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The Rise and Fall of a Barbarous Relic: The Role
of Gold in the International Monetary System
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ABSTRACT

In this paper we analyze the changing role of gold in the international monetary system, in particular the persistence of gold holdings by monetary authorities for 20 years following the breakdown of the Bretton Woods system and the Second Amendment to the Articles of Agreement of the International Monetary Fund which severed the formal link to gold. We emphasize four points.

First, the gold-exchange standard was a relatively recent arrangement that emerged only around 1900 in response to a set of historically-specific factors, factors which also help to account for its smooth operation. How long those factors would have continued to support it will never be known, for a great war and then a great depression intervened before they could be put to the test.

Second, a system which relied on inelastically-supplied precious metal and elastically-supplied foreign exchange to meet the world economy's incremental demand for reserves was intrinsically fragile, prone to confidence problems, and a transmission belt for policy mistakes. Proposals to finesse the liquidity problem through periodic adjustments in the price of gold were not feasible, given the damage this would do to the credibility of the authorities' commitment to maintain convertibility at the prevailing price.

Third, network externalities, statutory restrictions, and habit all contributed to the persistence of the practice of holding gold reserves. But the hold of even factors as powerful as these inevitably weakens with time. And the effects of their erosion are reinforced by the rise of international capital mobility, which increases the ease of holding other forms of reserves, both unborrowed and borrowed, and by the shift to greater exchange-rate flexibility, which according to our results diminishes the demand for reserves in general.

Fourth and finally, network externalities, in conjunction with central bankers' collective sense of responsibility for the stability of the price of what remains an important reserve asset, suggest that the same factors which have long held in place the practice of holding gold reserves, when they come unstuck, may become unstuck all at once.

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1. Introduction

Robert Mundell is renowned, even notorious, for advocating a role for gold in the international monetary system. Far from plumping for the sort of textbook gold standard that never has and never will exist, however, Mundell has always based his case on a nuanced view of the historical role of gold. The gold standard, in his view, always functioned as a gold-exchange standard in which specie was supplemented by foreign-exchange reserves issued by the leading international economic and financial power. There was nothing unstable or undesirable about this system so long as the price of gold was appropriately set. In particular, the gold-exchange standard allowed the world to economize on the costs of producing specie reserves and functioned smoothly when the reserve-currency country followed responsible policies.

Moreover, Mundell has always emphasized continuity in the evolution of international monetary arrangements, pointing to similarities in the structure of the prewar and interwar gold-exchange standards. He suggests that the Bretton Woods System of pegged-but-adjustable exchange rates is best understood as a gold-exchange standard (or more precisely as a gold-dollar standard) until the United States severed the gold-dollar link at the end of the

1960s.² The post-1973 shift to managed floating is seen as an aberration in which the stability and predictability of fixed exchange rates were allowed to go by the board, but even these developments have produced less real change than meets the eye. Floating, in this view, because it gave monetary authorities the license to pursue inflationary policies, has actually increased the demand for reserves and the demand for reserves of dollars and gold in particular. Indeed, persistence of gold in the portfolios of central banks points to a latent demand for monetary reform in which exchange rates are again pegged and the global supply of liquidity is managed by a world monetary authority that uses gold as one form of backing for its liabilities.

In this paper we relate our own account of the rise and fall of the gold-based international monetary system to Mundell's interpretation. We seek to understand the motives for recent central bank sales of gold, and we ask whether the yellow metal is likely to retain a monetary role in the 21st century.

We report new evidence on the determinants of central banks' demands for gold using data spanning more than a century of international monetary history. We estimate the canonical model of the demand for reserves, which relates central bank holdings to country size, exposure to international transactions, and balance-of-payments volatility.³ This allows us

² Mundell refers to the Bretton Woods System as it operated through 1971 as the gold-convertible dollar standard.

³See for example Kenen and Yuden (1965) and Heller (1966).

to test propositions that flow from Mundell's analysis and to speculate on the future monetary role of gold.

While our analysis is broadly consistent with Mundell's, we hold a less universalist view of the gold-exchange standard and argue that the international monetary system is accurately portrayed as a gold-exchange standard for at most seven decades from 1900. We emphasize that the system was buttressed for most of its existence by special factors with no counterpart today, early on by the insulation from political pressures enjoyed by central banks and later by capital controls that limited international financial flows. More generally, we are less confident than Mundell of the stability of a multiple reserve-asset system.⁴

We argue that the disintegration of the gold-exchange standard in the 1930s and the collapse of the Bretton Woods System in 1971-3 both reveal the fragility of this system. In our view, more than an inappropriately set price of gold that limited the supply of international liquidity was responsible for stability problems in these two periods. Rather, the collapse of the interwar system and the collapse of Bretton Woods both reflected flaws in the structure of the gold-exchange standard, specifically, the tendency for such a system to amplify and propagate the effects of unstable policies in the reserve-currency countries, and the further tendency for the repercussions of those policies to destabilize the monetary system itself.

⁴Our emphasis on the fragility of the gold-exchange standard is consonant with theoretical work pointing to the inevitability in the long-run of the collapse of any commodity price support scheme in the face of unforeseen shocks. See Townsend (1977), Salant (1983) and Buiter (1989).

Finally, we consider some hypotheses to explain the persistence of gold holdings by monetary authorities for 20 years after the breakdown of the Bretton Woods System and after the Second Amendment to the Articles of Agreement of the International Monetary Fund severed the formal link to gold. We distinguish three proximate explanations: network externalities which encourage the maintenance of the same international monetary practices as one's neighbors and therefore cause existing practices to become locked in, simple inertia in central bank behavior, and inertia in statutory requirements. We find some support for all three hypotheses. We suggest that this evidence as well as recent official gold sales bode ill for the future monetary role of gold.

2. Perspectives on the Past

In this section we review the development of the international monetary system from the late-19th century gold-exchange standard through the post-World War II gold-dollar standard.

A. The Gold Standard

The international gold standard developed out of the commodity-money standards that prevailed for many centuries up through and including the nineteenth. Prior to its advent, economies relied on a variety of commodity standards--silver standards, copper standards, and bimetallic standards among them. The pivotal development prompting the emergence of the gold standard in the nineteenth century was, in a sense, the industrial revolution, or more

broadly the technological and organizational advances associated with the advent of modern economic growth. With advances in shipbuilding and armaments technologies, warfare became more expensive, increasing the financial requirements of the state. This led to the issue of public debt and the development of financial institutions that served as bankers to the state. Out of these arrangements emerged modern central banks. In return for extending them exceptional privileges, governments asked their bankers to discharge a range of public functions. These eventually included overseeing the monetary system, which in practice meant acting as steward of the gold standard. The development of the steam engine brought steam power to the mint and made practical the minting and issuance of token subsidiary coinage, facilitating the transition from silver and bimetallism to gold.⁵ The development of double-entry bookkeeping, the establishment of the accountancy profession, and improvements in information technology -- all corollaries of the industrial revolution -- encouraged the spread of fractional-reserve banking, which allowed specie and specie-backed currency and coin to be supplemented with bank deposits and other near monies. Central banks followed suit, buying

⁵The problem with token coinage was that its face value exceeded the intrinsic value of its metallic content by definition, creating an incentive for counterfeiting and discouraging the authorities from issuing tokens. The constraint bound because the smallest practical gold coin was too valuable for day-to-day transactions. It was necessary to supplement gold with silver coinage (silver coins of comparable weight being worth only one-fifteenth as much). Issuing token coins and paper money was only practical once steam power permitted them to be stamped and printed with a precision that precluded easy counterfeiting. See Redish (1990).

up circulating gold in exchange for token coin and paper money that then provided the basis for domestic circulation.⁶

Once this movement toward the gold standard was initiated, it gained momentum. The shift to gold fed on itself through the operation of network externalities. There were advantages, in other words, to maintaining the same monetary arrangement as other countries. Doing so simplified trade. It facilitated foreign borrowing.⁷ And a common standard minimized the confusion caused by the inter-circulation of coins minted in neighboring countries. Thus, when Germany went over to gold in 1871, using the reparations received from its victory over France in the Franco-Prussian War, it brought Denmark, Norway, Holland and Sweden and the members of the Latin Union in its train. And once this influential group had joined together on the gold standard, other countries were drawn to follow.

B. The Gold-Exchange Standard

Circa 1880, when this process really got underway and it could for the first time be said that there existed a gold-based system of international scope, the system in place is accurately portrayed as a gold standard, not a gold-exchange standard.⁸ In 1880, the foreign exchange reserves of central banks and governments amounted to less than 10 per cent of

⁶Still, over much of the world, gold continued to circulate and provided the basis for day-to-day transactions. Things changed after World War I, as we explain below.

⁷As emphasized by Bordo and Rockoff (1996).

⁸On the transition from silver and bimetallism to gold and this convention of dating the emergence of a truly international gold standard around the first half of the 1880s, see Eichengreen and Flandreau (1996).

their gold reserves.⁹ (See Figure 1.)¹⁰ The practice of holding foreign exchange was the exception, not the rule.¹¹ But the share of foreign exchange in world official reserves then began its steady rise (as seen most clearly in Lindert's data, as in Appendix 1, Figure 1). Its upward trajectory was then interrupted by the Baring Crisis and the 1893 panic. By the turn of the century, however, the accumulation of foreign-exchange reserves was again proceeding, this time at an even faster pace than before. On the eve of World War I, the ratio of foreign exchange to gold reserves was 50 percent above its 1880 level.¹² This suggests that the shift

⁹These estimates for the 1880-1913 period are for 16 countries. For the interwar and post-World War II periods, we use a larger sample of 21 countries. Lindert (1967, 1969), by comparison, provides annual data on official foreign exchange reserves for 35 countries beginning in 1880 and a larger group of countries beginning somewhat later. He does not, however, provide annual data for individual countries' gold reserves over the 1880-1913 period, instead interpolating this series for the world between four benchmarks. In our work we have assembled annual estimates for a limited sample of countries rather than relying on interpolation. In addition, we limit our attention to countries for which the ancillary data used in the demand-for-reserves equations estimated below are consistently available.

Notwithstanding these differences, Lindert's series and our's paint broadly the same picture (see Appendix 1, Figure 1).

¹⁰Gold reserves are valued at official prices throughout. Appendix 1, Figure 2 shows market values for gold reserves in the post-1973 period.

¹¹The principal countries holding foreign exchange reserves in 1880 were Austria, Belgium, Canada, Denmark, Finland, Germany and Sweden. Source: Lindert (1967), Table 2-C.

¹²Lindert's alternative series suggests an even more impressive rise, with the share of foreign exchange reserves in the total doubling between 1880 and 1913. If like Lindert one considers the foreign-exchange assets of private as well as official financial institutions, then the relative rate of growth of foreign exchange claims is more impressive still.

from the gold to the gold-exchange standard can be regarded as a post-1895 -- even a post-1900 -- phenomenon.¹³

Central banks were naturally attracted by the possibility of substituting interest-earning foreign assets for gold in their portfolios, although in some cases the monetary statutes under which they operated provided only limited leeway for this. But as with the rise of the gold standard, the technological and organizational advances associated with the transition to modern economic growth encouraged the practice. The emergence of a global economy characterized by high levels of international trade and lending encouraged countries seeking to capitalize on the existence of international markets but for whom the accumulation of gold reserves was prohibitively expensive to opt for the more economical option of holding interest-bearing exchange reserves.¹⁴ The growth of deep, broad and liquid financial markets in London, Paris, Amsterdam, Zurich and Berlin and of an efficient gold market in London reduced the costs of shifts between gold and interest-bearing assets. Improvements in transportation and communication, notably the growth of cable traffic, allowed governments and central banks headquartered in remote locations to undertake more frequent portfolio shifts. The emergence of a truly international capital market encouraged the practice of holding foreign exchange reserves, lenders often requiring governments borrowing abroad to

¹³ Below, in the context of an econometric analysis of the demand for gold and foreign exchange, we find that the Chow statistic indicating a structural break in the determinants of the gold/total reserves ratio peaks in 1900-1901, consistent with this interpretation.

¹⁴ The role of income levels as a determinant of countries' reliance on gold versus foreign-exchange reserves is a theme of Eichengreen and Flandreau (1996).

hold their loan proceeds on deposit in the financial center where their bonds were underwritten and marketed.¹⁵

By the turn of the century, then, there existed a truly global gold-exchange standard. A large literature seeks to understand its operation. One strand of work, originating with Hume (1752), focuses on the adjustment mechanism and specifically on the importance of relative prices as opposed to income and wealth effects in bringing about changes in the level of spending and in the distribution of gold reserves. Later treatments in this spirit build on Mundell (1963, 1971).

In contrast, the modern literature, inspired by work on reputation and time inconsistency, focuses on the political and economic factors which lent credibility to the authorities' commitment to gold convertibility.¹⁶ In the early 20th century, credibility derived from the protection central banks enjoyed from pressure to subordinate exchange-rate policy to other goals. In many countries the right to vote was limited until after World War I, circumscribing the ability of those subject to unemployment to object when monetary policy was targeted at other variables. Neither trade unions nor parliamentary labor parties had developed to the point where workers could insist that defense of the exchange rate be

¹⁵ The integration into this expanding international economy of Russia and India, two leading holders of foreign exchange reserves, epitomizes the process. Russia borrowed in Paris and held foreign balances there as collateral (Feis 1930). India went onto the gold standard at the end of the 19th century, when the British sovereign was made legal tender there and the colonial government established a reserve in London (Keynes 1913).

¹⁶ Here we compress arguments made in Bordo and Kydland (1995) and Eichengreen (1996).

tempered by other goals. Central banks and governments were therefore free to do what was necessary to defend their currency pegs.¹⁷

The credibility of that commitment had the effect of loosening the constraints on policy. Because capital tended to flow in stabilizing directions, it was only rarely necessary to apply harsh monetary measures in response to temporary disturbances. As in Svensson's (1994) model of target zones, the existence of the exchange rate band defined by the gold import and export points, plus a credible commitment to defend it, gave the domestic authorities leeway to vary interest rates in response to shocks.¹⁸

The adequacy of the global supply of liquidity was a major issue through the middle of the 1890s. The world price level trended downward from 1873 through 1893, provoking populist agitation against the gold standard, as given classic expression in William Jennings Bryan's "cross-of-gold" speech. At that point the constraint was relaxed by a series of gold discoveries, most notably in Western Australia and South Africa. This may have been less the stabilizing response of the system to the rising real price of gold than a corollary of the continued expansion of the international economy of which the gold standard was a part.¹⁹ In

¹⁷ The United States, where universal male suffrage prevailed, provides proof by counter-example; the US came within a hair's breadth of being driven off the gold standard by populist agitation in the 1890s. See below.

¹⁸ Evidence on the operation of these mechanisms is to be found in Hallwood, MacDonald and Marsh (1996) and in Bordo and MacDonald (1997).

¹⁹ See Rockoff (1984) and Eichengreen and McLean (1994). A notable exception to this generalization is the cyanide process for extracting gold from impure ore; Rockoff shows that
(continued...)

other words, discoveries may have been the product not so much of any induced response to changes in the real gold price as of the penetration of agriculture into what had previously been sparsely settled regions of the world. (Recall Sutter's Mill, where two generations earlier the great California gold rush had been set off by the settlement of what came to be known subsequently as the Gold Country. The immediate event precipitating the discovery was the construction of a lumber mill on the American River.) The irony, then, is that the equilibrating response -- flow supplies of gold -- reflected the fact that the global gold standard was superimposed on a disequilibrium system of changing migratory patterns and a changing geography of agricultural production.²⁰

The fortuitous elasticity of the flow supply of new gold limited the need to supplement specie with foreign exchange. Nevertheless, the share of international reserves accounted for by foreign exchange continued to rise, from 16 per cent in 1903 to 21 per cent in 1910.²¹ Exchange reserves held in sterling, francs and marks loomed large relative to the gold reserves of the British, French and German central banks. (Exchange reserves were 75 per cent of the reserve-currency countries' gold reserves in 1913 according to Lindert, 1969.) Questions

¹⁹(...continued)

the rise in the real price of gold starting in the 1870s induced scientists in several countries to work simultaneously on its development.

²⁰An additional equilibrating mechanism was shifts of gold from nonmonetary to monetary uses. See Bordo (1981) and Cagan (1965) for evidence that this force and the response of gold production to changes in the real price worked with very long lags.

²¹We refer to data for 35 countries. See Lindert 1967, Table 5-4 and Table 2-C.

quietly arose about the ability of the reserve-currency countries to honor their commitment to convert foreign exchange into gold in the event that foreign claimants all suddenly developed cold feet.²²

How long this system would have lasted will never be known, for it was disrupted by the approach of World War I. Mounting political and military tensions raised doubts about whether countries would honor their unconditional commitment to redeem their foreign liabilities. As war loomed, they began shifting from foreign exchange into gold, the share of foreign balances in global reserves (35 countries) falling from 26 per cent in 1910 to 23 per cent in 1913 (Lindert 1967).

C. The Interwar Gold-Exchange Standard

The international system reconstructed following World War I was similar to its prewar predecessor. Gold convertibility again provided the basis for the monetary circulation. The combination of a fixed gold price with the freedom to import and export gold held exchange rates within narrow bands.

The principal differences between the prewar and interwar systems were four. First, countries now withdrew gold coin from circulation and concentrated it in their central banks (or at institutions like the Bank of England, which held it on their behalf).²³ Second, the dollar emerged as sterling's rival for the status of leading reserve currency, reflecting the growing

²² The definitive treatment of these issues is De Cecco (1974). See also Triffin (1964).

²³ In most cases this was done during the war itself, when gold was regarded as a national resource that could not be allowed to flow abroad and possibly fall into enemy hands.

economic and financial power of the United States and the creation in 1913 of the Federal Reserve System, a central bank with the capacity to guarantee the liquidity of the market. Third, in a number of major countries, most notably the US and UK, wages and prices no longer responded to changes in market conditions as freely as before.²⁴ Fourth and finally, compared with their prewar predecessors, interwar central banks responsible for managing the monetary system had more varied motives, came under more political pressure, and possessed less credibility. Universal male suffrage and the rise of trade unionism and parliamentary labor parties politicized monetary policy. Authors like Cassel, Keynes and Hawtrey articulated theories linking monetary policy to employment and advertized their wares in popular publications and official testimony.

Mundell has argued that the fatal flaw in the interwar system was the failure of countries to set the gold price appropriately and to properly manage the global supply of liquidity.²⁵ The interwar gold standard was an engine for deflation, in this view. While prices had risen significantly in the United States between 1914 and 1925, the dollar price of gold was left unchanged; according to Mundell, this rendered the dollar overvalued in terms of gold

²⁴ A large literature debates the question of whether there was a significant decline in wage and price flexibility over the World-War-I watershed. Recent work suggests that the case is strongest for the US, where the 1920s saw the rise of personnel departments and other institutionalized forms of labor relations, and in the UK, where union density rose sharply during the war and the government adopted an unemployment insurance scheme, sector-specific minimum wages (under the provisions of the Trade Boards Act), and other flexibility-reducing policies.

²⁵Mundell (1994) pp.6,8; Mundell (1995), p.455.

by as much as 35 to 40 percent. Other countries which restored their prewar parities, most notably Britain, experienced even more inflation over this interval than the United States. Higher commodity prices in conjunction with an unchanged nominal price of gold meant that the global supply of liquidity was inadequate. Central banks strapped for reserves raised their discount rates in the desperate effort to obtain them, imposing deflationary pressure under whose weight the gold standard edifice eventually crumbled.

This view must come to grips with the fact that the gold cover ratio (the ratio of gold to the sum of notes and central bank sight deposits) was in fact little changed, having fallen only from 48 per cent in 1913 to 41 per cent in 1925.²⁶ 41 per cent was still considerably in excess of the gold required by statute, which lay in the 29 to 34 per cent range.²⁷ While price levels were higher than a decade earlier, so were gold stocks, reflecting mining and the concentration of monetary gold in the vaults of central banks. Indeed, the \$3 billion of gold coin withdrawn from circulation provided the entire increase in gold cover required by statute between 1913 and 1928. And if the stock of gold was not enough, it could be supplemented by rebuilding the foreign exchange component that countries had liquidated during the war and in its wake. In the event, the share of foreign exchange in central bank reserves rose from 29 per cent in 1924-6 to 42 per cent in 1927-8, somewhat higher than the 1910 benchmark of

²⁶ League of Nations (1930), Annex XIII, Table III.

²⁷ Depending on how much foreign exchange was also held by central banks authorized by statute to do so.

36 per cent.²⁸ In any case, it is hard to argue that a global liquidity shortage constrained the growth of notes and sight liabilities in the second half of the 1920s, when they expanded at an annual average rate of four per cent.²⁹

Admittedly, there was the question of whether this configuration was dynamically stable. Penetration of overseas regions of recent European settlement having run its course, there were few prospective gold discoveries on the horizon, rendering the flow supply of new gold relatively inelastic.³⁰ For incremental liquidity the system depended on its ability to

²⁸ It then fell back to 37 per cent in 1929 as financial instability loomed (Nurkse, 1944, Appendix I).

²⁹Cassel (1928) shared Mundell's worry about the adequacy of the world's stock of monetary gold now that the U.S. price level was so much higher (and the real price of gold was so much lower). But his preferred solution was not to change the real gold price, which would have created what we refer to now as time inconsistency problems. Starting with his contributions to the Expert Committee at the Genoa Conference in 1922 (of which he was a member), Cassel stressed the need to economize on monetary gold by withdrawing gold coin from circulation and encouraging central banks to supplement their gold reserves with convertible foreign exchange. Critical for encouraging this practice, he emphasized, was central bank cooperation, for a coordinated international reduction in gold cover ratios would be less threatening than unilateral action to the credibility of monetary policy. In contrast, Charles Rist's solution in fact anticipated Mundell, arguing that the interwar "gold shortage" could have been alleviated by readjusting the price of gold in terms of the dollar and pound in 1924-25 "to bring the purchasing power of gold nearer to what it would have been if the rise in prices had been due to an increase in the production of gold and not to monetized debt." Cortney (1961), p.8.

³⁰Cassel (1928) emphasized the progressive exhaustion of the South African mines on which the world depended so heavily for its incremental supplies of gold. While not questioning that new deposits would be discovered, he anticipated the picture of a relatively inelastic flow supply as described in the text. Bordo and Eichengreen (1997) demonstrate that had the Great Depression not terminated the gold exchange standard that the post-World War I deflation would have encouraged sufficient gold production and shifts of gold from nonmonetary to

(continued...)

pyramid additional foreign exchange reserves on a relatively static base of monetary gold.³¹ Contemporaries were not oblivious to the exchange-overhang problem -- to the fact that the system depended on exchange reserves for incremental liquidity, but that augmenting them could at the same time undermine confidence in the ability of the reserve-currency countries to convert them -- that had arisen in the first decade of the 20th century. Only after World War II was this problem given a name -- the “Triffin Dilemma” — but it was well known before. Writing in 1929, for example, the monetary expert Feliks Mlynarski warned that “banks which had adopted the gold exchange standard will become more and more dependent on foreign reserves, and the banks which play the part of gold centers will grow more and more dependent on deposits belonging to foreign banks. Should this system last for a considerable time the gold centers may fall into the danger of an excessive dependence on the banks which accumulate foreign exchange reserves and vice versa the banks which apply the gold exchange standard may fall into an excessive dependence on the gold centers. The latter may be threatened with difficulties in exercising their rights to receive gold, whilst the former may

³⁰(...continued)

monetary uses to allow the principal countries to satisfy their legal gold reserve ratios. Their simulations are based on econometric estimates of relatively but not totally inelastic flow supplies of new gold.

³¹ In actual fact, new gold supplies rose significantly in the 1930s, following the collapse of commodity prices (and the consequent increase in real gold prices). But this price-level collapse was precisely the disaster that the progressive accumulation of foreign balances was meant to head off.

incur the risk of great disturbances in their credit structure in the case of a sudden outflow of reserve deposits.”³²

The immediate problem, however, was neither the prospective foreign exchange overhang nor the putative gold shortage. Rather, it was the international distribution of reserves. Between 1927 and 1930, the gold reserves of three countries -- France, Germany and the United States -- rose from 56 per cent to 63 per cent of the world total. These trends reflected unstable monetary policies on the part of the newly-created Federal Reserve System, sterilization of reserve inflows by the Bank of France, and efforts by the Reichsbank to rebuild its reserve position following the German hyperinflation.³³ The actions of these three central banks thereby imparted powerful deflationary impulses to the rest of the world. In addition, the UK suffered from persistent competitiveness problems which forced the Bank of England to follow contractionary monetary policies to maintain gold convertibility. The UK's weak position threatened the stability of one of the key reserve countries and hence of the system itself.

Meanwhile, the decline in central bank credibility, reflecting increasing pressures to pursue domestic stabilization goals, meant that capital no longer flowed in stabilizing directions. Before the war, when a central bank allowed the exchange rate to weaken in response to a temporary shock, interest rates would fall, stimulating the economy, since

³² Mlynarski (1929), p.89. Clearly, the “Triffin Dilemma” might equally well be labeled the “Mlynarski Dilemma.”

³³ See Eichengreen (1992) and Meltzer (1996).

currency traders expected the currency to appreciate subsequently, given the credibility of the commitment to hold it within the gold points. Now that the depth of that commitment had come into question, however, any weakening of the exchange rate might only excite expectations of a further weakening, with counterproductive interest-rate effects.³⁴ Thus, the scope for stabilizing monetary policy was limited. In addition, the existence of two competing reserve currencies, sterling and the dollar, that were close substitutes in portfolios heightened the system's fragility by providing easy opportunities for shifting between them.

As soon as doubts surfaced about the stability of the reserve currencies, central banks scrambled to liquidate their exchange reserves and replace them with gold. The share of foreign exchange in global reserves plummeted from 37 per cent at the end of 1930 to 13 per cent at the end of 1931 and 11 per cent at the end of 1932 (Nurkse, 1944, Appendix II). This collapse of the foreign-exchange component of the global reserve base exerted deflationary pressure on the world economy. Despite that there was only so much gold to go around, central banks around the world wanted more. To attract it they jacked up interest rates in the face of an unprecedented slump.

It is unnecessary to choose between unstable policies and an unstable international system as the cause of the Great Depression. The two sources of instability interacted and compounded one another. More than any other episode, the Depression revealed the fragility

³⁴ As in the model of unstable target zones presented by Bertola and Caballero (1992). Eichengreen and Jeanne (1997) illustrate the applicability of this model to the interwar period.

of the gold-exchange standard and the tendency for its operation to aggravate policy mistakes.³⁵

With the liquidation of foreign exchange reserves, the gold-exchange standard collapsed back into a gold standard of the late-19th century variety. This shift was only temporary, however; between 1931 and 1936 the residual gold bloc collapsed, and the remaining gold-standard countries went onto floating rates. Recent research suggests that this was not entirely bad; abandoning gold convertibility allowed countries to adopt reflationary monetary policies and halt the downward spiral of prices and economic activity.³⁶

At the same time, there is a sense in which the gold-exchange standard was never really abandoned. While US President Roosevelt unpegged the dollar from gold in 1933, he repegged it in 1934 at \$35 a fine ounce. His decision to effectively put the dollar back on gold, albeit at a devalued rate, worked to preserve the currency's status as a reserve asset.

D. The Postwar Gold-Dollar Standard

Given US economic preponderance, the dollar was the basis for international monetary relations after World War II. The disagreements between the US and UK delegations at Bretton Woods are well known. What is relevant for our purposes is that the British

³⁵ Our view is thus different from Mundell's, as expressed for example in Mundell (1995, p.458), "It is a mistake, though a common one, to blame the gold standard for the deflation and the great depression. The gold standard, however, is just a mechanism that worked well when it was managed well and worked badly when it was mismanaged." Our view emphasizes in contrast intrinsic instabilities in the system and their tendency to interact with policy problems.

³⁶ As argued by Eichengreen and Sachs (1985) and Mundell (1995).

delegation was strongly opposed to the reestablishment of a gold-based international monetary system, while the US insisted on a role for gold. In part this divergence of opinion is explicable in terms of self-interest: following World War II the US held a majority of the free world's monetary gold reserves. But American attitudes cannot be understood without reference to the fact that gold convertibility had been a continuous fact of economic life in the United States with the exception of nine short months in 1933-4. The gold price of \$35 established by Roosevelt in January 1934 remained the terms under which the US stood ready to convert dollars under the Bretton Woods System. Tradition cast a long shadow.

Bretton Woods departed from the prewar and interwar gold standards in four ways. Pegged exchange rates became adjustable subject to the existence of a "fundamental disequilibrium." Controls on capital- and (for a transitional period) current-account transactions were permitted to limit international capital flows. (This was a way of providing the central bank with the credibility needed to operate a system of pegged exchange rates despite the politicization of the monetary policy making; the circle was squared by using controls to loosen the links between exchange rate management and internal financial conditions.) The International Monetary Fund was created to provide surveillance of national economic policies. And limits were imposed on the right of private citizens, as distinct from governments and central banks, to hold, import and export gold.

These innovations addressed the major worries that policy makers inherited from the 1930s. They were concerned that there should exist an alternative to deflation for eliminating

payments deficits. They insisted on a mechanism for containing destabilizing capital flows. They sought to economize on gold in order to prevent a global liquidity shortage. And they recognized the need for a mechanism to influence governments whose policies threatened to destabilize the international system.

But none of these innovations eliminated the fundamental problem with the gold-exchange standard, namely, the need to accommodate the expanding world economy's demand for liquidity without at the same time destabilizing the system. Under the gold-exchange standard this demand could be met only by pyramiding a growing quantity of foreign exchange reserves on an inelastic gold base. As early as 1947 Triffin had pointed to this problem as the weak link in the Bretton Woods chain.³⁷ The flow supply of new gold had always been inelastic, but this was especially so in a policy-making environment in which governments now resisted any fall in the price level (rise in the real price of gold). Economic growth was unusually rapid in the post-World War II quarter century, further aggravating the excess demand for reserves.

The problem, then, was that the acceptability of foreign-exchange reserves hinged on the willingness and ability of the reserve-currency country to convert its liabilities into gold. But under the postwar gold-dollar standard, increases in the demand for reserves were met mainly by increases in the ratio of dollars to monetary gold. As the foreign liabilities of the

³⁷ See Triffin (1947).

reserve-currency country grew, the credibility of its commitment to keep them as good as gold might be cast into doubt.

There was no obvious way around this dilemma. If the reserve-currency country neglected its deficits, its external liabilities would continue to mount relative to its gold reserves, aggravating the confidence problem. If it imposed restrictive policies, it would starve the world of reserves and stifle trade and growth. If it revalued its gold as Rueff, Harrod, Busschau, Gilbert, and Mundell advocated, raising the gold/exchange-reserve ratio by increasing the nominal price of the yellow metal, it would be regarded as renegeing on its commitment to convert its liabilities into gold at a fixed price.³⁸ This would reduce the

³⁸In fact Mundell advocated both raising the price of gold and the creation of SDRs as ways of preserving the Bretton Woods dollar-gold standard. Mundell (1991), p.223.

willingness of governments and central banks to hold its liabilities and undermine the system as a whole (as happened with sterling after 1949 and 1967).^{39, 40}

In any case, such a solution would only postpone the inevitable. In a rapidly growing world, it was only a matter of time before the gold scarcity would resurface, precipitating a crisis.⁴¹ Opposition to gold revaluation was shared by most officials and academics, who believed that the creation of the SDR was preferable to attempting to resurrect the gold-exchange standard (Williamson, 1977, p.35).

³⁹ There was reason to expect that a country which revalued its gold reserves once might well do so again. This would have given other countries an incentive to shift out of foreign exchange and into gold in anticipation and only accelerated the eventual collapse of the gold-exchange standard. In his own writings, Mundell tends to minimize the importance of this time-inconsistency problem, suggesting that gold revaluation was a viable option for solving not only the problems of the Bretton Woods System but eliminating the excess demand for gold in the Great Depression as well. See Mundell (1995), p.458. Some variants of this proposal (e.g. Rueff 1972) entailed using the profits from the increase in the dollar price of gold to liquidate the outstanding dollar balances. For this to be effective it would have been necessary to proscribe central banks from holding foreign exchange reserves in the future. And, aside from the French, the major governments would have rejected this notion of returning to a pure gold standard. Indeed, Mundell (1973) was opposed to Rueff's solution for a return to a pure gold standard because of its deflationary consequences. We return to this issue below.

⁴⁰ In addition, there was the problem that raising the dollar price of gold would reward two pariah nations, the USSR and South Africa, which were major gold producers.

⁴¹For other arguments against this solution, see Williamson (1977), pp. 33-34. For a contrary view see Meltzer (1991). Bordo and Eichengreen (1997) analyze the inevitability of the collapse of a hypothetical gold exchange standard constructed after World War II in a world where the Great Depression and the revaluation of gold to \$35 per ounce by the US had not occurred.

Keynes had sought to meet this problem by empowering his clearing union to issue “bancor,” an international reserve asset that could be used to supplement supplies of the yellow metal.⁴² The more conservative US design for the IMF limited countries’ right to draw from the Fund to a third of what Keynes proposed and linked those drawings to the gold that governments deposited with the Fund, thereby effectively eliminating its capacity to create paper gold.

As a result, the share of foreign exchange in global international reserves rose over the first two post-World-War-II decades. From the early 1960s members of the Bellagio Group, of which Mundell was a member, sounded warnings and advocated the creation of a synthetic reserve asset. Such arguments found official expression in the 1963 IMF *Annual Report* and in a 1964 report of a G-10 study group.

The response, an amendment to the IMF Articles of Agreement creating Special Drawing Rights (SDRs), came finally in 1968. The delay reflected divisions between France and the United States and within the US government itself. The Johnson Administration recognized that the creation of the SDR might prevent a crisis of the dollar, but it also worried that the creation of a rival might reduce the US currency’s international role. Ultimately the United States conceded that something had to be done because the alternative to the gold-exchange standard was generalized disorder. For the French, on the other hand, the collapse

⁴² In recent writings, Mundell (1983, 1994, 1995) has advanced parallel proposals for the creation of an international reserve money, to be backed in whole or partially with gold, to regulate the global supply of international liquidity.

of the gold-exchange standard would make possible a return to a pure gold standard of the 19th-century variety and an end to America's "exorbitant privilege" of underwriting its external deficits courtesy of foreign central banks and governments.⁴³ Consequently, while other countries favored the creation of SDRs, the French insisted that the scheme be activated only after the United States first eliminated its payments deficit. By the time the US satisfied this precondition in 1969 and the SDR scheme was finally activated, issuing SDRs only served to aggravate worldwide inflation.

The first Triffin-like crisis occurred in March 1968, after the collapse of the Gold Pool established by the US and seven other central banks to reduce the pressure on US reserves. The subsequent creation of a two-tier arrangement within which participants agreed to neither sell nor buy gold from the market transformed the Bretton Woods System. The two-tier market demonetized gold at the margin and cut the link between gold production and other market sources of gold and official reserves. Together with the pressure that the US placed on other monetary authorities to refrain from converting their dollar holdings into gold, it shifted the world onto a de facto dollar standard.⁴⁴ The final collapse of the system then followed, precipitated by mounting world inflation triggered in part by expansionary US monetary policy, itself a reflection of the growing preference of the monetary authorities for

⁴³ See Bordo, Simard and White (1995).

⁴⁴ See Bordo (1993) and Garber (1993).

full employment over price stability and budget deficits associated with the Vietnam War and spending on social programs.

As with the breakdown of the interwar standard four decades earlier, Bretton Woods collapsed in the face of growing imbalances between the policies of its principal members. The United States was unwilling to follow the stable financial policies required of the reserve center country, while the major European countries, for their part, were increasingly reluctant to import US inflation.⁴⁵ The collapse of the system was symbolized by closure of the US gold window on August 15, 1971, a decision triggered by French and British intentions to convert their dollars into gold.⁴⁶ The rest is history, as they say: half-baked reforms failed to rise, and by 1973 the Bretton Woods System was no more.

3. Speculations About the Future

A striking aspect of the subsequent system of generalized floating is the continued role of gold. Gold reserves, in ounces, remained basically unchanged for two decades after 1971, notwithstanding the elimination of the last official link between currencies and gold by the Second Amendment to the IMF Articles of Agreement. The dollar value of monetary gold stocks soared, rising six fold at market prices. The other side of this coin (as it were) is that

⁴⁵A complementary explanation of the events leading to collapse is growing misalignment in real exchange rates between the US and its principal competitors in the face of differential productivity trends. See Balassa (1964) and Marston (1987). In this view, expansionary US monetary and fiscal policies exacerbated the misalignment by further overvaluing the dollar (Obstfeld 1993).

⁴⁶The recent definitive treatment of this history is James (1996).

the value of monetary gold reserves failed to keep pace with the value of world trade, which expanded enormously over the period: the global gold/import ratio fell from 15 per cent to 10 per cent over the first two post-Bretton Woods decades. It follows that the ratio failed to keep pace with the growth of total reserves (Figure 1). Still, the persistence of gold in the reserve portfolios of central banks is remarkable.

Only after 1989 did this begin to change.⁴⁷ Over the 1990s to date, central banks have sold off about five per cent of their gold. The share of gold in their international reserves has fallen to less than 25 per cent from some 35 per cent in 1989 (market value). In 1992-3 the Netherlands and Belgium sold some 9 million and 5 million ounces, respectively (roughly one quarter and one third of their total reserves). Belgium sold a further 5.6 million tons in 1995. Canada reduced its gold reserves from 17 million to 4 million ounces between 1988 and 1995. The Reserve Bank of Australia quietly disposed of nearly 80 per cent of its gold. The Argentine Central Bank sold virtually all its gold reserves in the first half of 1997. In October 1997 a group of experts appointed by the Swiss government proposed that Switzerland sell more than half its gold reserves. The following month the Bundesbank announced that for some time it had been lending part of its gold reserves on the London bullion market.

Together these moves raise the question of whether we are now witnessing a break with the past. To answer that question, we must first understand the reasons for the

⁴⁷Although both the US and the IMF in fact sold some gold reserves in the 1970s.

persistence over the earlier period of the practice of gold reserves. We consider five hypotheses.⁴⁸

A. Memory and Habit

The most popular explanation is memory and habit, specifically, memories of the association of gold with monetary stability and habits derived therefrom. The public -- and for that matter monetary policy makers -- may not understand the connection between gold reserves and price stability, but their recollection of the historical record leads them to believe that such a connection exists. This renders politicians reluctant to modify or revoke the statutes requiring the central bank to hold gold reserves for fear of encouraging reckless policies. It renders central bankers reluctant to liquidate their gold reserves for fear of exposing themselves to similar criticism.

It follows that as the gold standard becomes ancient history, memories should fade and with them the association of gold with price stability. As central banks display a growing commitment to policies of stable money even under fiat-money standards, the idea that gold is necessarily associated with price stability should weaken and disappear. Parliaments and

⁴⁸In a sense, the problem is that we have many explanations and only one data point. But the fact that central banks are now liquidating what may be a substantial share of their gold reserves may help us to discriminate among these hypotheses. An adequate explanation for the phenomenon, in other words, must be capable of explaining both why the practice of holding gold reserves persisted for more than two decades after the breakdown of Bretton Woods and why it declined in the 1990s. In addition, some of these hypotheses can be tested using cross-country and time-series data on central bank portfolios.

presidents who were hesitant to revoke statutes requiring the central bank to hold gold reserves may then finally gain the courage to do so.⁴⁹

B. Lobbying by Gold-Mining Interests

Mining interests lobby for central banks to continue to provide part of the demand for the world's gold stock. They oppose central bank sales of gold for fear that these will drive down the market price of their industry's product. Organizations like the World Gold Council circulate publications arguing the case for the maintenance of gold reserves. But as economic growth proceeds and extractive industries like gold mining account for a progressively smaller share of GNP, there is reason to think that their lobbying efforts will have less effect. Thus, the declining effectiveness of pressure from the gold interests may explain why a number of central banks have begun to draw down their gold reserves.⁵⁰

⁴⁹ These arguments suggest a continuous process in which gold reserves are drawn down as the hold of memory and habit gradually loosens. But experience suggests that the process develops discontinuously -- that central banks as a group hold onto the bulk of their gold reserves until they reach a tipping point where they revalue and/or sell off a substantial share of their gold. If so, memory and habit, while part of the story, are at best an incomplete explanation. A counter argument is that memory may be a strictly generational phenomenon. Thus, Lucchetti and Sesit (1997) quote a Bank of England official that central banks are moving to "a new generation of managers who don't carry the baggage of their predecessors." Having grown up in an era of floating exchange rates, Lucchetti and Sesit continue, "younger bankers have no psychological ties to gold, which anchored the post World War II monetary system."

⁵⁰What these dynamics cannot explain is why the process should proceed so discontinuously. And if this explanation is generally correct, it is paradoxical that the central banks of countries like Canada and Australia, where the gold-mining industry is disproportionately important, have been among the first to sell off their gold reserves.

C. Collective Responsibility

A third possibility is that central bankers feel collective responsibility for supporting the practice of holding gold reserves. If one important central bank begins selling off its gold, others might scramble to do likewise before the market price collapsed, and the practice would disintegrate. Hence, central banks, particularly those holding relatively large quantities of gold, realize that their individual actions may have undesirable systemic repercussions.

This “not-on-my-watch” hypothesis has the merit of consistency with the model of network externalities invoked above to explain the rise of the gold standard. It is consistent with the observation that those central banks which have been in the vanguard of gold sales have been medium sized or relatively small, the implication being that they are least likely to set off a collective scramble out of gold. And it can explain why the process of liquidating gold reserves, once it gets underway, may be sudden and discontinuous.⁵¹

D. Gold as a War Chest

Gold has traditionally been held as a war chest. Countries concerned that potential belligerents will not redeem their monetary obligations have an incentive to hold reserves in the form of an asset that is not subject to such risk. Recall the shift out of foreign exchange by Germany and other countries in the years leading up to World War I. It can be similarly

⁵¹Again, however, the explanation is at best partial, for it does not explain why central bankers feel a collective responsibility for the maintenance of the practice in the first place.

argued that East-West tensions encouraged the maintenance of gold reserves after World War II, and that the end of the Cold War has facilitated the decline of the practice.⁵²

E. Gold as an Inflation Hedge

A final explanation emphasizes gold's value as an inflation hedge. The return on gold is thought to vary negatively with the return on other assets in high inflation periods, but not necessarily in periods when inflation is low. Hence, central banks, like other investors, will have an incentive to hold gold for portfolio-diversification purposes in high-inflation periods like the 1970s but not in low inflation periods like the 1990s. This explanation has the merit of helping to explain the persistence of central banks' gold holdings into the high-inflation period that followed the breakdown of Bretton Woods and the increasing liquidation of gold reserves starting in the early 1990s, when the transition to low inflation in the major advanced economies had been secured. And in fact, standard calculations confirm that the covariance of the returns on gold and U.S. equities was negative in the high inflation period 1973-83 but positive in the low inflation period 1984-96.⁵³

⁵²The problem is that those countries which have taken the most dramatic steps to draw down their gold reserves (Canada, Australia and Belgium among them) were never deterred by the threat of Cold-War conflict, one presumes, from holding dollar-denominated assets. Those countries to which this argument most plausibly applies have not been in the vanguard of those drawing down their gold reserves.

⁵³To be more precise, we calculated the beta on these two asset classes, normalizing the covariance between the two returns by the variance of the return on the stock index. This yielded a beta of -0.85 for gold in the high inflation period but 0.40 in the subsequent low inflation era.

The problem for proponents of this view is to explain why gold has this special characteristic as a regime-specific inflation hedge. It makes sense that investors should want to move into gold and other real assets in periods when inflation is eroding the value of financial assets. But existing accounts of this inflation-hedge story remain incomplete. It is unclear why inflation is not similarly good for equity markets (equities being claims on real assets, in other words).⁵⁴ And it is not clear why the correlation between the return on gold and the return on other assets varies as it does with the monetary regime.

4. Evidence

To analyze these issues systematically, we estimated demand-for-reserves functions, relating the log of reserves to measures of economic size (log GNP), openness (the import/GNP ratio), and balance of payments variability (the three year moving standard deviation of the log of exports).⁵⁵ We gathered annual data on these variables from 1880 through 1995 for a sample of 21 countries.⁵⁶ We included dummy variables for individual years, since specification tests suggested these were appropriate. And to shed light on

⁵⁴Non-neutralities in the tax system affecting the after-tax value of corporate profits in high-inflation environments have been cited in this connection.

⁵⁵We also included in some of our regressions short-term interest rates and the rate of change in the price of gold as opportunity cost variables. As in other studies, the opportunity cost variable was generally insignificant except in the recent managed float (Landell-Mills, 1989). Hence, these regressions are not reported.

⁵⁶Australia, Argentina, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, United Kingdom, United States, Greece, Germany, Italy, Japan, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland. For the 1880-1913 period because of data gaps we omitted Brazil, Chile, Greece, Portugal, Spain.

compositional issues, we estimated separate equations for the demand for gold or for the ratio of gold to total reserves, depending on the hypothesis under consideration.⁵⁷

Table 1 reports the results for the benchmark specification for total reserves and gold reserves. GNP and the import share enter with their expected signs. The income elasticity of demand for both gold and total reserves is unity or just above. Greater openness as measured by the import share translates into greater demand for both gold and total reserves over the entire period. While export variability enters positively as a determinant of the demand for gold but negatively as a determinant of the demand for total reserves, both coefficients differ insignificantly from zero at conventional confidence levels. Although standard arguments suggest that the demand for reserves should increase with balance-of-payments variability, there are notorious difficulties with measuring balance-of-payments variability independently of the reserve changes that are the variable to be explained. In particular, export variability will be inadequate when shocks to the balance of payments stem mainly from the capital account, while actual variability will not be appropriate when it is expected (as opposed to actual) balance-of-payments shocks that motivate the demand for reserves. While for all these reasons it is unsurprising that the coefficient on export variability is not well defined, this coefficient still displays the expected positive sign and generally differs from zero at standard confidence levels except in the Bretton Woods period in the case of gold and under Bretton Woods and the post-Bretton Woods float in the case of total reserves. We take these changes

⁵⁷Estimating separate equations for both gold and foreign exchange reserves as well as the total would have been redundant, given adding-up constraints.

over time (specifically, the declining significance of our export-revenue-based payments variability measure) as evidence of the growing importance of capital-account shocks as the period progressed.

To substantiate our interpretation of the timing of successive stages in the development of the gold-exchange standard, we conducted Chow tests for breaks in the demand for reserves. Separately for the prewar era (1882-1913), the interwar period (1923-39), the Bretton Woods period (1951-70) and the floating period (1973-95), we tested for a structural break in each year. The resulting series of test statistics are shown in Figures 2-5. We are interested in identifying the years in which the test statistic peaks, which is the most likely period of structural shift.

Figure 2 suggests a break in the demand for foreign exchange reserves in the second half of the 1890s and in the ratio of gold reserves to total reserves in 1900-1901. (Critical values are 2.37 at the 95 per cent confidence level and 3.32 at the 99 per cent level.) This is consistent with our interpretation dating the emergence of a global gold-exchange standard as late as 1895 or 1900.

Figure 3, for the interwar period, suggests breaks in the demand for international reserves in 1931, when Britain and other countries abandoned gold convertibility, severing the link between domestic nominal variables and central bank gold reserves, and again around 1935, when the residual Gold Bloc began to splinter. The break in the determinants of the

gold/total reserve ratio is centered on 1931; there is no comparable break in the mid-1930s, by which time the foreign-exchange component of the system had been largely liquidated.

Figure 4, for the Bretton Woods period, suggests stability in the determinants of the share of gold in total reserves when the sample is limited to 1959-1970 (a period sometimes referred to as that of the convertible Bretton Woods System). Over the longer period 1951-1970, in contrast, there are breaks toward the beginning of the period, not surprisingly given that foreign exchange was scarce in the early 'fifties, after which the dollar shortage receded.

Finally, Figure 5, for 1973-95, shows considerable evidence of instability. The Chow tests for a shift in the demand for gold and the share of gold in total reserves peaks around 1987-88, just before gold sales get underway.⁵⁸

One explanation for changes over time in the share of reserves held in gold, suggested by Mundell's writings, emphasizes the volatility of monetary policy in the reserve currency countries.⁵⁹ We measured volatility as a 3-year moving standard deviation of the log of the monetary base and took the reserve-currency countries to be Britain under the gold standard, the US, the UK and France in the interwar period, the US under Bretton Woods, and the US, Germany and Japan under the post-Bretton Woods float.⁶⁰ When we measure policy using

⁵⁸ The relationship determining the demand for foreign exchange appears to shift earlier, in the late 'seventies and early-to-mid 'eighties, a phenomenon for which a myriad of explanations suggest themselves.

⁵⁹See e.g. Mundell (1983), p. 192 and Mundell (1994), p.22.

⁶⁰ Where there was more than one reserve-currency country, we used the three-year moving
(continued...)

changes in the monetary base, volatility enters positively for the heyday of the Bretton Woods System (1959-70), a period when the United States came in for criticism for neglecting its responsibilities as a reserve-currency country, but with a zero coefficient otherwise (see Table 2).⁶¹

When we measure volatility by the twelve month standard deviation for each year of the exchange rate of the reserve-currency country or countries, we similarly find that volatility encouraged central banks to hold gold rather than foreign exchange in the post-Bretton Woods period of floating (1973-95), but not before (see Table 3).⁶² This lends support to the Mundellian view that policy instability in the reserve-currency countries provided a motive for holding gold rather than foreign exchange. Plausibly, the relevant measure of instability was monetary-policy related under Bretton Woods and exchange-rate related thereafter.

To test Mundell's hypothesis that world inflation after the advent of floating rates stimulated the demand for gold, we add a proxy for this to our specification.⁶³ In Table 4 we report regressions for the demand for gold and the ratio of gold to total reserves. World

⁶⁰(...continued)
standard deviation of the log of the aggregate money supplies converted into dollars.

⁶¹ When we measure policy by changes in M2, however, this result evaporates.

⁶²For the interwar period we used the pound dollar exchange rate; for the postwar period, the trade weighted dollar exchange rate.

⁶³See Mundell (1983, 1994, 1995). We used the weighted average of the G-5 inflation rate and, alternatively, the inflation rates of the same core countries as in the regressions with a measure of the volatility of monetary policy.

inflation enters as predicted only in the post-Bretton Woods years, as if only then was inflation sufficiently persistent that actual inflation predicted future inflation and correspondingly affected the demand for reserves (Table 4).⁶⁴ An alternative specification, in which we instead added a high-inflation dummy variable which takes on a value of unity when the inflation rate exceeded 3 per cent, produced basically the same result. These regressions suggest that the shift from high inflation in the period 1973-83 to low inflation in 1984-95 reduced the demand for gold as a share of total reserves by about eight per cent. For the post-Bretton Woods float, then, the results support Mundell's view that rise in inflation in the 1970's increased the demand for gold reserves, while the decline in inflation since the early 1980's reduced it.

To analyze the sources of persistence in the demand for gold reserves, we added three final regressors. One is the lagged dependent variable, which we interpret as a measure of simple inertia or historical persistence. Interpretation of the coefficient on the lagged dependent variable is not straightforward, of course: a large coefficient could indicate that a greater propensity to hold gold reserves in the past has the effect of encouraging the central bank to hold more gold reserves in the present, but it could also simply be picking up the effects of random factors which cause some countries to hold more gold than others. Some countries may hold unusually high quantities of gold, in other words, because of persistent error terms rather than hysteresis in portfolio behavior per se.⁶⁵ A standard approach to

⁶⁴For direct evidence on this, see Alogoskoufis and Smith (1991).

⁶⁵ Furthermore, the combination of autocorrelated errors and lagged dependent variables
(continued...)

estimation in this case is to instrument the lagged dependent variable (Liviatan, 1963). Since the instrumental variables are uncorrelated in the probability limit with the disturbance, substituting the instrumented value of lagged reserves will yield consistent estimates.⁶⁶ Here the obvious instruments are lagged incomes, the lagged import ratio, and lagged export variability. Intuitively, including only the predicted, or systematic, component of lagged reserves enhances the plausibility of our interpretation that the lagged value is picking up inertia in the demand for reserves rather than persistent random effects.

Our second ancillary variable is a measure of network externalities, namely, the global gold reserve ratio. If the attractions of holding gold rise with the number of other countries which do the same and with the amount of gold they hold, then a given country's holdings should increase with the global ratio.

Our third ancillary variable measures statutes requiring central banks to hold reserves. If the demand for gold reserves is persistent because statutory requirements are persistent, then this variable should have an independent effect after controlling for other determinants of

⁶⁵(...continued)

introduces the possibility of biased coefficient estimates due to the correlation between the lagged variable and the error term.

⁶⁶ Although those estimates will not be efficient if the adjustment has not deal with the autocorrelation of the disturbance terms.

the demand for reserves. We use a dummy variable for the presence or absence of statutory gold reserve requirements.⁶⁷

When included one at a time (Table 5), each of these ancillary variables enters with its expected positive sign and a coefficient that differs from zero at standard confidence levels. When included together, all three variables matter, although lagged holdings and statutory requirements tend to dominate.

The instrumented lagged dependent variable enters with large coefficients in the gold-reserves equation, suggesting considerable persistence. Statutory requirements are highly significant determinants of the demand for gold in the Bretton Woods years and marginally significant in the interwar years. The fact that the coefficient on this variable is insignificant for our 115 years as a whole reflects its significant negative coefficient for the period 1880-1913. Over much of this period, two of the most important gold standard countries, the United States and France, were not required to hold gold by statute.⁶⁸ It is their inclusion that produces the negative coefficient for the gold-standard years. The effect of the global gold ratio is ambiguous: while generally positive in sign, its coefficient differs insignificantly from

⁶⁷Unfortunately, we were unable to obtain this information for the post-Bretton Woods period. See Appendix 3 for the individual country gold statutes for the three regimes ending with Bretton Woods.

⁶⁸ After France abandoned the free coinage of silver in 1873, she adopted a limping gold standard in which silver remained legal tender although it was not freely coined. Bank of France notes were convertible into gold or silver coin by residents and foreigners only at the option of the authorities. The U.S. officially joined the gold standard in 1900 but it was only with the founding of the Federal Reserve in 1914 that statutory gold reserve requirements were instituted.

zero in the demand-for-gold-reserves equation but does differ significantly from zero in the ratio-of-gold-to-total-reserves equation.

On balance, we conclude that there is some evidence supporting all three historical explanations for the persistence of gold reserves: simple inertia, network externalities, and statutory requirements.

To analyze the impact on the demand for reserves of the shift from fixed to floating rates, we added a dummy variable for the exchange rate regime (equaling one for countries with pegged rates, zero for those with floating rates).⁶⁹ Table 6 shows the effect of the exchange rate regime on the demand for gold and the demand for total reserves. The exchange rate regime matters in the gold standard years (when it enters negatively and significantly for 1882-1913 and 1923-39 in the equations for both gold and total reserves). This is not surprising; the ability of poor countries with a history of running fiat money systems to accumulate the reserves necessary for the operation of a specie standard was one of the principal constraints on going on gold (Eichengreen and Flandreau 1996). The negative coefficient is again evident in the post-1972 period, especially in the equation for gold; the results thus suggest that countries with floating currencies had a significantly lower propensity to hold gold.⁷⁰

⁶⁹ The exchange rate regime data were gathered mainly from IMF and League of Nations publications; for help with them we thank Rex Ghosh. For the data on capital controls we are grateful to Gian Maria Milesi-Ferretti.

⁷⁰ Interestingly, the coefficient for floating-rate countries is positive and significant in the
(continued...)

To account for the impact on the demand for reserves of the relaxation of capital controls, we added dummy variables for two measures of capital controls: current account restrictions and capital account restrictions. Tables 7-8 present the results. Countries with such restrictions in place appear to have a significantly greater propensity to hold reserves in general and gold reserves in particular, a result driven largely by behavior in the post-Bretton Woods period.⁷¹ The post-Bretton Woods years are the period of highest capital mobility, so these results support the argument that countries' growing ability to borrow abroad -- an ability presumably not shared by countries with capital controls in place -- diminished their need to hold reserves. In the equations where the dependent variable is gold reserves, current-account restrictions enter with a strongly positive sign, as if the removal of controls leads countries to reduce their gold reserve holdings in particular. A possible interpretation is that countries that seek to integrate themselves into the world economy attach less value to the war-chest argument for holding gold.

These results paint a less than rosy picture of the future monetary role for gold.

Experience to date suggests that the move to floating rates and international capital mobility

⁷⁰(...continued)

Bretton Woods years. This result is driven mainly by Canada, a gold mining country which held large reserves.

⁷¹ It should be noted that there is, however, evidence that the presence of capital account restrictions significantly *reduced* the demand for gold reserves in the Bretton Woods years. We examined also the effects of the presence of export-proceed-surrender requirements; the results for these were virtually identical to those for capital-account restrictions. In contrast, there was little evidence that the presence or absence of multiple exchange rates had much affect on reserve-holding behavior one way or another.

has progressively diminished central banks' appetite for gold. Habit, network externalities and lingering statutory requirements have all encouraged the authorities to hold onto their gold reserves for longer than might otherwise be expected. But while these effects introduce persistence into the demand for gold, such sources of persistence tend to die out over time. Each of these sources of inertia in central bank gold holdings is likely to have weaker effects in the future than in the past.

5. Conclusion

Again recapitulating all our results would make a long paper even longer. The briefest summary would emphasize four points.

First, the gold-exchange standard was a relatively recent arrangement that emerged only around 1900 in response to a set of historically-specific factors, factors which also help to account for its smooth operation. How long those factors would have continued to support it will never be known, for a great war and then a great depression intervened before they could be put to the test.

Second, a system which relied on inelastically-supplied precious metal and elastically-supplied foreign exchange to meet the world economy's incremental demand for reserves was intrinsically fragile, prone to confidence problems, and a transmission belt for policy mistakes. Proposals to finesse the liquidity problem through periodic adjustments in the price of gold were not feasible, given the damage this would do to the credibility of the authorities' commitment to maintain convertibility at the prevailing price.

Third, network externalities, statutory restrictions, and habit all contributed to the persistence of the practice of holding gold reserves. But the hold of even factors as powerful as these inevitably weakens with time. And the effects of their erosion are reinforced by the rise of international capital mobility, which increases the ease of holding other forms of reserves, both unborrowed and borrowed, and by the shift to greater exchange-rate flexibility, which according to our results diminishes the demand for reserves in general.

Fourth and finally, network externalities, in conjunction with central bankers' collective sense of responsibility for the stability of the price of what remains an important reserve asset, suggest that the same factors which have long held in place the practice of holding gold reserves, when they come unstuck, may become unstuck all at once.

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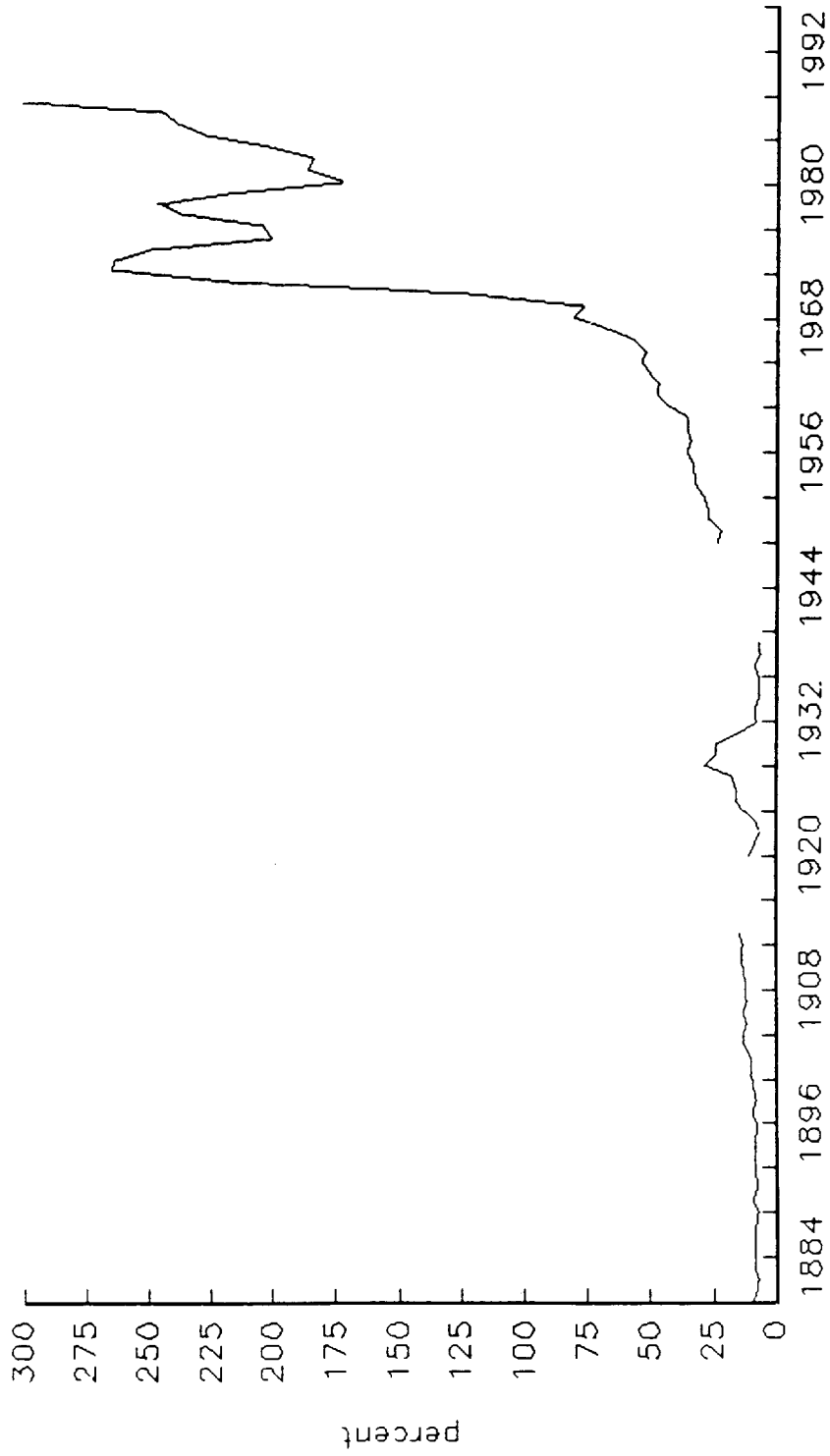
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FIGURE 1. The Ratio of Foreign Exchange Reserves to Gold Reserves



Gold Standard: 16 countries, Bloomfield (1963) and Lindert (1967, 1969)
Interwar: 21 countries, League of Nations
Post war: 21 countries, Gold - Official Value, IFS

FIGURE 2. Test for Structural Breaks: the Gold Standard Period

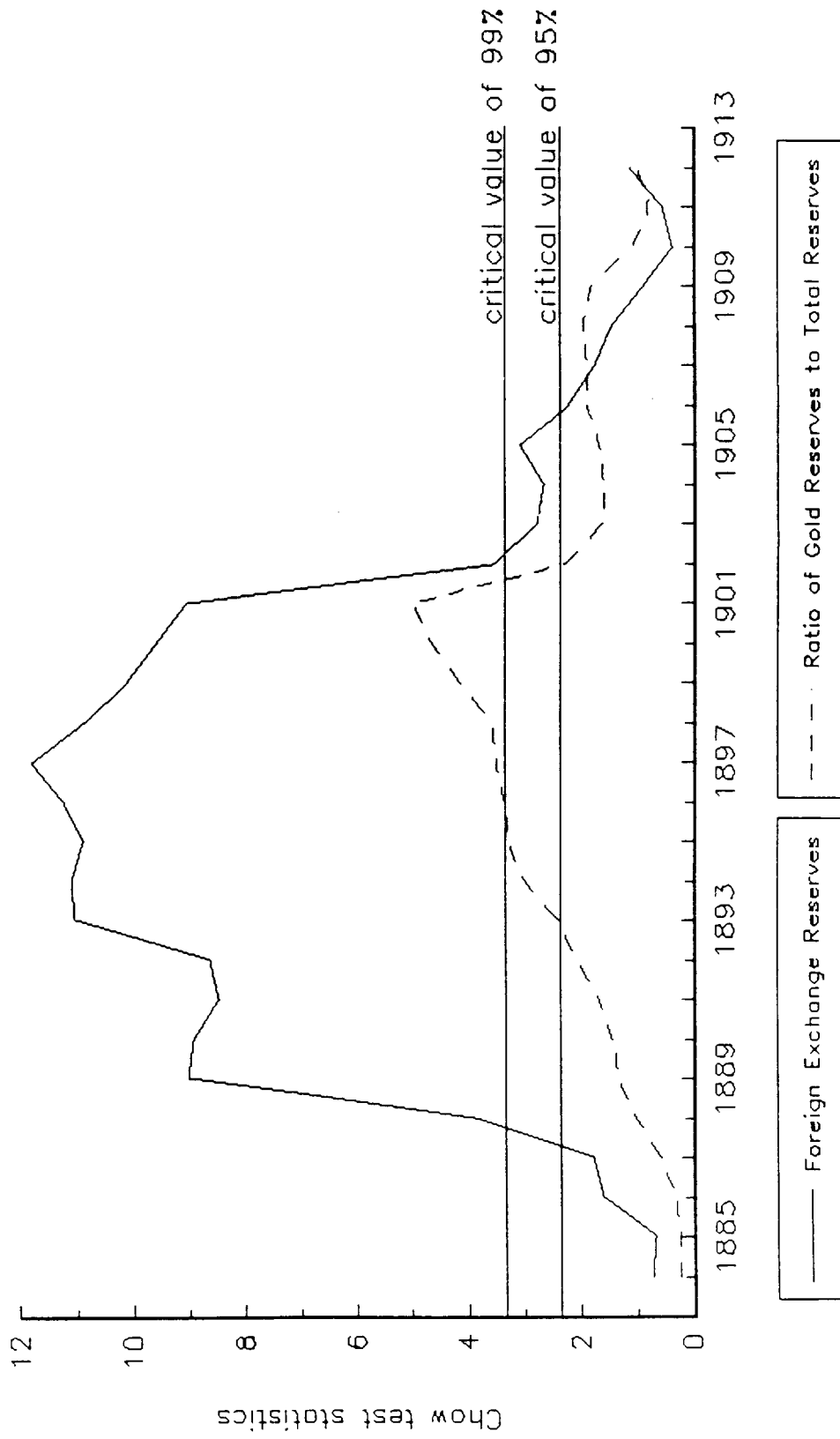


FIGURE 3. Test for Structural Breaks: the Interwar Period

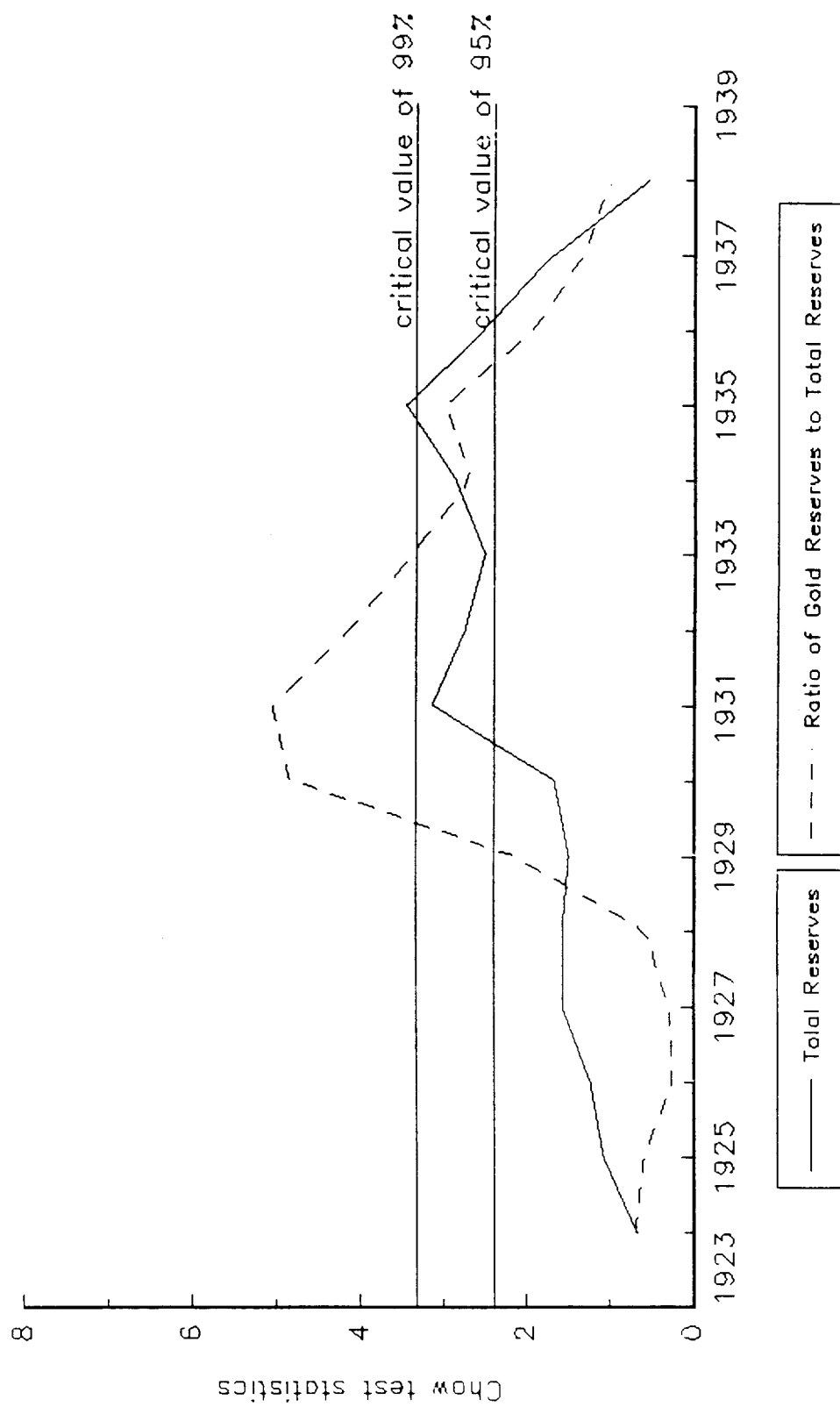


FIGURE 4. Test for Structural Breaks: Bretton Woods

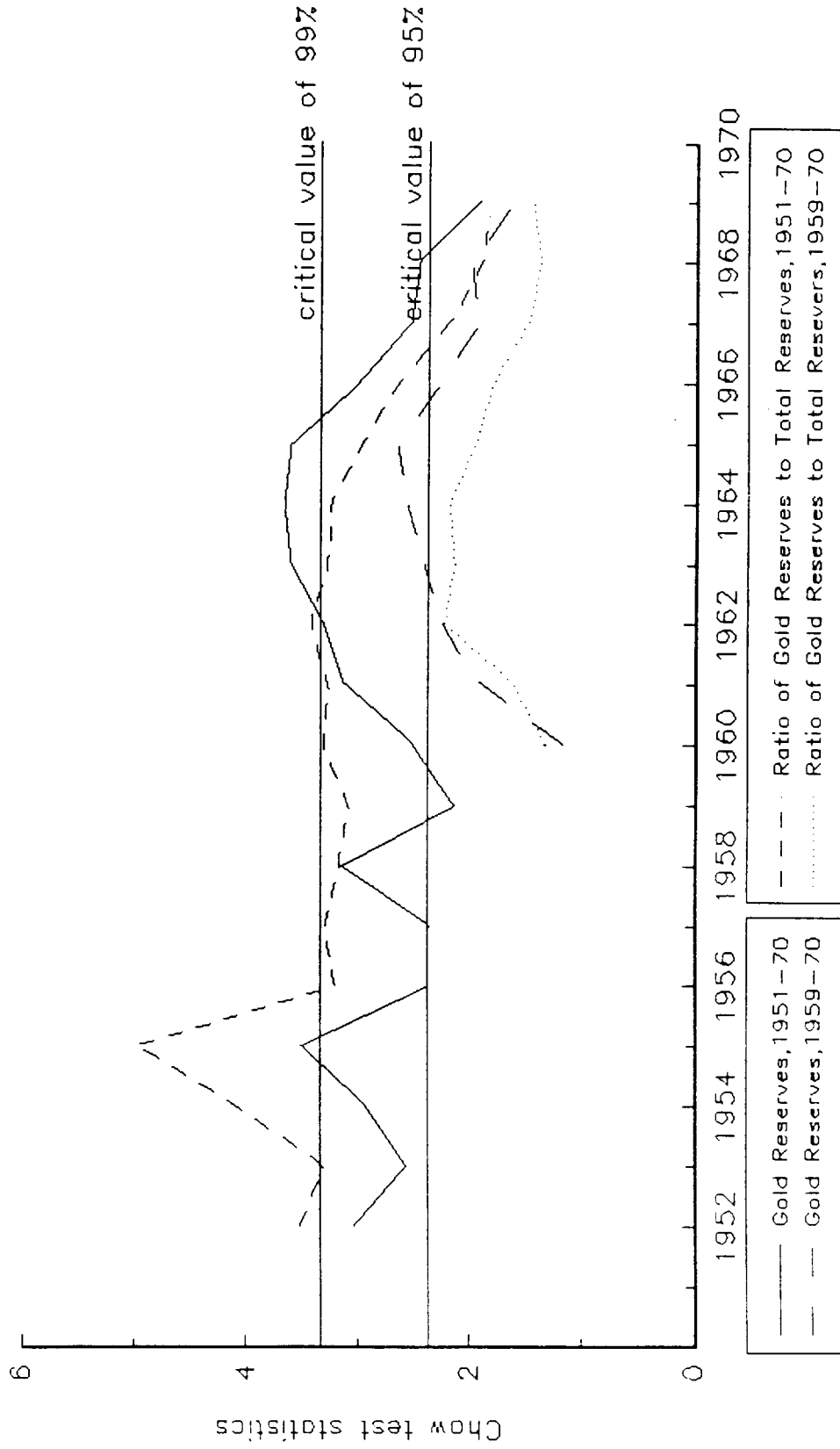


FIGURE 5. Test for Structural Breaks: Floating Exchange Rate Period

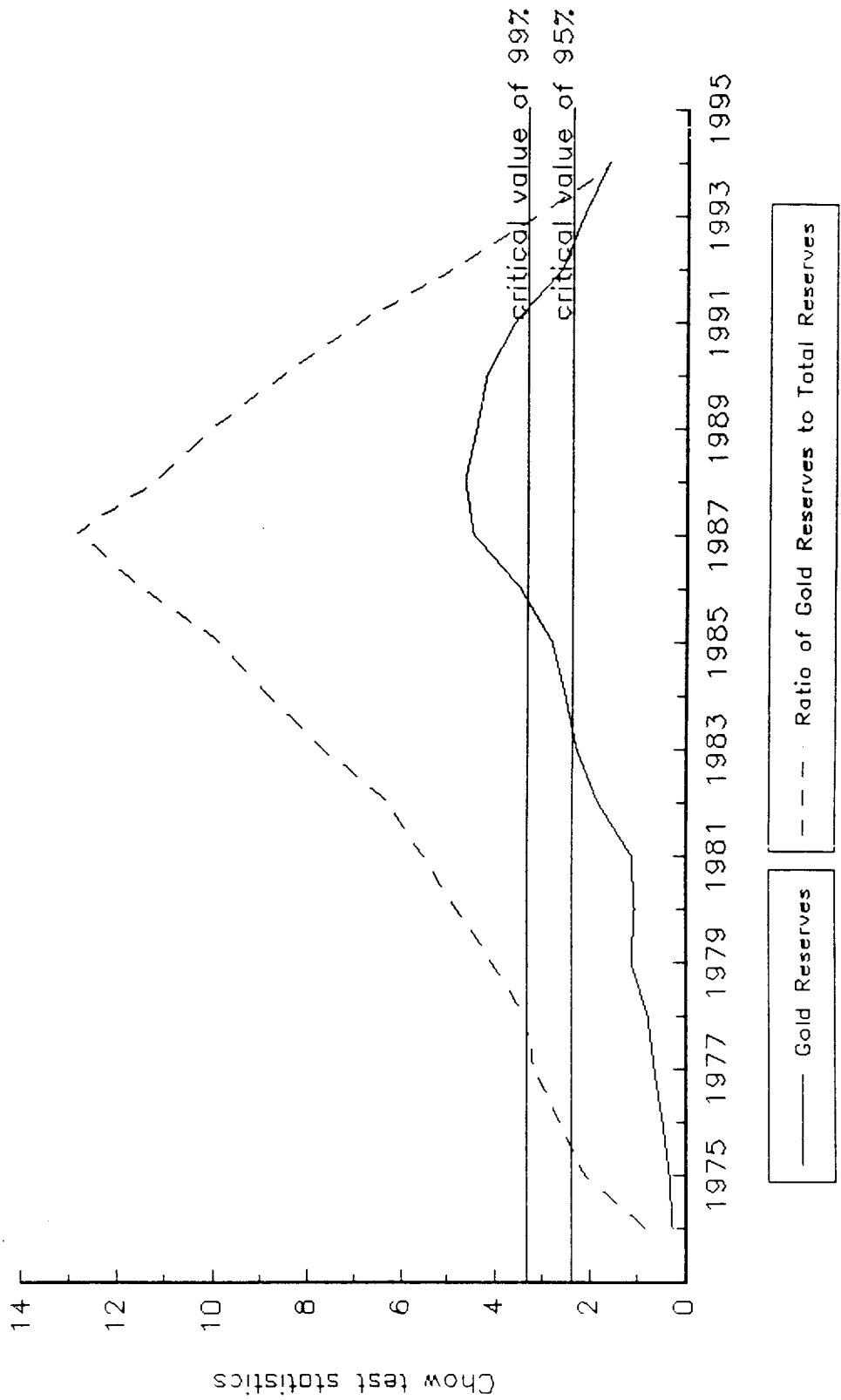


Table 1.
The Demand for International Reserves: Benchmark Specification (Constant, Log GNP, Import Share, Export Variability)

A. Dependent Variable: Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	R ²	n
Total 1882-95	-3.87 (-13.43)	1.02 (240.08)	1.94 (12.65)	-0.03 (-0.90)	0.99	1499
Gold 1882-13	-1.85 (-4.96)	0.79 (27.32)	0.27 (1.21)	4.93 (0.86)	0.73	376
Interwar 1923-39	-5.02 (-9.19)	1.11 (28.28)	4.13 (5.84)	4.25 (3.88)	0.77	278
Interwar 1925-35	-4.81 (-8.98)	1.11 (26.47)	3.52 (4.61)	3.66 (3.52)	0.80	194
Bretton 1951-70	-3.43 (-9.57)	1.02 (170.28)	3.80 (11.22)	-3.78 (-3.88)	0.99	323
Bretton 1959-70	-3.89 (-17.91)	1.02 (181.70)	3.83 (10.42)	-3.52 (-3.90)	1.00	241
Floating 1973-95	-3.47 (-16.41)	1.00 (172.05)	2.93 (10.93)	-0.04 (-1.23)	0.99	480

B. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	R ²	n
Total 1882-95	-4.66 (-10.66)	1.06 (164.90)	2.47 (10.58)	0.11 (2.11)	0.99	1497
Gold 1882-13	-2.79 (-7.75)	0.87 (31.06)	0.28 (1.28)	6.67 (1.17)	0.78	374
Interwar 1923-39	-7.34 (-9.09)	1.29 (22.27)	6.23 (5.97)	4.94 (3.05)	0.66	278
Interwar 1925-35	-6.22 (-8.56)	1.21 (21.22)	4.03 (3.90)	3.40 (2.42)	0.72	194
Bretton 1951-70	-4.11 (-6.44)	1.04 (97.32)	4.04 (6.71)	-6.65 (-3.84)	0.98	323
Bretton 1959-70	-5.23 (-12.85)	1.04 (98.83)	3.89 (5.65)	-6.04 (-3.57)	0.99	241
Floating 1973-95	-7.08 (-17.30)	1.05 (93.52)	4.57 (8.80)	0.15 (2.50)	0.96	480

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are included. Variable definitions: Dependent variables are log values. Import share = imports/GNP. Export variability = three year moving standard deviation of log exports.

Sources: See Appendix 2.

Table 2.

The Demand for International Reserves: Including Money Supply (M0) Volatility

A. Dependent Variable: Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Money Supply Volatility	R ²	n
Total 1882-95	-3.74 (-65.58)	1.02 (477.59)	1.78 (12.02)	-0.04 (-1.37)	1.43 (4.25)	0.99	1499
Gold 1882-13	-2.12 (-8.65)	0.82 (30.07)	0.53 (2.52)	12.11 (2.35)	1.23 (0.67)	0.72	376
Interwar 1923-39	-4.50 (-10.51)	1.10 (28.73)	3.31 (5.29)	3.17 (3.33)	0.11 (0.17)	0.76	278
Interwar 1925-35	-4.55 (-9.69)	1.10 (26.79)	2.99 (4.41)	2.92 (3.18)	0.93 (1.06)	0.80	194
Bretton 1951-70	-3.86 (-21.68)	1.02 (172.58)	3.78 (11.24)	-4.08 (-4.36)	-2.66 (-2.30)	0.99	323
Bretton 1959-70	-4.15 (-25.75)	1.02 (183.23)	3.79 (10.38)	-3.28 (-3.68)	0.16 (2.00)	1.00	241
Floating 1973-95	-3.74 (-22.29)	1.01 (179.26)	2.84 (10.60)	-0.02 (-0.49)	0.78 (1.33)	0.99	480

B. Dependent Variable: Ratio of Gold Reserves to Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Money Supply Volatility	R ²	n
Total 1882-95	0.88 (41.06)	-0.02 (-22.37)	0.04 (0.65)	-0.06 (-5.10)	-0.48 (-3.74)	0.27	1499
Gold 1882-13	0.46 (6.39)	0.05 (5.73)	-0.03 (-0.53)	-1.23 (-0.80)	-0.10 (-0.18)	0.09	376
Interwar 1923-39	0.46 (2.88)	0.02 (1.71)	0.14 (0.61)	0.05 (0.13)	0.10 (0.41)	0.01	278
Interwar 1925-35	0.69 (3.42)	0.01 (0.55)	-0.26 (-0.89)	-0.28 (-0.70)	-0.01 (-0.03)	0.01	194
Bretton 1951-70	0.36 (4.65)	0.01 (2.51)	0.14 (0.98)	-0.70 (-1.74)	-0.75 (-1.51)	0.08	323
Bretton 1959-70	0.20 (3.14)	0.00 (2.16)	0.20 (1.40)	-0.03 (-0.10)	0.25 (8.07)	0.28	241
Floating 1973-95	0.00 (0.03)	0.01 (3.53)	0.25 (3.29)	0.02 (2.22)	0.13 (0.78)	0.06	480

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are not included. Variable definitions: Ratio of gold reserves to total reserves = $\log(\text{gold reserves}) / \log(\text{gold reserve} + \text{foreign reserves})$. Money supply volatility = three year moving standard deviation of $\log M0$ of major countries; gold standard (UK), interwar (US, UK and France), Bretton Woods (US), floating (US, German and Japan).

Sources: See Appendix 2.

Table 3.
The Demand for International Reserves: Including Exchange Rate Volatility

A. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Exchange Rate Volatility	R ²	n
Total 1923-95	-4.58 (-32.59)	0.97 (184.14)	4.06 (9.88)	-0.14 (-2.27)	0.02 (3.87)	0.97	1073
Interwar 1923-39	-7.03 (-11.28)	1.27 (22.61)	5.42 (5.83)	3.79 (2.70)	0.00 (0.90)	0.65	278
Interwar 1925-35	-5.89 (-9.50)	1.19 (21.44)	3.50 (3.72)	2.50 (2.02)	0.00 (0.77)	0.71	194
Bretton 1951-70	-5.29 (-15.74)	1.04 (97.05)	4.09 (6.19)	-6.87 (-4.02)	-0.47 (-1.74)	0.98	273
Bretton 1959-70	-5.35 (-16.12)	1.04 (99.03)	3.81 (5.53)	-6.43 (-3.84)	-0.45 (-1.59)	0.99	241
Floating 1973-95	-7.47 (-23.04)	1.05 (97.82)	4.66 (9.13)	0.14 (2.39)	0.08 (2.24)	0.96	480

B. Dependent Variable: Ratio of Gold Reserves to Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Exchange Rate Volatility	R ²	n
Total 1923-95	0.64 (22.16)	-0.01 (-11.38)	0.12 (1.42)	-0.04 (-3.57)	0.00 (4.74)	0.17	1073
Interwar 1923-39	0.45 (2.80)	0.03 (1.77)	0.19 (0.80)	-0.01 (-0.03)	0.00 (1.05)	0.01	278
Interwar 1925-35	0.65 (3.30)	0.01 (0.63)	-0.19 (-0.64)	-0.35 (-0.89)	0.00 (1.05)	0.02	194
Bretton 1951-70	0.32 (4.06)	0.01 (2.41)	0.20 (1.25)	-0.60 (-1.47)	-0.07 (-1.14)	0.08	273
Bretton 1959-70	0.32 (4.14)	0.01 (2.46)	0.22 (1.35)	-0.52 (-1.31)	-0.10 (-1.54)	0.10	241
Floating 1973-95	-0.02 (-0.42)	0.01 (3.57)	0.24 (3.18)	0.02 (2.26)	0.01 (1.90)	0.06	480

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are not included. Variable definitions: Exchange rate volatility = standard deviation of monthly exchange rates of major currencies; interwar(pound/dollar), post war(index of trade weighted dollar).

Sources: See Appendix 2.

Table 4.
The Demand for International Reserves: Including World Inflation

A. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	World Inflation	R ²	n
Floating ⁽¹⁾ 1973-94	-7.45 (-21.15)	1.05 (95.01)	4.66 (9.11)	0.15 (2.46)	0.03 (1.41)	0.96	480
Floating ⁽²⁾ 1973-94	-7.41 (-22.37)	1.05 (96.32)	4.64 (9.06)	0.14 (2.41)	0.21 (1.57)	0.96	480
Floating ⁽³⁾ 1973-94	-7.36 (-22.39)	1.05 (94.76)	4.67 (9.14)	0.15 (2.48)	0.16 (1.27)	0.96	480

B. Dependent Variable: Ratio of Gold Reserves to Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	World Inflation	R ²	n
Floating ⁽¹⁾ 1973-94	-0.10 (-2.01)	0.01 (4.53)	0.23 (3.04)	0.02 (2.72)	0.02 (4.40)	0.09	480
Floating ⁽²⁾ 1973-94	-0.06 (-1.23)	0.01 (4.14)	0.23 (2.99)	0.02 (2.43)	0.07 (3.64)	0.08	480
Floating ⁽³⁾ 1973-94	-0.07 (-1.51)	0.01 (4.59)	0.23 (3.09)	0.03 (2.87)	0.08 (4.52)	0.09	480

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are not included. Variable definitions: (1) World inflation = the GDP weighted average of the G-5 (US, UK, France, German and Japan) inflation rate (2) World inflation = 1 if the GDP weighted average of G-5 inflation rate exceeds 3%, 0 otherwise (3) World inflation = 1 if high inflation period (1973-83), 0 otherwise. Sources: See Appendix 2.

Table 5.

The Demand for International Reserves: Including Instrumented Lagged Dependent Variable, Global Gold Ratio, Dummy for Statutory Gold Reserve Requirements

A. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Var.	Lagged Dep.	Global Gold	Statutory Requirements	R ²	n
Total 1882-70	-0.51 (-0.67)	-0.02 (-0.19)	0.02 (0.08)	0.48 (0.48)	1.03 (12.65)	0.48 (0.81)	0.14 (1.93)	0.98	955
Gold 1882-13	3.11 (1.25)	0.15 (0.50)	0.30 (1.39)	-3.20 (-0.64)	0.85 (2.47)	-3.49 (-1.05)	-0.66 (-8.27)	0.81	374
Interwar 1923-39	-1.91 (-0.72)	0.11 (0.32)	1.00 (0.62)	1.41 (0.88)	0.96 (3.55)	0.93 (0.61)	0.17 (1.02)	0.67	278
Interwar 1925-35	-0.20 (-0.07)	0.10 (0.32)	-0.67 (-0.42)	0.08 (0.06)	0.90 (3.56)	-0.25 (-0.16)	0.24 (1.48)	0.74	194
Bretton 1951-70	-3.45 (-1.48)	0.28 (0.99)	1.50 (1.14)	2.20 (0.83)	0.76 (2.82)	1.00 (0.92)	0.97 (7.91)	0.87	303
Bretton 1959-70	-6.21 (-1.46)	0.58 (1.03)	2.40 (0.99)	2.54 (0.86)	0.50 (0.93)	2.33 (1.37)	0.88 (6.10)	0.89	221

B. Dependent Variable: Ratio of Gold Reserves to Total Reserves

Period	Constant	Log GNP	Import Share	Export Var.	Lagged Dep.	Global Gold	Statutory Requirements	R ²	n
Total 1882-70	-0.55 (-2.95)	0.06 (2.62)	0.04 (0.61)	0.05 (0.18)	-0.06 (-2.57)	1.13 (7.46)	0.13 (6.68)	0.25	955
Gold 1882-13	-0.17 (-0.18)	0.11 (1.33)	0.01 (0.13)	0.07 (0.04)	-0.08 (-0.73)	0.51 (0.44)	0.01 (0.37)	0.10	374
Interwar 1923-39	0.13 (0.23)	-0.11 (-1.22)	-0.15 (-0.42)	-0.14 (-0.32)	0.13 (1.58)	0.86 (2.24)	0.09 (2.01)	0.06	278
Interwar 1925-35	0.27 (0.38)	-0.14 (-1.25)	-0.55 (-1.20)	-0.50 (-1.02)	0.14 (1.45)	0.91 (1.91)	0.15 (2.97)	0.09	194
Bretton 1951-70	-0.19 (-0.32)	-0.11 (-1.01)	-0.02 (-0.04)	1.27 (2.08)	0.13 (1.24)	0.50 (1.87)	0.30 (10.84)	0.34	303
Bretton 1959-70	-0.35 (-0.32)	-0.07 (-0.32)	0.12 (0.17)	1.24 (1.78)	0.09 (0.44)	0.50 (1.25)	0.27 (8.63)	0.31	221

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are not included. Two-stage least squares estimates.

Variable definitions: Lagged dependent variable is instrumented by the benchmark specification. Global Gold Ratios are calculated using our data; gold standard(16 countries), interwar and post war(21 countries). Dummy for statutory gold reserve requirements = 1 if requirements are present, 0 otherwise.

Sources: See Appendix 2.

Table 6.
The Demand for International Reserves: Including an Exchange Rate Regime Dummy Variable

A. Dependent Variable: Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Exchange Rate Regime	R ²	n
Total 1882-95	-3.81 (-13.52)	1.02 (243.87)	1.77 (11.54)	-0.01 (-0.24)	-0.36 (-6.24)	0.99	1499
Gold 1882-13	-1.81 (-5.22)	0.80 (29.48)	0.03 (0.13)	4.12 (0.77)	-0.90 (-7.40)	0.77	376
Interwar 1923-39	-4.58 (-7.78)	1.09 (27.53)	4.25 (5.90)	3.76 (-3.34)	-0.31 (-2.21)	0.77	278
Interwar 1925-35	-4.34 (-7.65)	1.09 (25.52)	3.64 (4.68)	3.03 (2.85)	-0.34 (-2.59)	0.81	194
Bretton 1951-70	-3.68 (-9.95)	1.02 (184.78)	3.63 (11.56)	-3.69 (-4.12)	0.55 (3.63)	0.99	323
Bretton 1959-70	-4.11 (-19.23)	1.02 (191.21)	3.71 (10.61)	-3.60 (-4.19)	0.72 (3.61)	1.00	241
Floating 1973-95	-3.35 (-15.19)	1.00 (172.46)	2.70 (9.87)	-0.03 (-0.96)	-0.23 (-3.15)	0.99	480

B. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Exchange Rate Regime	R ²	n
Total 1882-95	-4.60 (-10.73)	1.06 (167.32)	2.26 (9.73)	0.13 (2.61)	-0.41 (-4.76)	0.99	1497
Gold 1882-13	-2.76 (-8.02)	0.87 (32.59)	0.09 (0.41)	6.24 (1.15)	-0.70 (-5.82)	0.80	374
Interwar 1923-39	-6.74 (-7.76)	1.26 (21.62)	6.47 (6.09)	4.29 (2.58)	-0.44 (-2.08)	0.67	278
Interwar 1925-35	-5.48 (-7.21)	1.17 (20.50)	4.21 (4.04)	2.43 (1.70)	-0.53 (-3.08)	0.74	194
Bretton 1951-70	-4.40 (-6.44)	1.04 (101.95)	3.74 (6.46)	-6.46 (-3.91)	0.56 (1.97)	0.98	323
Bretton 1959-70	-5.52 (-13.45)	1.04 (101.51)	3.68 (5.48)	-6.10 (-3.70)	0.84 (2.18)	0.99	241
Floating 1973-95	-6.97 (-16.29)	1.05 (93.48)	4.33 (8.14)	0.16 (2.67)	-0.27 (-1.91)	0.96	480

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are included.
 Variable definitions: Exchange rate regime dummy = 0 if a country has a fixed exchange rate regime, 1 if a country has a floating exchange rate regime.
 Sources: See Appendix 2.

Table 7.

The Demand for International Reserves: Including a Capital Controls Dummy Variable (Current Account Restrictions)

A. Dependent Variable: Total Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Capital Controls	R ²	n
Total 1951-94	-4.12 (-6.38)	1.01 (220.18)	3.05 (15.34)	-0.04 (-1.36)	0.22 (3.77)	0.99	826
Bretton 1951-70	-3.99 (-6.37)	1.01 (104.17)	3.45 (10.72)	-1.41 (-0.86)	-0.06 (-0.82)	0.98	306
Bretton 1959-70	-3.75 (-12.88)	1.02 (110.73)	3.42 (9.90)	-1.40 (-0.91)	0.02 (0.32)	0.99	224
Floating 1973-94	-3.89 (-19.10)	1.01 (182.63)	2.81 (11.03)	-0.09 (-2.83)	0.52 (6.19)	0.99	480

B. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Capital Controls	R ²	n
Total 1951-94	-5.91 (-4.73)	1.05 (88.75)	4.15 (10.86)	0.07 (1.24)	0.61 (5.47)	0.94	811
Bretton 1951-70	-5.62 (-4.16)	1.07 (35.78)	3.88 (6.01)	-3.68 (-1.16)	-0.01 (-0.10)	0.86	303
Bretton 1959-70	-7.01 (-7.51)	1.10 (35.17)	3.85 (5.21)	-2.96 (-0.94)	0.23 (1.45)	0.88	221
Floating 1973-94	-7.17 (-15.51)	1.05 (77.43)	4.26 (8.59)	-0.03 (-0.44)	1.27 (7.64)	0.95	470

Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are included. Variable definitions: Capital controls dummy = 1 if a country has restrictions on its current account, 0 otherwise.

Sources: See Appendix 2.

Table 8.
The Demand for International Reserves: Including a Capital Controls Dummy Variable (Capital Account Restrictions)

A. Dependent Variable: Total Reserves

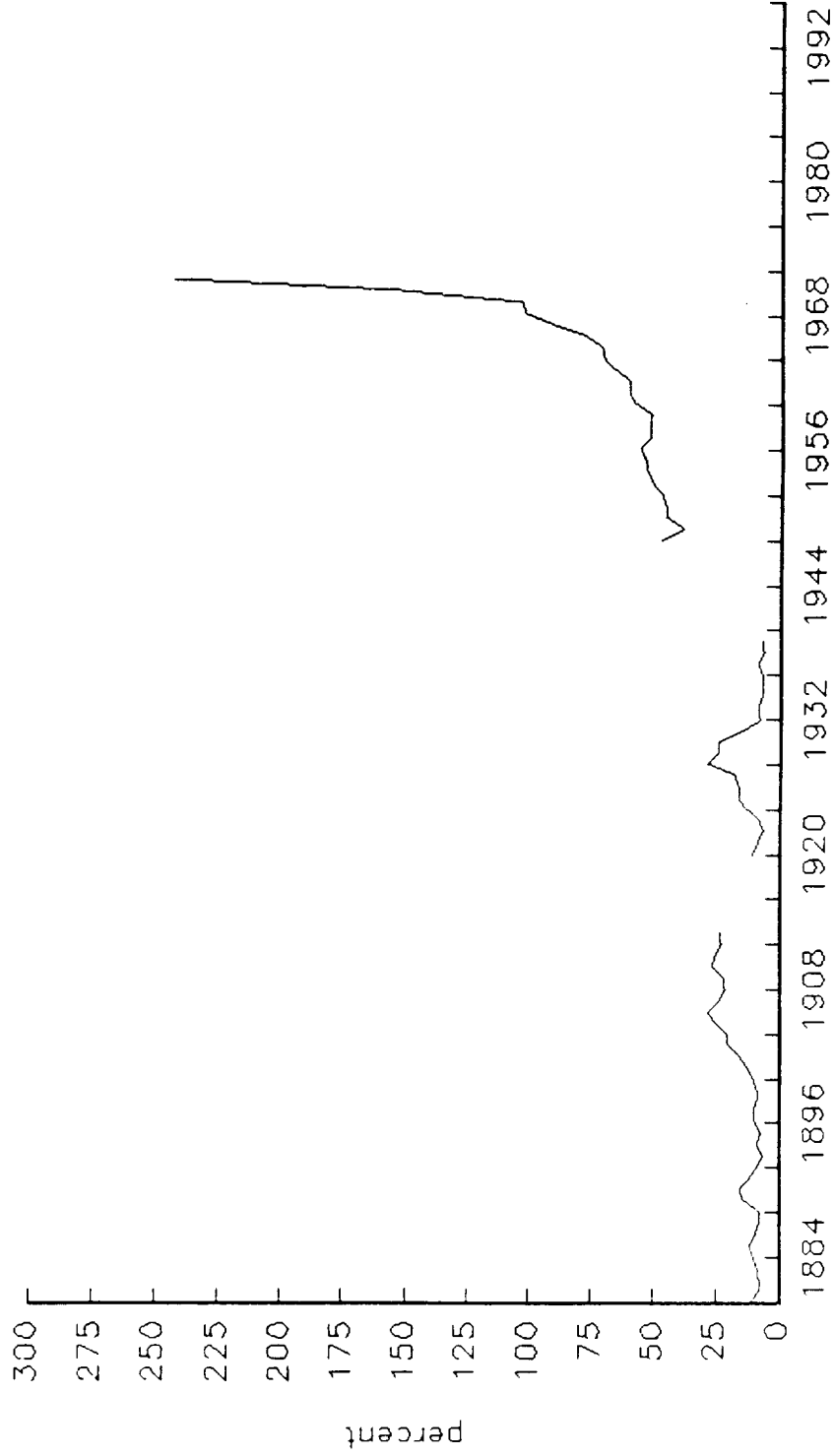
Period	Constant	Log GNP	Import Share	Export Variability	Capital Controls	R ²	n
Total 1951-94	-4.29 (-6.86)	1.01 (230.37)	3.14 (16.25)	-0.04 (-1.49)	0.39 (7.60)	0.99	826
Bretton 1951-70	-3.93 (-6.31)	1.01 (104.85)	3.44 (10.78)	-1.27 (-0.80)	-0.15 (-1.87)	0.98	306
Bretton 1959-70	-3.70 (-12.73)	1.02 (110.73)	3.39 (9.87)	-1.09 (-0.73)	-0.06 (-0.78)	0.99	224
Floating 1973-94	-4.28 (-22.39)	1.01 (204.49)	3.11 (13.20)	-0.07 (-2.65)	0.71 (11.21)	0.99	480

B. Dependent Variable: Gold Reserves

Period	Constant	Log GNP	Import Share	Export Variability	Capital Controls	R ²	n
Total 1951-94	-4.95 (-3.88)	1.05 (86.69)	3.95 (10.11)	0.15 (2.59)	-0.12 (-1.13)	0.93	811
Bretton 1951-70	-4.52 (-3.58)	1.06 (37.95)	3.71 (6.16)	-1.65 (-0.56)	-0.84 (-5.81)	0.87	303
Bretton 1959-70	-5.88 (-6.65)	1.08 (36.59)	3.34 (4.78)	-0.37 (-0.12)	-0.75 (-4.60)	0.89	221
Floating 1973-94	-7.01 (-13.84)	1.04 (72.57)	4.28 (8.04)	0.11 (1.72)	0.34 (2.39)	0.95	470

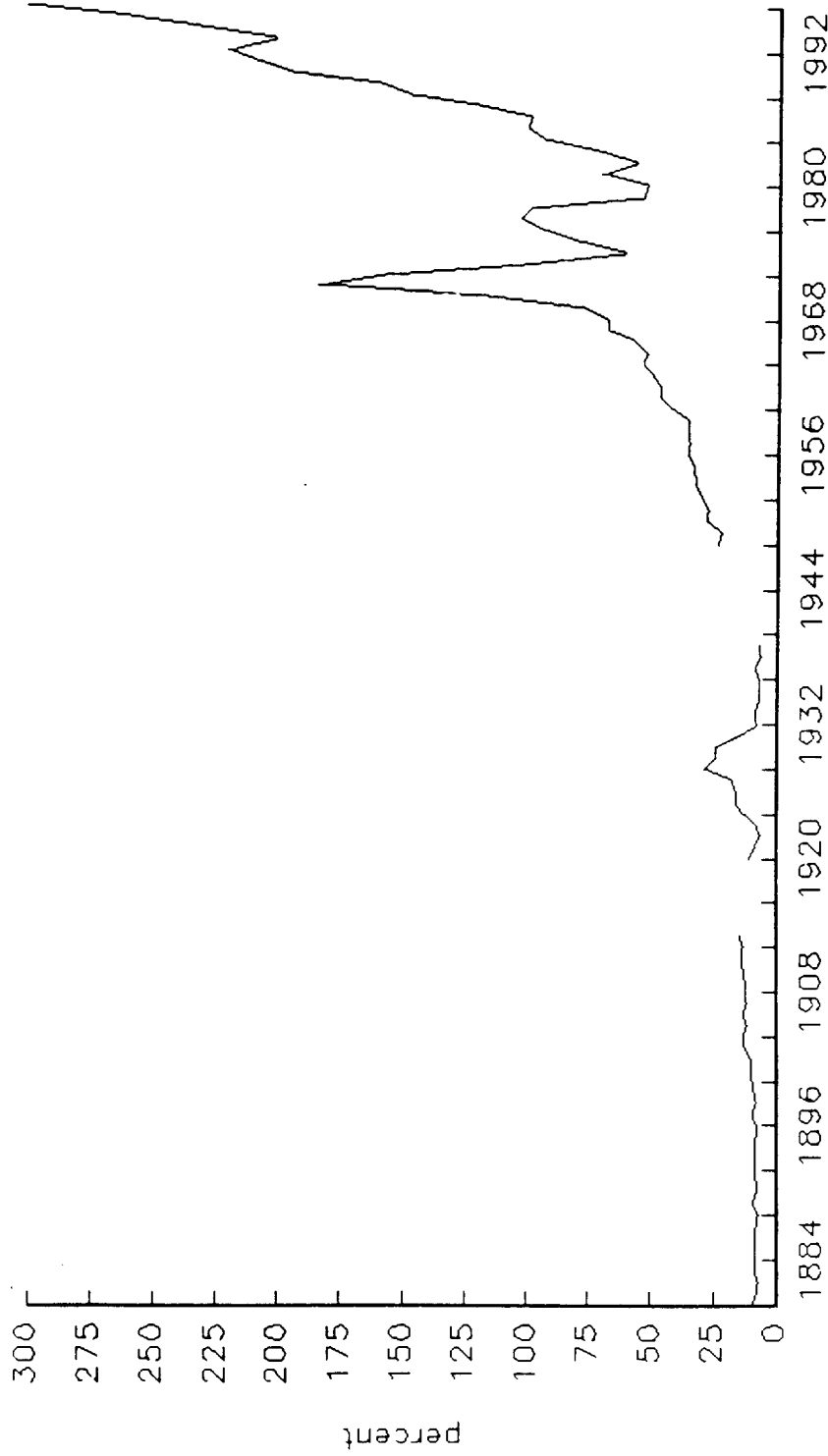
Notes: t-statistics in parentheses. Two-tailed critical values are 1.96 at the 95% confidence level and 2.58 at 99% level. Year dummies are included. Variable definitions: Capital controls dummy = 1 if a country has restrictions on its capital account, 0 otherwise. Data Sources: See Appendix 2.

APPENDIX 1. FIGURE 1. The Ratio of Foreign Exchange Reserves to Gold Reserves



Gold Standard: 35 countries, Gold Reserves (interpolated between benchmarks), Lindert (1967, 1969)
Interwar: 21 countries, League of Nations
Post war: World, Gold - Book Value, IFS

APPENDIX 1. FIGURE 2. The Ratio of Foreign Exchange Reserves to Gold Reserves



Gold Standard: 16 countries, Bloomfield (1963) and Lindert (1967, 1969)
Interwar: 21 countries, League of Nations
Post war: 21 countries, Gold - Market Value, IFS

Appendix 1. Alternative Measures of Reserves

Appendix 1. Table 1.

Gold and Foreign Exchange Reserves: Aggregate

A. Gold Standard

Series 1: 16 countries, Bloomfield(1963) and Lindert(1967, 1969)

Series 2: 35 countries, Gold Reserves (interpolated between benchmarks),
Lindert(1969)

millions of US dollars

years	Series 1		Series 2	
	GR	FR	GR	FR
1880	545.1	49.4	1000.0	104.9
1881	547.3	38.3	1069.6	82.0
1882	589.3	37.6	1139.1	84.4
1883	598.1	48.1	1208.7	97.8
1884	635.5	50.3	1278.3	120.8
1885	667.7	53.0	1347.8	149.2
1886	720.8	60.0	1417.4	126.9
1887	804.3	58.4	1487.0	114.7
1888	823.5	56.8	1556.5	115.2
1889	860.2	75.2	1626.1	220.3
1890	812.0	57.2	1695.7	257.5
1891	839.8	64.2	1765.2	195.6
1892	893.9	70.8	1834.8	155.0
1893	854.5	70.2	1904.3	109.6
1894	988.8	78.8	1973.9	154.9
1895	1024.2	79.1	2043.5	138.3
1896	1069.2	78.3	2113.0	183.0
1897	1089.3	96.4	2182.6	215.0
1898	1102.8	83.5	2252.2	191.7
1899	1163.9	92.7	2321.7	195.1
1900	1247.0	112.1	2391.3	224.5
1901	1320.0	130.1	2460.9	295.5
1902	1381.1	128.4	2530.4	378.2
1903	1388.0	162.8	2600.0	501.3
1904	1404.5	175.1	2828.6	567.0
1905	1743.0	193.9	3057.1	753.3
1906	1761.1	224.2	3285.7	908.8
1907	2031.1	218.5	3514.3	808.6
1908	2226.7	256.5	3742.9	776.4
1909	2343.4	271.1	3971.4	851.0
1910	2355.8	301.9	4200.0	1097.0
1911	2371.9	315.2	4433.3	1086.7
1912	2436.1	310.0	4666.7	1040.0
1913	2599.7	370.9	4900.0	1130.3

Appendix 1. Table 1. (Continued)
 Gold and Foreign Exchange Reserves: Aggregate

B. Interwar

Series 1: 21 countries, League of Nations

millions of US dollars

years	Series 1	
	GR	FR
1920	6215.7	652.5
1921	6789.2	545.6
1922	7262.9	450.7
1923	8889.3	633.8
1924	8589.1	1109.0
1925	8749.0	1359.3
1926	8806.5	1343.8
1927	9165.5	1571.6
1928	10005.2	2849.5
1929	9858.5	2323.6
1930	9590.7	2268.2
1931	9486.1	1443.9
1932	9957.0	719.9
1933	12294.4	988.2
1934	18196.4	1241.3
1935	19719.7	1329.9
1936	24880.0	1598.0
1937	23427.6	1907.4
1938	23942.6	1462.8
1939	24588.0	1598.4

Appendix 1. Table 1. (Continued)
Gold and Foreign Exchange Reserves: Aggregate

C. Post War

Series 1: 21 countries, Gold - Official Value, IFS

Series 2: 21 countries, Gold - Market Value, IFS

Series 3: World, Gold - Book Value, IFS

Series 4: World, Gold - Market Value, IFS

billions of US dollars: Series 1 and 2, billions of SDRs: Series 3 and 4

years	Series 1		Series 2		Series 3		Series 4	
	GR	FR	GR	FR	GR	FR	GR	FR
1948	30.1	6.9	30.0	6.9	32.5	15.3	32.2	15.3
1949	30.4	6.6	30.3	6.6	33.0	12.6	32.7	12.6
1950	30.5	8.3	30.4	8.3	33.4	15.0	33.2	15.0
1951	30.4	8.2	30.2	8.2	33.6	15.2	33.3	15.2
1952	30.7	8.8	30.4	8.8	33.6	15.8	33.3	15.8
1953	31.2	9.7	30.8	9.7	34.1	17.2	33.8	17.2
1954	31.9	10.3	31.8	10.3	34.7	18.3	34.8	18.3
1955	32.2	10.5	32.1	10.5	35.2	18.6	35.1	18.6
1956	32.8	11.6	32.5	11.6	35.9	20.0	35.8	20.0
1957	33.9	11.5	33.6	11.5	37.1	19.4	37.1	19.4
1958	34.5	12.2	34.4	12.2	37.8	19.6	37.9	19.6
1959	34.4	12.1	34.2	12.1	37.8	19.4	37.8	19.4
1960	34.9	14.9	35.3	14.9	37.9	22.1	38.6	22.1
1961	35.5	16.7	35.8	16.7	38.8	23.3	38.9	23.3
1962	35.4	16.6	35.7	16.6	39.2	23.7	39.2	23.7
1963	36.2	18.1	36.6	18.1	40.2	26.6	40.3	26.6
1964	36.8	19.7	37.1	19.7	40.7	28.4	40.9	28.4
1965	37.9	19.8	38.3	19.8	41.8	29.4	41.9	29.4
1966	36.9	21.2	37.3	21.2	40.8	32.0	41.0	32.0
1967	35.2	23.8	35.5	23.8	39.4	35.2	39.6	35.2
1968	33.4	26.9	39.9	26.9	38.8	39.1	46.4	39.1
1969	33.6	25.9	33.8	25.9	39.0	39.8	39.2	39.8
1970	32.4	39.6	34.2	39.6	37.1	56.2	39.6	56.2
1971	33.1	71.7	38.9	71.7	36.1	87.1	41.4	87.1
1972	33.7	89.3	56.9	89.3	.	110.9	61.1	110.9
1973	38.1	99.9	98.4	99.9	35.8	116.8	95.3	116.8
1974	40.1	99.7	163.5	99.7	35.8	144.0	155.7	144.0
1975	48.9	98.0	122.7	98.0	35.7	158.7	122.2	158.7
1976	54.6	111.1	117.9	111.1	35.5	186.6	117.8	186.6
1977	63.7	150.3	145.8	150.3	36.1	228.5	139.9	228.5
1978	80.6	198.2	200.6	198.2	36.3	245.5	180.1	245.5
1979	100.1	217.4	406.0	217.4	33.1	272.9	368.0	272.9
1980	141.5	244.2	467.0	244.2	33.4	321.3	441.7	321.3
1981	119.1	221.3	315.0	221.3	33.4	329.7	326.2	329.7
1982	111.0	204.2	361.0	204.2	33.3	327.9	394.0	327.9
1983	107.2	215.3	301.4	215.3	33.3	362.3	346.2	362.3
1984	100.8	228.1	243.9	228.1	33.2	407.1	298.5	407.1
1985	108.6	258.8	259.3	258.8	33.3	404.8	283.3	404.8
1986	125.0	304.7	309.0	304.7	33.3	418.6	304.1	418.6
1987	148.2	454.6	379.2	454.6	33.1	507.6	322.8	507.6
1988	131.5	473.0	322.5	473.0	33.1	542.7	288.6	542.7
1989	129.8	498.8	314.9	498.8	32.9	591.0	287.1	591.0
1990	135.9	588.0	302.3	588.0	32.9	637.7	254.1	637.7
1991	133.5	574.6	276.0	574.6	32.8	671.8	231.9	671.8
1992	122.5	567.7	257.5	567.7	32.5	693.7	224.8	693.7
1993	122.9	597.6	297.0	597.6	32.3	765.9	262.1	765.9
1994	128.3	670.8	290.7	670.8	32.1	824.4	240.9	824.4
1995	130.2	770.9	291.1	770.9	31.8	949.9	236.3	949.9
1996	117.7	842.9	275.6	842.9	31.7	1087.1	232.3	1087.1

Source: See Appendix 2.

Appendix 1. Table 2.

Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

A. Gold Standard

Bloomfield(1963) and Lindert(1967, 1969)

millions of US dollars

years	Argentina		Australia		Belgium		Canada	
	GR	FR	GR	FR	GR	FR	GR	FR
1880	.	.	50.1	.	15.0	22.4	6.0	0.2
1881	.	.	49.4	.	15.5	14.1	6.6	0.3
1882	.	.	42.2	.	15.0	18.0	6.6	0.0
1883	.	.	43.2	.	14.5	26.1	7.2	0.0
1884	.	.	51.3	.	13.5	28.9	7.5	0.0
1885	.	.	61.3	.	14.0	28.4	6.7	1.0
1886	.	.	58.8	.	11.0	33.0	6.0	0.0
1887	.	.	72.0	.	11.0	31.6	6.0	0.0
1888	.	.	80.5	.	11.0	28.9	7.4	0.1
1889	.	.	75.8	.	13.0	34.0	6.0	0.0
1890	.	.	86.6	.	12.0	31.7	6.7	0.0
1891	.	.	85.1	.	13.0	34.7	5.8	0.0
1892	.	.	86.0	.	16.0	37.9	6.7	0.0
1893	.	0.0	86.3	.	15.0	39.5	7.7	0.3
1894	.	0.0	100.5	.	20.0	41.7	8.0	0.0
1895	.	0.0	104.6	.	17.5	41.9	8.2	0.0
1896	.	0.0	115.1	.	17.5	43.4	8.6	0.4
1897	.	0.0	103.6	.	17.5	50.9	8.3	1.1
1898	.	0.0	93.2	.	18.0	35.9	9.0	0.0
1899	.	1.8	90.0	.	18.0	41.9	9.6	0.0
1900	.	0.3	108.4	.	18.0	50.7	11.8	0.0
1901	.	1.0	96.3	.	17.0	66.5	11.6	0.0
1902	.	0.6	102.6	.	17.0	63.8	12.9	2.3
1903	36.9	1.9	97.4	.	18.0	63.3	16.1	0.2
1904	48.5	4.9	94.2	.	18.0	67.0	17.6	0.0
1905	87.0	8.0	104.6	.	19.0	57.9	19.6	0.0
1906	99.1	9.7	110.4	1.5	20.0	63.6	23.8	0.0
1907	101.4	0.6	115.4	1.5	20.5	46.7	25.1	5.0
1908	122.2	6.7	121.3	1.1	21.0	62.8	27.1	19.7
1909	166.4	13.1	128.0	2.3	21.5	58.3	27.5	0.3
1910	179.4	16.2	146.7	5.2	24.0	56.4	33.4	2.5
1911	182.3	10.3	162.9	5.2	36.0	55.3	37.5	15.5
1912	215.0	18.6	139.6	3.5	42.0	71.6	33.8	1.9
1913	225.0	5.0	152.1	2.3	48.0	77.7	45.4	13.2

Appendix 1. Table 2. (Continued)

Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

A. Gold Standard

Bloomfield(1963) and Lindert(1967, 1969)

millions of US dollars

years	Denmark		Finland		France		Germany	
	GR	FR	GR	FR	GR	FR	GR	FR
1880	14.0	2.6	3.5	7.4	109.9	.	53.8	6.0
1881	14.0	3.3	3.5	6.4	115.7	.	47.5	4.5
1882	14.0	2.8	3.5	5.6	186.8	.	50.7	1.6
1883	14.0	2.8	3.5	6.4	178.9	.	66.2	2.5
1884	13.0	3.0	3.5	6.1	210.5	.	63.8	2.0
1885	13.0	2.3	3.5	5.3	222.9	.	63.5	6.7
1886	14.0	5.0	3.5	5.4	245.3	.	90.0	5.6
1887	15.0	7.2	3.5	4.1	225.8	.	111.8	3.7
1888	16.0	4.0	3.5	4.1	199.4	.	145.0	3.0
1889	16.0	4.1	3.5	6.0	256.6	.	140.4	3.0
1890	17.0	3.1	3.5	5.4	227.8	.	123.6	1.7
1891	16.0	2.7	3.5	4.5	275.3	.	137.7	4.7
1892	17.0	3.7	3.5	4.8	329.9	.	144.2	3.5
1893	17.0	4.2	3.5	3.6	329.0	.	123.3	1.7
1894	18.0	6.3	3.5	6.3	399.2	.	145.4	1.9
1895	19.0	4.4	3.5	9.2	379.7	.	164.8	2.0
1896	19.0	2.6	3.5	10.3	371.6	.	161.7	2.0
1897	18.0	3.5	3.5	11.4	374.7	.	139.4	3.6
1898	20.0	1.3	3.5	13.0	349.8	.	136.5	8.6
1899	20.0	1.3	4.0	9.8	370.0	.	136.5	7.9
1900	20.0	1.2	4.0	9.9	455.3	.	134.5	19.1
1901	19.0	4.6	4.0	10.8	483.4	.	155.9	13.5
1902	20.0	3.3	4.0	14.8	499.4	.	170.8	15.3
1903	21.0	2.0	4.0	15.7	463.2	.	153.4	12.9
1904	23.0	2.4	4.0	12.7	505.9	.	162.6	13.1
1905	25.0	2.3	5.5	17.0	557.9	1.0	176.6	16.2
1906	25.0	1.4	5.5	18.6	514.9	5.3	160.1	20.0
1907	21.4	1.9	5.5	17.0	507.7	16.8	150.7	8.5
1908	19.8	2.9	5.5	14.3	673.6	1.9	186.5	36.6
1909	20.0	3.7	5.0	20.6	673.6	13.0	189.0	44.6
1910	18.5	5.1	4.5	21.9	622.5	9.1	187.3	58.6
1911	24.1	5.7	7.5	20.9	614.1	1.9	176.3	40.7
1912	18.6	7.2	7.5	17.4	601.9	4.3	206.5	25.6
1913	20.6	6.2	7.0	20.9	677.5	3.2	256.5	49.6

Appendix 1. Table 2. (Continued)

Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

A. Gold Standard

Bloomfield(1963) and Lindert(1967, 1969)

millions of US dollars

years	Italy		Japan		Netherlands		Norway	
	GR	FR	GR	FR	GR	FR	GR	FR
1880	.	.	.	.	19.0	.	6.0	2.8
1881	.	.	.	.	4.0	.	6.0	2.4
1882	.	.	.	.	6.0	.	6.0	2.8
1883	.	.	.	.	10.0	.	6.0	3.2
1884	.	.	.	.	15.0	.	6.0	3.0
1885	.	.	.	.	26.0	.	6.0	2.5
1886	.	.	.	.	24.0	.	6.0	2.7
1887	30.0	.	.	.	22.0	.	7.0	3.3
1888	20.4	.	.	.	24.0	.	8.0	4.4
1889	19.8	.	.	.	22.0	13.0	8.0	4.2
1890	20.7	.	.	.	20.0	3.3	8.0	2.7
1891	21.8	.	.	.	16.0	6.8	8.0	2.7
1892	20.9	.	.	.	14.5	9.5	7.0	3.5
1893	19.2	.	.	.	18.1	9.3	7.0	1.6
1894	14.6	.	.	.	19.7	9.8	8.0	1.7
1895	16.8	.	.	.	17.3	6.7	8.0	2.6
1896	17.7	2.7	.	.	12.7	2.0	7.7	2.1
1897	24.6	2.9	48.5	.	12.7	2.9	7.8	5.1
1898	25.4	4.0	45.0	.	20.8	3.0	8.6	3.8
1899	27.2	2.8	55.2	.	18.2	2.2	8.6	3.5
1900	26.8	2.0	33.9	.	23.5	4.1	7.8	2.6
1901	26.4	3.9	35.8	.	27.7	4.4	8.2	3.3
1902	26.6	5.5	54.7	.	22.7	4.0	8.2	1.5
1903	39.2	6.0	69.5	42.2	20.2	2.5	6.7	2.0
1904	38.5	3.9	48.4	41.6	27.2	7.2	6.8	3.3
1905	40.5	6.1	239.1	52.2	31.9	8.4	7.6	3.6
1906	46.7	6.7	246.9	65.9	28.0	2.5	8.3	5.4
1907	334.5	7.6	222.2	79.6	34.0	2.3	7.3	7.5
1908	363.3	6.5	195.1	57.0	40.6	6.5	7.9	6.8
1909	369.0	7.3	222.7	57.8	48.6	7.3	8.1	7.3
1910	373.1	9.4	235.5	67.9	50.2	3.0	9.2	6.8
1911	396.0	11.9	181.7	77.8	56.4	6.6	10.3	6.2
1912	401.5	12.2	175.0	92.3	65.0	6.5	10.3	6.9
1913	402.6	10.9	187.9	115.8	60.9	5.5	11.9	8.9

Appendix 1. Table 2. (Continued)
 Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

A. Gold Standard

Bloomfield(1963) and Lindert(1967, 1969)

millions of US dollars

years	Sweden		Switzerland		UK		US	
	GR	FR	GR	FR	GR	FR	GR	FR
1880	2.5	8.0	.	.	134.3	0.0	131.0	0.0
1881	2.5	7.3	.	.	119.7	0.0	163.0	0.0
1882	2.5	6.8	.	.	107.1	0.0	149.0	0.0
1883	2.5	7.1	.	.	108.0	0.0	144.0	0.0
1884	4.0	7.3	.	.	111.4	0.0	136.0	0.0
1885	4.0	6.8	.	.	117.8	0.0	129.0	0.0
1886	4.0	8.3	.	.	102.2	0.0	156.0	0.0
1887	4.0	8.5	.	.	106.1	0.0	190.0	0.0
1888	4.0	12.3	.	.	101.2	0.0	203.0	0.0
1889	5.0	10.9	.	.	104.1	0.0	190.0	0.0
1890	5.0	9.3	.	.	106.1	0.0	175.0	0.0
1891	5.0	8.1	.	.	118.7	0.0	134.0	0.0
1892	5.0	7.9	.	.	124.1	0.0	119.0	0.0
1893	5.0	10.0	.	.	128.5	0.0	95.0	0.0
1894	6.0	11.1	.	.	166.9	0.0	79.0	0.0
1895	7.0	12.3	.	.	189.8	0.0	88.0	0.0
1896	5.5	12.8	.	.	215.6	0.0	113.0	0.0
1897	8.5	15.0	.	.	173.3	0.0	149.0	0.0
1898	8.5	13.9	.	.	163.5	0.0	201.0	0.0
1899	8.5	21.5	.	.	157.2	0.0	241.0	0.0
1900	10.0	22.2	.	.	162.1	0.0	231.0	0.0
1901	12.5	22.1	.	.	174.2	0.0	248.0	0.0
1902	14.0	17.4	.	.	173.3	0.0	255.0	0.0
1903	16.0	14.0	.	.	167.4	0.0	259.0	0.0
1904	17.0	19.0	.	.	167.9	0.0	225.0	0.0
1905	18.0	20.6	.	.	173.7	0.0	237.0	0.0
1906	19.0	23.6	.	.	162.5	0.0	291.0	0.0
1907	19.0	18.3	14.6	5.3	169.8	0.0	282.0	0.0
1908	21.0	25.1	22.7	8.6	181.0	0.0	218.0	0.0
1909	22.0	26.0	23.9	9.4	182.0	0.0	236.0	0.0
1910	22.0	28.5	30.0	11.4	179.6	0.0	240.0	0.0
1911	24.0	52.5	31.0	4.7	185.9	0.0	246.0	0.0
1912	28.0	36.8	33.4	5.2	188.8	0.0	269.0	0.0
1913	28.0	43.4	32.8	8.2	180.6	0.0	263.0	0.0

Appendix 1. Table 2. (Continued)

Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

B. Interwar

League of Nations

millions of US dollars

years	Argentina		Australia		Belgium		Brazil		Canada		Chile	
	GR	FR	GR	FR	GR	FR	GR	FR	GR	FR	GR	FR
1920	990.6	.	807.1	.	.	.	.	.	175.0	130.4	58.6	71.9
1921	728.6	.	856.6	.	.	.	.	.	155.7	100.2	38.5	46.1
1922	619.0	.	1026.7	.	.	.	.	.	236.4	110.3	40.1	47.8
1923	802.9	.	1068.2	188.6	98.0	6.6	41.6	18.3	180.3	103.9	39.0	46.8
1924	738.9	.	1070.5	313.6	87.7	9.7	49.2	32.8	206.3	110.5	34.7	45.5
1925	720.0	.	1461.0	448.8	90.4	10.0	55.4	21.1	226.0	209.0	35.1	53.2
1926	923.2	.	1222.0	246.3	104.6	75.4	68.0	47.9	230.0	259.0	12.3	57.1
1927	1101.5	.	1182.9	351.2	100.0	73.0	99.8	42.8	229.0	210.0	9.2	49.2
1928	1320.3	.	1190.2	451.2	125.8	78.9	148.7	28.7	190.8	156.8	9.1	58.7
1929	950.5	95.7	941.9	183.7	163.5	85.3	148.4	26.9	149.8	71.4	9.1	49.8
1930	886.0	73.8	347.2	181.1	191.5	135.4	13.8	31.9	193.6	34.9	8.9	43.3
1931	468.5	41.7	241.0	241.8	355.0	0.0	7.4	14.4	137.7	37.6	8.8	15.4
1932	339.4	0.0	119.7	253.5	361.2	0.0	5.9	26.2	120.7	0.0	5.7	5.5
1933	224.4	0.0	8.5	588.1	489.4	0.0	4.8	22.5	116.8	0.0	6.7	6.2
1934	325.3	0.0	10.0	784.0	583.3	0.0	3.1	11.0	130.3	0.0	13.2	1.5
1935	1561.6	164.6	9.8	596.1	636.9	0.0	6.8	25.9	113.4	4.0	7.3	0.1
1936	1574.7	389.8	4.0	756.0	816.2	0.0	7.1	22.9	111.9	9.0	7.4	0.2
1937	1690.1	272.0	4.0	962.0	722.3	32.4	9.7	4.1	109.0	15.0	7.4	0.2
1938	1817.4	105.4	3.9	788.2	725.6	8.0	9.4	27.8	112.3	27.8	7.5	0.2
1939	1526.8	213.3	3.9	947.1	712.2	.	10.0	30.4	121.9	61.4	7.6	0.2

years	Denmark		Finland		France		Germany		Greece	
	GR	FR	GR	FR	GR	FR	GR	FR	GR	FR
1920	36.0	7.7	12.8	.	.	.	.	.	.	.
1921	41.5	8.5	7.1	.	.	.	.	.	.	.
1922	47.9	2.7	7.2	17.2	.	.	.	.	.	.
1923	38.7	3.1	8.9	15.9	1064.9	21.9	.	.	14.1	.
1924	35.1	8.2	8.3	13.9	954.1	18.1	181.0	285.2	17.0	.
1925	44.2	19.0	8.4	31.4	863.9	15.0	287.6	241.9	15.1	17.3
1926	54.9	7.1	8.3	27.2	585.4	13.5	436.0	229.3	13.1	17.4
1927	48.7	25.9	8.0	32.6	725.0	10.1	443.0	112.1	15.0	18.0
1928	46.3	30.2	7.7	18.8	1224.5	1263.3	651.3	126.0	7.2	48.1
1929	45.9	24.0	7.6	17.2	1600.8	1002.0	543.6	193.3	8.3	32.1
1930	46.1	26.5	7.6	23.8	2142.5	1048.2	528.9	182.3	6.6	32.4
1931	36.2	3.8	7.1	14.5	2633.9	826.9	233.7	0.0	10.5	12.7
1932	25.2	0.0	4.8	11.5	3325.2	179.3	191.4	0.0	15.0	0.0
1933	25.5	0.0	6.1	24.9	3664.7	55.3	113.5	65.3	47.5	0.0
1934	30.0	0.0	7.2	32.1	5541.5	64.1	31.5	35.5	34.2	8.6
1935	25.9	0.0	10.3	28.8	4419.9	88.6	33.3	71.1	21.6	5.2
1936	26.3	0.0	18.0	32.8	7453.9	86.0	26.6	44.9	25.8	3.2
1937	26.1	13.7	13.9	44.5	4342.9	36.8	28.5	75.5	37.9	.
1938	25.6	18.4	24.4	49.7	2937.6	23.4	28.5	79.1	41.4	.
1939	.	.	24.3	35.7	2865.0	2.8	28.5	90.4	51.2	.

Appendix 1. Table 2. (Continued)

Gold and Foreign Exchange Reserves: Individual Countries (1880-1939)

B. Interwar

League of Nations

millions of US dollars

years	Italy		Japan		Netherlands		Norway		Portugal	
	GR	FR	GR	FR	GR	FR	GR	FR	GR	FR
1920	.	.	549.8	372.4	218.9	20.3	24.3	10.4	.	.
1921	.	.	588.9	316.8	203.9	19.9	22.4	7.2	.	.
1922	.	.	584.1	125.0	224.1	53.1	25.8	10.2	.	.
1923	190.5	32.0	589.3	107.8	227.6	20.7	24.6	5.3	8.7	3.5
1924	182.5	25.0	508.7	87.0	193.0	63.8	20.5	7.1	8.1	12.8
1925	167.7	27.7	473.4	55.3	177.9	80.7	26.3	12.5	10.2	14.7
1926	165.0	91.8	519.4	66.8	166.0	75.0	32.9	20.1	10.7	6.4
1927	230.7	383.5	515.2	61.1	160.4	67.4	38.3	15.6	9.4	3.9
1928	265.6	316.5	502.3	39.8	175.0	88.5	39.3	10.9	9.4	10.6
1929	271.9	269.8	503.2	.	179.5	88.4	39.2	17.6	9.4	12.5
1930	277.5	226.7	406.9	.	171.4	99.4	39.1	19.0	9.4	10.2
1931	293.6	113.3	197.5	.	356.8	34.6	38.9	5.5	12.7	22.8
1932	299.9	67.0	121.1	.	416.2	28.6	26.0	5.6	17.2	15.0
1933	454.9	19.6	109.5	.	476.9	0.5	30.7	1.1	29.8	4.5
1934	497.1	6.2	137.1	.	567.3	0.7	34.2	10.4	41.2	11.4
1935	249.8	30.3	143.2	.	435.4	1.4	45.6	11.3	40.4	13.4
1936	279.6	4.4	158.8	.	464.2	1.3	53.8	27.0	41.1	19.4
1937	210.3	1.7	231.5	.	751.9	2.8	44.8	58.0	41.1	20.4
1938	193.4	8.0	140.7	.	803.7	2.2	50.7	53.4	40.7	18.3
1939	142.4	20.4	126.8	.	540.8	1.1	48.2	23.1	37.2	18.8

Years	Spain		Sweden		Switzerland		UK		US	
	GR	FR	GR	FR	GR	FR	GR	FR	GR	FR
1920	386.2	13.1	57.8	22.1	91.8	4.2	574.6	0.0	2232.2	0.0
1921	339.3	5.7	63.1	31.0	95.4	10.2	603.9	0.0	3044.3	0.0
1922	391.0	5.7	71.7	64.6	102.0	14.1	684.2	0.0	3202.6	0.0
1923	364.0	4.3	72.2	38.0	97.0	17.0	709.1	0.0	3249.7	0.0
1924	337.9	4.5	62.9	36.1	92.2	35.2	687.3	0.0	3113.3	0.0
1925	364.0	4.3	61.7	54.2	90.3	42.9	698.2	0.0	2872.3	0.0
1926	378.3	5.2	60.0	55.4	91.2	42.9	734.2	0.0	2991.4	0.0
1927	444.0	6.3	61.7	70.5	99.6	38.1	740.9	0.0	2903.3	0.0
1928	424.6	15.8	63.3	57.6	102.7	48.9	746.0	0.0	2755.1	0.0
1929	375.7	14.8	65.6	71.0	114.7	68.1	709.6	0.0	3020.3	0.0
1930	282.9	9.7	64.7	104.7	138.2	84.9	721.0	0.0	3107.1	0.0
1931	213.9	26.6	52.0	12.4	455.3	20.0	550.1	0.0	3174.5	0.0
1932	181.2	71.1	38.0	39.5	479.5	16.9	420.1	0.0	3443.6	0.0
1933	239.6	97.8	81.5	98.3	496.2	4.2	808.1	0.0	4859.4	0.0
1934	307.3	129.9	91.2	143.7	618.2	2.3	969.3	0.0	3223.8	0.0
1935	297.9	128.0	103.1	159.0	451.4	2.3	980.9	0.0	10125.1	0.0
1936	.	.	135.6	183.8	858.6	17.5	1559.1	0.0	11257.4	0.0
1937	.	.	137.4	250.8	645.0	117.7	1613.4	0.0	10760.3	0.0
1938	.	.	178.1	189.0	693.9	64.0	1596.1	0.0	14511.7	0.0
1939	.	.	162.9	72.2	534.7	91.5	.	0.0	17643.5	0.0

Sources: See Appendix 2.

Appendix 2. Data Sources

1880-1913: 16 countries

Argentina, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, The Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States

1921-1939 and 1948-1996: 21 countries

Argentina, Australia, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Italy, Japan, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

(1) Gold Reserves (data underlying Appendix 1 Tables 1 and 2 and Figures 1 and 2)

1880-1913

Australia, Canada, Denmark, Germany, Italy, Japan, The Netherlands, Norway, Switzerland in Lindert, Peter H. (1967), *Key Currencies and Gold Exchange Standard, 1900-1913*, Dissertation, Cornell University.

Belgium, Denmark, Finland, Sweden in Bloomfield, Arthur I. (1963), *Short-Term Capital Movements Under the Pre-1914 Gold Standard*, Princeton Studies in International Finance No. 11, Princeton University, Chart 2.

Argentina in Della Paolera, Gerardo (1988), "How the Argentine Economy Performed during the International Gold Standard: A Reexamination." Ph.D dissertation, University of Chicago, Table 32

Canada in Curtis, C. A. (1931), "Statistics of Banking" in *Statistical Contributions to Canadian Economic History*, Vol. I eds. C. A. Curtis, and K. W. Taylor.

France, Monetary Gold Stock in Saint Marc, Michele (1983) *Histoire Monetaire de la France 1800-1980*, University of France Press, Paris.

United Kingdom, Monetary Gold Stock in Sheppard, David K. (1971), *The Growth and Role of UK Financial Institutions 1880-1962*, Methuen & Co. Ltd, London. pp 136-137, Table (A) 1.12, col. 15.

United States, Gold Held in the Treasury and Federal Reserve Banks computed by NBER Historical Database from *Annual Reports of the Secretary and Circulation Statements of US Money*, US Treasury Department.

Sources for Appendix 1. Alternative Measures of Reserves. Figure 1 and Table 1.

Series 2 (Aggregate Gold Reserves of 35 countries) interpolated between benchmarks in Lindert, Peter H. (1969), *Key Currencies and Gold, 1900-1913*, Princeton Studies in International Finance No. 24, Princeton University, P 25.

1921-1939

League of Nations, *Statistical Yearbook*, Gold and Foreign Reserves, 1926, 1931, 1932, 1940 and 1941

1948-1996

Gold (National Valuation) in International Monetary Fund (1997), *International Financial Statistics (IFS) CD-ROM*

Sources for Appendix 1. Alternative Measures of Reserves. Figures 1 and 2 and Table 1.

Series 3 (Book Value), World Gold (Book Value) in *IFS CD-ROM* (1997)
Series 4 (Market Value), World Gold (Ounces) times Price of Gold in *IFS CD-ROM* (1997).

(2) Foreign Exchange Reserves (data underlying Figure 1 and Appendix 1 Tables 1 and 2 and Figures 1 and 2)

1880-1913

Belgium, Denmark, Finland, France, Germany, Italy, Japan, The Netherlands, Norway, Sweden, Switzerland in Bloomfield (1963), Appendix II.

Argentina, Australia, Canada in Lindert (1967), Table 2-C.

Sources for Appendix 1. Alternative Measures of Reserves. Figure 1 and Table 1.

Series 2 (Aggregate Foreign Exchange Reserves of 35 countries), Official Foreign Exchange Holdings computed from the data in Lindert (1967), Table 2-C and Table 5-4.

1921-1939

League of Nations, *Statistical Yearbook*

1948-1996

Total Reserves minus Gold in *IFS CD-ROM* (1997)

Sources for Appendix 1. Alternative Measures of Reserves. Figures 1 and 2 and Table 1.

Series 3 and Series 4, World Total International Reserves minus Gold in *IFS CD-ROM* (1997).

(3) Statutory Gold Reserve Requirements (data underlying Appendix 3 Tables 1, 2 and 3)

Sources:

1880-1914

Germany, Sweden, Italy in Michael D. Bordo and Anna J. Schwartz eds.(1984) *A Retrospective on the Classical Gold Standard, 1821-1931*, Chicago: University of Chicago Press, Chapters 7-9

Other countries in Charles Conant (1924), *A History of Modern Banks of Issue Sixth Edition*.

Reprinted by Augustus, M Kelly Publishers, New York 1969.

1925-1931

League of Nations (1930), *Legislation on Gold*, Geneva, Table I-III.

1944-1972

Hans Aufricht (1961, 1967), *Central Banking Legislation*. 2 Vols. Washington D.C. International Monetary Fund.

Dummy for statutory gold reserve requirements = 1 if requirements are present. 0 otherwise.

(4) Exchange Rate Regime

Sources:

1880-1939 and 1946-1960

Bordo, Michael D. and Anna J. Schwartz (1996) "The Operation of the Specie Standard: Evidence for Core and Peripheral Countries, 1880-1990" In *Currency Convertibility: The Gold Standard and Beyond* eds. Jorge Braga de Macedo, Barry Eichengreen and Jaime Reis, Table 2.1 and Table 2.2

1961-1989

Ghosh, Atish R., Anne-Marie Gulde, Jonathan D. Ostry, and Holger C. Wolf (1995), "Does the Nominal Exchange Rate Regime Matter ?" *IMF Working Paper*, Appendix I and II, Exchange Rate Regime Classification.

1990-1996

International Monetary Fund (1996), *International Financial Statistics Yearbook*, p 18, Exchange Rate Arrangement.

For 1880-1939, exchange rate regime dummy = 0 if a country has a gold convertible regime, 1 otherwise. After 1946, exchange rate regime dummy = 0 if a country has a fixed exchange rate regime, 1 if a country has a floating exchange rate regime.

Note: Cooperative arrangements (European Monetary System) are classified as a fixed exchange rate regime.

(5) Capital Controls

Sources:

1951-1995

Data are from elaborations on IMF *Annual Report on Exchange Rate Arrangements and Exchange Restrictions*, various issues.

Capital controls (current account) dummy = 1 if a country has restrictions on its current account, 0 otherwise. Capital controls (capital account) dummy = 1 if a country has restrictions on its capital account, 0 otherwise.

(6) Nominal National Income

1880-1913 and 1921-1939

Various Definitions in Bordo and Schwartz (1996).

1948-1996

GDP in *IFS CD-ROM* (1997).

(7) Price

1880-1913 and 1921-1939

Various Definitions in Bordo and Schwartz (1996).

1948-1996

GDP deflator in *IFS CD-ROM* (1997).

(8) Annual Exchange Rate

1880-1913 and 1921-1939

Domestic Currency / US Dollar in Bordo and Schwartz (1996).

1948-1996

Domestic Currency / US Dollar (Average) in *IFS CD-ROM* (1997).

(9) Monthly Exchange Rates

Exchange rate volatility = standard deviation of monthly exchange rates of major currencies.

1920-1939

US Dollar / UK Pound in *Banking and Monetary Statistics*, Board of Governors of the Federal Reserve System, Washington D.C., 1948, Table No. 173.

1948-1996

Index of trade weighted Dollar in *IFS CD-ROM* (1997).

(10) Monetary Base

1880-1913

Notes in Circulation in Mitchell, B. R., *International Historical Statistics: 1750-1988, Europe* (1992), *The Americas* (1993), *Africa, Asia and Oceania* (1995), New York: Stockton Press.

1921-1939

Notes in Circulation in League of Nations, *Bulletin of Statistics*. Monthly, 1932-1939.

1948-1996

Reserve Money in *IFS CD-ROM* (1997).

(11) Trade Volume

1880-1913 and 1921-1939

Exports and Imports in Mitchell, *International Historical Statistics*,

1948-1996

Exports and Imports in *IFS CD-ROM* (1997).

Appendix 3. Central Bank Gold Reserve Statutes

Table 1 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER THE CLASSICAL GOLD STANDARD (1880 – 1914)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Argentina	Currency Board 1899 – 1913
Australia	25% in gold on bank notes up to £7,000,000, 100% above that (law of 1910). Before 1910 no government notes, no legal reserve requirements on commercial bank notes.
Belgium	33 1/3% on notes and other demand liabilities
Brazil	33 1/3% in gold on note issue (Act of 1890); 100% in gold and convertible securities: Currency Board (1906-1914)
Canada	25% on Dominion notes in excess of 20 million. No legal reserve requirements on chartered banks.
Chile	None
Denmark	37.5% in gold coin or bullion on notes until 1907; thereafter 50%.
Finland	maximum uncovered note issue of 40,000,000 marks, 100% cover in gold, foreign exchange above that
France	None
Germany	33 1/3% in gold coin or bullion on note liabilities
Greece	3 1/3% in gold coin or bullion on notes
Italy	40% in gold or silver on notes
Japan	on note liability in gold coin or bullion in excess of fiduciary issue of 120,000,000 yen (1899)
Netherlands	40% in gold coin on notes and deposits
Norway	on note liabilities, 100% in gold coin or bullion in excess of fiduciary issue of 35,000,000 crowns

Table 1 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER THE CLASSICAL GOLD STANDARD (1880 - 1914)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Portugal	33 1/3% in gold coin or bullion on note circulation and demand liabilities
Spain	33 1/3% cash reserve on a maximum note issue of 1,500,000 pesetas, at least one half to be held in gold
Sweden	40 million kroner in gold on notes
Switzerland	40% in gold coin on notes
United Kingdom	100% in gold coin or bullion on notes in excess of fiduciary issue (£ 14 million plus two - third of lapsed bank notes)
United States	as of 1900, Treasury minimum of 100 million in gold coin

Sources: Germany, Sweden, Italy in Michael D. Bordo and Anna J. Schwartz (eds). A Retrospective on the Classical Gold Standard, 1821 - 1931. Chicago: University of Chicago Press 1984. Chapters 7-9.

Other countries are in Charles Conant. A History of Modern Banks of Issue Sixth Edition. (1924). Reprinted by Augustus, M. Kelly Publishers, New York 1969.

Table 2 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER THE GOLD EXCHANGE STANDARD (1925 – 1931)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Argentina	None
Australia	25% in gold coin or bullion on bank notes
Belgium	on sight liabilities: 30% gold coin or bullion; 40% gold and gold exchange
Brazil	None
Canada	25% in gold or bullion on first 50 million Dominion notes; 100% on excess
Chile	50% in gold and gold exchange on bank notes plus deposits
Denmark	30% in gold coin or bullion on bank notes
Finland	300 million marks in gold coin or bullion on all bank notes plus other sight liabilities up to 1200 million mark
France	35% in gold coin bullion on bank notes plus current credit accounts
Germany	on note liabilities; 40% of which $\frac{3}{4}$ (30%) in gold or day to day loans; on deposits: 40% in secondary names
Greece	40% in gold and gold exchange on bank notes plus other sight liabilities
Italy	40% in gold and gold exchange on notes and sight liabilities
Japan	75% in gold coin or bullion on notes in excess of £260 million
Netherlands	40% in gold coin or bullion on bank notes, bank assignations and demand deposits
Norway	100% in gold coin or bullion on bank note circulation over 240 million Kroner
Portugal	None

Table 2 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER THE GOLD EXCHANGE STANDARD (1925 – 1931)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Spain	40% in gold coin or bullion (in silver) on bank notes not exceeding 4000 million pesetas; 50% (10% in silver) on bank notes exceeding 4000 million pesetas but not exceeding 5000 million pesetas unless increased to 6000 million pesetas by special authorization
Sweden	50% in gold coin or bullion on notes in excess of 250 million kroner; minimum gold reserve of 150 million kroner
Switzerland	40% in gold or bullion on notes
United Kingdom	100% in gold bullion on notes in excess of £260 million
United States	40% in gold coin on Federal Reserve notes; 35% on Federal Reserve deposits

Source: League of Nations. Legislation on Gold. Geneva 1930. Tables I-III.

Table 3 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER BRETTON WOODS (1944 – 1972)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Argentina	NA
Australia	None
Belgium	33 1/3% on sight liabilities in gold
Brazil	NA
Canada	25% in gold coin, bullion and foreign exchange on notes and deposit liabilities
Chile	NA
Denmark	25% in gold coin, gold bullion, gold exchange (maximum 5% of note circulation) or non interest bearing foreign exchange (maximum 5% of note circulation) <u>1936 Law</u>
Finland	not updated from <u>1925 Law</u>
France	35% in bullion and gold coin on notes and current credit accounts
Germany	None
Greece	None
Italy	None
Japan	100% in gold and silver coin and bullion domestic assets and foreign exchange
Netherlands	50% in gold and foreign exchange on bank notes, bank drafts, and credit balance on current accounts
Norway	None
Portugal	on notes in circulation and other sight liabilities in gold 25% in gold coin and bars; 25% in convertible foreign exchange

Table 3 – CENTRAL BANK STATUTORY GOLD RESERVE REQUIREMENTS UNDER BRETTON WORDS (1944 – 1972)	
<u>COUNTRY</u>	<u>LEGAL RESERVE REQUIREMENTS</u>
Spain	None
Sweden	on notes (in excess of 9900 million kroner) equal to double the amount of gold reserve; the amount not covered by gold to consist of non gold assets; gold reserve minimum of 150 million kroner
Switzerland	40% on notes; rest in non gold assets
United Kingdom	100% in gold coin and bullion on note liabilities in excess of £1575 million fiduciary issue
United States	25% on notes and deposits (eliminated in 1965 and 1968)

Source: Hans Aufricht. Central Banking Legislation. 2 Vols. Washington, D.C. International Monetary Fund. 1961, 1967.