollars resulting from growing U.S. balance of payments deficits. By the time full convertibility was achieved, the U.S. dollar was serving the buffer function for which the Articles intended the Fund's resources (Mundell, 1969a, p. 481). Had the original Keynes ICU plan been adopted and had the U.S. undertaken postwar aid through the Union rather than through Marshall Aid, the U.S. would have accumulated sufficient overdraft facilities to finance most of its deficits in the 1950's and 1960's (Gardner, 1972, p. 27). However the extra liquidity would have likely fueled a higher rate of world inflation than actually occurred.

4.3.5 The Emergence of the Dollar as a Key Currency

During the preconvertibility period, the dollar emerged as the key currency of the international monetary system. At the beginning of the period, sterling was the dominant currency in world reserves but by the end of the 1950's it was eclipsed by the dollar. See figure 15. Moreover, the data overstates the role of sterling because it includes blocked sterling balances and sterling used only in the sterling and transferable account areas. Because of the sheer size of the U.S. in the world economy, its great importance in world trade, and its open and deep capital markets, the dollar emerged in the 1950's as a private international money (McKinnon, 1989). It was used as a unit of account in invoicing imports and exports, as a medium of exchange in serving as a vehicle currency for interbank transactions, and as a store of value for private claims. Simultaneously, the dollar

emerged as an official international money. This stemmed from its use as a unit of account to define the parities of member countries in the IMF. The dollar was also used as the primary intervention currency--members maintained their fixed parities by buying and selling dollars. Finally, because of its role as unit of account and medium of exchange and its growing private acceptance it became the dominant international store of value to be used as reserves. The growing private and official demand for dollars was supplied through private and official long-term capital outflows in excess of a current account surplus, which produced a series of official settlements balance of payments deficits beginning in 1950. See figures 12 and 18. By 1958-59, the balance of payments deficit became a source of policy concern. The first of many attempts to stem the tide began with policies tying foreign aid to U.S. exports and the persuading of foreign governments to remove discriminatory barriers against U.S. exports (Solomon, 1976, p. 27).

The convertible Bretton Woods system that began at the end of 1958 differed in a number of ways from the system intended by its architects. These include: the dominance of the U.S. in the international monetary order (soon to be challenged by a reemerging continental Europe); the reduced prestige of the IMF; the rise of the dollar as a key currency and the decline of sterling; a shift from the adjustable peg system towards a de facto fixed exchange rate regime and finally growing capital mobility. Despite the prevalence of capital controls in most countries, private long-term capital mobility increased considerably in the 1950's and speculative short-term capital movements (through leads and lags) emerged as a powerful force in thwarting the attempts by monetary authorities to maintain a parity far removed from the fundamentals. While the outlook for the Bretton Woods system never looked brighter than in December 1958, emerging signs of weakness were soon to be revealed.

5. The History of Bretton Woods: The Heyday of Bretton Woods 1959-1967

With the establishment of current account convertibility by the Western European industrial nations at the end of December, 1958, the full blown Bretton Woods system was in operation.⁴⁴ Each member intervened in the foreign exchange market, either buying or selling dollars, to maintain its

parity within the prescribed 1% margins. The U.S. Treasury in turn pegged the price of the dollar at \$35.00 per ounce by freely buying and selling gold.⁴⁵ Thus each currency was anchored to the dollar and indirectly to gold. Triangular arbitrage kept all cross rates within a band of 2% on either side of parity. Through much of this period capital controls prevailed in most countries in one form or another, although until the mid 1960's their use declined.⁴⁶

The system that operated in the next decade turned out to be quite different from what the architects had in mind. First, instead of a system of equal currencies, it evolved into a variant of the gold exchange standard--the gold dollar system. Initially, it was a gold exchange standard with two key currencies, the dollar and the pound. But the role of the pound as key currency declined steadily throughout the 1960's.⁴⁷ Sterling declined both as a private vehicle currency and as an official reserve currency until by the sterling devaluation of November, 1967, its official use was limited to the sterling area. See figure 15. Sterling's decline as a key currency reflected the decline in economic importance of the U.K. in the postwar period, the pattern of stop-go stabilization policies and a relatively rapid underlying inflation rate.

Parallel to the decline of sterling was the rise in the dollar as a key currency. As mentioned in Section 4 above, use of the dollar as both a private and official international money, increased dramatically in the 1950's and continued into the 1960's. See figure 15. With full convertibility, the dollar's fundamental role as intervention currency led to its use as international reserves. This was aided by stable and low monetary growth and relatively low inflation (before 1965). See figure 1 and table 1.

The gold exchange standard evolved in the post World War II period for the same reasons it did in the 1920's--to economize on noninterest bearing gold reserves. In the postwar, the growth of the world's monetary gold stock was by the late 1950's insufficient to finance the growth of world real output and trade (Triffin, 1960 and Gilbert, 1968). The other intended source of international liquidity--the resources of the Fund--was also insufficient, although as discussed below, numerous important steps were taken to augment it.

The second important difference between the convertible Bretton Woods system, and the intentions of the Articles was the evolution of the adjustable peg system into a virtual fixed exchange rate system. Between 1949 and 1967, there were very few changes in parities of the G-10 countries. See table 2. The only exceptions were the Canadian float in 1950, devaluations by France in 1957 and 1958 and minor revaluations by Germany and the Netherlands in 1961. The adjustable peg system became less adjustable because the monetary authorities, based on the 1949 experience, were unwilling to accept the risks associated with discrete changes in parities--loss of prestige, the likelihood that others would follow, and the pressure of speculative capital flows if even a hint of a change in parity were present.

As the system evolved into a fixed exchange rate gold dollar standard, the three key problems of the interwar system re-emerged: adjustment, liquidity and confidence. These problems dominated all discussion of the international monetary system during the convertible Bretton Woods period and so the historical survey is organized around them.

5.1 The Three Problems

The three problems facing the Bretton Woods system were spelled out clearly at the Bellagio Conference in 1964 (Machlup, 1964).⁴⁸ Under the classical gold standard, balance of payments adjustment worked automatically through the price specie flow mechanism aided by short-term capital flows. Alternatively, if currencies were inconvertible into gold, adjustment occurred through changes in the exchange rate. Under Bretton Woods, concern over the unemployment consequences of wage rigidity delayed the deflationary adjustment required by a deficit country, and together with the use of short-term capital controls considerably muted the automatic mechanism.⁴⁹ Some automatic adjustment was supposed to occur via changing income and expenditure in the open economy Keynesian model and some via the money supply response to changes in reserves. However, full adjustment in that model relied on discretionary monetary and fiscal policy, incomes policies, and

direct trade controls. Changes in exchange rates was the mechanism of last resort. The adjustment problem concerned the burden of adjustment between deficit and surplus countries and the choice of policy tools.

Liquidity, the provision of international reserves in the Bretton Woods system, could delay or avoid the use of various adjustment policies including exchange and trade controls. In the short run liquidity avoids disruption. In the long run it can allow time for adjustment but hamper less drastic policies. The perceived liquidity problem in the Bretton Woods system was that the various sources of liquidity were not adequate or reliable enough to finance the growth of output and trade. The world's monetary gold stock was insufficient by the late 1950's, IMF unconditional drawing rights were meager, and the supply of U.S. dollars depended upon the U.S. balance of payments, which in turn was related to the vagaries of government policy and the confidence problem.

The confidence problem, as in the interwar period, involved a portfolio shift between dollars and gold. As outstanding dollar liabilities held by the rest of the world monetary authorities increased relative to the U.S. monetary gold stock, the likelihood of a run on the "bank" increased. The probability of all dollar holders being able to convert their dollars into gold at the fixed price declined.

The three problems were interconnected. The more reserves in the system, the less the burden of adjustment on deficit countries, the more on surplus countries, because no matter how reserves are distributed initially they will eventually be redistributed to the surplus countries. Conversely, deficit countries tend to bear the main burden of deficient liquidity. On the other hand, the more adequate the adjustment mechanism, the less need for liquidity. Finally as liquidity provided by a reserve center increases, confidence declines (Machlup, 1964, pp. 36-37).

In one sense, the distinction between the problems is artificial. For the U.S. as the key reserve country the adjustment and confidence issues were tightly intertwined because the main concern over the ongoing balance of payments deficit was the threat to its gold reserves. This was also the case for the U.K.--because sterling was used as international reserves, the loss of international reserves was

a threat to confidence in sterling. Finally because the U.S. deficit provided liquidity to the rest of the world, adjustment by the U.S. meant a shortage of reserves for the system. Indeed the three problems would not arise under either a pure floating rate regime or a perfectly fixed exchange rate regime such as a pure gold coin standard or a pure dollar standard.⁵⁰ The problems arose because the Bretton Woods Articles encouraged countries to follow independent domestic stabilization policies, and because of the development of the gold exchange standard.

5.2 The Adjustment Problem in Bretton Woods

The problem was conceived of as having two parts: the asymmetry of adjustment between deficit and surplus countries and the asymmetry of adjustment between the U.S. as the center of the system and the rest of the world.⁵¹ Solutions to the problem included the use of traditional monetary and fiscal policy, a policy mix between the two, the use of new tools such as incomes policies, rescue packages, capital and trade controls, and the injection of new liquidity. Proposals which were suggested but not adopted were greater exchange rate flexibility and changes in the price of gold.

5.2.1. Asymmetry of Adjustment Between Deficit and Surplus Countries

I focus briefly on two extreme examples of the asymmetric adjustment problem: the United Kingdom and Germany.

The United Kingdom and Germany: 1959 to 1967

Throughout this period the U.K. alternated between expansionary monetary and fiscal policies designed to maintain full employment and encourage growth and austerity programs --a strategy referred to as stop-go. The connecting link was the state of the balance of payments. Expansionary policy inevitably led to deterioration in the current account, a decline in international reserves and speculation against the sterling parity. The basic problem was a slower growth rate in the U.K. than in her trading partners coupled with a higher underlying inflation rate, which threatened the competitive position of the pound. On several occasions, standby loans were drawn from the IMF and rescue packages arranged by the G-10 through the BIS, referred to as Basle type operations and arrangements (Tew, 1988, chapter 10). The pattern was evident in the 1950's, with a major crisis and

rescue by the IMF in 1957. Expansionary policy and rapid growth in 1959 led to a current account deficit in 1960 and a crisis in March 1961, alleviated by a \$1.5 million standby loan from the IMF and adoption of an austerity program.⁵² See figure 16 which shows the U.K. balance of payments and its components. With an improvement in the balance of payments, policy switched to ease in 1962 and was expansionary throughout 1963. By the time the Labour party was elected on October 16, 1964, the current account had deteriorated quite markedly and reserves declined rapidly. The Wilson government refused to devalue, announced an import surcharge on October 26 but did not depart from its expansionary policy.⁵³ The balance of payments continued to deteriorate, reserves declined, speculation against sterling mounted, and on November 25, a \$4 billion rescue package was arranged with the G-10 and the IMF. The authorities continued to maintain a relatively expansionary policy through 1965 and pressure on sterling reserves continued. A tight budget package was instituted in July 1965 along with restrictions on capital outflows. The pressure temporarily abated but arose anew in the spring and summer of 1966. This time a massive austerity program was instituted on July 20 and external assistance was provided by the Federal Reserve and other central banks. Declining output and rising unemployment in early 1967 led to a reversal of the tight fiscal and monetary policies. The balance of payments deteriorated in the summer of 1967. A series of adverse shocks-- the closing of the Suez Canal in the Six Day War and a dock strike in October were contributing factors. A speculative attack on sterling mounted in November. This time the \$3 billion rescue package was insufficient to stem the tide. Sterling was devalued on November 18, 1967, by 14.3% to \$2.40 (Cairncross and Eichengreen, 1983, chapter 5).

The November 1967 devaluation also marked the effective end of sterling's role as a reserve currency. After the devaluation, the countries of the sterling area increasingly began to hold dollars as a reserve currency. To protect the remaining sterling balances, an agreement was worked out at Basle in 1968 whereby in exchange for holding a specified proportion of their reserves in sterling,

each member received a dollar guarantee on their sterling holdings in excess of ten percent of their total reserves (Dam, 1982, p. 184).⁵⁴ In effect, sterling as a reserve asset became equivalent to dollars.

The U.K. experience was important for the adjustment issue for a number of reasons. She was a country with a chronic balance of payments deficit, forced to take strong corrective action.⁵⁵ In the eight years after convertibility, virtually every technique and tool recommended by the OECD's WP-3 study (OECD, 1966) on adjustment was used. In addition, new facilities to provide the liquidity to allow the time for adjustment were developed. Basle arrangements--both short-term swaps (extensions of inter-central bank credit lines); and longer-term facilities (Tew, 1968, chapter 10), the General Arrangements to Borrow of 1961, whereby the G-10 provided a \$6 billion line of credit in a package of hard currencies to the IMF.⁵⁶ Finally, the pound, as an alternative reserve currency, was viewed as a first line of defense for the dollar. Devaluation of the pound, it was believed, would ultimately put pressure on the dollar (Dam, 1982, chapter 6).

West Germany was a surplus country which faced the opposite problem to that of the U.K.⁵⁷ See figure 17. Relatively rapid growth (especially of exports) and relatively slow underlying inflation produced a series of current account surpluses and reserve inflows throughout the 1950's.⁵⁸ Concern over the inflationary consequences of the balance of payments surpluses prompted the German authorities in 1959 to both follow tight monetary policy and to institute measures to prevent capital inflows. These included the prohibition of interest payments and discriminatory reserve requirements on foreign deposits. The tight money led to both a recession and a further reserve inflow in 1960. Finally in 1961, the DM was revalued by 5%. With two exceptions, 1962 and 1965, the German current account was in surplus until the end of Bretton Woods. The package of tight money and capital controls was repeated again in 1964-1966 and 1968. Opposition to further revaluations, primarily by the export sector, mounted throughout the 1960's. In sum, Germany resisted adjustment during the Bretton Woods regime. The German monetary authorities believed the key problem of the international monetary system was inflation imported from abroad.

5.2.2. Asymmetry Between the United States and the Rest of the World

The United States had an official settlements balance of payments deficit in 1958 which persisted, with the notable exception of 1968-1969, until the end of Bretton Woods. See figure 18. However, with the exception of 1959, the U.S. had a current account surplus until 1970. The balance of payments deficit under Bretton Woods arose because capital outflows exceeded the current account surplus. In the early postwar years, the capital outflow consisted largely of foreign aid. By the end of the 1950's private long-term investment abroad (mainly direct investment) exceeded military expenditures abroad and other official transfers (Eichengreen, 1991b).

The balance of payments deficit was perceived as a problem by the U.S. monetary authorities because of its effect on confidence. As official dollar liabilities held abroad mounted with successive deficits, the likelihood increased that these dollars would be converted into gold and eventually the U.S. monetary gold stock would reach a point low enough to trigger a run. Indeed the U.S. monetary gold stock by 1959 equalled total external dollar liabilities and the rest of the world's monetary gold stock exceeded that of the U.S.. See figure 10. By 1964 official dollar liabilities held by foreign monetary authorities exceeded the U.S. monetary gold stock.

A second reason the balance of payments deficit was perceived as a problem was the dollar's role in providing liquidity to the rest of the world. Elimination of the U.S. deficit would create a worldwide liquidity shortage.

For the Europeans the U.S. balance of payments deficit was a problem for different reasons. First, as the reserve currency country the U.S. did not have to adjust her domestic economy to the balance of payments. As a matter of routine, the Federal Reserve automatically sterilized dollar outflows. The asymmetry in adjustment was resented. The Germans, as mentioned above, viewed the U.S. as exporting inflation to surplus countries through its deficits. Their remedy was for the U.S. (and the U.K.) to pursue contractionary monetary and fiscal policy (Emminger, 1967). In actual fact, U.S. inflation was less (on a GNP weighted average basis) than that of the rest of the G-7 before 1968. See figures 1 and 28. The French resented U.S. financial dominance and the seigniorage which

they believed the U.S. earned on its outstanding liabilities.⁵⁹ Acting upon this perception, the French in 1965 began to systematically convert outstanding dollar liabilities into gold. The French solution to the dollar problem was to double the price of gold--the amount by which the real price of gold had declined since 1934. The capital gains earned on the revaluation of the world's monetary gold reserves would be sufficient to retire the outstanding dollar (and sterling) balances. Once the U.S. returned to balance of payments equilibrium, the world could return to a fully functioning classical gold standard. (Rueff, 1967).

Some economists argued that the U.S. balance of payments deficit was not really a problem. The rest of the world voluntarily held dollars because of their valuable service flow--the deficit was demand determined. Despres, Kindleberger and Salant (1966) viewed the U.S. as supplying financial intermediary services to the rest of the world. Europeans borrowed long-term capital from the U.S. because U.S. capital markets were deeper and more efficient and interest rates were lower. In turn, they maintained short-term bank deposits in American banks because of a higher return.⁶⁰ The Gross Liquidity deficit employed at the time was misleading because it disregarded the financial intermediary services provided by the capital exported abroad. (See figure 19 for the different measures of the balance of payments used under Bretton Woods.) Even the Official Settlements balance was misleading because, were foreign residents to seek to hold their liquid savings at home, instead of in U.S. bank deposits, the counterpart of foreign borrowing must be held by the foreign central bank in dollars or be converted into gold. This would imply a U.S. official settlements deficit.⁶¹

The policy response of the U.S. monetary authorities was fourfold: to impose controls on capital exports; to institute measures to improve the balance of trade; to alter the monetary fiscal policy mix; and to employ measures to stem the conversion of outstanding dollars into gold.

Capital Controls

On the belief that the Balance of Payments deficit was aggravated by capital exports, the Kennedy and Johnson administrations imposed a series of restraints on capital outflows.⁶² Prominent among them were an increase in taxes on foreign earnings of U.S. corporations in 1961, and the Interest Equalization Tax of 1963, which taxed the earnings of foreign securities by 1%. This was extended to bank loans in 1965 and the rate was doubled in 1967. Also imposed were guidelines on direct investment in 1965 and limits on the growth of bank lending to foreigners in the same year. As Meltzer (1991) argued, most of these measures were counterproductive. They were either evaded (at some cost) or to the extent they succeeded, they reduced the return flow of interest income.

Balance of Trade Measures

A number of measures were designed to reduce official spending abroad, and to encourage exports and discourage imports. These included a reduction in defense and nondefense government purchases abroad, expansion of Export-Import Bank lending in 1960, and tying development aid to dollar purchases in 1961.

The Monetary Fiscal Policy Mix

During the Kennedy and Johnson years some attention was devoted to tailoring the monetary fiscal policy mix to maintain both internal and external balance (Mundell, 1968, chapter 16).⁶³ The most well known attempt was expansionary fiscal policy (an investment tax credit, accelerated depreciation allowances) to cure the recession of 1960-61 combined with Operation Twist. It was designed to twist the yield curve and raise short-term rates, thereby encouraging a capital inflow, while simultaneously reducing long-term rates to stimulate the economy.

Gold Conversion Policy

The U.S. initiated a number of international arrangements to prevent foreign monetary authorities from converting outstanding dollar liabilities into gold. These included swap arrangements with other central banks beginning in 1961. In a swap arrangement, each central bank would extend to the other a bilateral line of credit. Typically the Federal Reserve would borrow to purchase dollars

held abroad instead of selling gold (Meltzer, 1991, p. 62). To repay the swaps the Treasury would issue Roosa bonds i.e. long-term bonds denominated in foreign currencies. By issuing Roosa bonds the U.S. monetary authorities avoided reducing gold reserves. To prevent a rise in the free market price of gold leading to a run on the U.S. monetary gold stock, the London Gold Pool was established in 1961. With the Bank of England as agent, the U.S. along with seven European countries stabilized the private market price of gold, with the U.S. supplying 60% of the gold sold (Schwartz, 1989, p.342). The U.S. also dissuaded foreign monetary authorities from converting dollars into gold.⁶⁴

Proposed Solutions to the U.S. Adjustment Problem

During this period, a number of solutions to the U.S. adjustment problem were proposed. The first, an increase in world liquidity, was suggested both by U.S. authorities, the IMF, and OECD. Provision of an alternative international reserve media would eliminate the need for the U.S. to run a deficit. Negotiations over the period 1964 to 1967 led to the creation of SDR's (see Section 5.3 below). The second proposal was an increase in the price of gold, either unilaterally which would devalue the dollar against other currencies, or by a uniform change in all parities as under Article IV. The U.S. opposed both versions of the proposal. A unilateral devaluation, it was felt, would be quickly followed by other countries, and would reduce U.S. credibility--should the U.S. devalue once, what should prevent it from doing it again. It was also opposed because it would be difficult for the U.S. Congress to accept a change in the price of gold. A multilateral revaluation of gold, as suggested by the French, was also rejected as at most only a temporary solution.⁶⁵

The final proposal, for increased exchange rate flexibility, was opposed by the U.S. and other monetary authorities. The IMF throughout the 1960's reiterated its earlier opposition to floating exchange rates and advocated increased liquidity as the primary prescription for the Bretton Woods System's ills.⁶⁶ Only in 1970, in a special report (IMF, 1970), after a number of exchange rate crises had occurred, did the Fund come out in favor of temporary floating and very limited flexibility. (DeVries, 1987).⁶⁷

The U.S. balance of payments policies were in the main ineffective. As long as the U.S. maintained relatively stable prices, as it did before 1965, the system could be preserved for a number of years. The real problem was that of the gold exchange standard--ultimately there would be a convertibility crisis. The twin solutions of an increase in the price of gold and an increase in world liquidity by creation of an artificial reserve asset would not permanently eradicate the problem.

Even at some higher price of gold, world gold production would eventually be inadequate to produce long-run price stability. In the long-run, when account is taken of gold as a durable exhaustible resource, deflation is inevitable (Bordo and Ellson, 1985). Moreover an increase in world liquidity by an artificial reserve asset, if it is convertible into gold would not remove the basic convertibility problem (McKinnon, 1988). Finally as Townsend (1977), Salant (1983), and Buiter (1989) point out the gold exchange standard as a type of commodity stabilization scheme is bound to collapse in the face of unforeseen shocks. See Garber (1992).

5.3. The Liquidity Problem

In 1953 and 1958, the IMF issued reports on the adequacy of world reserves. Based on the ratio of reserves to imports for the world and different groups of countries, the first report concluded that world reserves were adequate. The second report said that they were adequate for the present but might not be sufficient in the coming decade of the 1960's after the return to convertibility and faster economic growth. It recommended an increase in member quotas. Triffin (1960) criticized the Fund report on a number of grounds and suggested a number of powerful reasons why reserves might be inadequate.

His first argument was that the ratio of reserves to imports in 1957 was too low. He argued that it should be greater than forty percent. For the G-10 (less the U.S.) in 1957 it was 34, figure 20, although, as can be seen, it was unusually low in that year.⁶⁸

Triffin's main argument for a shortage of liquidity was the inadequacy of gold reserves. The real price of gold had been falling since World War II and would eventually reduce world gold production. Indeed this happened in the early 1950's, but was offset by new sources of production

later in the decade (Gilbert, 1968). See figure 21. Gold production declined again in 1966. Moreover, the falling real price would stimulate private demand for gold. It seemed unlikely that Russian gold sales would make up much of the shortfall. See figure 22. Indeed the prospects for growth in the world monetary gold stock to be adequate to finance the growth of world real output and the volume of trade seemed dim. As can be seen clearly in figure 23 for the G-7, this was the case. A large gap opened between both the growth of output and the volume of trade and the growth of gold reserves in 1958. For the G-7 less the U.S. however, the gap only opens up in 1966. See figure 24. For the world excluding the U.S., net additions to the monetary gold stock (exclusive of the depletion of U.S. monetary gold reserves) declined throughout the Bretton Woods period. See figure 25 for the sources of change in the rest of the world's reserves.

Triffin further argued that this shortfall in the growth of reserves would not be made up by growth in sterling balances which already were in decline and this shortfall would only in part be satisfied by the IMF. The rest would come from the U.S. via its balance of payments deficit. The famous Triffin dilemma then would come about, as mentioned above, because with continuous deficits, U.S. monetary gold reserves would decline both absolutely and relatively to outstanding dollar liabilities until an eventual convertibility crisis. However, the U.S. monetary authorities would close the deficit before this would happen, creating a massive shortage of international liquidity and the prospect of world deflation.

"The time will certainly come, sooner or later, when further accommodation of short-term liabilities will either have to be slowed down or substantially matched by corresponding increases in our already bloated gold assets. If this were not done on our own initiative, foreign central banks would do it for us by stopping their own accumulation of dollar assets and requiring gold payment instead for their overall surplus with the United States. ...dollar balances cannot be relied upon to contribute substantially and indefinitely to the solution of the world liquidity problem" (Triffin, 1960, p.63).

Triffin's own solution to the problem was to go back to the original Keynesian ICU plan, converting all existing reserves into international money and having the IMF serve as the world's central bank, to provide generous liquidity.

In the years following Gold and the Dollar Crisis, three types of solutions to the liquidity problem were proposed and implemented: expanding the Fund's resources; creating new resources outside the Fund; creating a new type of reserve asset, the SDR.

5.3.1 Expanding the Fund's Resources

The Fund's resources were expanded by a 50% increase in members quotas in 1960 and a 25% increase in 1966. Moreover, the increase in quotas led to a further increase in Fund resources by raising the super gold tranche i.e., when a member's currency is drawn upon, the gold tranche of its quota is increased by the drawing. In addition, the General Arrangements to Borrow (GAB) in 1961 provided the Fund a further line of credit of \$6 billion.

5.3.2 Resources Outside the Fund

As mentioned in the discussion on adjustment, members of the G-10 developed an extensive network of swaps and standby arrangements to help members in the event of a payments crisis. These facilities increased the amount of conditional liquidity but not the international reserves of the international monetary system.

5.3.3 The SDR: A New Reserve Asset

The key innovation in the convertible Bretton Woods period was the development of the Special Drawing Right under the First Amendment to the Fund's Articles in 1968. Strong academic interest in the creation of a new reserve asset to solve the liquidity problem began in 1963. Earlier several related proposals had circulated (Grubel, 1963). The Bellagio Conference considered the merits of a number of them. Official interest by the U.S., the monetary authorities of the G-10 and the IMF was expressed in a number of studies in 1964 and 1965 (Solomon, 1976, chapter IV)-- especially an IMF report in 1964 and the Ossola Report by Working Party 3 of the G-10 (1965).

The latter considered some competing proposals, including alternative forms of a composite reserve unit (CRU). Under the Bernstein plan, each member of the G-10 would subscribe an amount of its own currency to a pool and receive in exchange a corresponding amount of CRU's which could be then used as equivalent to gold. In a French alternative, members would subscribe to the pool in proportion to their gold holdings and then gold and CRU's would circulate together in fixed proportions (Williamson, 1977, p. 20). Extensive negotiations, under U.S. initiative, between the IMF and the G-10 between 1965 and 1967 finally led to the creation of the SDR which was formally ratified at the September, 1967, Annual Meeting of the IMF, at Rio (Solomon, 1976, chapter VII).

A Special Drawing Account was set up at the Fund, separate from the General Account. In contrast to the early CRU scheme, access to SDR's was made available to all members, not just the G-10. Members were credited SDR's in proportion to their quotas. Also unlike the CRU, the SDR was a fiat obligation, it was not backed by gold. Its acceptability stemmed from the obligation by other members to accept them—similar to the legal tender provision of domestic fiat money. Members must accept SDR's when the Fund mandates their acceptance, as long as their holdings are less than three times their cumulative allocation. This put a limit on the amount of a potentially inferior asset that would have to be absorbed (Dam, 1982, p. 154). One SDR was defined as equivalent to one gold dollar.

Two limitations on the SDR were that it could only be used to finance Balance of Payments deficits and that members must hold on average a balance over a five year period of at least 30% of its allocation. The former was to prevent the SDR from aggravating the confidence problem (Williamson, 1977, p. 23); the latter was a compromise between France, which wanted the new facility to be a form of credit, and the U.S., which wanted a reserve asset (Dam, 1982, pp. 163-164). Otherwise members were free to use SDR's unconditionally. To use them, a member would notify the Fund, which would then designate a surplus country to receive SDR's and in return provide the deficit country an equal value of some convertible currency to use in intervention (Williamson, 1977, p. 22).

France, as part of its continuing struggle against U.S. hegemony, in effect, exacted the provision that the SDR scheme could only be activated when the U.S. balance of payments deficit was eliminated.⁹ This was in opposition to the American view that the introduction of SDR's would then allow it to reduce its deficit. The scheme was activated on January 1, 1970, after the U.S. had a balance of payments surplus in 1968 and 1969, (see figure 18) and following what was perceived to be an alarming decline in international reserves. See figure 20. Based on a projection that the decline in the growth of international reserves that began in 1965 would persist, (see figure 24), the initial allocation was quite large--\$9.5 billion over a three year period.

Institution of the SDR has raised a number of issues. First, is its acceptability. It has been argued that the SDR was doomed to be less acceptable as a reserve asset than the dollar and gold (McKinnon, 1988, Metzler, 1991). It was less acceptable than the dollar because its use was limited to official international transactions and unlike the dollar it could not be used as a private international money. It was also less acceptable because it bore a low rate of interest. It was less acceptable than gold as a store of value because it lacked the intrinsic properties of gold. Ultimately, its main function in the international monetary system, other than as a marginal reserve asset, was as a unit of account.

The second issue was that the SDR scheme was designed only to expand the growth of reserves. It did not include a mechanism providing a restraint on reserve growth through the deficits of reserve centers (Williamson, 1977, p. 23). In actual fact SDR's added to the inflationary pressures of the early 1970's.

The third issue was that of seigniorage. The issue of SDR's by economizing on gold reserves created a social saving. To the extent that competitive interest was not paid on SDR balances the social saving was distributed as seigniorage. Moreover to the extent seigniorage was allocated in proportion to members' quotas, it was distributionally neutral (Williamson, 1977, p. 24 and Mundell and Swoboda, 1969).

The final issue was that of confidence. By restricting SDR's to financing balance of payments deficits, the problem of having another asset in the portfolio of international assets, between which destabilizing switches can occur, was avoided. But any extension of the SDR's use as a true substitute for dollars possessing gold convertibility would have aggravated the confidence problem. Considerable effort was directed to the liquidity problem and to devising institutional solutions. It was widely believed that solving the liquidity problem would also solve the adjustment problem and thereby preserve the Bretton Woods system. What the reformers did not pay adequate attention to was the buildup in world inflation after 1965, in turn considerably aggravated by a vast surplus of international liquidity.

5.4 The Confidence Problem

The key problem of the convertible Bretton Woods period was the confidence crisis for the dollar. As argued by Triffin (1960), Kenen (1960) and Gilbert (1968), the gold dollar system that evolved after 1959 was bound to be dynamically unstable if the growth of the world monetary gold stock was insufficient to finance the growth of world output and trade and to prevent the U.S. monetary gold stock from declining relative to outstanding U.S. dollar liabilities. The pressure on the U.S. monetary gold stock would continue, as growth of the world monetary gold stock declined relative to the growth of world output and trade and the world substituted dollars for gold, until at some point a confidence crisis would be triggered leading to the collapse of the system as occurred in 1931. An international lender of last resort, such as proposed by Kindleberger (1973), could temporarily prevent the collapse if it could issue international high-powered money which was equivalent to domestic high powered money, but if the basic problem was a gold shortage then it too would become ineffective. However at the same time as fears over U.S. gold convertibility threatened the dynamic stability of the Bretton Woods system gold still served two positive roles. The first is that gold was the numeraire of the system; all currencies were anchored to its fixed price via the U.S. commitment to peg its price. The second is the fact that until 1968 gold still served as backing to the U.S. dollar via a 25% gold reserve requirement against Federal Reserve notes which may have

served as a brake on U.S. monetary expansion. Against this background, we trace the history of gold and the dollar.

5.4.1 The First Crisis - October, 1960

The first glimpse of a confidence crisis was the gold rush of October 1960 when speculators pushed the free market price of gold on the London market up from \$35.20 (the U.S. Treasury's buying price) to \$40.00. See figure 26. This first significant runup in gold prices, since the London gold market was reopened in 1954, was supposedly triggered by concerns over a Democratic victory in the 1960 U.S. Presidential election. Kennedy's pledge "to get America moving again" was interpreted as an inflationary policy which might force the U.S. to devalue its currency (i.e. unilaterally raise the price of gold in terms of dollars, Solomon, 1976, p. 35)

The U.S. monetary authorities feared that private speculation in the gold market might spill over into official demands for conversion. Consequently remedial action was quickly taken.⁷⁰ The Treasury supplied the Bank of England sufficient gold to restore stability and the monetary authorities of the G-10 agreed to refrain from buying gold above \$35.20. In succeeding months, the London Gold Pool was formed; it became official in November, 1961. As mentioned above, the Pool, which was formed between the U.S. and seven other central banks, agreed to buy or sell gold in order to peg the price at \$35.00 per ounce. For the next six years, the Pool did succeed in stabilizing the price of gold, but it did not prevent a steady decline in the U.S. monetary gold stock.⁷¹ See figure 10. In fact, though the seven other central banks supplied 40% of the gold required to stabilize the price of gold, they replenished their monetary gold stocks outside the Pool by converting outstanding dollar balances into gold at the U.S. Treasury (Meltzer, 1991, p. 63).

During the period 1961 to 1967, the U.S. made a series of arrangements to protect its monetary gold reserves. As noted above, these included the network of swap arrangements with other central banks, Roosa bonds and moral suasion. However, France did not go along with these efforts and began its campaign against the dollar in February, 1965.

The period was marked by two sets of underlying forces which would undermine the dollar's relationship to gold--growing gold scarcity and a rise in U.S. inflation. World gold production levelled off in the mid 1960's and even declined in 1966 (see figure 21), while at the same time private demand soared, precipitating a drop in the world monetary gold stock after 1966 (see figures 22 and 27). Indeed, beginning in 1966, the Gold Pool became a net seller of gold. Also, U.S. money growth accelerated in 1965, in part to finance the Vietnam War. Inflation began to rise in 1965 (figures 1 and 28) and the current account surplus began to deteriorate in 1964 (figure 18). Moreover, U.S. competitiveness began to deteriorate in 1965 reflected in a rise of the ratio of U.S. unit labor costs relative to trade weighed unit labor costs (Metzler, 1991, p. 71). The balance of payments deficit worsened between 1964 and 1966, but was reversed in 1966 by capital inflows triggered by tight monetary policy.

After the devaluation of sterling, which the U.S. tried unsuccessfully to prevent, pressure mounted against the dollar via the London gold market. From December 1967 to March 1968 the Gold Pool lost \$3 billion in gold, with the U.S. share at \$2.2 billion (Solomon, 1976, p. 119). The immediate concerns of the speculators may have been fears of a dollar devaluation, but according to Gilbert (1968) and Johnson (1968), it reflected the underlying gold scarcity. In the face of the pressure, the Gold Pool was disbanded on March 17, 1968, and a two-tier arrangement put in its place. Henceforth, the monetary authorities of the Gold Pool agreed to neither sell nor buy gold from the market. They would only transact among themselves at the official \$35.00 price. In addition, on March 12, 1968, the U.S. removed the 25% gold requirement against Federal Reserve notes. The key consequence of these new arrangements was that gold was demonetized at the margin. The link between gold production and other market sources of gold and official reserves was cut. Moreover, in the following years, the U.S. put considerable pressure on other monetary authorities to refrain from converting their dollar holdings into gold. In effect, the world switched to a de facto dollar standard.

A number of solutions to the gold dollar confidence problem were proposed at the time. These included the introduction of a new reserve asset, a rise in the price of gold, and demonetization of gold.⁷² The first scheme would substitute SDR's (or something similar) for dollars and gold as a reserve asset. This presumably would take the pressure off the U.S. However, as long as this new currency would be convertible into gold, and the gold market remained as it was, the pressure would just shift to the new asset. Indeed, this was the reason the use of SDR's was limited to financing balance of payments deficits.

The second scheme, proposed by Rueff (1967), Gilbert (1968) and others, was to solve the gold scarcity problem by doubling the price of gold. This would create sufficient liquidity to both alleviate the liquidity and adjustment problems. Also, the rise in the price of gold would encourage gold production and discourage private demand. Growth in the world monetary gold stock would be sufficient to finance the growth of real output and prevent a threat to U.S. gold reserves for some undetermined future.⁷³ There are two fundamental problems with this solution.⁷⁴ First, it is time inconsistent. If the price of gold were doubled once, what is to prevent it from being raised again? Market participants would expect a future change in price and would permanently reduce their holdings of dollars (as happened to sterling after 1949 and 1967). Second, it would only postpone the problem. It would only be a matter of time, in a rapidly growing world, before a future gold scarcity would arise, precipitating a future crisis.

A variant of this theme was a unilateral dollar devaluation. This was opposed by the U.S. for the above reasons and because it would likely be followed by the rest of the world.⁷⁵

The final proposal was to demonetize gold and remove all impediments to the operation of a pure dollar standard. According to McKinnon (1969, 1988) such a system was already in place by the mid 1960's. Both private entities and official agencies held dollars because of their superior attributes as international money. Use of the dollar solved the n-1 balance of payments problem (Mundell 1968, chapter 10). The dollar as the nth currency, allowed the rest of the world to independently peg their exchange rates and target their balance of payments. The U.S. had to follow a passive balance of

payments policy i.e., a policy of benign neglect. The only major constraint on the U.S. was to stabilize the price of traded goods, a policy which it had followed successfully until 1965. Given the U.S. stabilized price of traded goods, the world price level would be anchored to it via commodity arbitrage and monetary adjustment. Growth in the rest of the world would be financed by dollars supplied by the U.S. deficit (Floyd, 1985). Gold convertibility however, presented a problem. As long as the U.S. was committed to convertibility, its ability to elastically supply the dollars demanded by the rest of the world would be curtailed by the threat of a confidence crisis. The solution would then be to demonetize gold.

Two problems with this approach were first, that the Europeans were unwilling to go along with dollar hegemony; and second, that without gold convertibility, there was no commitment mechanism to constrain the U.S. to follow a stable monetary policy. As it turned out, the dollar standard which emerged de facto in 1968, broke down precisely for these reasons.

5.5 Conclusion

By 1968 the international monetary system had evolved very far indeed from the model of the architects of the Articles of Agreement. In reaction to both the development of financial markets and the confidence problem, the system had evolved into a de facto dollar standard. However, gold convertibility still played a role. Though the major industrial countries tacitly agreed not to convert their outstanding dollar liabilities into U.S. monetary gold, the threat of doing so was always present. At the same time, as the countries of continental Europe and Japan gained in economic strength relative to the U.S., they became more reluctant to absorb outstanding dollars. They also were reluctant to adjust their surpluses by revaluing their currencies. They increasingly came to believe that adjustment should be undertaken by the U.S.

The system also had developed into a de facto fixed exchange rate system. However, unlike the classical gold standard, where the fixed exchange rate was the voluntary focal point for both internal and external equilibrium, in the Bretton Woods system exchange rates became fixed out of the fear of the consequences of members allowing them to change. Nevertheless, because of increased

capital mobility, the pressure for altering the parities of countries with persistent deficits and surpluses became harder to stop through the use of domestic policy tools and the aid of international rescue packages. Pressure increased from both academic and official sources for greater exchange rate flexibility.

By 1968, the system had also evolved a form of international governance which was quite different from that envisioned at the beginning. Instead of a community of equal currencies managed by the IMF, the system was managed by the U.S. in co-operation with the other members of the G-10. In many respects, it was closer to the key currency system proposed by Williams (1936,1943). (See Johnson, 1972a). The IMF still had an important role as a clearing house for different views on monetary reform, as a center of information, as the principal voice for the countries of the world other than the G-10, as their primary source of adjustment assistance and finally as an important partner in the major G-10 rescue packages.⁷⁶

In sum, the problems of the interwar system that Bretton Woods was designed to avoid re-emerged with a vengeance. The fundamental difference, however, was that the system was not likely to collapse into deflation as in 1931 but rather explode into inflation.

6. The Collapse of Bretton Woods

After the establishment of the two-tier arrangement, the world monetary system was on a de facto dollar standard. The system became increasingly unstable until it collapsed with the closing of the gold window in August 1971. The collapse of a system beset by the fatal flaws of the gold exchange standard and the adjustable peg was triggered by an acceleration in world inflation, in large part the consequence of an earlier acceleration of inflation in the United States. Before 1968, the US inflation rate was below that of the GNP weighted inflation rate of the G-7 excluding the U.S. (see figure 28).⁷⁷ It began accelerating in 1964, with a pause in 1966-67. The increase in inflation in the U.S. and the rest of the world was closely related to an increase in money growth, figure 29, and in money growth relative to the growth of real output. See figure 30.

U.S. money growth ratcheted upwards beginning in the early 1960's reflecting expansionary monetary policy. Growth in Federal Reserve credit and in the monetary base accelerated dramatically from 1961 to 1962, then again from 1963 to 1965 and, after the credit crunch of 1966, from 1967 through 1968. After another bout of tight money in 1969, both aggregates accelerated again from 1970 to 1972. See figure 31. The sizeable excess of Federal Reserve credit over the growth of the base is in part reflected in the decline in international reserves seen in figure 18. Expansionary monetary policy in the early 1960's reflected the growing preference by the authorities for full employment over price stability (Niehans, 1976) and later in the mid 1960's, to help finance budget deficits associated with both the Vietnam war and increased spending on social programs. Indeed changes in the monetary base are closely correlated with the government's budget deficit.⁷⁸ See figure 32.

There are a number of competing hypotheses on how U.S. money growth and inflation spread to the rest of the world. (See Genberg and Swoboda, 1977a). One leading hypothesis, the world monetarist hypothesis (Genberg and Swoboda, 1977b), argues that the world price level is determined by world money supply and world money demand. Individual countries price levels converge to the worldwide average via commodity market arbitrage. U.S. money growth was the primary determinant of world money growth because of an asymmetrical relationship between the U.S. and the rest of the world. U.S. dollars served as high powered money for other countries as well as for the U.S and the U.S. could sterilize reserve flows whereas the rest of the world could not (Swoboda and Genberg, 1982 and 1992.⁷⁹

Darby et al (1983) provided considerable evidence on the transmission of inflation in the Bretton Woods system. Their regressions led to a number of important conclusions. First, U.S. inflation was caused by lagged U.S. money growth. Second U.S. money growth was independent of changes in international reserves--the balance of payments had no effect on the Federal Reserve's reaction function. Third, U. S. money growth had strong and significant effects on money growth in seven major countries with very long lags - up to four years. These lags reflected the fact that

central banks in the seven countries partially sterilized reserve flows. Finally, money growth in the seven countries explained inflation in these countries with a significant lag. (Darby, et al, 1983, chapter 1).

The key transmission mechanism of inflation was the classical price specie flow mechanism augmented by capital flows. Little evidence for other mechanisms including commodity market arbitrage was detected (Darby et al, 1983, Ch. 12). According to these authors, the Bretton Woods system collapsed because of the lagged effects of U.S. expansionary monetary policy. As the dollar reserves of Germany, Japan and other countries accumulated in the late 1960's and early 1970's, it became increasingly more difficult to sterilize them. This fostered domestic monetary expansion and inflation. The only alternative to importing U.S. inflation was to float--the route taken by all countries in 1973.

An alternative explanation of the events leading to collapse is growing misalignment in real exchange rates between the U.S. and her principal competitors in the face of differential productivity trends. Following the argument of Balassa (1964), more rapid growth of productivity in the traded goods sector (relative to the non-traded goods sector) in Germany, Japan and other surplus countries led to higher CPI inflation and also increased pressure to revalue. Expansionary U.S. monetary and fiscal policy of the late 1960's exacerbated the misalignment by further overvaluing the dollar (Obstfeld, 1992). Marston (1987) provides evidence for this view in a comparison of productivity trends, inflation rates and real exchange rates in the U.S. and Japan 1964-1983 but for other countries the evidence is limited (Eichengreen, 1992).

With this background we briefly survey the events of 1968 to 1971. After the creation of the two-tier system pressure increasingly shifted to the U.S. to adjust. However in 1968 and 1969 important exchange rate crises occurred in France and Germany. They illustrate the increasing fragility of the adjustable peg system in the face of improved capital mobility. Strikes and student riots in France in May 1968, to which the government responded with expansionary monetary and fiscal policy, led to a speculative flight from the franc and a considerable drop in French international

reserves. See figure 33. The pressure was alleviated by a massive rescue package organized by the U.S. in June and imposition of capital controls (Solomon, 1976, pp. 153-154). The pressure continued into the fall of 1968 but the French resisted devaluation in November by a shift to tight monetary and fiscal policy. At the same time as France faced pressure to devalue, Germany (with low inflation and rapid real growth) was facing increasing pressure to revalue. Speculative funds flowed from France to Germany, and German reserves mushroomed. See figure 17. The Germans resisted revaluation on the grounds that it would harm the competitive position of export industries. They preferred France to devalue first. While the French announced their austerity measures, the Germans altered their border taxes, lowering the V.A.T. on imports and imposing taxes on exports--a measure equivalent to a partial revaluation of 4 percent--and imposed restrictions on capital inflows. The crisis was temporarily alleviated but began anew in the spring of 1969. France eventually devalued by 11.1 % on August 8, 1969. The Germans initially reacted to the further reserve inflows by imposing further restrictions on foreign owned deposits and by a readjustment of border taxes. Finally the Deutschmark (after a temporary float) was revalued by 9.3% on September 29 (Solomon, 1976 pp. 161-163). See table 2.

The U.S. current account balance continued to deteriorate in 1968 but the overall balance of payments exhibited a surplus in 1968 and 1969, thanks to a large short-term capital inflow. The capital inflow was activated by events in the Eurodollar market. In the face of tight monetary policy in 1968-69 and Regulation Q ceilings on time deposits, deposits shifted from U.S. banks to the Eurodollar market. U.S. banks in turn borrowed in the Eurodollar market repatriating these funds. In 1970, as U.S. interest rates fell in response to rapid monetary expansion and Regulation Q was suspended for large CD's, the borrowed funds returned and the deficit grew to \$9 billion. The deficit exploded to \$30 billion by August 1971.⁸⁰ See figure 18. The dollar flood increased the reserves of the surplus countries auguring inflation. German money growth doubled from 6.4% to 12% in 1971 and the German inflation rate increased from 1.8% in 1969 to 5.3% in 1971 (Meltzer, 1991, p. 73). Pressure mounted for a revaluation of the mark. In April 1971 the dollar inflow to Germany reached

\$3 billion. On May 5, 1971, the German central bank suspended official operations in the foreign exchange market and allowed the Deutschemark to float. Similar action by Austria, Belgium, the Netherlands and Switzerland followed. (Solomon, 1971, p. 179).

In the following months advocates of cutting the link with gold surfaced. In April 1971 the U.S. balance of trade turned to deficit for the first time and influential voices began urging dollar devaluation. The decision to suspend gold convertibility was triggered by French and British intentions in early August to convert dollars into gold. On August 15, at Camp David, President Nixon announced that he had directed Secretary Connolly "to suspend temporarily the convertibility of the dollar into gold or other reserve assets ..." The accompanying policy package included a 90-day wage-price freeze, a ten percent import surcharge, and a ten percent investment tax credit (Solomon, 1976, p. 186).

The U.S. decision to suspend gold convertibility ended a key aspect of the Bretton Woods system. The remaining part of the system--the adjustable peg--disappeared 19 months later.

The Bretton Woods system collapsed for three basic reasons.⁸¹ First, two major flaws undermined the system. One flaw was the gold exchange standard which placed the U.S. under threat of a convertibility crisis. In reaction it pursued policies which in the end made adjustment more difficult. The second flaw was the adjustable peg. Because the costs of discrete changes in parities were deemed so high, in the face of growing capital mobility, the system evolved into a reluctant fixed exchange rate system without an effective adjustment mechanism.

Second, U.S. monetary policy was inappropriate for a key currency. The U.S., after 1965, by inflating followed an inappropriate policy for a key currency country. Though the acceleration of inflation was low by the standards of the following decade, when superimposed upon the cumulation of low inflation since World War II, it was sufficient to trigger a speculative attack on the world's monetary gold stock in 1968 leading to the collapse of the Gold Pool (Garber, 1992). Once the regime had evolved into a de facto dollar standard, the obligation of the U.S. was to maintain price stability. Instead, it conducted an inflationary policy which ultimately destroyed the system.

Third, the surplus countries were increasingly unwilling to adjust. The major industrialized countries were unwilling to absorb dollar balances and to revalue their currencies. In turn, this reflected basic differences in the underlying inflation rates that countries were willing to accept. The growing gap between the sovereign interests of the U.S. and the other major industrial countries in part reflected the decline in U.S. power. At the same time as U.S. power declined relative to the continental countries and Japan, the G-10 lost effectiveness, and no other focal points of power emerged. The stage was set for a decentralized system.

7. Conclusion

In conclusion I summarize the main points of the paper, suggest answers to the two questions raised at the outset, and pose a number of questions that the other papers at the conference may answer.

7.1 Summary

The comparison of the performance of alternative monetary regimes in seven countries revealed that both real and nominal variables were most stable in the Bretton Woods convertible period, 1959 to 1970. In many respects the performance during that period was comparable to the period of the classical gold standard. In contrast, the preconvertible Bretton Woods regime was not as stable. Its performance was closer to that of the present floating rate regime.

The planning that led to Bretton Woods aimed to avoid the chaos of the interwar period. The ills to be avoided included: floating exchange rates, condemned as prone to destabilizing speculation in the early 1920's; the subsequent gold exchange standard that enforced the international transmission of deflation in the early 1930's; and the resort to beggar-thy-neighbor devaluations, trade restrictions, exchange controls and bilateralism after 1933. To avoid these ills, an adjustable peg system was designed, that combined the favorable features of the fixed-exchange rate gold standard and flexible exchange rates. Recent research however casts doubts upon the accuracy of the perceived flaws of the interwar system.

Both Keynes and White planned an adjustable peg system to be coordinated by an international monetary agency. The Keynes plan gave the ICU substantially more resources and power than the White Fund, but both institutions had considerable power over the domestic financial policy of the members. The British plan contained more domestic policy autonomy than did the U.S. plan while the American plan put more emphasis on exchange rate stability.

The Articles of Agreement signed at Bretton Woods represented a compromise between the two plans and between the interests of the U.S. and the U.K. The system that emerged was a system in which parities defined in terms of gold and the dollar could only be altered in the event of a fundamental disequilibrium. In the interim, international reserves and drawings on the Fund would finance adjustment. The compromise involved limited resources, limited power, defined an uncertain role for gold, and open-ended transitional arrangements.

The Bretton Woods system faced a number of problems in getting started and it took 12 years before the system achieved full operation. The two key problems in the early years--of bilateralism and the dollar shortage--were each largely solved by developments outside the Bretton Woods arrangements. The dollar shortage was solved by massive U.S. aid and the devaluations of 1949. Multilateralism was eventually achieved in Western Europe in 1958 following the establishment in 1950 of the EPU by the Europeans with U.S. assistance. Other developments in this period include the decline in importance of sterling as a reserve currency and the reduced importance of the IMF. By the end of the period, the system had evolved into a gold dollar exchange standard.

The period 1959 to 1967 was the heyday of Bretton Woods. The system had become a gold dollar standard whereby the U.S. pegged the price of gold and the rest of the world pegged their currencies to the dollar. The dollar emerged as the key reserve currency in this period, reflecting both its use as an intervention currency and a growing demand by the private sector for dollars as international money. This growth in dollar demand reflected stable U.S. monetary policy.

Three problems of adjustment, liquidity, and confidence dominated academic and policy discussions during this period. The adjustment issue focused on how to achieve it in a world with

capital controls, fixed exchange rates, and domestic policy autonomy. Various policy measures were proposed to aid adjustment.

Of particular interest during the period was asymmetry in adjustment between deficit countries like the U.K. and surplus countries like Germany, and between the U.S. as the reserve currency country and the rest of the world. Both the U.K. and Germany ran the gauntlet between concern over external convertibility and domestic stability. The U.K. alternated between expansionary policy that led to balance of payments deficits and austerity. Germany alternated between a balance of payments surplus that led to inflation and austerity.

For the U.S., the persistence of balance of payments deficits after 1957 was a source of concern. For some it demonstrated the need for adjustment; for others it served as the means to satisfy the rest of the world's demand for dollars. For monetary authorities the deficit was a problem because of the threat of a convertibility crisis as outstanding dollar liabilities rose relative to the U.S. monetary gold stock. U. S. policies to restrict capital flows and discourage convertibility did not solve the problem. The main solution advocated for the adjustment problem was increased liquidity. Exchange rate flexibility was strongly opposed.

The liquidity problem evolved from a shortfall of monetary gold beginning in the late 1950's. The gap was increasingly made up by dollars but, because of the confidence problem, dollars were not a permanent solution. New sources of liquidity were required, answered by the creation of the SDR's. However, by the time SDR's were injected into the system, they exacerbated worldwide inflation.

The key problem of the gold dollar system was how to maintain confidence. If the growth of the monetary gold stock was not sufficient to finance the growth of world real output and to maintain U.S. gold reserves, the system would become dynamically unstable. From 1960 to 1967 the U.S. adopted a number of policies to prevent conversion of dollars into gold. These included the Gold Pool, swaps, Roosa bonds, and moral suasion. The defense of sterling was a first line of defense for the dollar. When none of these measures worked, the two-tier gold market arrangement in March

1968 temporarily solved the problem by demonetizing gold at the margin and hence creating a de facto dollar standard.

The Bretton Woods System collapsed between 1968 and 1971 in the face of U.S. monetary expansion which exacerbated worldwide inflation. The U.S. broke the implicit rules of the dollar standard by not maintaining price stability. The rest of the world did not want to absorb dollars and inflate. They were also reluctant to revalue. The Americans' hands were forced by British and French decisions to convert dollars into gold. The impasse was ended by closing the gold window.

Another important source of strain on the system was the unworkability of the adjustable peg under increasing capital mobility. Speculation against a fixed parity could not be stopped by either traditional policies or international rescue packages. The breakdown of Bretton Woods marked the end of U.S. financial dominance. The absence of a new center of international management set the stage for a centrifugal monetary system.

7.2 Why Bretton Woods was so stable and why it was so short-lived

Our historical survey suggests that one reason why the macroeconomic performance of the Bretton Woods system exhibited such remarkable stability is that the United States as the center of the system followed stable financial policies, until the mid 1960's, and the rest of the world, tied to the U.S. via the fixed-exchange rate dollar standard, imported them. Divergences between countries' performances in this period largely reflected their decisions to follow different policy objectives (exemplified by different underlying inflation rates). That the system was so stable may also reflect the possibility that shocks to the U.S. and the rest of the world were quite limited in this period. Another possibility is that the stability in the statistics just masks the turmoil in the foreign exchange markets. The saga of speculative attacks on the major currencies, rescue packages, drastic austerity measures and capital controls throughout the 1960's, culminating in major devaluations in 1967 and 1969, makes the point.

The survey also suggests reasons the Bretton Woods system was so short-lived.

First, the two fatal flaws in its design: the gold exchange standard and the adjustable peg. Second,

the failure of the U.S. to maintain price stability after 1965. Third, the reluctance of the other major industrial countries to follow U.S. leadership when it conflicted with their national interests.

These answers, which most would agree with, lead to another question. Can we learn from the experience of Bretton Woods how to design a superior fixed exchange rate system? One possibility is to design a system that is based on rules which can be enforced. By rules is meant arrangements which bind policy actions over time. This view of policy rules, in contrast to an earlier tradition which stressed both impersonality and automaticity, stems from the recent literature on the time inconsistency of optimal government policy (Kydland and Prescott, 1977). This literature has demonstrated that, in almost all intertemporal policy situations, the public would benefit if government were bound by a commitment technology preventing it from changing planned future policy.

The rules to be designed should be transparent i.e. easily understood. They should allow for contingencies when the rules can be temporarily suspended, e.g., as in the case of the classical gold standard during a war (Bordo and Kydland, 1990). They also should allow for some feedback to accommodate random shocks.

Based on these criteria the Bretton Woods rules were not well designed.²² For nonreserve currency countries the rules were to maintain fixed parities, except in the contingency of a fundamental disequilibrium in the balance of payments, and to use financial policy to smooth out short-run disturbances. The enforcement mechanism was presumably the dominant power of the U.S. -- access to its open capital markets -- since the IMF had little power. The rule was defective because the fundamental disequilibrium contingency was never spelled out and no constraint was placed on the extent to which domestic financial policy could stray from maintaining external balance.

For the center country the rule was to maintain both price stability and gold convertibility. There was no explicit enforcement mechanism other than reputation and the commitment to gold convertibility. This rule suffered from two fatal flaws. First, because of the fear of a confidence crisis, the gold convertibility requirement prevented the U.S. in the early 1960's from acting as a

center country and elastically supplying the reserves demanded by the rest of the world. Second, as became evident in the later 1960's, the gold reserve requirement, which may have prevented the U.S. from providing sufficient international liquidity in the early 1960's, was useless in preventing the U.S. monetary authorities from pursuing an inflationary policy. No other enforcement mechanism existed. Ultimately, the U.S. attached greater importance to domestic economic concerns than to its role as the center of the international monetary system.

The failure of the Bretton Woods rule suggests a number of requirements for a well designed fixed exchange rate system. These include: that the countries follow similar domestic economic goals (underlying inflation rates); that the rules be transparent; and that some central monetary authority enforce them. The recent EMS system has been quite successful because it seems to encompass these three elements. Designing a system to extend beyond one region may be more difficult. The defects and dramatic collapse of Bretton Woods have discouraged nations from seeking to restore a system like it. Perhaps the perceived defects of the present system of floating--that it leads to undue volatility in both nominal and real exchange rates, in turn increasing macro instability and raising the costs of international transactions--are still not sufficient to overcome the aversion to a return by the world to a system like Bretton Woods.

7.3 Remaining Questions

Other questions remain to be asked about the origins, performance and demise of Bretton Woods. First, how did the Bretton Woods system differ in how it actually operated from other fixed exchange rate regimes? Second, what were the special factors that allowed the U.S., the U.K. and other countries to agree on the Articles of Agreement? Third, how did the adjustment mechanism work in normal times under Bretton Woods? Why did it break down? Fourth, was liquidity really inadequate before 1968? Why was it excessive thereafter? Fifth, could the confidence problem have been avoided under the gold dollar system? i.e. was collapse inevitable? Sixth, was Bretton Woods subject to different sources of shocks than other regimes? Were shocks transmitted between countries via the monetary standard or was there effective insulation? Seventh, what was the role of the IMF,

the G-10, and other avenues for cooperation in stabilizing the Bretton Woods system? Eighth, how did the nonindustrialized world relate to the Bretton Woods system? How effective was the IMF as a commitment mechanism for the LDC's? Ninth, how has the recent floating rate regime worked compared to Bretton Woods? How important were capital controls in the operation of Bretton Woods compared to the subsequent regime? Tenth, how has the EMS regime worked? What lessons did the current floating and EMS regimes learn from the Bretton Woods experience? These and other questions are answered by the remaining papers in this volume.

Data Appendix**Table 1 and Figures 1-9:****Canada:**

- 1) Population: 1880-1975, Data used in Bordo and Jonung (1987), The Long-run Behavior of the Velocity of Circulation. The International Evidence, New York: Cambridge University Press. 1976-1989, International Monetary Fund (1990) International Financial Statistics Yearbook.
- 2) M2: 1880-1984, Bordo and Jonung (1987). 1985-1989 Bank of Canada Review, various issues, table E1.
- 3) Real G.N.P.: 1880-1985, Bordo and Jonung (1987). 1986-1989, Bank of Canada Review, various issues, table A1.
- 4) G.N.P. Deflator: 1880-1985, Bordo and Jonung (1987). 1986-1989, Bank of Canada Review, various issues, table A1.
- 5) Consumer Price Index: 1880-1913, Interurban-Intertemporal Consumer Price Index in Robert C. Allen (1990), Real Income in the English Speaking World, Department of Economics , University of British Columbia Press. 1914-1960, M.C. Urquhart and K.A.H. Buckley (1965), Historical Statistics of Canada, Montreal: MacMillan. 1961-1989, Economic Report of the President 1991.
- 6) Short-term Interest Rate: 1880-1985, Bordo and Jonung (1987). 1986-1989, Treasury Bill Rate, International Financial Statistics Yearbook 1990.

7) Long-term Interest Rate: 1880-1985, Bordo and Jonung (1987). 1986-1989, International Financial Statistics Yearbook 1990, series 61.

8) Real Interest Rates: Computed as the difference between the Nominal Interest Rate and the rate of change of the Consumer Price Index.

9) C\$/S: 1880-1914, Gold Standard, Rate= \$1.00. 1919-1960, Federal Reserve Board (1943 and 1976) Banking and Monetary and Statistics 1 and 2. 1961-1989, Economic Report of the President 1991.

10) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the domestic to the U.S. Consumer Price Index.

France:

1) Population: 1880-1949, Mitchell, B.R. (1978) European Historical Statistics 1750-1970, New York: Columbia University Press, Table A1. 1950-1989, International Financial Statistics, various issues.

2) M1: 1880-1969, Michele Saint Marc (1983), Histoire Monetaire de la France 1800-1980, Paris: Presse Universitaire de la France, pp. 36-38. 1970-1989, Reserve Money (Currency plus Demand and Time Deposits), International Financial Statistics.

3) Real G.D.P.: 1880-1900, Calculated from the Toutain Index, Michele Saint. Marc (1983) pp. 99-100. 1901-1949, Sauvy (1954), Rapport sur le Revenu National presente, Conseil Economique, March 1954. 1950-1988, INSEE, Statistique Annuaire de la France.

- 4) Deflator: Calculated as the ratio of nominal to real G.D.P.. Nominal G.D.P. 1880-1913, M. Levy-Leboyer and F. Bourguignon (1990), The French Economy in the Nineteenth Century, New York: Cambridge University Press, Table A-III. 1914-1988 INSEE.
- 5) Consumer Price Index: 1880-1969, Michele Saint Marc (1983), p.107. 1970-1989, International Financial Statistics Yearbook 1990.
- 6) Short-term Interest Rate: Homer S. (1977), A History of Interest Rates, New Brunswick: Rutgers University Press. 1880-1914, Open Market Rate, Tables 27 and 61. 1925-1975, Day-to-Day Money Rate, Table 61. 1976-1989, Call Money Rate, International Financial Statistics Yearbook 1990.
- 7) Long-term Interest Rate: 1880-1969, Homer (1977), tables 25 and 60, 3% Rentes. 1970-1989, Long Term Government Bond Yield, International Financial Statistics Yearbook 1990.
- 8) Real Interest Rates: Computed as the difference between the Nominal Interest Rate and the rate of change of the Consumer Price Index.
- 9) FF/\$: 1880-1969, Michele Saint Marc (1983), page 107. 1970-1989, Economic Report of the President 1991.
- 10) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the domestic to the U.S. Consumer Price Index.

Germany:

1) Population: 1880-1979, A. Sommariva and G. Tullio (1987), German Macroeconomic History, 1880-1979, New York: St. Martin's Press, pp.234-236. 1980-1989, International Financial Statistics Yearbook 1990.

2) M2: 1880-1913, Data underlying Bordo (1986) "Financial Crises, Banking Crises, Stock Market Crashes and the Money Supply: Some International Evidence" in F. Capie and G. Wood eds. Financial Crises and the World Banking System, London: MacMillan. 1924-1938, Bordo and Jonung (1987). 1950-1989 Deutsche Bundesbank Monthly Reports, various issues.

3) Real G.N.P.: 1880-1985, Data underlying Meltzer and Robinson (1989) "Stability under the Gold Standard in Practice" in M.D. Bordo ed. Money History and International Finance: Essays in Honor of Anna J. Schwartz Chicago: University of Chicago Press. 1986-1989, International Financial Statistics Yearbook 1990.

4) Deflator: 1880-1985 Meltzer and Robinson (1989). 1986-1989, International Financial Statistics Yearbook 1990.

5) Consumer Price Index: 1880-1979, Sommariva and Tullio (1987) pp. 231-234. 1980-1989, International Financial Statistics Yearbook 1990.

6) Short-term Interest Rate: 1880-1939, Open Market Discount Rate from Homer (1977), Tables 33 and 67. 1950-1989, Call Money Rate: Homer (1977), Table 67 and International Financial Statistics Yearbook 1990.

7) Long-term Interest Rate: 1880-1975, Homer (1977), tables 32 and 67, High Grade Bond Yields. 1976-1989, Mortgage Bond Yield, International Financial Statistics Yearbook 1990.

8) Real Interest Rates: Computed as the difference between the Nominal Interest Rates and the rate of change of the Consumer Price Index.

9) DM/\$: 1880-1979, Sommariva and Tullio (1987) pp. 231-234. 1980-1989, Economic Report of the President 1991.

10) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the domestic to the U.S. Consumer Price Index.

Japan:

1) Population: 1880-1949, Bureau of Statistics 1957 Japan Statistical Yearbook, 1950-1989, International Financial Statistics Yearbook 1990.

2) M1: 1901-1959, Mitchell (1982), International Historical Statistics of Africa and Asia, New York: New York University Press, tables H1 and H2. 1960-1989, data supplied by Robert Rasche.

3) Real G.N.P.: 1885-1988, data supplied by Robert Rasche. 1989 International Financial Statistics Yearbook 1990.

4) Deflator: 1885-1988, data supplied by Robert Rasche. 1989 International Financial Statistics Yearbook 1990.

- 5) Consumer Price Index: 1950-1989, International Financial Statistics, various issues.
- 6) Short-term Interest Rate: 1880-1938, and 1953-1989, Discount Rate at Tokyo Banks, data supplied by Robert Rasche.
- 7) Real Interest Rate: Computed as the difference between the Nominal Interest Rate and the rate of change of the G.N.P. Deflator.
- 8) Yen/\$: 1880-1989, data supplied by James Lothian
- 9) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the G.N.P. Deflator to the U.S. Consumer Price Index.

United Kingdom

- 1) Population: 1880-1975, Bordo and Jonung (1987). 1976-1989, International Financial Statistics Yearbook 1990.
- 2) M3: 1880-1985, Bordo and Jonung (1987). 1986-1989, Bank of England, Quarterly Bulletin, various issues, Table 11.1.
- 3) Real NNP: 1880-1985, Bordo and Jonung (1987). 1986-1989, Central Statistical Office, Economic Trends, various issues.
- 4) Deflator: 1880-1985, Bordo and Jonung (1987). 1986-1989, Central Statistical Office, Economic Trends, various issues.

5) Consumer Price Index: 1880-1965, Feinstein's retail Price Series in F. Capie and A. Webber (1985), A Monetary History of the United Kingdom, Volume 1, London: George Allen & Unwin, Table III.(12). 1966-1989, International Financial Statistics Yearbook 1990.

6) Short-term Interest Rate: Treasury Bill Rate 1880-1985, Bordo and Jonung (1987). 1986-1989, International Financial Statistics Yearbook 1990.

7) Long-term Interest Rate: 1880-1985, Consol Rate, Bordo and Jonung (1987). 1986-1989, Long Term Government Bond Yield, International Financial Statistics Yearbook 1990.

8) Real Interest Rates: Computed as the difference between the Nominal Interest Rate and the rate of change of the Consumer Price Index.

9) \$/Pound: 1880-1939, Friedman and Schwartz (1982), Monetary Trends in the United States and the United Kingdom, Chicago: University of Chicago Press, table 4.9, column 8, pp. 130-135. 1947-1989, International Financial Statistics, various issues.

10) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the domestic to the U.S. Consumer Price Index.

United States

1) Population: 1880-1975, Bordo and Jonung (1987). 1976-1989, International Financial Statistics Yearbook 1990.

2) M2: 1880-1947, Bordo and Jonung (1987). 1948-1989, data supplied by Robert Rasche.

3) Real GNP: 1880-1945, Balke, Nathan S. and Gordon, Robert J. (1986), Appendix B Historical Data in Robert J. Gordon (ed.), The American Business Cycle Continuity and Change, Chicago: the University of Chicago Press, pp.781-783, column 2. 1946-1989, The Economic Report of the President 1991, pp. 288.

4) Deflator: 1880-1945, Balke, Nathan S. and Gordon, Robert J. (1986), Appendix B Historical Data in Robert J. Gordon (ed.), The American Business Cycle Continuity and Change, Chicago: the University of Chicago Press, pp.781-783, column 3. 1946-1989, The Economic Report of the President 1991, pp. 290.

5) Consumer Price Index: 1880-1970, pp 210-211 in U.S. Bureau of the Census (1975) Historical Statistics of the United States. Colonial Times to 1970. Bicentennial Edition, Washington D.C., hereafter called Historical Statistics. 1971-1989, International Financial Statistics Yearbook 1990.

6) Short-term Interest Rate: Commercial Paper Rate 1880-1986, Bordo and Jonung (1987). 1987-1989, International Financial Statistics Yearbook 1990.

7) Long-term Interest Rate: Long Term Government Bond Yield 1880-1986, Bordo and Jonung (1987). 1987-1989, Bordo and Jonung (1990) "The Long-Run Behavior of Velocity: the Institutional Approach Revisited" Journal of Policy Modelling Vol. 12 No. 2 (Summer), pp. 165-197.

8) Real interest Rates: Computed as the difference between the Nominal Interest Rate and the rate of change of the Consumer Price Index.

9) Trade Weighted Exchange Rate (Real and Nominal): 1960-1989 data supplied by Alan Meltzer.

Italy:

1) Population: 1880-1975, Istituto centrale di statistica (1976), Sommario di Statistiche Storiche dell'Italia 1861-1975, 1976-1989, International Financial Statistics Yearbook 1990.

2) M3: 1880-1980, Statistical Appendix from Spinelli, Franco and Fratianni, Michele (1991), Storia Monetaria D'Italia, Milan: Arnoldo Mondadori Editore, pages 48-51, series U1 + U2 + D. 1981-1989, International Financial Statistics Yearbook 1990, series 351 Money plus Quasi-Money.

3) Real G.N.P. and Deflator: 1880-1970, B.R. Mitchell (1975), table J1. 1971-1989 International Financial Statistics Yearbook 1990.

4) Consumer Price Index: 1880-1980, Statistical Appendix from Spinelli and Fratianni (1991), pages 66-71, series CLI. 1981-1989, International Financial Statistics Yearbook 1990, series 64.

5) Long-term Interest Rate: 1880-1980, Statistical Appendix from Spinelli and Fratianni (1991), pages 82-84, series RIL. 1981-1989, International Financial Statistics Yearbook 1990, series 61.

6) Real interest Rates: Computed as the difference between the Nominal Interest Rate and the rate of change of the Consumer Price Index.

7) Lira/\$: 1880-1980, Statistical Appendix from Spinelli and Fratianni (1991), pages 87-89, series ELUS. 1981-1989, International Financial Statistics Yearbook 1990, series af.

8) Real Exchange Rate: Computed as the nominal exchange rate divided by the ratio of the domestic to the U.S. Consumer Price Index.

Figure 10:**U.S. Monetary Gold Stock:**

Table SC-10, column 3 in The Role of Gold in the Domestic and International Monetary Systems. Report to the Congress of the Commission on the Role of Gold in the Domestic and International Monetary Systems. Volume 1. March 1982, hereafter called Gold Commission Report. The numbers in this table, as well as in table SC-8 (see World Monetary Gold Stock) are given in ounces. The fixed gold-price of \$35 per oz. is used to convert these numbers into dollars.

U.S. external liabilities:

Supplement 1972 to the International Financial Statistics of the IMF, page 2, series 4 (total) and 4a (monetary authorities and governments).

World Monetary Gold Stock:

Table SC-8, columns 1 (1945-1970) and 2 (1971) from the Gold Commission Report

Figure 11:

Table 8, page 314 in Triffin, Robert (1957), Europe and the Money Muddle, New Haven, Yale University Press

Figure 12:

Table B-102, page 424-425 in the Economic Report of the President 1989

Figure 13:

Current Account:

International Monetary Fund Balance of Payments Yearbook, various issues.

Reserves:

Total International Reserves as reported in the Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1961) of the International Financial Statistics.

Figure 14:

Current Account and Reserves:

Bank of England (1970) Statistical Abstract, Number 1, table 19.

dollar deficits:

1946-1951, Cairncross Alec and Eichengreen Barry (1983), Sterling in Decline, Oxford: Basil Blackwell, table 4.3, page 146.

1952-1957, Central Statistical Office (1958) Annual Abstract of Statistics, no. 95, London: HMSO, Section X, table 277, page 241.

Figures 15 and 25:

Gold, Reserve Position in the Fund, Foreign Exchange and SDRs:

Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1961) of the International Financial Statistics.

U.S. dollars:

1948-1951, Robert Triffin (1961) Gold and the Dollar Crisis, New Haven: Yale University press, table 14 page 72.

1951-1961, International Financial Statistics, April 1963, page 23.

1961-1971, Treasury Bulletin, July 1973, table IFS-2, total liabilities to official institutions in foreign countries.

British pounds:

1948-1951, Triffin (1961), table 14 page 72.

1951-1961, International Financial Statistics, April 1963, page 23.

1961-1971, Bank of England Statistical Abstract, Number 2, 1975, table 25/2: Exchange reserves in sterling held by central monetary institutions: geographical details, total all countries. These data are converted to U.S. \$ by using the actual exchange rate from the International Financial Statistics Yearbook 1990.

Figures 16,17,18 and 33:

Current Account, Long-term Capital, Short-term Capital and Change in Reserves:

1950-1959, OECD (1964) Statistics of Balance of Payments, 1950-1961, Paris

1960-1971, OECD (1979) Balances of Payments of OECD Countries, 1960-1977, Paris.

Figure 19:

Current Account:

1945-1970, Historical Statistics, series U15 + U16 + U17.

1971, Department of Commerce (1973) Statistical Abstract of the United States.

Liquidity Balance:

1946-1969, Department of Commerce Survey of Current Business, June 1970, p.43 table 3, row 4, 1970-1971, Statistical Abstract of the United States 1971.

Net Liquidity Balance:

1960-1971, Survey of Current Business, June 1972, p.26, row 33.

Basic Balance (Balance on Current Account and long-term capital):

1960-1971, Survey of Current Business, June 1972, p.26, row 26.

ORT:

Calculated as the sum of the transactions in U.S. official reserves (Source: Historical Statistics U24 and International Financial Statistics 79c.d) and the change in Liabilities to Foreign Official Institutions (Source: International Financial Statistics, 79b.d).

Figure 20:**Total International Reserves and total imports:**

Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1961) of the International Financial Statistics.

Figure 21:

Real price of gold:

Table SC-16, p.222-223, in the Gold Commission Report.

World gold output:

Table SC-2, p.188-189, in the Gold Commission Report.

Figure 22:

Private Demand:

Calculated as the sum of Jewelry + Industrial Demand (table SC-12, column 6), Coin + Medallions (table SC-12, column 7) and Net Private Bullion Purchases (table SC-12, column 8) minus Disharding of Private Bullion Holdings (table SC-13, column 6), from the Gold Commission Report.

Production:

See figure 21.

Change in world monetary gold stock:

See figure 27.

East-Block Gold Sales:

Table SC-13 column 2, page 211, in the Gold Commission Report.

Figures 23 and 24:

Real trade:

Calculated as the sum of real exports and imports, converted to dollars by using the actual exchange rate. Source: Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1971) of the International Financial Statistics.

Gold and Total International Reserves:

Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1971) of the International Financial Statistics.

Real Income:

Summers and Heston (1991) "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988", The Quarterly Journal of Economics, May, pp. 327-368.

Figure 26:

1954-1967, International Financial Statistics, various issues.

1968-1971, Table SC-17 in the Gold Commission Report.

Figure 27:

World Gold Stock:

Table SC-6, p. 195-196 in the Gold Commission Report.

World Monetary Gold Stock:

Table SC-8, p. 199 in the Gold Commission Report.

Figure 28:

United States:

Inflation rate calculated using the G.N.P. Deflator from table 1.

G7 and G7 excluding U.S.

The inflation rate is calculated as a weighted average of the inflation rates (using the G.N.P. Deflators from Table 1) in the different countries. The weights are calculated as the share of each country's National Income in the total Income in the G7 countries, where the G.N.P./G.D.P. data are converted to dollars using the actual exchange rates.

Figures 29 and 30:

Money Growth:

Calculated as the change in M1. Figure for the G7 and G7 excluding the United States are calculated by converting the national money supplies to U.S. dollars using the actual exchange rate. Data are from the Supplement 1972 (1948-1959) and Yearbook 1990 (1960-1971) of the International Financial Statistics.

Real Output Growth:**United States:**

Calculated as the change in the real G.N.P.-data from table 1.

G7 and G7 excluding the U.S.:

Calculated as a weighted average of the real income growth (using the data from Table 1) in the different countries. The weights are calculated as for figure 28.

Figure 31:**Federal Reserve Credit:**

1958-1970: Federal Reserve Board (1943), Banking and Monetary Statistics, table 10.2 B, pp. 526-535, 1971: Federal Reserve Board (1981), Annual Statistical Digest, 1970-1979, table 2A. p. 10.

U.S. Monetary Base:

Lothian James R. (1983), Data Appendix in Darby, Michael R., Lothian James R. et al (1983), The International Transmission of Inflation, Chicago: University of Chicago Press, series USMHQSAE, p.707.

Figure 32:

U.S. Budget Deficit:

DeLeeuw, Frank and Holloway, Thomas M. (1982), The High-Employment Budget: Revised Estimates and Automatic Inflation Effects, Survey of Current Business, April, table 3, pp. 26-27.

U.S. Monetary Base:

see figure 31.

Endnotes

1. The par value system was preserved by the Smithsonian Agreement, December 18, 1971, until its final abandonment on March 1, 1973.
2. I also examined the period (1946-1973) which includes the three years of transition from the Bretton Woods adjustable peg to the present floating regime. The evidence is similar to that of the 1946-1970 period so it is not presented here.
3. To be more exact the U.S. stayed on gold until 1933 and France until 1936. For a detailed comparison of the performances of these three regimes in the interwar period see Eichengreen (1989a).
4. Within the sample of seven countries, Canada floated from 1950 to 1961.
5. This is a very crude measure of convergence or divergence between the different countries' summary statistics. Because it is based on the average for the whole period it suppresses unusual movements within particular subperiods. These will be discussed in the text.
6. The data sources for figure 1 and all subsequent figures are listed in the Data Appendix.
7. For similar evidence see Bordo (1981). Darby, Lothian et.al. (1983) and Darby and Lothian (1989).
8. See Meltzer and Robinson (1989) for similar results using the Kalman Filter.
9. See Baxter and Stockman (1989) for evidence that by using a different detrending filter other than the logarithm first difference used here, real output variability is not greater in the floating period than the fixed period. Also see Sheffrin (1988), Bergman and Jonung (1990) and Backus and Kehoe (1991).
10. Define the real interest rate as $r_t = i_t - \Delta \log P_t$; where i_t is the nominal interest rate and $\Delta \log P_t = \log P_t - \log P_{t-1}$ is the percentage change in the consumer price index.
11. For use of this measure, see Grilli and Kaminsky (1991).

12. Also see Dornbusch (1976).
13. Stockman (1983, 1988) argues that greater variability in real exchange rates under floating rates than under fixed rates reflects the reaction of real exchange rates to productivity shocks, with changes in the real exchange rate producing nominal exchange rate volatility. This volatility is offset under fixed rates by exchange market intervention.
14. McKinnon (1992) treats the period 1950 to 1970 as the defacto dollar standard. He views this period rather than 1959 to 1971 as the appropriate one for making the type of regime comparisons undertaken here. I made the same calculations as those shown in Table 1 for the period 1950 to 1971. Virtually every variable for each country exhibited greater instability than in the 1959 to 1970 period. This reinforces my choice of dates.
15. Capie and Wood (1986) argue that Britain's abandonment of the gold standard in September 1931 was not caused by sterling overvaluation but by the banking crisis in Austria and Germany.
16. Nurske's (1944) interpretation of the lessons of the interwar experience should be viewed as largely reflecting the collective views of Keynes, White and others.
17. Also see Yeager (1976). Aliber (1962) however provides mixed evidence for a number of European countries.
18. Following Friedman and Schwartz (1963). Also see Temin (1989) and Bernanke and James (1991).
19. For a discussion of the development of the Keynes plan see Moggridge (1986), for the White plan see Oliver (1975).
20. For excellent discussions on the negotiations see Gardner (1959) chapters V and VII and Van Dormael (1978).
21. Gold could be paid into the ICU and would serve as reserves but bancor could not be redeemed in gold. Gold could also be used in settlement between members.
22. According to Meltzer (1988) and Moggridge (1986) this reflected Keynes' preference for rules over discretion.

23. For the U.S. this meant up to \$26 billion in liabilities to be absorbed,
24. In contrast to the ICU, the regulations for the Fund were less extensive and the conditions attached to access to the Fund's resources less clear cut and more open to discretion, especially in the earlier drafts. (Moggridge, 1986).
25. A third plan, John Williams' Key Currency plan (1936, 1943) which was never seriously considered, would have had the U.S. and Britain follow the experience of the Tripartite Agreement of 1936, when the U.S., Britain and France co-ordinated their exchange market intervention to stabilize the pound and franc exchange rates with the dollar. In the Williams plan, the monetary authorities of the U.S. and Britain would have set up a joint Exchange Stabilization Fund to stabilize the dollar-pound exchange rate. The two countries would also have co-ordinated their monetary policies to maintain full employment. Other countries would initially be allowed to float until their currencies could be stabilized in terms of the key currencies. Ultimately, the world would evolve into a key currency system with other nations using the key currencies to finance payments imbalances.
26. Eichengreen (1989b) however argues that despite U.S. dominance the British were able to obtain a remarkable number of concessions.
27. (Gardner, 1969, chapter 1). Of course this was the thinking that led to the establishment of the United Nations and other international institutions.
28. At the same time as the Articles of Agreement for the International Monetary Fund were signed, the International Bank for Reconstruction and Development (the World Bank) was established. The Charter of the International Trade Organization (I.T.O.) was drafted and signed in 1947 but never ratified. It was succeeded by the General Agreement for Tariffs and Trade (GATT) originally negotiated in Geneva in 1947 as an interim institution until the ITO came into force.
29. Members could draw on their quotas without condition. Beyond that, referred to later as the credit tranche, although not spelled out in the articles, increasingly more exacting conditions were required.

30. See e.g. Tew (1988), Scammell (1975) and Yeager (1976). Williamson (1985) viewed it as a comprehensive set of rules for assigning macroeconomic policies: exchange rates to medium-run external balance, monetary and fiscal policy to short-run internal balance and international reserves to provide a buffer shock to allow short-run departures from external balance.

31. Under the classical gold standard convertibility meant the ability of a private individual to freely convert a unit of any national currency into gold at the official fixed price. A suspension of convertibility meant that the exchange rate between gold and national currency became flexible but the individual could still freely transact in either asset (Triffin, 1960, p.22). By the eve of World War II, convertibility referred to the ability of a private individual to freely make and receive payments in international transactions in terms of the currency of another country. Under Bretton Woods, convertibility meant the freedom for individuals to engage in current account transactions without being subject to exchange controls. Tew (1988, p.50) refers to this as market convertibility and distinguishes it from official convertibility whereby the monetary authorities of each country must be freely willing to buy and sell foreign exchange (primarily dollars) to keep the parity fixed (within the 1% margin) and the U.S. must be freely willing to buy and sell gold to maintain the fixed price of \$35.00 per oz. (within the 1% margin). He refers to both market and official convertibility as "Bretton Woods convertibility." See also McKinnon (1979, chapter 2) and Black (1987).

32. Under Article XIV, three years after March 1, 1947, the IMF would begin reporting on the countries with existing controls, two years later it would begin consulting with individual members and advising them on policies to restore payments equilibrium and convertibility. Countries which did not make satisfactory progress would be censured and ultimately be asked to leave the Fund. In actual fact, the Fund always accepted the member's reason for remaining under Article XIV.

33. 200 agreements alone were negotiated in Western Europe in 1947. (Yeager 1976, p. 407).

34. Similar conditions prevailed in Japan (Solomon, 1976, p. 14).

35. \$1.25 billion in assistance (loan and grants) was given to Japan (Solomon, 1976, p. 15).

36. However, official acceptance of Article VIII status was not achieved until 1961.

37. Germany alone, shortly thereafter, made capital account transactions convertible.
38. Approximately £2.3 billion were held by the sterling area in December 1945. In 1947 before convertibility was attempted, it was agreed that £1.6 billion would be blocked (Presnell, 1986). The balances were reduced considerably in the next decade by the 1949 devaluation and a succession of current account surpluses.
39. Foreign buyers of goods from the sterling area delayed their purchases and payments while importers in the sterling area speeded up their payments.
40. In reaction in 1952, a controversial plan, the ROBOT plan, circulated inside the British government urging the authorities to float the pound, make it convertible into gold and dollars and to fund the sterling balances. See Cairncross, 1985, ch. 9.
41. According to Triffin (1957, chapter 3) the Fund made a mistake by not declaring the dollar a scarce currency in 1946. Had it done so, the disastrous experiment with pound convertibility in 1947 could have been avoided.
42. Seventy two hours if within 10 and 20 %.
43. Canada had originally set its parity in 1946 at \$1.00, but devalued with the U.K. in 1949 to 90.9¢
44. Japan made its currency convertible in 1964.
45. Countries in the sterling area bought and sold pounds to peg their parities in sterling and countries in the Franc and Escudo zones pegged their currencies to their respective metropolitan countries.
46. Germany eliminated capital controls in 1959 only to impose restrictions on capital inflows again in 1960, the U.S. began selective controls on foreign investment in 1964, the other European countries maintained some form of capital controls throughout Bretton Woods.
47. 50% of international trade was invoiced in sterling in 1945, 30% in 1967 (Dam, 1982, p. 152).
48. Mundell (1969b) described thirteen additional problems of the international monetary system, many of which are variants of/or closely related to the basic three.
49. For a surplus country adjustment via inflation was considered to be less of a problem although in a few countries such as Germany, it was resisted.

50. Obstfeld (1992) demonstrates that in an ideal world with price flexibility, information symmetry, non-distorting taxes and full enforceability of commitments, the three problems would be irrelevant as adjustment would be automatically financed by capital flows.
51. Giovannini (1989) presents mixed evidence for asymmetrical adjustment between the U.S. and other G-7 countries during the Bretton Woods period.
52. The crisis was in part precipitated by speculative pressure on the Deutschemmark to revalue. Yeager, 1976, p. 452.
53. According to Johnson (1968) had the British devalued in 1964 rather than hold out to 1967, the speculative attack on gold and the dollar in 1968 might not have occurred.
54. In addition a \$2 billion medium-term facility was arranged by twelve central banks and the BIS.
55. France, in the 1950's was in a similar position. Plagued by rapid inflation throughout the decade, various corrective devices failed to work. Equilibrium was reached by devaluations in 1957 and 1958 and monetary and fiscal reforms in 1959 which restored price stability. Italy in 1963-64 faced both inflation and a balance of payments deficit. Devaluation was avoided by a shift to tight monetary and fiscal policy and a rescue package (Yeager, 1976, chapter 23 and 25).
56. This alleviated a chronic problem facing the Fund - a shortage of hard currencies, especially the dollar, available for drawing (Dam, 1982, p. 148).
57. The Netherlands was comparable to West Germany.
58. Although the average inflation rate over the 1959-1970 period in Germany of 3.2% was only slightly less than that of the U.K. at 3.4% (table 1) this reflects both convergence towards the world inflation rate under the fixed exchange rate standard and the pressure of U.S. monetary expansion after 1965. It also reflects the use of annual averaged data. Using quarterly rates of change of consumer prices at annual rates, Darby, Lothian, et. al. (1983), Table 2.1 show that inflation in the U.K. over the period 1958IV-1967IV averaged 2.86% while in Germany it was 2.41%. A more telling indicator of the difference between the underlying inflation rates in the two countries is the

experience of both the preconvertibility period and the subsequent floating period when the U.K. inflation rate was more than double that of Germany.

59. Mundell (1971) chapter 15 makes the distinction between growth seigniorage and the inflation tax. Growth seigniorage refers to the growth in nominal money balances required to finance the growth in real output and avoid deflation. The money issuer captures the return on real cash balances arising from expected deflation. The inflation tax refers to the revenue captured by the monetary authorities when they issue money in excess of the growth of real output. The former, which is a benefit to the international monetary system,⁵⁹ was not generally distinguished from the latter, which represents a cost. More rapid growth in Western Europe than in the U.S. in the 1960's required the latter to supply dollars as international reserves through its balance of payments deficit. The growth seigniorage earned by the U.S. on its outstanding liabilities was largely transferred to Europe by the interest paid on dollar holdings.

60. They argued that Europe and the U.S. had different liquidity preferences--the Europeans preferred liquid short-term over long-term assets, the Americans the opposite. McKinnon (1969) reached the same conclusion based on a stable demand by the rest of the world for dollars to hold as an international money. See Hallwood and MacDonald (1986).

61. Several definitions of the balance of payments were used in this period by those concerned over the problem of the deficit. The Gross Liquidity balance or "liquidity" balance included both changes in claims by private foreigners and changes in claims by foreign official agencies below the line. It also treated flows of short-term private capital in an asymmetrical way. Changes in U.S. liquid balances to foreigners went below the line, while changes in private U.S. claims on foreigners went above. The increased holding of U.S. bank deposits by foreigners would, by this definition, worsen the balance of payments. This asymmetry was corrected in 1971 with the advent of the "net liquidity balance" concept. Changes in both U.S. liquid claims on and liabilities to foreigners were placed below the line. Finally the basic balance sums up the current account and private long-term capital flows (Yeager, 1976, pp. 51-54).

According to Meltzer (1991) the U.S. monetary authorities mismeasured the nature of the problem by focussing on these definitions. They viewed capital outflows as a problem while ignoring the beneficial effects of the return flow of interest, profits and dividends. This misperception would have been avoided by focussing on the current account balance. Also see Corden (1991).

62. See Solomon (1976) and Meltzer (1991).

63. For a critique see Obstfeld (1992).

64. Other measures to help the U.S. balance of payments deficit included establishment of the General Arrangements to Borrow (GAB) in 1961 which provided the IMF sufficient funds to lend to the U.S., and a 25% increase in IMF quotas. A number of drawings were undertaken by the U.S. in this period.

65. Meltzer (1991) argued that a 50% gold revaluation would have succeeded in preserving the Bretton Woods system well into the 1970's had the U.S. not followed an inflationary policy in the late 1960's.

66. The IMF focused more attention on the liquidity issue partly because of its opposition to exchange rate flexibility, partly because it believed more liquidity would greatly alleviate the adjustment problem and partly because it believed more liquidity would allow the U.S. to correct its balance of payments deficit (DeVries, 1987).

67. The official view on exchange rate flexibility is in marked contrast to the academic view, which by the end of the decade was solidly in favor of increased flexibility, as evident at the famous Burgenstock Conference (Halm, 1970). Also see Johnson (1972b).

68. Though the reserve to import ratio has been used extensively by the IMF, it has been criticized for being based on a crude transactions demand for money model. A more sophisticated approach to the demand for reserves based on optimizing behavior would make the demand a function of among other things, the opportunity cost of holding reserves, the variance of trade, the type of commodities exported. See Clower and Lipsey (1968), Williamson (1973) and Crockett (1987).

69. In actual fact, the French were not successful in making the elimination of the U.S. payments deficit a condition but the procedures were so designed as to give the European Economic Community a veto over the timing and amount of any SDR allocation (Dam, 1982, pp. 165-166).

70. John F. Kennedy in a famous speech on October 31, 1960 said, "If elected President, I shall not devalue the dollar from the present rate. Rather, I shall defend its present value and its soundness." (Solomon, p. 35)

71. However, according to Meltzer (1991) there is little evidence in the asset markets of a growing loss of confidence in the dollar through the 1960's. Real interest rates did not rise significantly relative to trade weighted real interest rates. Nor did the gold and foreign exchange markets suggest a flight from the dollar.

72. Also Triffin (1960) and others proposed converting the IMF into a world central bank which would issue gold guaranteed currencies and serve as an international lender of last resort.

73. Mundell (1973) criticized Rueff for not explaining how all these objectives could be met within a reasonable period of time and how the system could be prevented from deteriorating again.

74. See Williamson (1977) pp. 33-35 for others.

75. Under Article IV, the U.S. could have unilaterally devalued the dollar by less than 10% without requiring the IMF's permission.

76. According to Dominguez (1992), the IMF was designed to facilitate international cooperation by serving as a commitment mechanism. However its failure to enforce the fundamental rule of adherence to the par value system and its inadequate provision of adjustment assistance detracted from its role.

77. According to Corden (1985) p. 87, the fact that the U.S. inflation rate was below that of the rest of the G-7 before 1968 should not be regarded as evidence that the U.S. did not export its inflation. To the contrary, he argues that because the U.S. exported a large part of her monetary and fiscal expansion via the fixed exchange rate she was able to sustain a lower inflation rate than otherwise.

78. On both a national income and full employment basis the budget deficits in the periods 1965 to 1968 and 1970 to 1973 were the highest in the postwar period to date. See Eichengreen (1992).
Figure 11.

79. The world money supply is the product of the world monetary base times the world money multiplier. In the Bretton Woods system the money multiplier was enhanced by the asymmetric role of the U.S. dollar. It was also further enhanced by the growth of Eurodollar deposits. (Swoboda, 1978)

80. Another force swelling the stock of dollar liabilities abroad was the practice by European monetary authorities to hold deposits in the Eurodollar market. When these funds were lent out in local currencies they led to a further increase in dollar liabilities as the monetary authorities intervened to peg the exchange rate (Tew, 1988, p. 143).

81. See Cooper (1984) for a similar view.

82. See McKinnon (1989) for his version of the rules of the Bretton Woods Articles and the dollar standard. Also see Giovannini (1992,) and Obstfeld (1992).

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Table 1: Descriptive Statistics of Selected Open Economy Macro Variables, the G-7 Countries 1961-1999
 Annual Data: Mean, Standard Deviation

	Bretton Woods (Total) (1946-1970)	Bretton Woods (Preconvertible) (1946-1958)	Bretton Woods (Convertible) (1959-1970)	Floating Exchange (1974-1999)	Interwar (1919-1930)	Gold Standard (1861-1913)
a: Inflation pGMIP^a [forcast. err.-] ^b						
United States	2.4 (3.0)	2.8 (3.5)	2.6 (1.5)	5.6 (10.7)	-1.8 (7.6)	0.3 (3.1)
United Kingdom	3.7 (2.3)	4.6 (2.5)	3.4 (1.5)	9.4 (11.2)	-1.5 (7.8)	0.3 (3.1)
Germany	2.7 (4.0)	2.1 (6.2)	3.2 (1.8)	3.3 (11.7)	-2.1 (4.7)	-0.6 (2.6)
France	5.6 (4.1)	5.6 (5.7)	5.5 (3.6)	8.8 (13.5)	-2.2 (9.1)	0.6 (5.0)
Japan	4.5 (4.6)	3.1 (5.0)	5.5 (1.0)	2.6 (10.6)	-1.7 (7.3)	5.5 (15.6)
Canada	2.7 (2.0)	2.1 (2.4)	3.5 (1.1)	7.9 (10.9)	-1.9 (6.0)	0.4 (1.3)
Italy	3.8 (7.9)	5.9 (16.0)	3.8 (2.1)	12.9 (22.6)	-1.1 (11.7)	0.6 (3.2)
mean	3.6	3.9	3.9	7.2	-1.1	1.0
convergence	0.9	1.3	0.9	2.9	1.0	1.0
b: Real per capita growth^a						
United States	2.0 (2.8)	1.8 (3.4)	2.9 (1.9)	2.1 (1.5)	0.2 (8.1)	1.8 (5.0)
United Kingdom	2.1 (1.8)	2.1 (2.2)	2.3 (1.4)	1.5 (4.2)	1.2 (4.5)	1.1 (2.4)
Germany	5.0 (3.3)	7.3 (7.3)	3.6 (2.6)	2.2 (1.5)	2.6 (8.5)	1.7 (2.9)
France	3.9 (2.2)	4.6 (2.7)	3.9 (1.3)	1.7 (1.7)	1.5 (1.9)	1.5 (4.6)
Japan	8.1 (2.7)	7.5 (2.8)	8.9 (2.4)	3.5 (1.1)	2.0 (6.1)	1.4 (3.8)
Canada	2.5 (2.6)	1.9 (3.8)	3.8 (1.1)	1.6 (2.6)	0.2 (8.9)	2.3 (2.8)
Italy	5.6 (3.3)	5.2 (4.4)	5.8 (1.9)	2.5 (2.2)	0.9 (4.7)	1.0 (4.1)
mean	4.2	4.3	4.5	2.2	1.2	1.5
convergence	1.8	2.1	1.7	0.3	0.7	0.3
c: Money Growth^a						
United States	6.3 (5.8)	6.4 (8.3)	7.0 (1.5)	8.6 (8.6)	0.6 (8.6)	6.1 (5.9)
United Kingdom	3.2 (3.2)	1.7 (2.9)	5.5 (2.9)	13.5 (13.5)	0.8 (4.7)	2.1 (1.7)
Germany	12.8 (6.0)	17.6 (5.6)	10.9 (4.7)	5.7 (4.5)	1.3 (10.1)	2.7 (4.7)
France	11.5 (7.5)	14.7 (8.5)	8.6 (6.6)	8.8 (8.8)	6.4 (8.5)	2.2 (3.5)
Japan	17.3 (15.9)	18.2 (16.5)	14.6 (4.3)	5.7 (5.5)	0.5 (9.7)	5.8 (10.8)
Canada	6.0 (4.0)	5.0 (3.9)	9.4 (2.5)	11.0 (11.0)	1.1 (4.7)	2.4 (3.3)
Italy	13.3 (7.8)	15.9 (10.5)	12.4 (2.0)	13.4 (13.4)	3.8 (6.2)	3.2 (3.1)
mean	10.1	11.4	9.8	6.9	2.9	4.6
convergence	4.2	6.0	2.3	2.7	1.7	2.0
d: Short-term interest rate						
United States	3.4 (1.9)	2.0 (0.9)	4.8 (1.6)	8.9 (2.6)	3.5 (2.0)	4.8 (0.9)
United Kingdom	4.0 (2.5)	2.3 (1.8)	5.8 (1.6)	11.2 (2.1)	3.0 (1.8)	2.8 (0.8)
Germany	4.0 (1.5)	4.1 (1.1)	4.0 (1.7)	5.9 (2.4)	4.8 (1.6)	2.8 (0.9)
France	4.2 (1.9)	3.2 (1.5)	5.1 (1.9)	10.2 (2.6)	3.1 (1.4)	2.5 (0.6)
Japan	6.5 (0.8)	6.8 (0.8)	4.8 (0.4)	5.3 (2.0)	2.9 (0.5)	2.4 (0.5)
Canada	2.9 (2.0)	2.2 (1.3)	4.8 (1.3)	9.2 (3.4)	0.9 (0.4)	2.4 (0.5)
Italy	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
mean	4.2	3.5	5.1	8.5	2.9	3.2
convergence	0.8	1.3	0.3	1.9	0.9	0.7
e: Long term interest rate						
United States	3.9 (1.3)	3.0 (0.4)	5.0 (1.1)	10.4 (2.1)	4.2 (0.6)	3.8 (0.3)
United Kingdom	5.2 (1.8)	3.9 (0.8)	6.6 (1.3)	12.1 (2.8)	4.1 (0.7)	2.9 (0.2)
Germany	6.3 (0.7)	5.9 (0.5)	5.7 (1.0)	7.8 (1.5)	6.9 (1.8)	3.7 (0.3)
France	5.7 (0.8)	n.a.	5.7 (0.7)	10.9 (2.4)	4.6 (0.8)	3.2 (0.3)
Japan	7.0 (0.1)	n.a.	7.1 (1.8)	7.1 (1.8)	n.a.	n.a.
Canada	4.5 (1.5)	3.8 (0.8)	5.9 (1.0)	10.3 (2.3)	4.7 (0.8)	3.5 (0.4)
Italy	6.0 (0.7)	6.3 (0.4)	5.7 (0.7)	13.7 (3.3)	5.9 (0.8)	4.2 (0.5)
mean	5.5	4.8	6.1	10.3	5.1	3.6
convergence	0.9	1.2	0.3	1.7	0.9	0.3

Table 1 continued

	Bretton Woods (Total) (1966-1970)	Bretton Woods (Preconvertible) (1966-1958)	Bretton Woods (Convertible) (1959-1970)	Floating Exchange (1974-1989)	Interwar (1919-1938)	Gold Standard (1881-1913)
f: Real short term interest rate ^c						
United States	0.3	3.9	-1.2	4.7	2.4	0.4
United Kingdom	-0.1	3.4	-2.4	3.3	2.3	1.1
Germany	2.2	2.6	-3.0	3.6	1.6	1.5
France	-0.9	5.2	-3.3	6.9	1.2	1.4
Japan	1.9	2.5	2.7	2.8	0.5	1.1
Canada	-0.3	4.2	0.1	3.4	2.0	0.7
Italy	n.a.		n.a.		n.a.	
mean	0.5	3.6	-0.2	4.1	1.7	1.0
convergence	1.0	0.6	2.1	0.9	0.6	0.3
g: Real long term interest rate ^c						
United States	0.8	3.6	-0.7	4.4	2.5	0.7
United Kingdom	1.1	2.8	-0.8	2.6	3.2	1.0
Germany	4.3	4.4	4.3	4.4	4.3	1.0
France	0.4	4.4	-1.2	6.2	1.7	1.0
Japan	1.7	3.3	n.a.	0.8	3.0	1.3
Canada	1.3	3.8	6.3	0.4	2.2	2.2
Italy	-0.4	12.1				
mean	1.3	4.4	2.0	3.1	2.7	1.1
convergence	1.0	2.2	2.9	1.9	0.7	0.4
h: Nominal exchange rate ^e						
United States ^f	0.7	0.8	3.6	8.3	0.7	0.8
United Kingdom	2.4	6.3	2.4	3.3	1.4	3.9
Germany	1.8	3.8	4.4	11.3	1.1	2.1
France	2.5	7.7	22.0	42.6	0.2	0.2
Japan	15.9	37.2	16.1	27.4	0.2	0.2
Canada	1.6	1.9				
Italy	7.4	20.6				
mean	4.6	11.2	8.1	16.1	0.8	1.8
convergence	4.0	10.1	6.6	12.6	0.4	1.2
i: Real exchange rate ^d						
United States ^f	1.7	1.0	4.7	7.1	1.7	1.0
United Kingdom	3.5	3.5	3.8	7.3	2.5	3.5
Germany	2.8	5.1	6.2	7.7	1.9	1.8
France	4.1	5.6	7.7	4.3	2.5	2.9
Japan	3.0	1.5	4.4	4.3	1.2	1.2
Canada	2.4	2.3	2.4	2.3	1.2	1.7
Italy	8.0	18.7	15.1	25.2	2.4	1.6
mean	5.7	3.6	9.0	5.8	2.0	2.0
convergence	3.7	1.4	5.4	2.6	0.4	0.7

Notes:

- a Mean growth rate calculated as the time coefficient from a regression of the natural logarithm of the variable on a constant and a time trend
- b Calculated as the standard error of estimate of the fitted equation $\ln(P_t) = a + b \ln(P_{t-1})$ where P_t is the price index in year t
- c Calculated as the nominal interest rate minus the annual rate of change of the CPI
- d Calculated as the nominal exchange rate divided by the annual rate of foreign to the U.S. CPI
- e Absolute rates of change
- f Trade-weighted nominal and real exchange rate starting in 1960

Data Sources: See Data Appendix

Table 2: Exchange Rate and Gold Arrangements 1946-1971 6-10

	1946	1948	1949	1950	1951	1953	1957	1958
	(Initial parity: price of 1 U.S. \$)							
Belgium	43.83 francs		9/22 devaluation to 50 francs/dollar					12/27 BF becomes convertible de facto
Canada	1.00 dollar		9/19 devaluation to \$1.10	9/30 par value suspended	float			
France	119.1 francs	1/26 par value ¹ suspended	9/20 350 francs/\$				8/11 rate set at 420 francs/\$	12/29 official par value set at 493.7 francs/\$ [12/27 convertible de facto] 12/27 convertible de facto
Germany		6/20 Deutsche Mark introduced at 3.33 DM/\$	9/19 devaluation to 4.20 DM/\$			1/30 official par value set at 4.20 mark/\$		
Italy			9 rate set at 625 lire/\$ by monetary authorities					12/27 convertible de facto
Japan		← no true exchange rate →				5/11 official par value set at 360 yen/\$		
Netherlands	2.65 guilders		9/21 devaluation to 3.80 guilder/\$					12/27 convertible de facto
Sweden	7/13 official rate 3.60 krona/\$ set by monetary authorities		9/20 devaluation to 5.17 krona/\$		11/5 official par value set at 5.17 krona/\$			12/27 convertible de facto
United Kingdom	0.248 pounds		9/18 devaluation to 0.357 pound/\$					12/27 convertible de facto
United States	\$35/oz. gold							

¹ Multiple exchange rates were in effect from January 1948 to September 1949. From January 26 to October 16 a rate of 214.4 francs per U.S. \$ applied to all foreign exchange actions in non-convertible currencies and to selected imports paid in convertible currencies. For all other transactions the effective rate was the average of the 214.4 rate and the free rate. On October 16, 1948 the average rate was made applicable to all transactions except non-trade transactions in convertible currencies.

Table 2 continued

	1960	1961	1962	1964	1967	1968	1969	1970	1971
Belgium		2/15 BF becomes convertible under article VIII							
Canada			5/2 official par value set at \$1.08					5/31 float	
France	new franc (=100 old francs)	2/15 FF becomes convertible under article VIII					8/10 devaluation to 5.55 franc/\$		
Germany		3/6 revaluation to 4.00 mark/\$					10/26 revaluation to 3.66 DM/\$		5/9 float
Italy	3/30 official par value set at 625 lire/\$	2/15 convertible under article VIII							
Japan				4/1 Yen becomes convertible under article VIII					
Netherlands		3/7 revaluation to 3.62 guilder/\$							5/9 float
Sweden		2/15 convertible under article VIII							
United Kingdom		2/15 convertible under article VIII			11/18 devaluation to 0.417 pounds/\$				
United States		11 London Gold Pool established				3/15 Gold Pool suspended. 3/17 Two Tier Gold market instituted			8/15 suspension of gold convertibility

¹From 9/29 until 10/26 the exchange rate was floating

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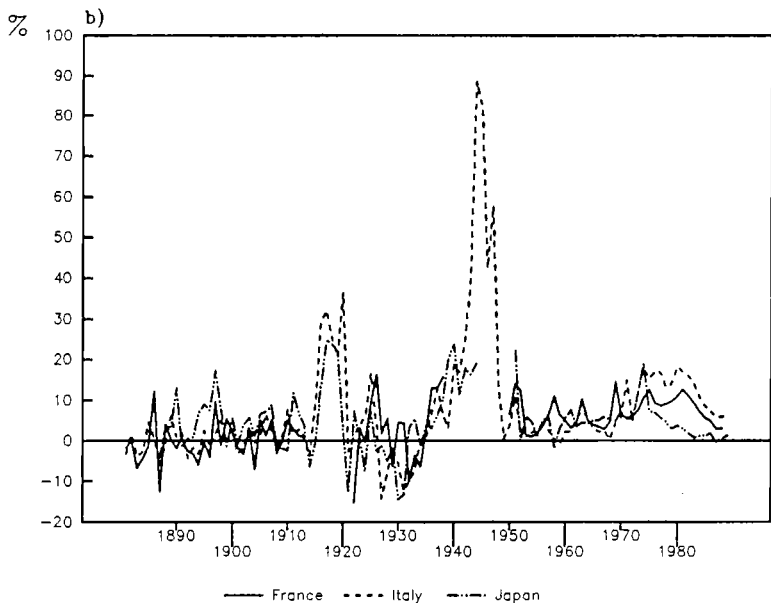
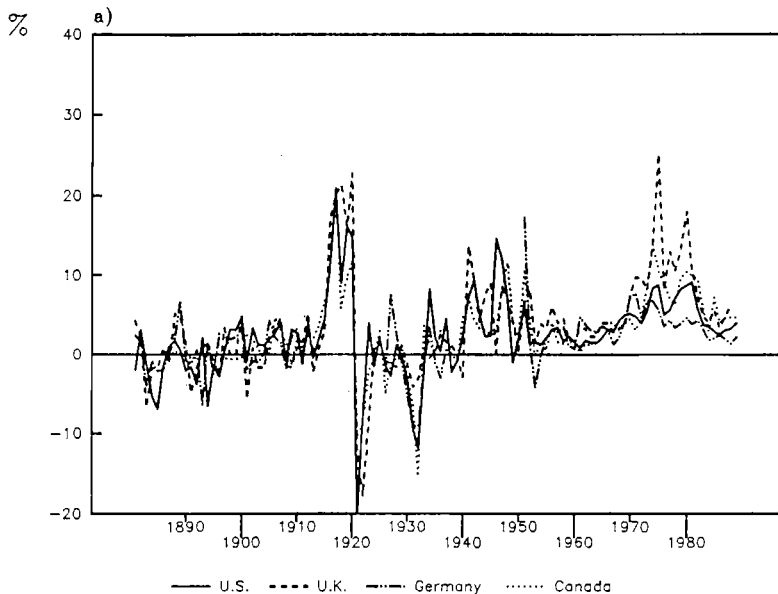


Figure 2: Per Capita Income Growth Rates, 1880-1989,
G7 countries

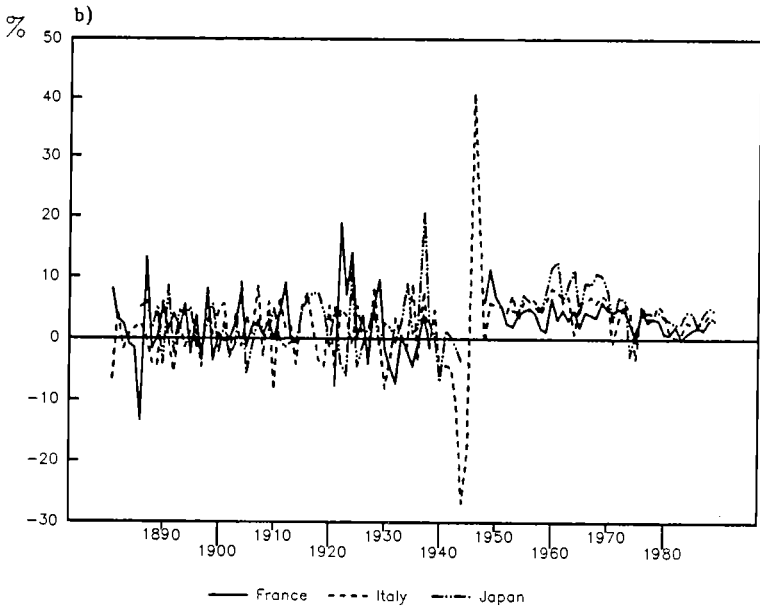
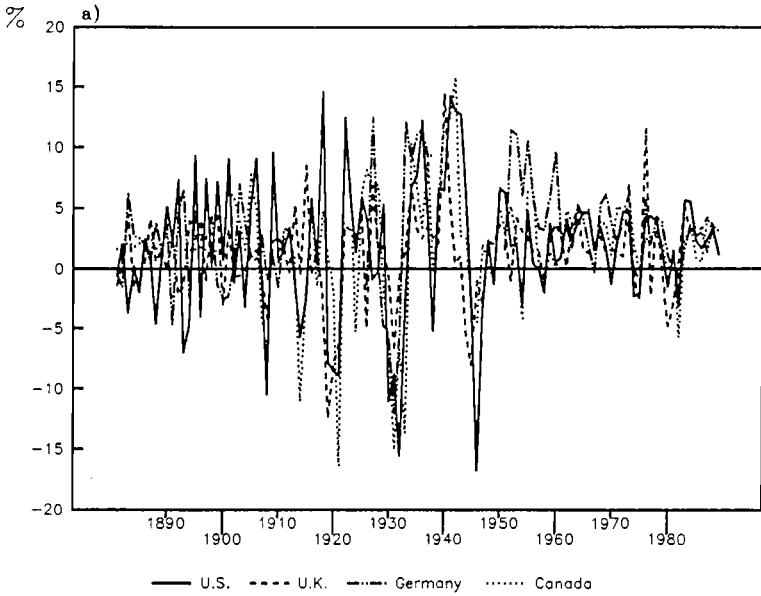


Figure 3: Money Growth Rates, 1880-1989, G7 countries

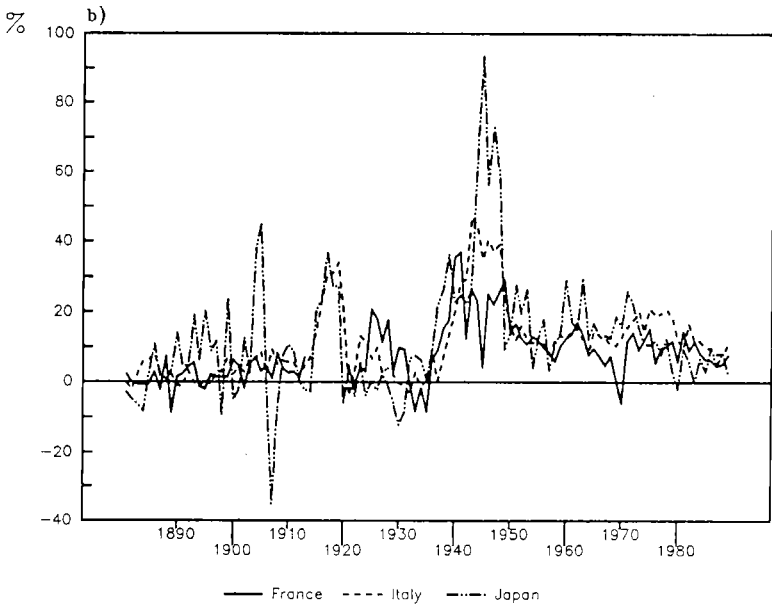
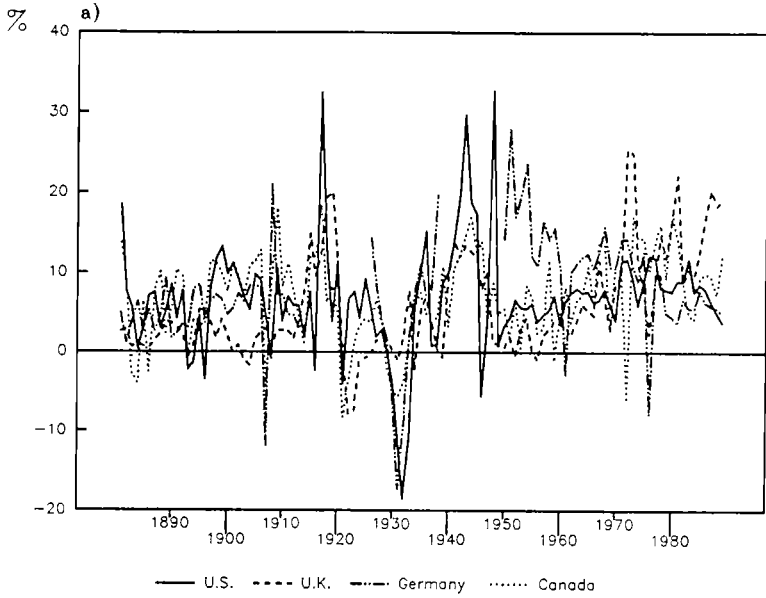


Figure 4: Short-term Interest Rates, 1880-1989, G7 countries

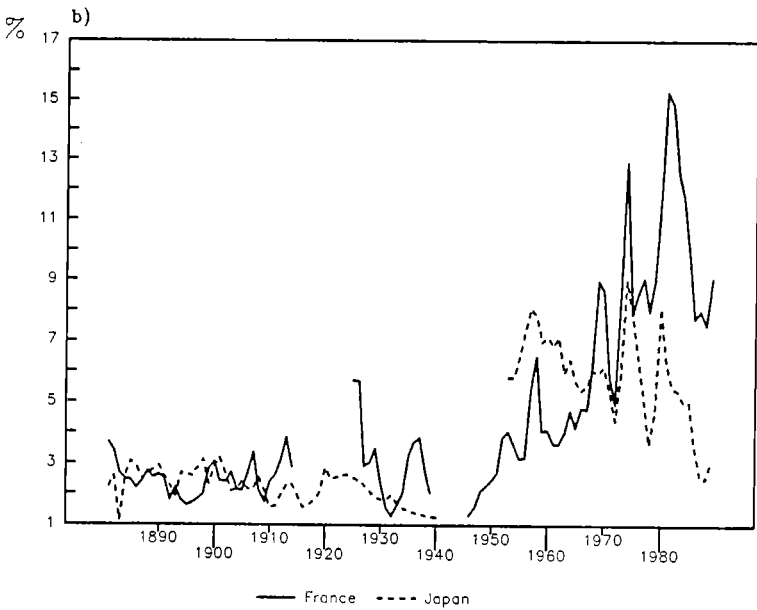
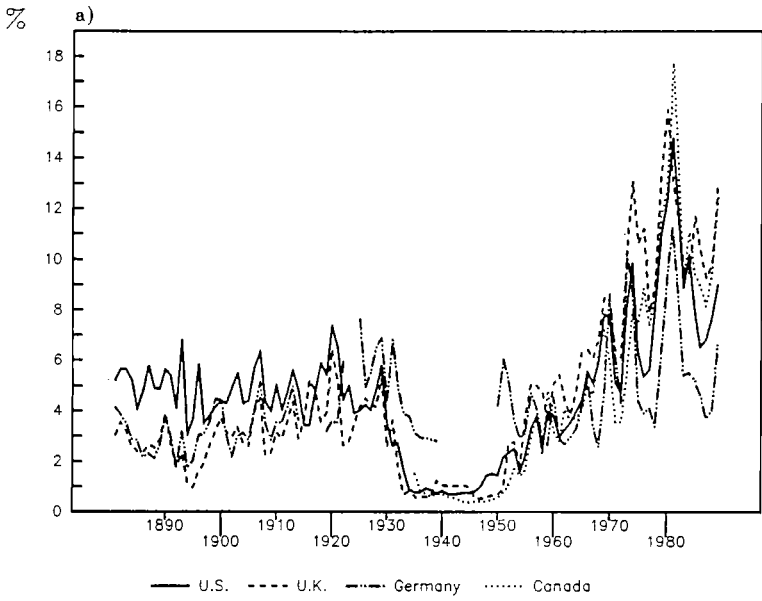


Figure 5: Long-term Interest Rates, 1880-1989, G7 countries

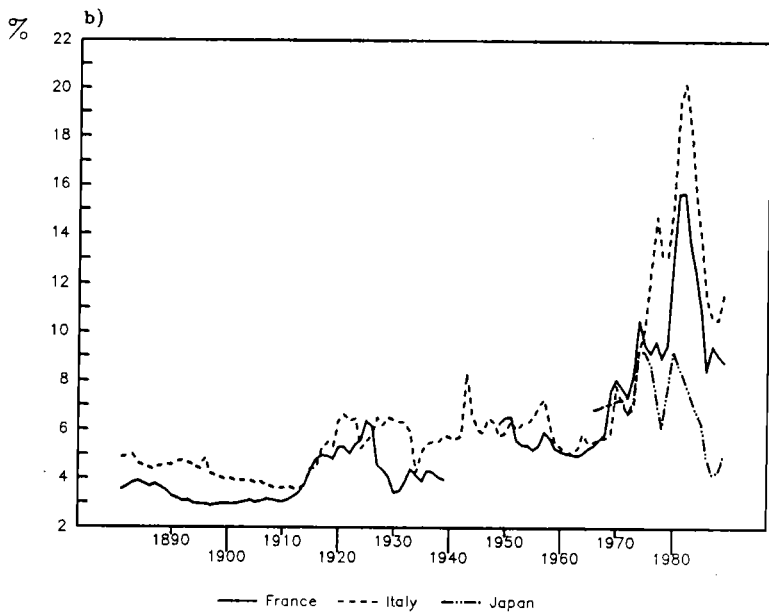
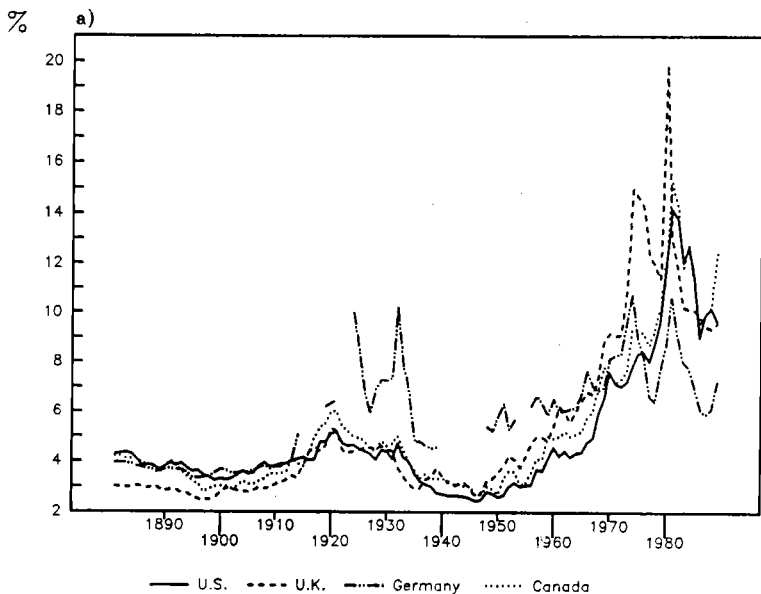


Figure 6: Real Short-term Interest Rates, 1880-1989, G7 countries

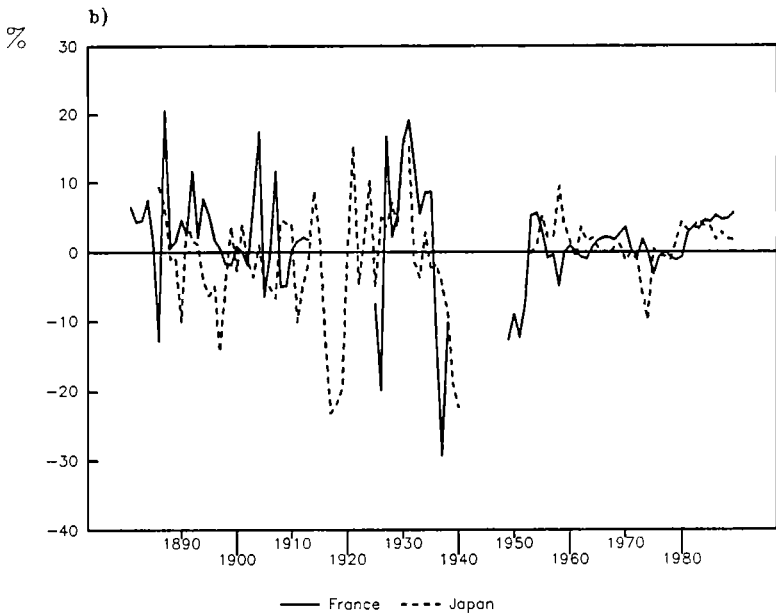
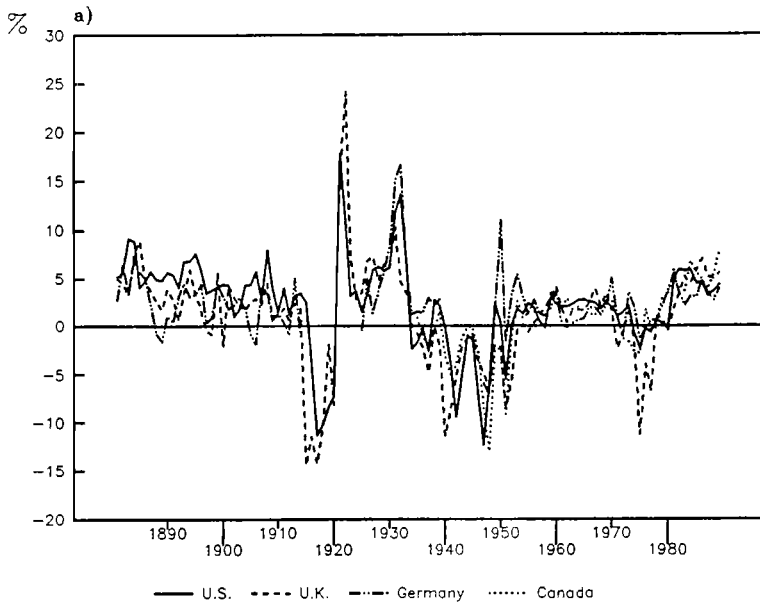


Figure 7: Real Long-term Interest Rates, 1880-1989, G7 countries

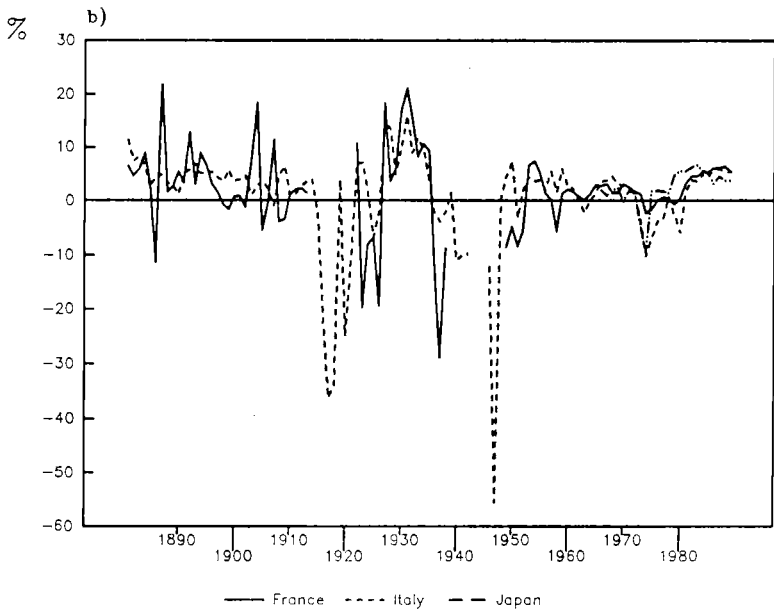
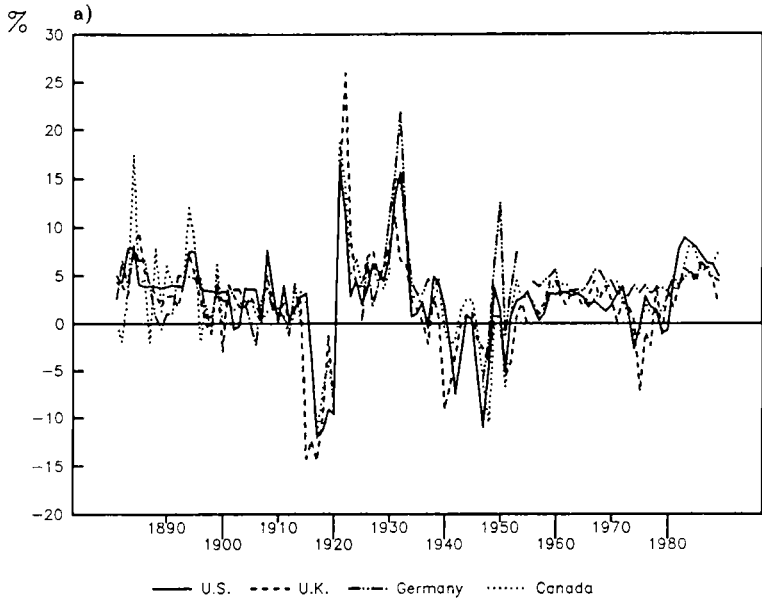


Figure 8: Absolute Change in Nominal Exchange Rates, 1880-1989, G7 countries

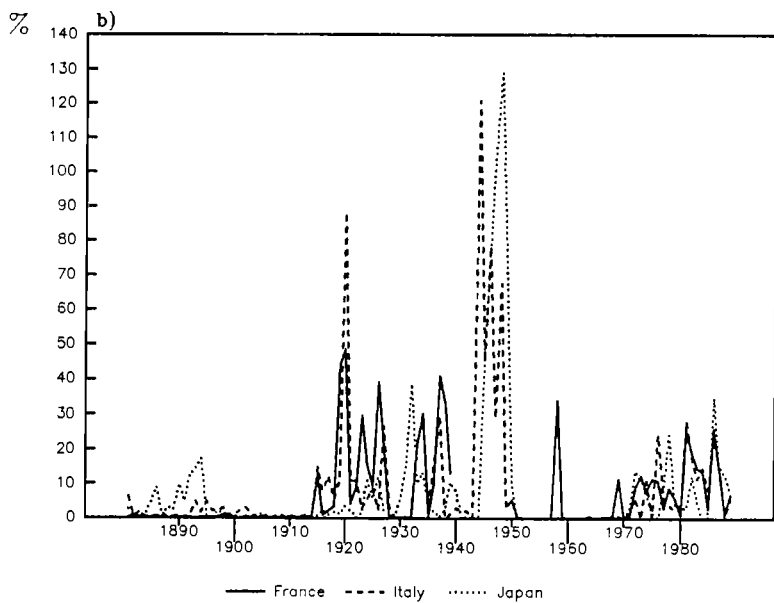
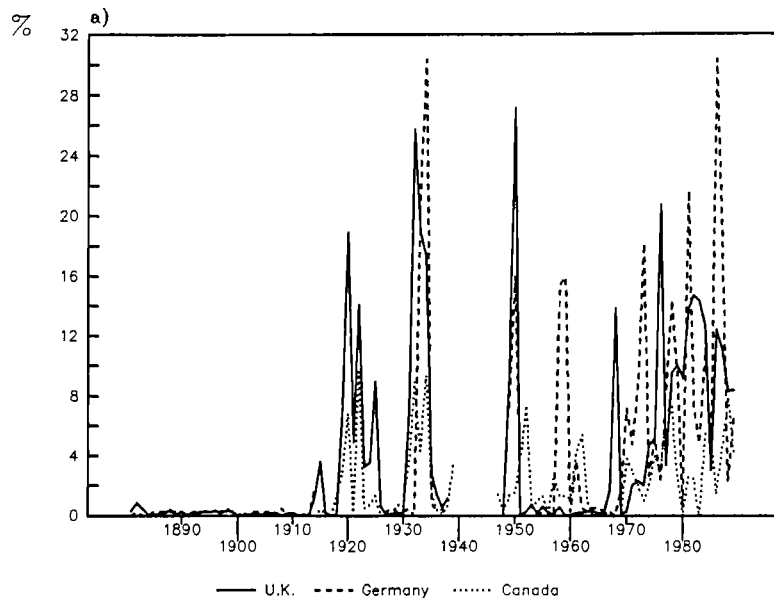


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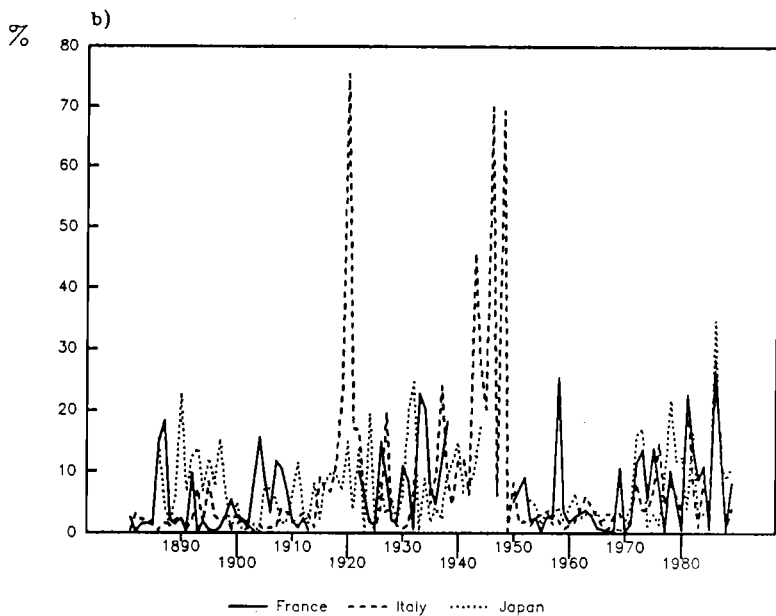
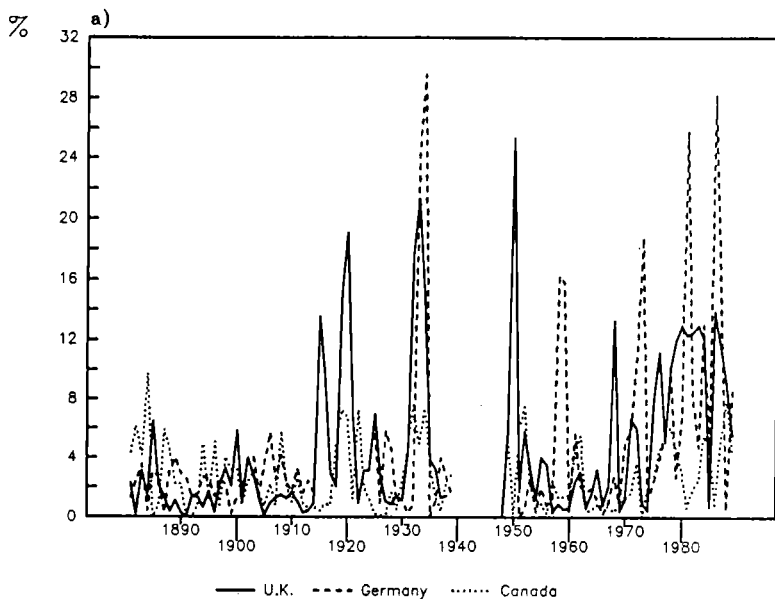


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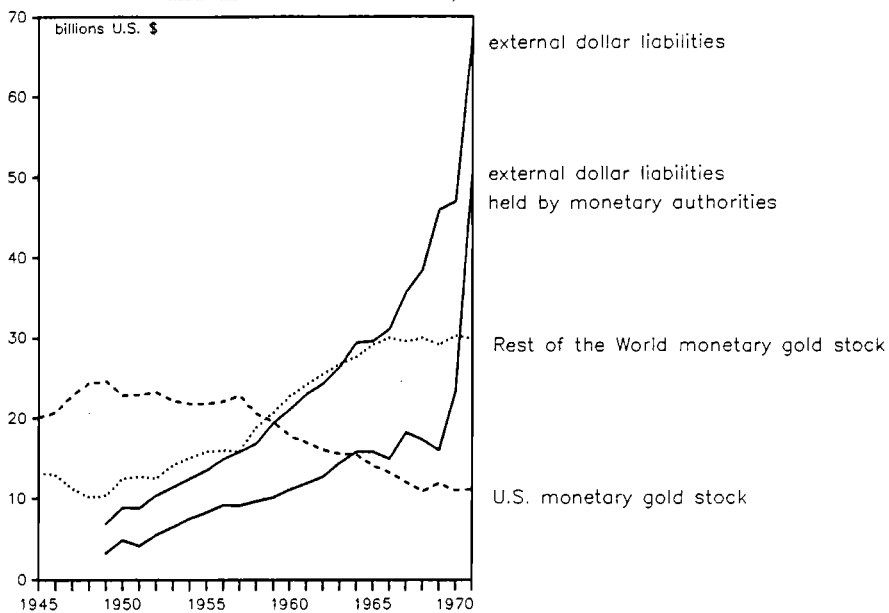


Figure 11: OEEC Europe Balance of Payments, 1947-1955

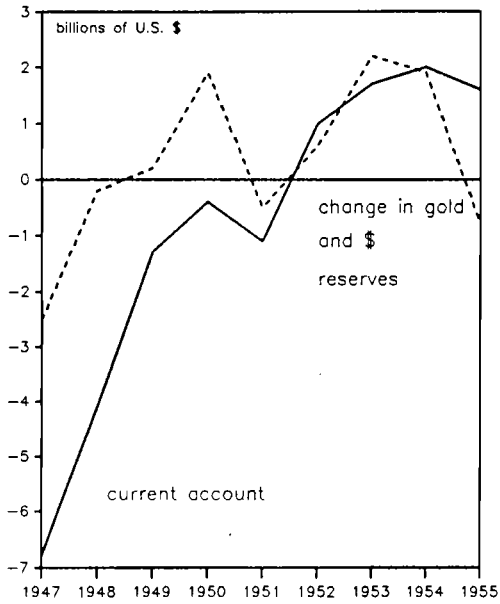


Figure 12: United States Balance of Payments, 1946-1958

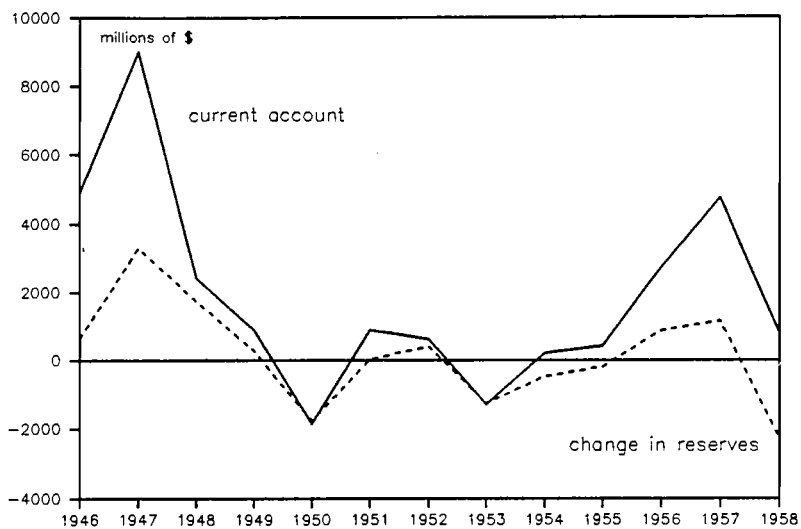


Figure 13: Balance of Payments of Germany, Italy and France, 1948-1958

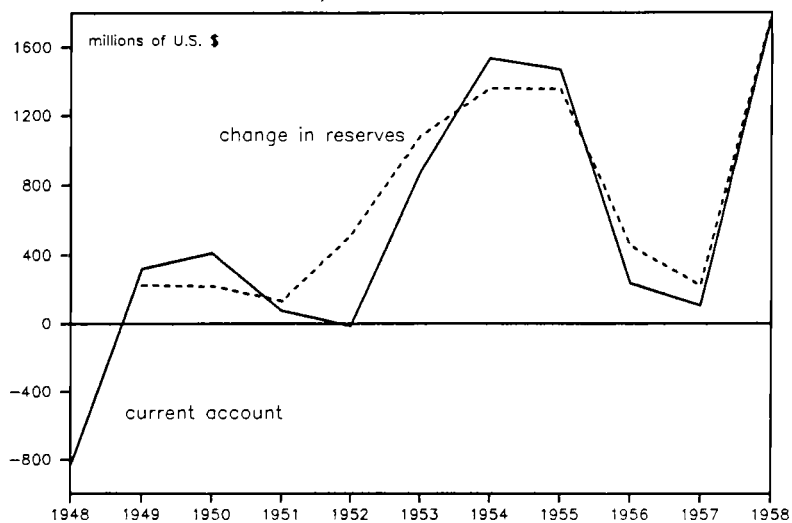


Figure 14: United Kingdom Balance of Payments: total and in gold and dollars, 1946-1958

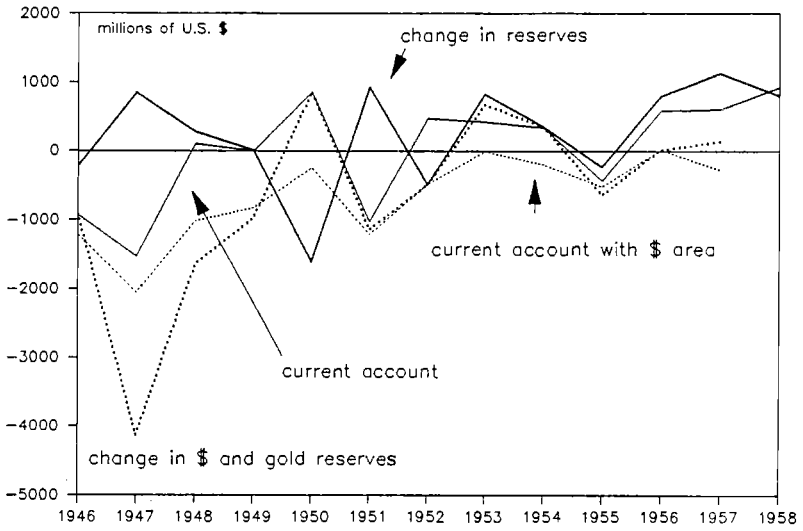


Figure 15: The Composition of World International Reserves, 1948-1971

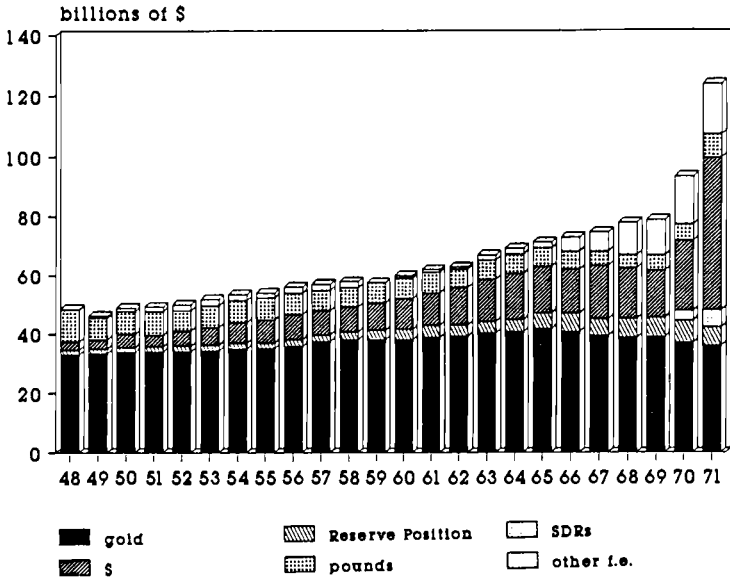


Figure 16: Balance of Payments: United Kingdom, 1950-1971

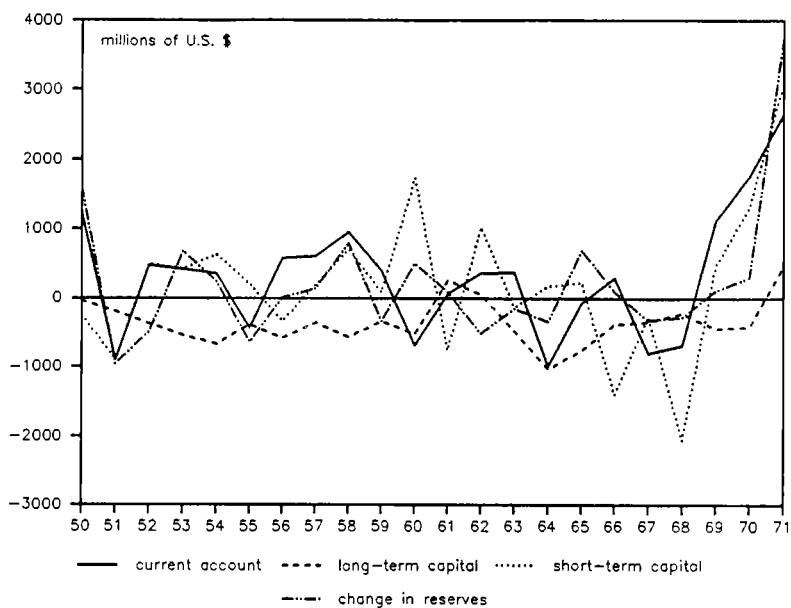


Figure 17: Balance of Payments: Germany, 1950-1971

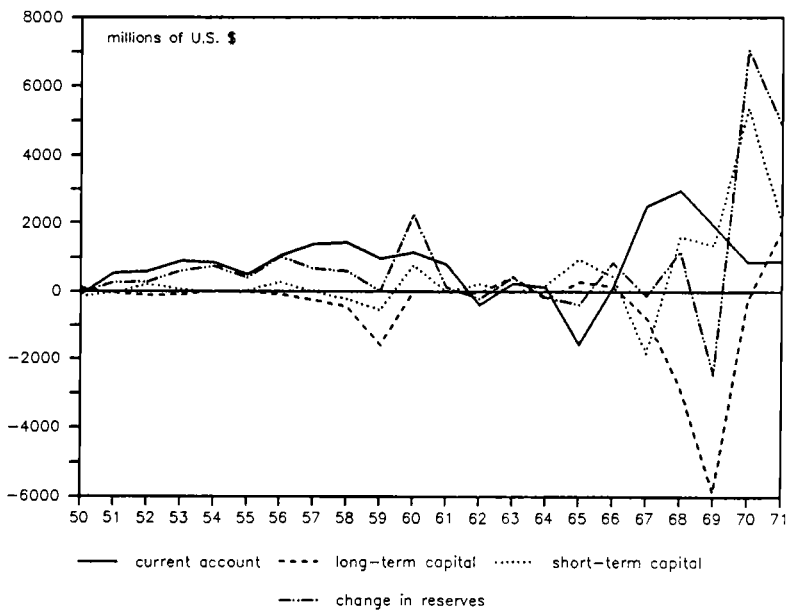


Figure 18: Balance of Payments: United States, 1950-1971

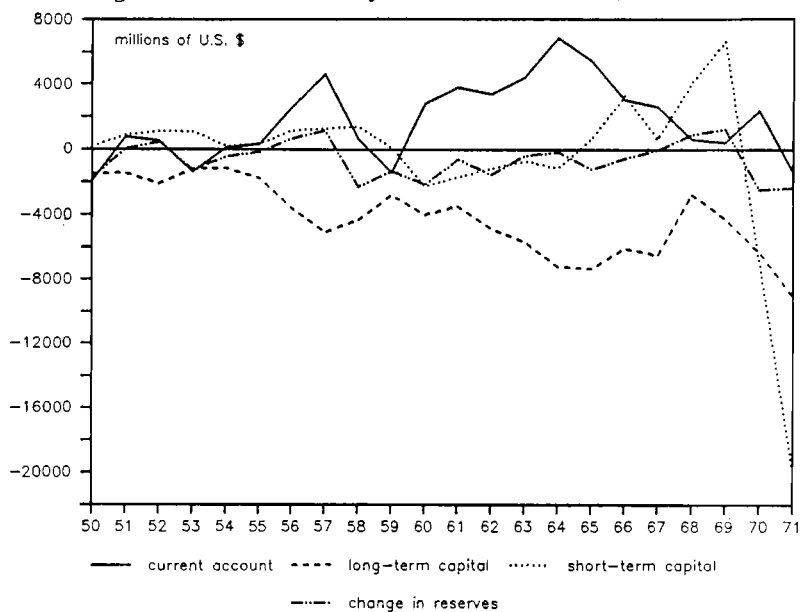


Figure 19: U.S. Balance of Payments: Different Concepts, 1945-1971

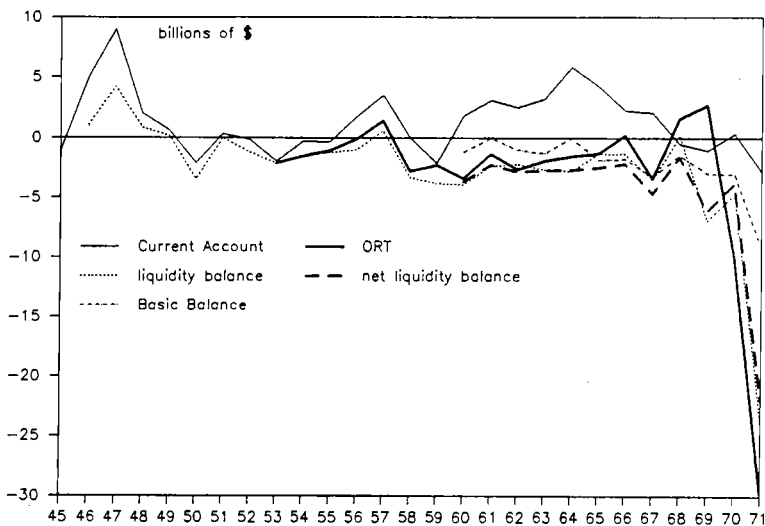


Figure 20: Ratio of Reserves to Imports: G10 plus Switzerland minus the U.S.

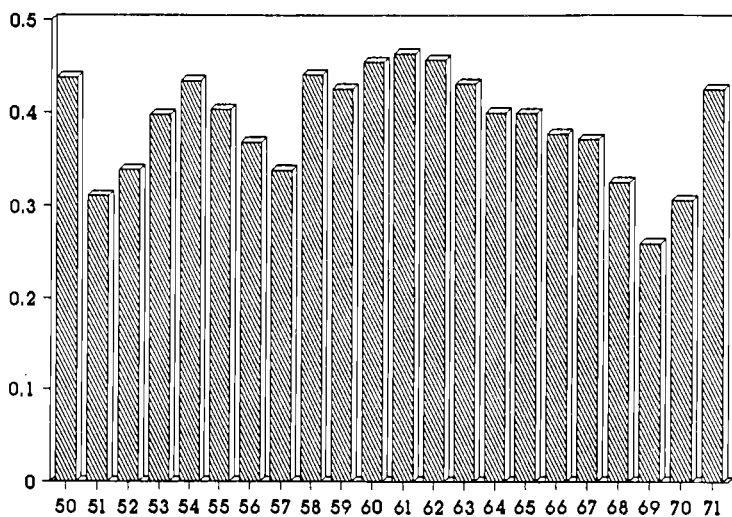


Figure 21: The Real Price of Gold and World Output,
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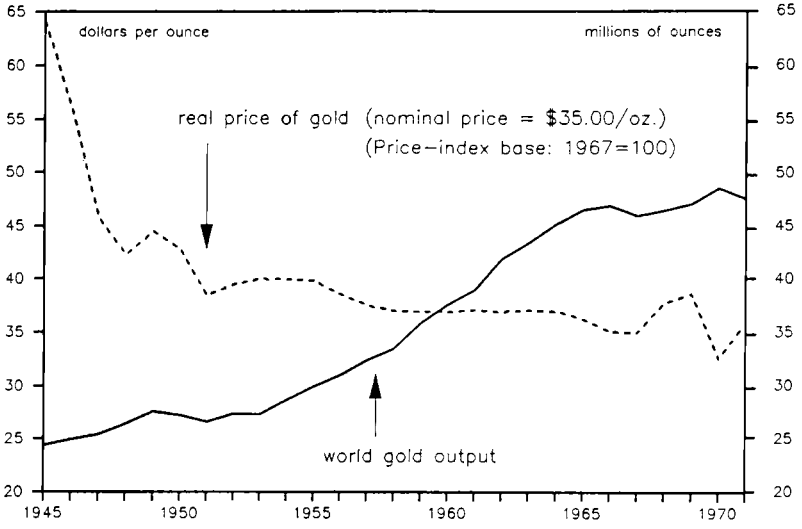
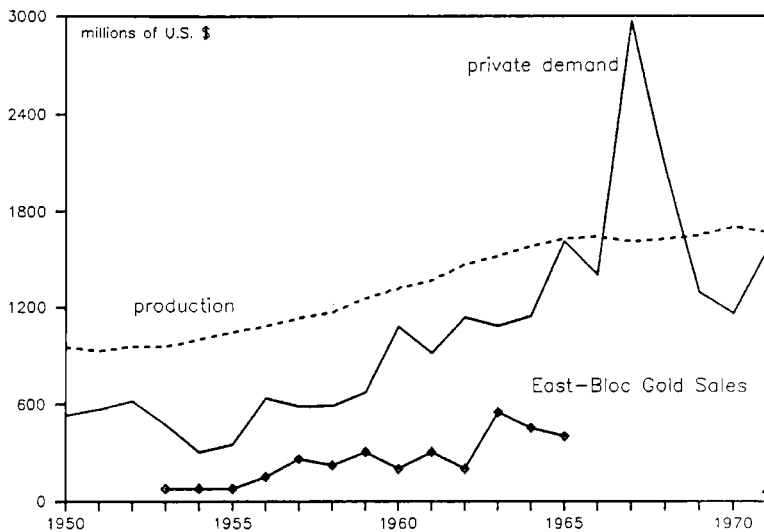


Figure 22: The Sources of Change in the World Monetary Gold Stock, 1950-1971

a) Sources



b) Changes in the World Monetary Gold Stock

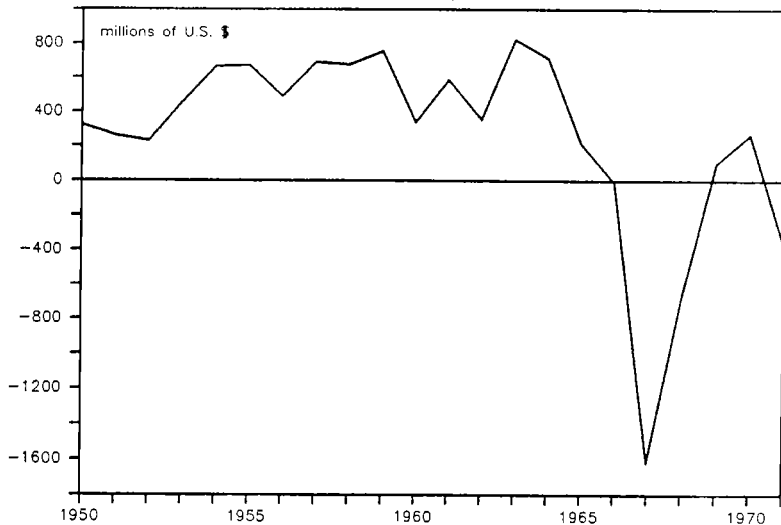


Figure 23: The Growth of the Monetary Gold Stock, the Growth in International Reserves and the Growth of the Volume of Real Trade and Real Income, G7, 1950-1973

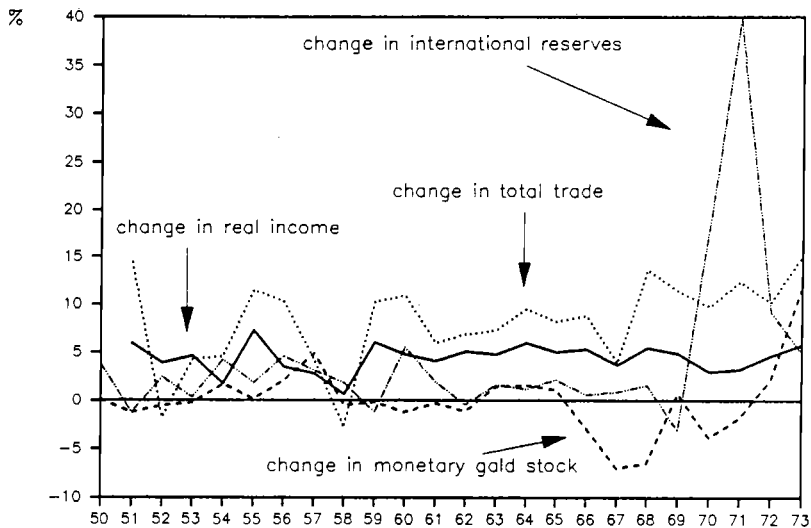


Figure 24: The Growth of the Monetary Gold Stock, the Growth in International Reserves and the Growth of the Volume of Real Trade and Real Income, G7 minus the U.S., 1950-1973

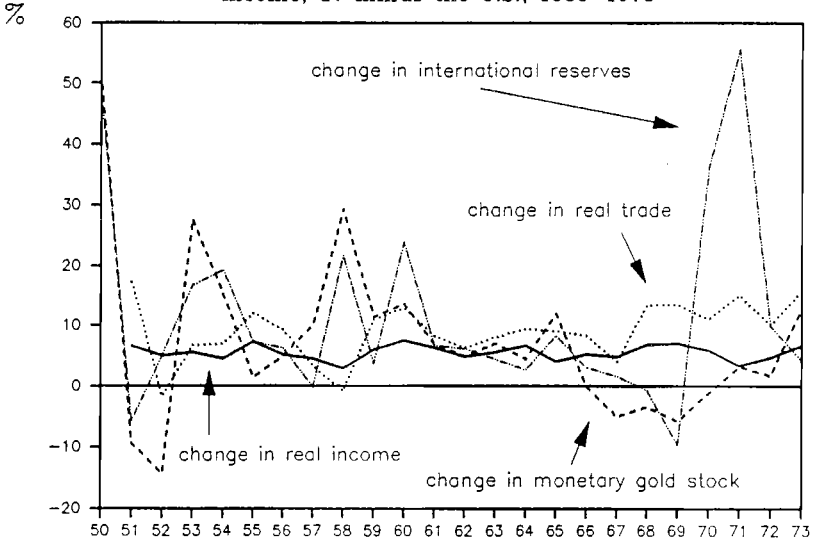


Figure 25: Sources of Change in International Reserves:
the World minus the U.S., 1950-1971

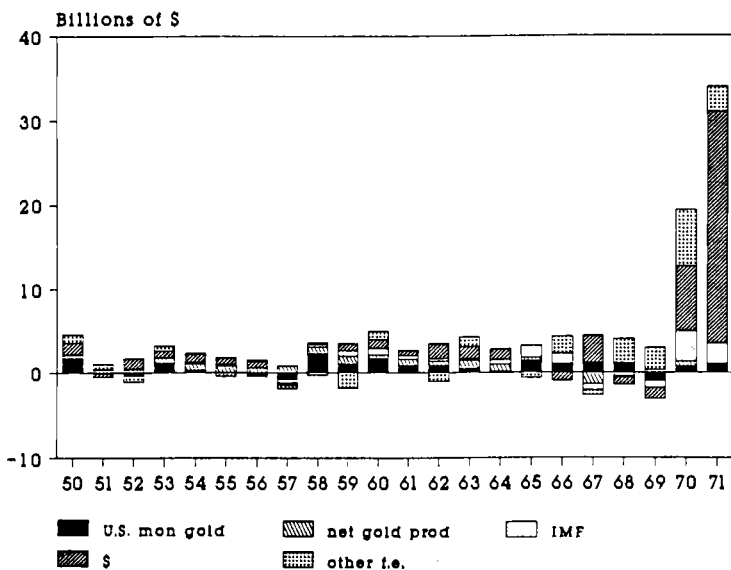


Figure 26: London Gold Price

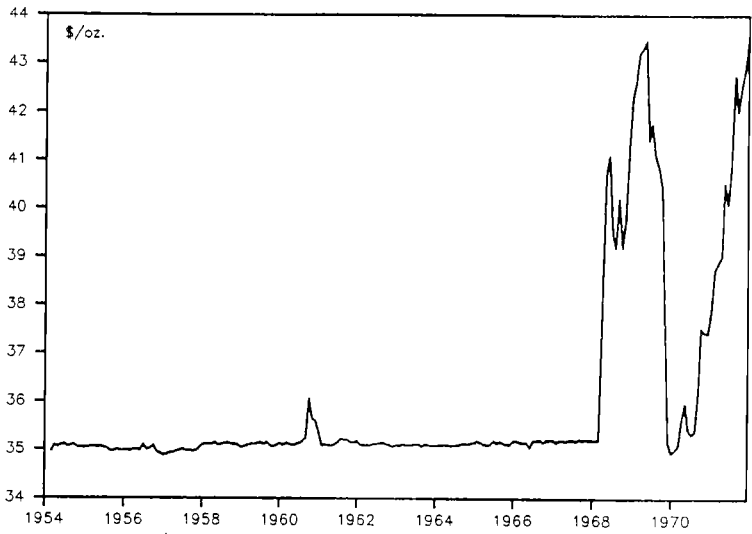


Figure 27: The World Gold Stock and World Monetary Gold Stock, 1945-1971

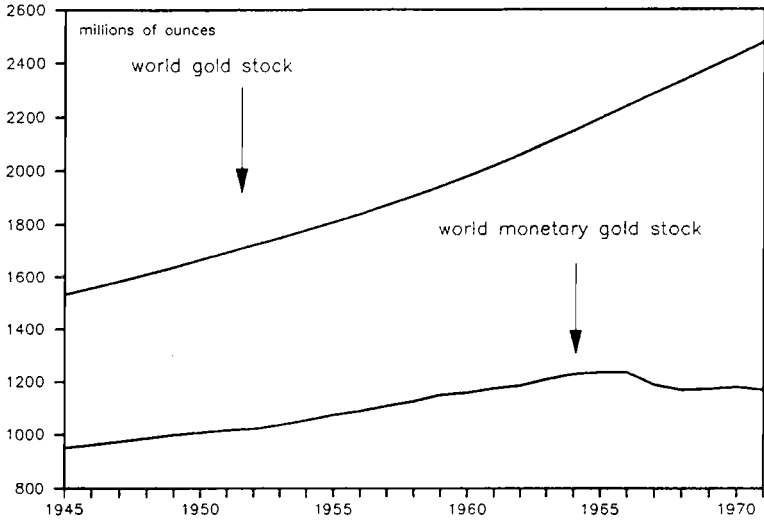


Figure 28: Inflation Rates in the U.S., G7 and G7 excluding the U.S., 1951-1973

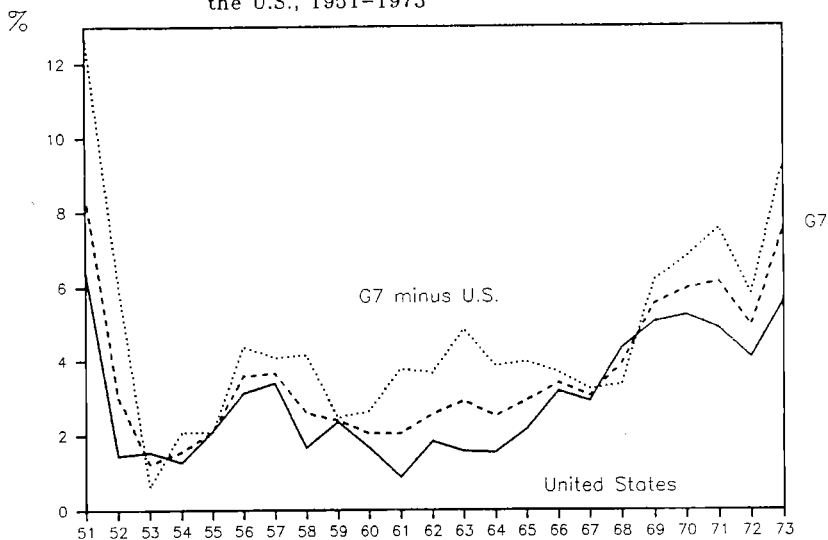


Figure 29: Money (M1) growth rates in the U.S., G7 and G7 excluding the U.S., 1951-1973

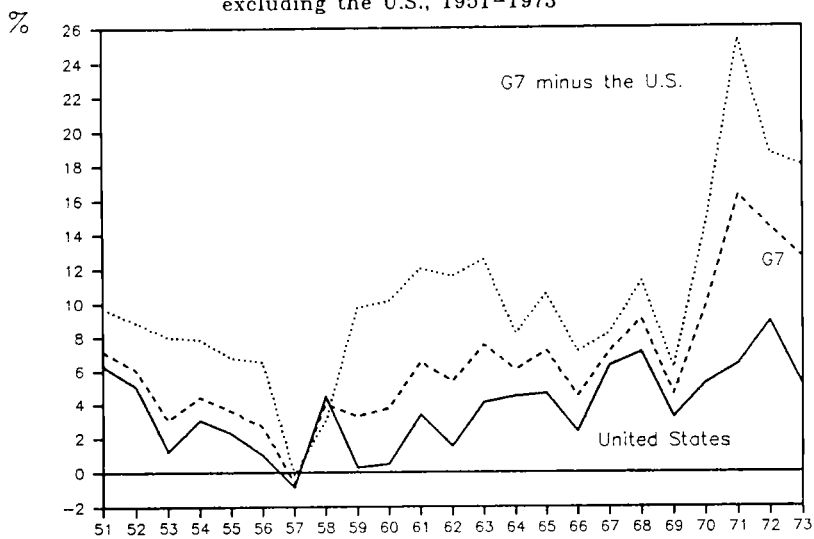


Figure 30: Money (M1) growth less real output growth in the U.S., G7 and G7 excluding the U.S., 1951-1973

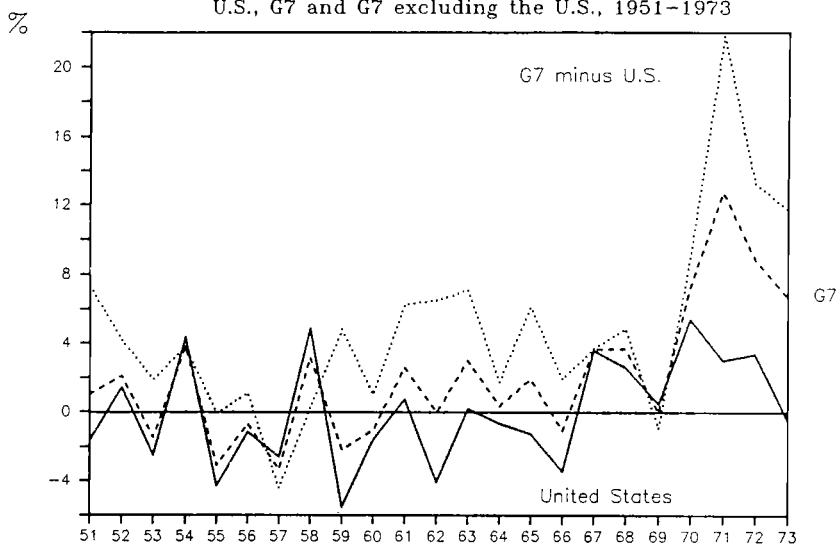


Figure 31: Growth of the Monetary Base and Federal Reserve Credit, 1959-1973
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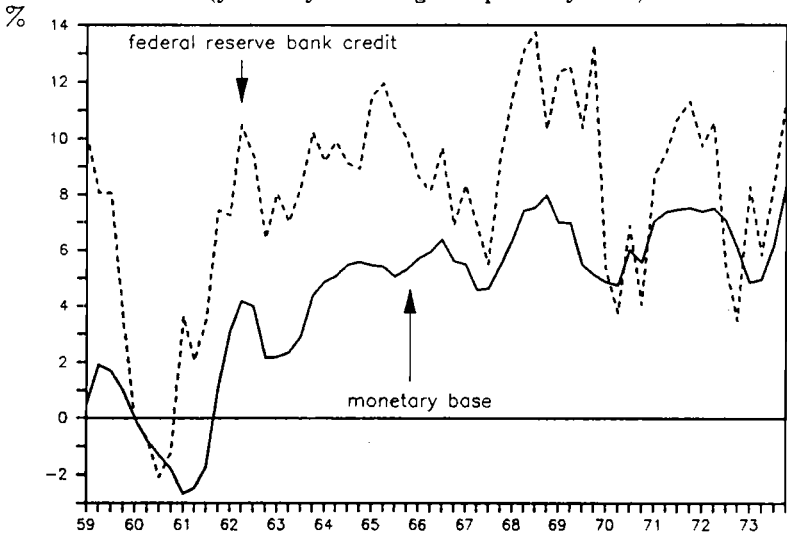


Figure 32: The U.S. Budget Deficit and Changes in the Monetary Base, 1955-1973
 (year to year change of quarterly data)

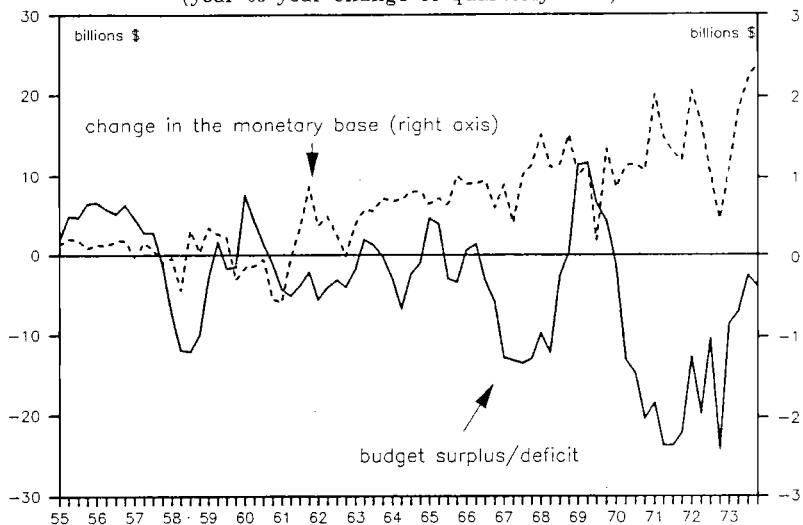


Figure 33: Balance of Payments: France, 1950-1971

