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RELAXING THE EXTERNAL CONSTRAINT: EUROPE IN THE 1930s

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ABSTRACT

This paper documents the effects of exchange rates and the external constraint during the interwar years. In the absence of international policy coordination, exchange rate depreciation is shown to have been a necessary precondition for the adoption of policies promoting recovery from the Great Depression. But currency depreciation was not without costs. It increased the variability of nominal exchange rates and rendered them increasingly difficult to predict. Increased variability and uncertainty about nominal exchange rates carried over to short-term changes in real exchange rates as well. Thus, exchange rate variability appears to have introduced additional noise into the operation of the price mechanism.

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I. Introduction

The new conventional wisdom on the macroeconomics of the 1930s focuses on the external constraint. The fixed exchange rates and high capital mobility characteristic of the gold standard, it is argued, tied other countries to the United States when its economy succumbed to the Great Depression. Deflation in the U.S. produced deflation in Europe so long as fixed exchange rates linked commodity prices and interest rates internationally. Balance-of-payments pressures inhibited the unilateral adoption of reflationary monetary and fiscal initiatives so long as countries remained committed to fixed rates. Only when they abandoned the gold standard, relaxing the external constraint, was it possible to initiate recovery from the Depression.

This new view has become remarkably widespread. Choudhri and Kochin (1981) were among the first to observe that countries like Spain that never adopted the gold standard were best able to insulate themselves from the deflationary shock emanating from the United States. Eichengreen and Sachs (1985) described the channels through which departing from gold enabled other countries to free themselves from the grip of depression. Eichengreen (1990) and Temin (1989) emphasized the greater capacity of countries with depreciated currencies to adopt reflationary monetary and fiscal initiatives. Eichengreen (1990) and Bernanke and James (1990) stressed the superior ability of countries with flexible exchange rates to ward off banking panics and financial crises.1/

This view is a departure from an older literature in which the Depression was regarded as a U.S. affair and the collapse of the international gold standard was portrayed as an unmitigated evil.2/ In a sense it is a sign of the times: growing awareness of economic interdependence in the 1980s has redirected attention to the importance of economic interdependence in the 1930s. To an extent it reflects the growing popularity of comparative and international history. In part it reflects the powerful message conveyed by

simple evidence. Table 1 displays rates of change of industrial production starting in 1929 for countries pursuing different international monetary strategies.3/ The five countries which adhered to the gold standard until 1936 (1935 for Belgium) suffered a devastating decline in industrial production and showed few signs of recovery until the end of the period. In contrast, the members of the sterling area, which went off the gold standard in 1931, began recovering strongly by 1933. Other countries that depreciated their currencies suffered a more devastating depression initially than that endured by the sterling area, but by 1936 their recovery was every bit as impressive. The experience of countries that relaxed the external constraint through exchange control lay between these extremes. Table 1 suggests that the importance of exchange rate policy was even more general than suggested by previous authors who focused on subsets of these countries.4/

Notwithstanding the extent of consensus, the recent literature has left important issues unresolved. Why, for example, were countries unable to agree to coordinate their reflationary initiatives internationally, rendering devaluation necessary for recovery? How quickly did economies respond to devaluation, and how persistent was the stimulus it provided? Finally, did countries pay a price for delinking themselves from the gold standard in the form of disruptions to asset and commodity markets?

These are the questions addressed in the remainder of this paper. Section II sketches the background to the period and asks why currency devaluation was a necessary precondition for recovery. The argument is that reflation without devaluation required international cooperation, but that different views of the operation of the economy posed an insurmountable obstacle to collaboration. Section III analyzes the effects of devaluation in a sample of some three dozen countries. Two innovations are to provide new evidence on the time profile of the response and to control for changes in global economic conditions. The evidence suggests that the economics of devaluation and recovery in the 1930s were

more complex than suggested in previous accounts. Explanations for these complexities are offered. Finally, Section III examines the implications of the change in exchange rate regime for the behavior of asset and commodity markets.

II. Why was Devaluation a Necessary Precondition for Recovery?

Virtually the entire world was on some form of gold standard when the Great Depression struck. Exceptions, in addition to Spain (which maintained a floating exchange rate throughout), included Japan (which only restored gold convertibility in 1930), Peru, Portugal and Yugoslavia (which restored convertibility only in 1931), China (which maintained a silver standard throughout the period), and Honduras (which switched from silver to gold in 1931). 45 nations were on the gold standard in 1929.

The three defining characteristics of a gold standard are a fixed domestic currency price of gold, freedom to import and export gold, and rules linking monetary liabilities of the central bank or government to its gold reserves. It is easy to see why these arrangements rendered small countries vulnerable to external shocks. The traditional ways of analyzing the problem are in terms of shocks to the current and capital accounts and, alternatively, in terms of the monetary approach to the balance of payments. Consider the first alternative. Imagine that countries of Central and Eastern Europe suffer a loss of access to capital imports from the United States, as in 1928. In the absence of other adjustments, this leads to a deterioration in their balance of payments. Any excess of commodity imports plus debt service payments over commodity exports must be financed by exporting gold. The decline in gold reserves produces a decline in the money supply and deflationary pressure on the domestic economy. Imagine next that these same countries suffer a decline in the U.S. demand for their exports, as in 1929. This

compounds the deterioration in their balance of payments, leading to further gold losses, additional monetary contraction, and yet more deflationary pressure.

The alternative approach is consistent with the above but complements it by shifting the focus to the source of the shocks. Posit a negative monetary shock in the United States, as in 1928-29.5/ U.S. monetary supply falls relative to demand, causing interest rates to rise. The U.S. balance of payments moves into surplus, as gold is imported to provide backing for additional monetary liabilities that begin to eliminate the excess demand for real balances. Foreign countries experience the disturbance as a decline in capital imports and a deterioration in their payments position. The U.S. price level falls, placing downward pressure on prices abroad. As the shock ramifies through the economy and activity declines, so does the U.S. demand for imports, imparting an additional disturbance to the rest of the world.

This account of the international transmission of the Great Depression is precisely accurate only if countries adhered faithfully to the gold standard. In fact, none of the three defining characteristics of the gold standard were strictly observed. There was a little exchange rate flexibility built into the system. In countries suffering a loss of reserves, the exchange rate was allowed to decline to the gold export point -- equivalently, the domestic-currency price of gold was allowed to rise above its official parity. The price of sterling, for example, could slip from its official parity of $4.866 to less than $4.855 before it became profitable, given costs of shipping, insurance and finance, to engage in gold market arbitrage. This provided a little insulation.

More importantly, central banks and governments rationed gold and foreign exchange to importers and others who demanded it for domestic currency and took other steps to limit gold exports. Moggridge (1972) describes the devices used by the Bank of England to discourage gold exports. More extreme examples were Australia and Brazil. In

Australia, the trading banks, which administered the gold standard, formed a cartel to ration foreign exchange to importers. By December 1929 the exchange rate had fallen 2 1/2 per cent below par. In 1930 private citizens were compelled to turn over all gold in their possession. Rationing was intensified, and the Australian pound slipped 6 per cent below par. All the while, Australia remained officially on gold. In Brazil, the authorities similarly placed a variety of obstacles in the way of convertibility. The milreis fell to less than 93 per cent of its official parity in January 1930, despite the country's official adherence to the gold standard.

Thus, both countries, despite official adherence to gold, were able to depreciate their exchange rates surreptitiously and to limit the contraction of their money supplies. The more restrictive the policy of rationing became, however, the higher was the black market price of foreign exchange, and the greater was the incentive for banks to violate their cartel agreement. Eventually rationing broke down, forcing the authorities to officially suspend convertibility.

Finally, countries possessing excess reserves could avoid having to choose between covert depreciation of the currency and overt contraction of the money supply. Central banks sought to maintain an extra margin of gold and foreign exchange reserves, on the order of 7 to 10 per cent, above the 33 to 40 per cent ratio of reserves to monetary liabilities required by statute.6/ They could lose this amount of gold without being forced to contract their domestic liabilities. This provided some insulation when their payments positions deteriorated.

Countries could employ several expedients, then, to moderate the impact of the external shock on their domestic economies. Still, so long as they continued to adhere to the gold standard, they had only limited room to maneuver.

Following the destabilizing impulse came its propagation. However devastating the disturbance, one would think that the self-equilibrating tendencies of the market eventually should have come into play. Domestic prices should have fallen along with U.S. prices to limit the deterioration in international competitiveness and loss of export sales. Domestic costs should have fallen along with domestic prices to limit any rise in real wages and unemployment. Thus, the failure of prices and costs to adjust after 4 or more years of depression is "somewhat troubling," as Bernanke and James (1990, p. 19) put it. They continue, "Given 1) the severity of the unemployment that was experienced during that time, 2) the relative absence of long-term contracts and the weakness of unions, and 3) the presumption that the general public was aware that prices and hence the cost of living were falling, it is hard to understand how nominal wages could have been so unresponsive."

Part of the explanation lies in the stickiness of other nominal variables. Mortgages were fixed in nominal terms and ran years to maturity. Rents were fixed in nominal terms and ran for extended periods. Bonds, corporate as well as government, paid coupons that were fixed in nominal terms. Civil servants, even when officially unionized, delegated spokesmen and lobbied effectively against cuts in money wages. Each of the affected groups -- landlords, bondholders and workers -- would have accepted a reduction in their nominal incomes had they been assured that others were prepared to do the same. Absent such an assurance, a coordination problem resulted.

A clear illustration of the operation of these forces is France in 1935. The country had already endured four years of deflation. Yet the decline in prices and costs remained inadequate to restore internal and external balance. Since 1929 wholesale prices in France, adjusted for the exchange rate, had risen by 14 per cent against the U.S. and by 18 per cent against the U.K. and Sweden, countries which had limited the need for nominal adjustment by devaluing their currencies and expanding their money supplies.7/ Continuing

economic difficulties led to the formation of a coalition government headed by Pierre Laval. To head off an incipient financial crisis, the new government was granted plenary powers. It issued more than 500 decrees designed to reduce government expenditure by 10 per cent. To remove resistance to wage cuts, the government unilaterally reduced all rents and mortgages by 10 per cent. Interest payments on government bonds were reduced by decree. Other proclamations allowed debtors to break contracts that had been signed prior to the deflation. These measures, as is evident from their nature, were designed to attack the sources of nominal inertia described above.

Revealingly, however, public sector employees frustrated the government's efforts. Laval sought to apply the 10 per cent rule to the salaries of government employees. Civil servants resisted demands that they be first to accept salary cuts, with only the promise that private sector salaries would follow. Their opposition forced Laval to draw back. Civil service salaries were reduced by only 3 to 5 per cent. Other parties asked to accept 10 per cent cuts in income intensified their opposition accordingly. Macroeconomic addjustment remained incomplete.

Thus, inertia built into the wage-price mechanism was one source of the persistent monetary nonneutrality. Another was the breakdown of financial intermediation, the mechanism emphasized by Bernanke (1983) for the United States. Deflation eroded the value of the collateral debtors had offered in return for bank loans. Commercial bankruptcies cut the income banks received on their portfolios. The decline in the prices of low grade bonds led to capital losses on investments. Eventually the deterioration in bank balance sheets undermined confidence in the financial system. It took only some additional bad news to provoke a run on the banks. Depositors scrambled to withdraw their balances, and fractional reserve banking systems were unable to satisfy their demands. The banks had to be reorganized by government or close their doors. Firms' access to

external funds, and hence fixed investment, as well as households' access to consumer credit, and hence the demand for consumer durables, continued to be disrupted even after the banking panic reached its peak. Eichengreen (1990) argued that the breakdown of financial intermediation, as emphasized by Bernanke (1983) in the U.S. context, operated also in a variety of other countries. Bernanke and James (1990) argued the same, providing an exhaustive list of 33 banking panics between 1931 and 1936.

Given these sources of persistence, policy initiatives were necessary to escape from depressed conditions. Yet adherence to the gold standard severely constrained the authorities' efforts to undertake reflationary action. Open market purchases designed to inject high powered money into circulation led to a loss of gold. For small countries, increasing domestic credit led to a matching loss of international reserves so long as prices were linked to world levels by commodity market arbitrage and interest rates were pegged to world levels by fixed exchange rates and capital mobility. This was the painful lesson learned by central banks between 1929 and 1931. Large countries had the capacity to expand without threatening gold convertibility insofar as their reflationary initiatives affected global conditions. But in practice, even the large countries with the most ample gold reserves, the United States and France, had little freedom of action.

The U.S. case is illustrative. In the spring of 1932, bowing to Congressional pressure, the Federal Reserve initiated a program of open market purchases. Under the direction of the Open Market Committee, the 12 reserve banks purchased more than $1 billion of securities. This led to an alarming decline in the Fed's gold reserves. Between March and June, the monetary gold stock of the United States fell by 11 per cent. Fearing for convertibility, the Fed abandoned the bond buying program as soon as Congress adjourned.

In France, the Flandin government that took office toward the end of 1934 initiated a liberal credit policy and resisted balancing the budget. To avoid driving up the long-term interest rates upon which industrial borrowing depended, government borrowing was shifted to the short end of the market. The Bank of France discounted Treasury bills. Predictably, these policies ran up against the external constraint. Import volumes rose by 12 per cent between January and March of 1935. Starting in May, individuals queued up at the Bank of France to convert banknotes into gold. The Bank's reserves fell by 2 per cent in May and by 11 per cent in June. Flandin demanded powers of decree to raise taxes and cut public spending, measures clearly inconsistent with his reflationary program. Plenary powers were denied, and the government fell. Its successor suspended the reflationary program. The same sequence of events repeated itself in the winter of 1936.

The obvious way to relax the external constraint was by abandoning the gold standard. Suspending convertibility allowed central banks to expand the money supply, even if doing so entailed currency depreciation. Table 2 shows the very different evolution of money supplies in countries on and off gold.8/ In gold standard countries, money supplies were still 14 per cent below 1929 levels six years later. Only with their devaluation in 1936 did these countries succeed finally in offsetting the monetary shock. In contrast, the money supplies of sterling area countries had recovered nearly to 1929 levels by 1932, and exceeded those levels thereafter. The experience elsewhere varied. The money supplies of countries outside the sterling area that depreciated their currencies declined even faster than those of the gold bloc before 1933, because of, among other factors, massive monetary contraction in the United States, but rebounded even more quickly than those of the sterling area thereafter. In exchange control countries, where memory of hyperinflation lingered, few steps were taken in the early years of the Depression to offset the decline in money supplies. Still, the suspension of convertibility

prevented a further decline in money supplies subsequently like that experienced by the gold bloc.

In contrast, there was little obvious pattern to fiscal balances across currency areas. In part this reflected the absence of conscious manipulation of fiscal instruments. In the sterling area, budget deficits averaged 1 per cent of government expenditure between 1929 and 1936; elsewhere they averaged 8 per cent whether countries were on or off gold. On a constant employment basis, the fiscal policies of the gold bloc countries were by far the most contractionary. There the fiscal authorities were forced repeatedly to cut public expenditure and raise taxes in order to compress domestic spending, limit imports and defend convertibility.

Just as policymakers were inhibited by the gold standard constraints from pursuing reflationary monetary and fiscal measures, they were prevented from intervening to contain banking panics. Fears that they would be unable to convert deposits into currency led investors to withdraw their balances from the banking system. The standard policy response was for the central bank to lend freely at a punitive rate. Unfortunately, lending freely threatened gold convertibility. Among the individuals withdrawing their balances were those attaching a positive probability to devaluation. As foreign depositors repatriated their funds and domestic residents purchased foreign exchange, the central bank suffered a loss of gold reserves. Supplying additional liquidity threatened to violate gold cover restrictions. Some central banks could suspend those restrictions temporarily or pay a tax to the government if the reserve ratio fell below the statutory minimum. But either action undermined confidence in convertibility and accelerated the drain of international reserves. Raising the central bank discount rate to 8 or 10 per cent was no help. An annualized interest differential of, say, 5 per cent was scarcely sufficient to attract capital inflows when domestic depositors could avoid a capital loss of 20 per cent or more in the event of

devaluation.9/ If anything, a punitive discount rate was taken as a signal that the situation threatened to escape control.

This limit on the capacity of gold standard countries to intervene in support of their banking systems has been emphasized by Eichengreen (1990), Temin (1989) and Bernanke and James (1990). The problem was even more profound than commonly suggested, however. Previous accounts argue that the reserve constraint limited the lender-of-last-resort activities in which gold standard countries could engage. Their central banks could discount bills on behalf of the banking system or engage in expansionary open market operations only until their free reserves were exhausted. In fact, adherence to the gold standard rendered even feasible lender-of-last-resort activities counterproductive. By injecting liquidity into the banking system, the central bank signalled that it attached a higher priority to domestic financial stability than to gold convertibility. As its gold cover ratio declined, the implicit probability of devaluation rose. Domestic depositors had an incentive to get their money out of the country to avoid capital losses on domestic assets in the event of devaluation. The additional liquidity injected into the banking system leaked back out, if anything at an accelerating pace.

Thus, the association of banking panics with the gold standard reflected more than limited ability to engage in lender-of-last-resort activities; it reflected the perverse effects of lender-of-last-resort intervention by countries on gold. An obvious solution to this problem was to suspend convertibility, allow the exchange rate to depreciate, impose exchange controls if necessary, and inject into the banking system however much liquidity was required for domestic financial stability. It is no coincidence, therefore, that those bank failures that occurred after countries went off gold were generally contained before they had a chance to spread.

The alternative to unilateral depreciation was internationally coordinated reflation. Had countries coordinated their reflationary initiatives, they could have countered the downward spiral of economic activity and stabilized their financial systems without endangering gold convertibility. Monetary reflation at home would have stimulated domestic demand. Monetary reflation abroad would have limited the deterioration in the balance of payments.10/ Lender-of-last-resort activities financed by loans of reserves from other central banks would have cut the link between bank failures and convertibility crises and prevented the injection of reserves from leaking back out of the banking system.

The advantages of coordinated action were appreciated. "His Majesty's Government...are convinced that well co-ordinated action between the leading Central Banks is likely to have more effect in improving world conditions than isolated efforts by particular countries," read a 1933 memorandum from the British Embassy to the U.S. State Department.11/ The very rationale for the 1933 World Economic Conference was to negotiate an internationally coordinated response to the global depression. Yet coordinated action proved impossible to achieve. One reason is that policymakers in different countries subscribed to different models of the economy.12/ This is the hypothesis advanced in a different context by Frankel (1988). But I move beyond Frankel's hypothesis by endogenizing policymakers' choice of model, and suggesting that it derived from the different historical experiences of the nations involved.

In Britain, the case for monetary reflation was widely acknowledged. Keynes had provided a fully articulated model of the channels through which monetary expansion operated on the economy in his private evidence to the Macmillan Committee and in his Treatise on Money, published in 1930. British experts, both within and outside of government, urged monetary expansion on the Bank of France and the Federal Reserve, the two central banks that were absorbing gold at a rapid rate. The Bank of England

repeatedly warned the Bank of France that the latter's failure to initiate reflationary policies was limiting the former's freedom of action.13/

Britain's appreciation of the merits of monetary reflation derived from the historical experience of the preceding decade. Discretionary monetary policy undertaken by the Bank of England had not given rise to runaway inflation. To the contrary, the deflation associated with the return to gold and the high interest rates required subsequently to maintain the sterling parity were blamed for the unemployment and slow growth suffered by the British economy since 1925. The effects of monetary restriction were clear to see, rendering the advantages of monetary reflation compelling.

In France, in contrast, monetary reflation was viewed as undesirable. There the Depression was seen as a product of excessive credit creation on the part of central banks that had failed to abide by the rules of the gold standard.14/ In this view, productive capacity worldwide had expanded more rapidly than the supply of monetary gold. Since the demand for money rose with the level of economic activity, lower prices were necessary to provide a matching increase in the supply of real money balances. Under the gold standard, a smooth deflation like that of 1873-1893 was the normal response. But in the 1920s central banks had used discretionary policy to block the downward adjustment of prices. They had recklessly pyramided domestic credit on foreign exchange reserves. Liberal supplies of credit had fueled speculation, raising asset prices to unsustainable heights and setting the stage for their collapse in the autumn of 1929. With this shock, central banks rushed to liquidate their exchange reserves, and prices fell abruptly to more realistic levels. This sudden deflation was far from smooth: it produced bankruptcies among debtors, discouraged investment and disrupted economic activity, provoking the Depression through which the world was suffering.

In this view, the Great Depression was an inevitable consequence of unrealistic policies pursued by central banks in preceding years. To now prevent deflation from running its course threatened to provoke another era of speculative excess and, ultimately, another depression. It was better to allow excess liquidity to be purged and prices to fall to sustainable levels. Only when adjustment had run its course would investors be confident that an era of sound finance was at hand. Only then could recovery commence.

The origins of this view can be traced, once again, to the experience of the preceding decade. In France, discretionary monetary policy before 1927 had given rise to an explosive inflationary spiral. Monetary reflation was associated in the public mind not with prosperity but with financial and political chaos. Stabilization in 1926 had been followed not by monetary stringency and slow growth but by capital inflows and prosperity. It was this experience that led French policymakers to formulate their favored view of the economy.

The U.S. model lay somewhere between these extremes. Federal Reserve officials tended to share the French perspective. They blamed excessive credit creation for the excesses of the Wall Street boom and for the Crash that inaugurated the Depression. Only by purging excessive liquidity from the financial system, they argued, could a sound basis for sustained growth be laid. This "liquidationist view" continued to guide Federal Reserve policy through much of the period. Outside the Fed, pressure for reflationary policy mounted as the Depression persisted. By 1932 Congressional pressure, particularly from the representatives of agricultural and silver-mining states, had become intense. In 1933 the reflationists' arguments were taken on board by the new president, Franklin Delano Roosevelt.

These three very different models of the economy posed an insuperable obstacle to international economic cooperation. The first model led British officials to attach priority

to an international commitment to monetary reflation, and to regard an agreement to stabilize exchange rates as contingent upon that commitment. The second model led French officials to attach priority to exchange rate stabilization and to regard proposals for monetary reflation with suspicion. The United States gravitated over time from the first position to the second. These very different views of the operation of the economy prevented effective international cooperation, rendering currency depreciation a necessary precondition for reflation.

III. The Response to Devaluation

Choudri and Kochin (1981), Eichengreen and Sachs (1985) and Bernanke and James (1990) all have argued that countries that devalued their currencies recovered more quickly from the Great Depression than countries that remained on gold. In this section I reexamine the question, sketching the time profile of the response to devaluation and controlling more precisely for changes in global conditions.

I take a sample of 37 countries, all those for which data could be obtained. Some variables are not available for some countries, which explains the variation across tables in the number of observations.15/ Following Donovon (1981) and Kamin (1988), I center the annual observations for each country on the year of devaluation. Year t, which denotes the central observation, is 1931 for Britain, for example, 1933 for the United States. I analyze the variables of interest from three years prior to devaluation to three years after. Since data are not available for 1939, the seven year window precludes consideration of devaluations taking place in 1936.16/

The first panel of the table shows two measures (mean and median) of the average rate of change of the indicator variable concerned, the number of countries in which the variable rises and falls, the t-test of the null hypothesis that the change in the variable is

zero, and the binomial-sign test of the probability that the indicator in question is equally likely to rise and fall. (The t-statistic is the more powerful test but is valid only under the assumption that the indicator variables are normally distributed.)

Table 4 summarizes the behavior of industrial production. The first line shows that industrial output was growing at an average annual rate of 3.0 per cent three years prior to devaluation. Two years prior to devaluation, however, output fell by an average of 5.4 per cent. It continued downward at approximately the same rate in the year preceding the abandonment of gold. In the year of devaluation, output rose in half of the countries concerned. After a year passed, industrial production was growing rapidly in nearly every country, at an average annual rate of nearly 10 per cent. Recovery spread and accelerated the second post-devaluation year before slowing somewhat in the third.

Table 5 analyzes the behavior of wholesale prices. In the vast majority of countries, prices fell rapidly in all three years preceding devaluation. The cumulative fall was on the order of 20 per cent. With devaluation, deflation halted immediately in nearly half of the countries. The situation remained basically the same in the first post-devaluation year: prices continued to fall in half of the countries, although where they rose they did so at an accelerating pace. By the second post-devaluation year, reflation was quite general. The rise in prices slowed by the third post-devaluation year, as if the nominal effects of devaluation had worked their way through the economy.

Table 6 shows the behavior of the volume of exports. These contracted on average by a total of 17 per cent in the two years preceding devaluation. They stabilized in the year devaluation took place and recovered their lost ground in the three subsequent years. Table 7 indicates that the time profile of nominal exports is essentially the same as that of export volumes, although their pre-devaluation decline is even greater.

Table 8 documents a somewhat different picture on the import side. Import volumes not only declined in the two pre-devaluation years but continued to fall in the year of devaluation. Only in the second and third post-devaluation year is there evidence of their recovery. Table 9 suggests that the relatively large rise in import prices already became apparent in the first post-devaluation year.

Table 10 shows the behavior of international reserves. Reserves declined precipitously in the three years preceding devaluation. There is little evidence that they began to recover contemporaneously with devaluation. In the first post-devaluation year, they continued to decline in fully half the countries, although in a few cases there were relative large gains. In the second post-devaluation year, the recovery of reserves became quite general, though its magnitude remained small. Only in the third post-devaluation year did most countries gain significant quantities of reserves.

This analysis of the aftermath of devaluation paints a picture of rapidly accelerating growth, rapidly rising exports, gradually recovering imports, and a delayed reflux of international reserves. But it is limited to devaluing countries. A more stringent test is to compare devaluing countries with a control group of nations that faced the same global economic conditions but did not depreciate their currencies during this period. This tests the hypothesis that devaluation was followed by recovery not because of any salutary effects of the change in exchange rates but because abandonment of the gold standard happened to coincide with the trough of the Great Depression.

A simple example can illustrate the construction of figures for the control group. Imagine that the analysis is limited to three countries: Britain, the United States and France (the last of which did not devalue between 1930 and 1935 and hence is a member of the control group). t is 1931 for Britain and 1933 for the United States. I control for global economic conditions by comparing British and French performance in 1931 and American

and French performance in 1933. The indicator variables for France for year t are calculated as unweighted averages of the figures for 1931 and 1933. Year t-1 figures for France are averages for French figures for 1930 and 1932; for year t-2 they are averages for 1929 and 1931. Generalizing to the case of more countries is straightforward.

This more stringent test yields weaker results. Devaluing countries grow more quickly than countries in the control group in years t through t+2, but only in years t and t+2 does the difference begin to approach statistical significance at standard confidence intervals. (A negative sign on the second t-statistic in a column indicates a lower value for countries in the control group than for devaluing countries.) Only two years after devaluation is wholesale price inflation significantly more rapid in devaluing countries than in the control group. The recovery of exports is more rapid in devaluing countries than in the control group only in years t, t+1, and t+3. While import volumes fall in the year of devaluation and rise thereafter, there is little discernible difference in the behavior of devaluing countries and the control group.

Why is there such weak evidence of a differential response between devaluing countries and the control group? Part of the reason is likely to be that the control group is small. (It is comprised of only four countries: France, the Netherlands, Switzerland and Poland.) Part of the explanation may also lie in the monetary policies of devaluing countries. Table 11 shows rates of growth of M1 over the devaluation periods. It is evident that devaluing countries hesitated to adopt reflationary monetary policies in the immediate aftermath of devaluation. Even when they subsequently turned to reflation, the monetary stimulus remained tentative.

What accounts for this hesitancy to reflate? To a remarkable extent, policymakers' actions were conditioned by memories of the last episode when the gold standard had been in abeyance. Suspension had been marked by inflation, social turmoil and political

instability. Only when domestic interest groups had agreed to compromise over the distribution of incomes and the burden of taxation and had sealed their compact by reimposing the gold standard had this chaos been vanquished. Now that the gold standard was gone, it was regarded as all the more important for politicians to affirm their commitment to budgetary orthodoxy and for central banks to demonstrate their opposition to inflation. Only as it became clear that inconvertibility was not a threat to price stability did policymakers begin to take on a more active role.

More than a year of experience was required to convince officials that inconvertibility did not pose an inflationary threat. Gradually they moved from accommodating the credit demands of industry and enterprise to a policy of price stabilization, and then to a policy of reflation. But the transformation was slow. As one observer wrote of Sweden, which abandoned gold in 1931, "The Board of Directors of the Riksbank apparently formulated their policies during the first part of 1932 much as though Sweden had not abandoned gold."16/ The gold standard may have disintegrated in 1931, but its ethos continued to influence the formulation of policy even where it no longer prevailed.

IV. Implications for the Performance of Financial and Commodity Markets

The preceding suggests that exchange rate flexibility, by relaxing the external constraint, facilitated the pursuit of policies that sped recovery from the Great Depression. This should not be viewed, however, as a blanket endorsement of floating exchange rates. The advantages of flexibility were predicated on the impossibility of international policy coordination. Moreover, exchange rate variability may have had other costs, in the form of the uncertainties and the relative price variability to which they gave rise.

In Eichengreen (1989) I analyzed the behavior of real and nominal exchange rates under the three interwar international monetary regimes: the free float of 1922-26, the fixed

rates of 1927-31, and the managed float of 1932-36. I found that the variability of real as well as nominal exchange rates declined with the move from free floating to managed floating and from there to fixed rates. It did not follow, however, that policies which rendered real and nominal exchange rates less variable also rendered them proportionately more predictable.

That analysis was based on the behavior of bilateral exchange rates against sterling and on naive forecasting equations. Here I extend the analysis to the behavior of effective exchange rates. I consider also the behavior of other variables, notably interest rates and prices, across the three exchange rate regimes. And I estimate a variety of more sophisticated forecasting equations.

The data for this analysis are taken, in the main, from Einzig (1937) and League of Nations publications. Einzig provided weekly data on spot exchange rates; to render these compatible with the wholesale price and money supply data drawn from Einzig and from League of Nations Monthly Bulletin, monthly averages were taken. Additional exchange rate data were taken from this same League of Nations source. I interpolated along weighted averages of annual data for foreign trade to construct effective exchange rates.18/ The three periods I consider are January 1922 through August 1926 (free floating), January 1927 through August 1931 (fixed exchange rates) and January 1932 through August 1936 (managed floating). The transition periods between regimes are omitted. The division into periods inevitably has an element of arbitrariness. The rationale for this particular periodization is discussed in Eichengreen (1989).

Table 12 displays percentage changes in nominal effective exchange rates under the three regimes. There are pronounced differences across periods. To a large extent, the extreme behavior of nominal rates in 1922-26 is due, however, to the exceptional variability of the German mark. (Given the use of trade weights that include Germany,

this affects each effective rate.) Leaving Germany out of the calculation entirely, as in the bottom panel of the table, changes the picture. (Except where explicitly noted to the contrary, any comparisons across periods cited in the text omit Germany for 1922-26.) The bottom panel suggests that effective nominal rates were about twice as variable under free floating as under managed floating, and 2 1/2 times as variable under managed floating as in the gold standard period.

Table 13 compares the behavior of prices. As measured by the standard deviation of monthly inflation rates, prices were 50 per cent more variable under free floating than under managed floating, and 20 per cent more variable under managed floating than under fixed rates. Though the pattern is the same as in Table 12, differentials in the variability of inflation across periods were small compared to differentials in the variability of nominal exchange rates. This presumably reflects the failure of prices to respond proportionately to month-to-month exchange-rate movements.

Table 14 displays the implications for the behavior of real effective rates. Real rates were roughly 33 per cent more variable under free floating than under managed floating, 66 per cent more variable under managed floating than during the gold standard period. It appears, then, that increased nominal exchange rate variability in the floating periods translated into an increase in the variability of relative prices, although the increase was not proportionate.

A common criticism of policies to stabilize exchange rates is that they simply shift the impact of disturbances onto other variables. The evidence in Table 13 on wholesale price inflation provided little support for this view. Table 15, which considers the variability of interest rates, is more supportive of the hypothesis. The absolute value of the monthly change in the interest rate was larger in the fixed rate period than under free floating for every country but Germany, Switzerland and Britain. The standard deviation

was larger under fixed rates for these three countries and the Netherlands but not for the others. The United Kingdom has an unusually variable nominal interest rate in the gold standard period; this may reflect persistent fears about the capacity of the UK to continue to stabilize its exchange rate. The results for 1932-36 confirm that interest rates were highly variable in countries that attempted to stabilize their exchange rates but whose capacity to do so was seriously tested by the market. The large standard deviations for the United States are dominated by outliers for March and April of 1933, months preceding and contemporaneous with devaluation. The large standard deviations for the Netherlands reflect repeated speculative attacks on a currency still pegged to gold.

Exchange rate variability is not the same thing as exchange rate uncertainty. Yet Table 16 shows that the variability of exchange rates is a good proxy for their predictability, as measured by a naive exchange rate forecast. The log effective nominal rate is regressed on its own lagged value, and the standard deviations of the forecast errors are computed. The forecasting equations have little predictive power, reflecting the well-known random walk character of exchange rate movements. Hence reductions in nominal exchange rate volatility imply commensurate reductions in exchange rate uncertainty. These results suggest that nominal effective rates were twice as difficult to predict under free floating as under managed floating, and 2 1/2 to 3 times as difficult to predict under managed floating as in the gold standard period.

Similar conclusions emerge when we consider predictability at longer horizons. Table 17 regresses the effective nominal rate on itself lagged three and six months.19/ Nominal effective rates three months ahead are about twice as difficult to predict under free floating as under managed floating, 2 1/2 times as difficult to predict under managed floating as under the gold standard. Six months ahead, the comparison between managed floating and

the gold standard period is unchanged; the difference between the periods of free and managed floating is, however, somewhat attenuated.

A limitation of these results is that they fail to employ information on other variables useful for predicting exchange rate movements. Tables 18 and 19 therefore compare forecast errors derived from equations regressing the nominal effective rate on three own lags with forecasts derived from equations to which three lags of money supplies and wholesale prices are added. More information obviously improves the forecasts. Table 19 shows, however, that the improvement is statistically significant only in a minority of cases. Plausibly enough, the additional information has the greatest tendency to make a significant difference in the period of managed floating, when sporadic intervention by the monetary authorities took place.

Tables 17 and 20 show the results of comparable exercises using the real effective rate. When the real rate lagged one month is the only information included in the forecasting equation, real exchange rate variability and real exchange rate predictability point to virtually identical conclusions. Real exchange rate uncertainty, measured by the standard deviation of forecast errors, was 33 per cent greater under free floating than under managed floating, 66 per cent greater under managed floating than in the fixed rate period. The implication, then, is that allowing exchange rates to vary, as in the 1930s, conferred significant costs in terms of increased uncertainty regarding the short-term behavior of relative prices.

This conclusion is modified when real exchange rate forecasts are constructed for longer horizons. At 3 and 6 month intervals, there remains evidence of greater real exchange rate uncertainty under floating than under fixed rates. Yet real rates 3 and 6 months out actually appear to have been more difficult to predict under managed floating in the 1930s than under free floating in the 1920s. One suspects that this may reflect the

nature of underlying real disturbances as much as the effects of the exchange rate regime, however. Future research may be able to separate out these effects.

V. Conclusion

This paper has documented the effects of exchange rates and the external constraint in the interwar years. In the absence of international policy coordination, exchange rate depreciation has been shown to have been a necessary precondition for the adoption of policies promoting recovery from the Great Depression. Those policies were shown to have been highly effective. At the same time, currency depreciation was not without costs. Depreciation both increased the variability of nominal exchange rates and rendered them increasingly difficult to predict. Increased variability and uncertainty about nominal exchange rates carried over to short-term changes in real rates as well. Thus, exchange rate variability appears to have introduced additional noise into the operation of the price mechanism.

From the vantage point of Europe in the 1990s, these results point to an obvious dilemma. Fixed exchange rates have advantages in terms of greater stability and predictability of relative prices. This has been one of the traditional arguments in favor of the European Monetary System. Exchange rates that are systematically stabilized, as in the second half of the 1920s, have similar advantages over exchange rates that are stabilized through sporadic intervention and are subject to periodic realignment, as in the 1930s. This has been one of the arguments from moving from the European Monetary System to a European central bank. The other side of the coin, so dramatically illustrated by the experience of the 1930s, is that fixed rates tighten the external constraint. Eurocrats may argue that nominal exchange rates have lost their ability to affect real variables, even in the short run, or that all significant obstacles to effective policy coordination in Europe have

been removed. But the outside observer would feel more confident seeing systematic evidence on both questions before irrevocable policy decisions are made.

FOOTNOTES

1. A partial list of other authors who subscribe to this view would include Temin and Wigmore (1988), Broadberry (1989) and most of the contributors to Gregory and Butlin (1988).

2. Friedman and Schwartz (1963) and Temin (1976) are, of course, the two classic analyses of the Depression which focus mainly on the United States. The negative view of exchange rate changes in the 1930s derives largely from the influential account of Kindleberger (1973).

3. The countries included in Tables 1-3 (except as noted) are Belgium, France, the Netherlands, Poland and Switzerland (members of the gold bloc), Austria, Bulgaria, Czechoslovakia, Germany, Hungary, Italy and Yugoslavia (countries under exchange control), Australia, Denmark, Finland, New Zealand, Norway, Sweden and the United Kingdom (members of the sterling area), and Brazil, Colombia, Chile, Mexico, Costa Rica, Guatemala, Nicaragua, El Salvador and the United States (other countries with depreciated currencies).

4. Choudri and Kochin (1981) considered Spain and half a dozen smaller European countries that remained on gold for various periods of time. Eichengreen and Sachs (1985) concentrated on ten European countries. Temin (1989) limited his attention to the U.S., the U.K., France and Germany. Bernanke and James (1990) consider a sample of 22 countries and come closest to making this same point.

5. There is a growing consensus that a monetary shock in the U.S. provides at least part of the explanation for the onset of the Depression. See Hamilton (1987, 1988) and Bernanke and James (1990).

6. Eichengreen (1990b), p. 249.

7. League of Nations (1935), p. 221.

8. The label M1 is used loosely. For each country, the figures represent currency plus deposits of commercial banks, as tabulated by the League of Nations in its Monetary Reviews.

9. 20 per cent was the typical rate of depreciation of exchange rates in the month following devaluation. This implies an annualized rate of return on the order of 790%, meaning that even a small probability of devaluation in the next month rendered a single digit interest differential ineffectual.

10. This argument is spelled out at length in Eichengreen (1985).

11. U.S. Department of State (1933), I, p. 466.

12. There is a large literature concerned with other determinants of economic policy decisions in the 1930s. For example, Gourevitch (1984) considers interest group politics, while Weir and Skocpol (1984) examine the role played by the structure of state bureaucracies. It is certain that factors such as these also affected the scope for

international policy coordination. Space limitations permit me to develop here only what I regard as the most novel aspect of the argument, namely the importance of competing conceptual frameworks. For a more extended analysis of one notable attempt to arrange a coordinated response to the Depression, namely the 1933 World Economic Conference, which attempts to incorporate roles for state structures and interest group politics, see Eichengreen and Uzan (1990).

13. A recent discussion of Keynes's Macmillan Committee evidence and its impact is provided by Clarke (1989). A representative sampling of British opinion on Bank of France and Federal Reserve policy may be found in Royal Institute of International Affairs (1931). Correspondence between the Bank of England and the Bank of France is described in Eichengreen (1986).

14. A cogent statement of the prevailing French view is Rist (1933).

15. Appendix A lists the countries in the sample, the subsets included in the various tables, and the sources of data.

16. Since exchange control similarly allowed countries to relax the external constraint, countries utilizing the instrument are treated as having left the gold standard in the year that controls were imposed.

17. Lester (1939), p.241.

18. Trade data are taken from the League of Nations' International Trade Statistics volumes. Appendix B contains a brief description of the methodology used to construct the effective rates.

19. Additional lags were also added. For example, in the column labelled "-3,-4" the exchange rate was regressed on its value lagged both three and four months. The standard deviations of the residuals are reported only for those cases where the additional lag was statistically significant.

Table 1

Percent Change in Industrial Production, 1929-36
(in percentage points)

	1929-32	1929-33	1929-34	1929-35	1929-36
Gold Bloc	-28.2	-22.6	-21.8	-20.6	-13.9
Exchange Control	-35.7	-31.7	-21.2	-10.3	-2.3
Sterling	-8.8	-2.5	+8.9	+18.1	+27.8
Other Depreciators	-17.5	-1.6	+3.3	+14.1	+27.1

Notes: Complete country list appears in footnote 3 to the text. Yugoslavia and Bulgaria are omitted from the averages for exchange control countries, as is Australia from the sterling area, due to missing data. Figures shown are arithmetic averages of country data.

Source: See appendix.

Table 2

Percent Change in M1
(in percentage points)

	1929-32	1929-33	1929-34	1929-35	1929-36
Gold Bloc					
with Switzerland	-5.8	-10.1	-11.7 [1]	N/A	N/A
without Switzerland	-6.1	-10.3	-11.1 [1]	-14.1	-6.9
Exchange Control	-21.3	-23.8	-23.7	-20.8	-19.0 [2]
Sterling	-2.4	0.7	2.8	6.7	-3.9
Other Depreciators [3]	-21.7	-17.1	-9.8	-4.4	9.7

Notes: [1] Missing Beligum in 1934.

[2] Missing Italy in 1936.

[3] Missing Costa Rica, Guatemala, and Nicaragua throughout.

Source: See appendix.

Table 3

Government Deficit as a Share of Expenditure
(in percentage points)

	1929-32	1929-33	1929-34	1929-35	1929-36
Gold Bloc	-3.2	-5.9	-7.6	-7.6	-7.8
Exchange Control	-6.8	-6.0	-7.6	-8.3	-7.8
Sterling	-3.0	-3.8	-2.6	-2.1	-0.8
Other Depreciators	-10.8	-9.6	-9.8	-9.3	-7.9

Notes: Each cell is the unweighted average (across countries in the bloc) of unweighted averages (across the time period for each column) for each country. Data for Germany is missing for 1936; hence that country is omitted from the final column.

Source: See appendix.

Table 4
Industrial Production

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	.0296	-.0541	-.0487	.0141	.0886	.1144	.0668
Median	.0225	-.0520	-.0570	.0100	.0625	.1238	.0970
Change from Previous Period							
Number ↑	15	8	7	12	19	21	19
Number ↓	7	14	16	11	4	2	4
Probability that H_0 true	6.7%	14.3%	4.6%	50%	0%	0%	0%
t-statistic	1.542	-2.496	-2.086	.4658	3.475	5.437	4.236
Total Sample							
Summary Statistics							
Mean	.0248	-.0556	-.0551	.0008	.0831	.1015	.0620
Median	.0189	-.0520	-.0680	-.0100	.0588	.1143	.0861
Change from Previous Period							
Number ↑	17	8	7	12	23	24	23
Number ↓	9	18	20	15	4	3	4
Probability that H_0 true	8.5%	3.9%	1%	34.9%	0%	0%	0%
t-statistic	-.6703	-.1831	-.7444	-1.212	-.5995	-1.655	-.8141

Table 5
WPI

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	-.0364	-.0929	-.0598	.0122	.0310	.0449	.0173
Median	-.0272	-.0940	-.0919	-.0213	-.0024	.0310	.0227
Change from Previous Period							
Number ↑	8	6	4	12	13	22	21
Number ↓	19	22	24	16	15	6	7
Probability that H_0 true	2.5%	0%	0%	30%	43%	0%	1%
t-statistic	-2.676	-6.401	-2.470	.4248	1.379	2.224	1.021
Total Sample							
Summary Statistics							
Mean	-.0388	-.0939	-.0666	-.0027	.0208	.0373	.0152
Median	-.0394	-.0995	-.1101	-.0260	-.0108	.0183	.0181
Change from Previous Period							
Number ↑	8	6	4	12	13	23	23
Number ↓	23	26	28	20	19	9	9
Probability that H_0 true	0%	0%	0%	10.5%	19%	1%	1%
t-statistic	-.5309	-.1998	-.8395	-1.547	-1.353	-1.116	-.3761

Table 6
Volume of Exports

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	.0336	-.0548	-.1171	-.0159	.1608	.0448	.0381
Median	0.0000	-.0436	-.1210	-.0640	.0970	.0380	.0350
Change from Previous Period							
Number ↑	12	9	5	11	20	16	16
Number ↓	12	16	20	14	5	9	9
Probability that H_0 true	50%	11.4%	0%	34.5%	0%	11.4%	11.4%
t-statistic	.7229	-1.155	-2.739	-.2545	2.769	1.454	1.463
Total Sample							
Summary Statistics							
Mean	.0301	-.0547	-.1143	-.0296	.1412	.0453	.0339
Median	-.0038	-.0717	-.0822	-.1230	.0660	.0506	.0190
Change from Previous Period							
Number ↑	13	10	5	11	21	19	17
Number ↓	14	18	23	17	7	9	11
Probability that H_0 true	50%	12.7%	0%	16.5%	1%	4.5%	16.5%
t-statistic	-.2410	.0098	.2060	-.6907	-1.069	.0471	-.5088

Table 7
Nominal Exports

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	-.0488	-.1595	-.1934	-.0566	.1216	.1328	.0810
Median	.0070	-.1540	-.1818	-.0769	.0709	.0764	.0805
Change from Previous Period							
Number ↑	16	3	4	15	24	26	24
Number ↓	15	29	28	17	8	6	8
Probability that H_0 true	50%	0%	0%	42%	0%	0%	0%
t-statistic	-1.345	-6.110	-6.450	-1.262	2.209	3.268	2.708
Total Sample							
Summary Statistics							
Mean	-.0507	-.1664	-.2014	-.0639	.1051	.1278	.0814
Median	-.0090	-.1596	-.2187	-.1014	.0582	.0332	.0678
Change from Previous Period							
Number ↑	16	3	4	15	24	27	26
Number ↓	18	32	31	20	11	8	9
Probability that H_0 true	42.2%	0%	0%	24.9%	1.9%	0%	0%
t-statistic	-.1885	-.0415	-.5544	-1.301	-1.165	-1.103	-.7392

Table 8
Volume of Imports

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	.0326	-.1267	-.1069	-.1408	.0057	.1171	.0735
Median	.0495	-.0797	-.0813	-.1492	.0155	.1070	.0622
Change from Previous Period							
Number ↑	16	8	8	4	13	19	20
Number ↓	7	16	16	20	11	5	4
Probability that H_0 true	4.6%	7.5%	7.5%	0%	41.9%	0%	0%
t-statistic	.8608	-3.457	-2.918	-3.604	.2026	3.911	3.417
Total Sample							
Summary Statistics							
Mean	.0327	-.1208	-.1073	-.1421	.0083	.1047	.0652
Median	.0303	-.0440	-.0690	-.1397	.0155	.0943	.0529
Change from Previous Period							
Number ↑	18	9	8	4	14	20	21
Number ↓	8	18	19	23	13	7	6
Probability that H_0 true	3.9%	6%	2.5%	0%	50%	1%	0%
t-statistic	.0004	.4929	-.0329	-.1028	.2833	-1.273	-1.183

Table 9
Nominal Imports

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	-.0886	-.1930	-.2232	-.0739	.0977	.2108	.0831
Median	-.0396	-.1986	-.1913	-.1312	.0388	.1917	.0815
Change from Previous Period							
Number ↑	15	3	6	14	16	29	23
Number ↓	16	29	26	18	16	3	9
Probability that H_0 true	50%	0%	0%	30%	50%	0%	1%
t-statistic	-2.833	-5.939	-6.509	-1.588	1.825	4.714	2.748
Total Sample							
Summary Statistics							
Mean	-.0875	-.1869	-.2181	-.0875	.0705	.1952	.0799
Median	-.0546	-.1726	-.1997	-.1495	-.0380	.1906	.0729
Change from Previous Period							
Number ↑	15	3	6	14	16	30	25
Number ↓	19	32	29	21	19	5	10
Probability that H_0 true	29.4%	0%	0%	15.4%	36.7%	0%	1%
t-statistic	.1225	.0883	-.2920	-.8984	-.9375	-.2257	-.3372

Table 10
Reserves

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	-.0761	-.0790	-.1975	.0032	.0266	.0025	.1858
Median	-.0628	-.0380	-.1930	-.0046	-.0015	.0260	.1520
Change from Previous Period							
Number ↑	6	9	4	11	12	17	21
Number ↓	18	16	22	15	14	9	4
Probability that H_0 true	1%	11.4%	0%	28%	42%	9.0%	0%
t-statistic	-2.696	-1.871	-4.173	.0744	.4318	.0527	3.888
Total Sample							
Summary Statistics							
Mean	-.0720	-.0694	-.1718	-.0018	.0136	-.0024	.1560
Median	-.0628	-.0372	-.1820	-.0058	-.0427	.0057	.1334
Change from Previous Period							
Number ↑	7	11	6	12	12	17	21
Number ↓	19	17	23	17	17	12	7
Probability that H_0 true	9%	16.5%	0%	22.8%	22.8%	22.8%	1%
t-statistic	.5316	.7033	1.702	-.3695	-.6821	-.3345	-1.976

Table 11
M1

	Year Relative to Devaluation						
	T-3	T-2	T-1	T	T+1	T+2	T+3
Devaluing Countries							
Summary Statistics							
Mean	.0045	-.0401	-.0424	.0364	.0531	.0374	.0603
Median	.0184	-.0148	-.0330	.0151	.0296	.0406	.0546
Change from Previous Period							
Number ↑	14	11	5	17	18	22	23
Number ↓	12	16	22	10	9	5	3
Probability that H_0 true	42%	22%	0%	12.3%	6%	0%	0%
t-statistic	.2833	-1.792	-1.380	1.547	2.795	3.754	4.256
Total Sample							
Summary Statistics							
Mean	.0074	-.0353	-.0422	.0274	.0451	.0331	.0598
Median	.0231	-.0089	-.0294	.0049	.0215	.0221	.0491
Change from Previous Period							
Number ↑	16	13	6	17	19	23	24
Number ↓	13	17	24	13	11	7	3
Probability that H_0 true	35.4%	29%	0%	29%	10.3%	0%	0%
t-statistic	.5790	.7043	.0296	-1.244	-1.376	-1.388	-.1806

TABLE 12

STANDARD DEVIATIONS OF CHANGE IN SPOT RATES: MONTHLY EFFECTIVE (TRADE-WEIGHTED) NOMINAL EXCHANGE RATES IN LOGS
(log EER_t - log EER_{t-1})

	Period 1 1922.01-1923.06 1924.01-1926.07	Period 2 1927.01-1931.07	Period 3 1932.01-1935.10 1936.01-1936.07
Belgium	.28824	.00813	.04082
Germany[1]	.29350	.00752	.01409
Netherlands	.32306	.00301	.00992
Italy	.31308	.02137	.01769
USA	.32803	.00674	.03246
France	.29260	.00552	.01385
Switzerland	.31680	.00737	.00877
Sweden	.32344	.00381	.03871
Norway	.32638	.00784	.03944
Denmark	.31459	.00402	.04275
Finland	.33165	.00998	.04274
UK	.32425	.01442	.01972
mean	.31470	.00831	.02675

[1] 1923.01 and onwards only.

Without Germany

	1922.01-1926.07	1927.01-1931.07	1932.01-1935.10 1936.01-1936.07
Belgium	.03712	.00546	.03866
Netherlands	.05438	.00406	.01158
Italy	.04970	.01891	.01706
USA	.04681	.00677	.02354
France	.03145	.01048	.01654
Switzerland	.04444	.01396	.00556
Sweden	.03459	.00729	.02049
Norway	.04628	.01141	.02146
Denmark	.03770	.00366	.02335
Finland	.05846	.00712	.03138
UK	.04080	.00298	.01647
mean	.04379	.00837	.02055

Source: see text.

TABLE 13

MONTHLY PERCENTAGE CHANGE IN WHOLESALE PRICES
[mean & standard deviation in per cent]

	# of obs	mean	S.D.	kurtosis	skewness
1922.01-1926.08					
USA	55	1.545	1.220	7.652	-4.540
France	55	1.723	4.017	1.068	-0.125
Belgium	55	1.604	4.374	1.532	0.608
Netherlands	55	-0.273	1.790	0.373	-0.045
Italy	55	0.414	1.946	0.087	-0.002
Switzerland	55	-0.275	1.554	1.489	0.522
UK	55	-0.167	1.178	-0.752	-0.022
Group w/o Ger.	385	0.653	2.297	N/A	N/A
Ger. 1/22-6/23	18	63.750	70.264	2.813	1.628
Ger. 2/24-8/26	30	-0.049	1.904	1.228	-0.086
Group w/ Ger.	433	3.227	5.095	N/A	N/A
1927.01-1931.08					
USA	55	-0.523	0.998	-0.799	-0.135
France	55	-0.595	1.343	-0.859	0.083
Belgium	55	-0.590	1.099	-0.574	-0.277
Netherlands	55	-0.774	1.508	-0.799	-0.080
Italy	55	-1.075	1.394	1.159	-1.014
Switzerland	55	-0.535	0.935	0.344	0.183
Germany	55	-0.376	0.943	0.009	-0.017
UK	55	-0.656	1.012	-0.468	0.094
Group	440	-0.640	1.154	N/A	N/A
1932.01-1936.08					
USA	55	0.362	1.527	2.129	0.999
France	55	-0.072	1.641	-0.012	0.512
Belgium	55	0.104	2.287	25.348	4.521
Netherlands	55	-0.220	1.461	-0.319	0.038
Italy	55	0.035	1.293	-0.446	0.267
Switzerland	55	-0.145	0.988	-0.916	-0.247
Germany	55	0.084	0.671	0.609	-0.310
UK	55	0.122	1.044	-0.325	0.110
Group	440	0.034	1.364	N/A	N/A

NOTE: Wholesale price data are from Einzig (1937). Statistics are constructed using procedures described in the text.

Source: see text.

TABLE 14

STANDARD DEVIATIONS OF MONTHLY CHANGE IN REAL EFFECTIVE EXCHANGE RATES:
$\log REER_t - \log REER_{t-1}$
(Trade-weighted)

	Period 1	Period 2	Period 3
	1923.01-1923.06 1924.01-1926.07	1927.01-1931.07	1932.01-1935.10 1936.01-1936.07
Belgium	.07842	.01247	.02706
Germany	.04682	.00747	.02407
Netherlands	.05092	.01331	.01718
Italy	.05746	.01702	.02023
USA	.04674	.01180	.02830
France	.07507	.01489	.02085
Switzerland	.04274	.01160	.01265
Sweden	.04774	.00747	.03862
Norway	.04756	.01140	.04108
Denmark	.04853	.01117	.03965
Finland	.04450	.01352	.04175
UK	.32425	.01442	.01972
mean	.05277	.01228	.02781

W/O Germany & Finland

	1922.01-1926.07	1927.01-1931.07	1932.01-1935.10 1936.01-1936.07
Belgium	.02304	.00961	.02503
Netherlands	.02988	.01407	.01817
Italy	.02730	.01551	.01632
USA	.02877	.01158	.01951
France	.02471	.01280	.01551
Switzerland	.02775	.01325	.01419
Sweden	.09150	.00829	.01914
Norway	.03016	.01377	.02119
Denmark	.02040	.01055	.01990
UK	.01711	.00772	.01823
mean	.02483	.01172	.01872

Note: Because WPI data for Finland begin only in 1923, in the top panel Period 1 omits 1922.

Source: see text.

TABLE 15

PERCENTAGE CHANGE IN SHORT-TERM INTEREST RATES
[mean and standard deviation in parentheses]

	# of obs	mean	S.D.	kurtosis	skewness
1922.01-1926.08					
USA	55	0.028	7.915	4.713	-1.023
France	55	0.454	5.045	1.735	0.644
Belgium	55	0.619	3.967	12.639	2.903
Netherlands	55	0.555	17.519	1.111	0.813
Italy	55	0.477	3.048	2.681	0.572
Switzerland	55	0.717	14.981	4.978	1.910
UK	55	1.166	13.480	12.591	2.645
Group w/o Ger.	385	0.577	9.422	N/A	N/A
Ger. 1/22-6/23	18	34.310	92.610	7.360	2.766
Ger. 2/24-8/26	30	-5.730	12.430	4.036	0.483
Group w/ Ger.	433	1.537	13.120	N/A	N/A
1927.01-1931.08					
USA	55	-2.050	8.178	1.645	-1.241
France	55	-1.370	11.146	6.924	1.680
Belgium	55	-0.667	6.387	3.621	0.040
Netherlands	55	-0.854	11.086	1.676	0.486
Italy	55	-0.764	4.627	2.932	-0.510
Switzerland	55	-0.521	8.492	7.939	2.031
Germany	55	2.350	11.330	4.224	1.957
UK	55	1.081	16.876	20.178	3.771
Group	440	-0.349	9.765	N/A	N/A
1932.01-1936.08					
USA	55	4.287	63.160	34.570	5.512
France	55	3.656	26.300	6.335	2.038
Belgium	55	-1.243	5.378	2.183	-0.539
Netherland	55	14.726	93.790	22.231	4.396
Italy	55	-0.717	6.658	4.463	1.461
Switzerland	55	0.683	5.884	15.823	3.382
Germany	55	-1.490	4.425	7.863	-1.311
UK	55	-1.429	24.846	2.820	1.265
Group	440	2.309	28.805	N/A	N/A

Source: Interest rate data are from Einzig (1937).

TABLE 16

EXCHANGE RATE PREDICTABILITY
(STANDARD DEVIATIONS OF RESIDUALS FROM EXCHANGE RATE FORECASTS)
EFFECTIVE NOMINAL EXCHANGE RATE
(in logs)
MONTHLY DATA

	Period 1 1922.01-1923.06 1924.01-1926.07	Period 2 1927.01-1931.07	Period 3 1932.01-1935.10 1936.01-1936.07
Denmark	.25533	.00340	.04023
Germany	.26396	.00869	.04211
Norway	.26491	.00706	.03858
Sweden	.26173	.00378	.03744
Switzerland	.25874	.00659	.00872
USA	.26312	.00674	.03227
France	.23938	.00510	.01283
Netherlands	.26054	.00289	.00964
Belgium	.23704	.00794	.04082
Italy	.25070	.01809	.01746
Germany[1]	.21111	.00746	.01401
UK	.26354	.01431	.01914
mean	.25251	.00767	.02610

[1] 1923.01-1923.06 and 1924.01-1926.07 only.

w/o Germany

	1922.01-1926.07	1927.01-1931.07	1932.01-1935.10 1936.01-1936.07
Denmark	.03681	.00317	.02285
Finland	.05764	.00700	.03084
Norway	.04525	.01127	.02117
Sweden	.03457	.00720	.02001
Switzerland	.04429	.01333	.00553
USA	.04680	.00674	.02332
France	.03127	.00897	.01643
Netherlands	.05435	.00406	.01132
Belgium	.03603	.00541	.03843
Italy	.04849	.01517	.01470
UK	.03948	.00282	.01594
mean	.04318	.00774	.02005

Source: see text.

TABLE 17
EXCHANGE RATE PREDICTABILITY
STANDARD DEVIATIONS FOR VARIOUS LAG STRUCTURES
OF RESIDUALS FROM EFFECTIVE EXCHANGE RATE FORECASTS

	Period 1				Period 2				Period 3			
# of Log	-3	-3,-4	-6	-6,-7	-3	-3,-4	-6	-6,-7	-3	-3,-4	-6	-6,-7
				Nominal								
Nether-lands	.0982	--	.1261	--	.0097	.0073	.0167	.0119	.0218	--	.0292	--
Belgium	.0689	--	.0815	--	.0134	.0068	.0174	.0105	.0708	--	.1013	--
France	.0632	--	.0798	--	.0189	.0116	.0186	.0143	.0357	.0322	.0547	.0512
Italy	.0845	--	.1034	--	.0147	--	.0101	--	.0528	.0462	.1031	.0869
Sweden	.0585	--	.0709	--	.0183	.0109	.0241	.0156	.0427	.0397	.0677	.0632
UK	.0672	.0615	.0745	--	.0052	--	.0085	.0077	.0325	.0312	.0544	.0500
Finland	.0953	--	.1213	--	.0193	.0118	.0300	.0199	.0641	.0575	.0766	--
US	.0805	--	.0927	--	.0161	.0135	.0207	.0157	.0526	.0462	.0878	.0750
Denmark[1]	.0790	.0762	.1396	.1319	.0067	.0053	.0102	.0080	.0419	.0360	.0622	.0506
Germany[1]	.0504	.0469	.0603	.0538	.0184	.0147	.0241	.0176	.0257	--	.0334	--
Norway	.0774	--	.1113	--	.0308	.0207	.0499	.0380	.0456	.0404	.0711	.0625
Swltz	.0743	.0689	.0712	--	.0338	.0204	.0451	.030	.0097	--	.0139	--
mean	.0748	--	.0944	--	.0171	--	.0230	--	.0413	--	.0630	--
				Real (w/o Finland & Germany)								
Nether-lands	.0410	--	.0464	--	.0241	--	.0326	.0297	.0341	--	.0495	--
Belgium	.0323	--	.0338	.0318	.0146	--	.0135	--	.0464	--	.0639	--
France	.0312	--	.0313	--	.0241	.0234	.0309	.0285	.0290	--	.0393	--
Italy	.0416	--	.0482	--	.0277	--	.0173	--	.0390	--	.0523	.0457
Sweden	.0298	--	.0340	--	.0177	.0165	.0273	.0247	.0390	--	.0569	--
UK	.0239	--	.0268	--	.0122	--	.0167	--	.0350	.0345	.0567	.0517
Finland[2]	.0354	--	.0469	--	.0253	--	.0384	--	.0459	.0428	.0565	--
US	.0416	--	.0414	--	.0237	--	.0271	--	.0358	--	.0524	.0489
Denmark[1]	.0334	--	.0401	.0377	.0154	.0150	.0168	--	.0394	.0343	.0580	.0500
Germany[1]	.0284	.0237	.0322	.0298	.0170	.0160	.0257	--	.0388	.0363	.0617	.0580
Norway	.0486	--	.0694	--	.0314	.0276	.0477	.0430	.0442	.0416	.0660	.0616
Swltz	.0440	--	.0441	--	.0308	.0261	.0401	--	.0242	--	.0303	--
mean	.0359	--	.0412	--	.0220	--	.0278	--	.0375	--	.0536	--

Notes: Blanks indicate that regressions to create residuals yielded coefficients on extra lags that were not statistically significant at standard confidence levels.

1 1924.01-1926.08 only
2 1923.01-1926.08 only

TABLE 18

STANDARD DEVIATIONS OF RESIDUALS OF LOG EXCHANGE-RATE FORECASTS USING EFFECTIVE NOMINAL RATES[1]

	Period 1 1922.01-1926.08		Period 2 1927.01-1931.08		Period 3 1932.01-1936.08		
	A	B	A	B	A	B	C
Finland	.0551[4]	.0509[4]	.0036	.0032	.0265	.0222	.0223
Denmark	.0340	.0318	.0024	.0019	.0204	.0191	.0191
Sweden	.0342	.0314	.0040	.0037	.0176	.0157	.0161
Norway	.0459	.0424	.0070	.0054	.0163	.0159	.0157
Nether	.0538	.0457	.0027	.0023	.0107	.0102	N/A
Switz	.0414	.0388	.0044	.0025	.0050	.0045	N/A
France	.0279	.0254	.0035	.0034	.0145	.0139	.0137
Italy	.0480	.0437	.0070	.0061	.0113[3]	.0081[3]	N/A
UK	.0380	.0347	.0020	.0019	.0147	.0141	.0131
USA[2]	.0444[2]	.0434[2]	.0043	.0041	.0178	.0111	N/A
Belgium	.0342	.0302	.0026	.0025	.0378	.0316	N/A
Germany	N/A	N/A	N/A	N/A	N/A	N/A	N/A
mean w/o Germany	.0415	.0380	.0039	.0034	.0175	.0151	--

Notes:

1 Effective exchange rates do not include Germany.
2 1922.02 to 1926.08 only.
3 1932.01 to 1935.11 only.
4 1923.01 to 1926.08 only.

A: $\log s_T = \alpha + \beta_1 \log s_{T-1} + \beta_2 \log s_{T-2} + \beta_3 \log s_{T-3} + \varepsilon_T$

B: $\log s_T = \alpha + \beta_1 \log s_{T-1} + \beta_2 \log s_{T-2} + \beta_3 \log s_{T-3} + \beta_4 \log M_{T-1} + \beta_5 \log M_{T-2} + \beta_6 \log M_{T-3} + \beta_7 \log WPI_{T-1} + \beta_8 \log WPI_{T-2} + \beta_9 \log WPI_{T-3}$

C: Same as B except M1 is used instead of currency in circulation. Data for deposits available only starting in 1932.

Source: see text.

TABLE 19

SIGNIFICANCE OF ALTERNATIVE INFORMATION SETS IN FORECASTING EQUATIONS

F statistics

	Period 1 A vs B	Period 2 A vs B	Period 3 A vs B	Period 3 A vs C
Finland	0.88[1]	2.02	2.97*	2.97*
Denmark	1.03	5.01*	1.00	1.04
Sweden	1.36	1.23	1.82	1.38
Norway	1.22	4.62	0.43	0.55
Netherlands	2.73*	2.55*	0.71	N/A
Switzerland	0.96	15.57*	1.67	N/A
France	2.09	0.21	0.65	0.83
Italy	1.47	2.19	5.28*[3]	N/A
UK	1.41	1.00	0.54*	N/A
USA	3.13[2]	0.61	11.23*	N/A
Belgium	2.04	0.18	3.09*	N/A

Notes:

1 $F_{6, 31}$

2 $F_{6, 42}$

3 $F_{6, 33}$

H_0 is that all the lags of WPI and M jointly equal 0.

$F_{6,43}$ unless otherwise noted.

$F_{6,43}$: 5% = 2.32 * = significant at 5% level

$F_{6,31}$: 5% = 2.41

Source: Based on Table 18.

TABLE 20

EXCHANGE RATE PREDICTABILITY
(STANDARD DEVIATIONS OF RESIDUALS FROM EXCHANGE RATE FORECASTS)
MONTHLY REAL EXCHANGE RATES, TRADE-WEIGHTED, IN LOGS

	Period 1 1923.01-1923.06 1924.01-1926.07	Period 2 1927.01-1931.07	Period 3 1932.01-1935.10 1936.01-1936.07
Denmark	.04848	.01088	.03824
Finland	.04433	.01273	.04119
Norway	.04748	.01109	.04041
Sweden	.04767	.00738	.03766
Switzerland	.04236	.01051	.01254
USA	.04674	.01178	.02815
France	.06774	.01436	.02063
Netherlands	.05043	.01321	.01713
Belgium	.07068	.01247	.02706
Italy	.05483	.01700	.01930
Germany	.04679	.00730	.02390
UK	.04660	.01517	.02169
mean	.05113	.01290	.02733

[1] 1923.01-1923.06 & 1924.01-1926.07.

W/O Germany and Finland

	1922.01-1926.07	1927.01-1931.07	1932.01-1935.10 1936.01-1936.07
Denmark	.02156	.01044	.01962
Norway	.03004	.01366	.02082
Sweden	.01896	.00824	.01894
Switzerland	.02700	.01325	.01411
USA	.02779	.01152	.01916
France	.02268	.01256	.01492
Netherlands	.02835	.01386	.01793
Belgium	.02225	.00932	.02497
Italy	.02596	.01532	.01619
UK	.01797	.00760	.01776
mean	.02426	.01158	.01844

Source: see text.

APPENDIX A

Devaluing Countries, by Year of Devaluation and Members of the Control Group

1929	1931	1932	1934
Argentina	Mexico	Colombia	Czechoslovakia
	Canada	Costa Rica	Italy
	United Kingdom	Ecuador	
1930	Denmark	Nicaragua	1935
	Norway	Chile	
Australia	Sweden	Greece	Belgium
Brazil	Finland	Yugoslavia	
New Zealand	El Salvador	Paraguay	
Venezuela	Japan	Uruguay	Control Group
	Ireland		
	Austria	1933	Poland
	Germany		France
	Hungary	United States	Netherlands
	Bulgaria	Guatemala	Switzerland

Countries Excluded from Each Table due to Missing Data

Industrial Production: Australia, Venezuela, Ireland, Ecuador, Yugoslavia, Czechoslovakia, Bulgaria, Uruguay, Paraguay, and Argentina (1926/27 - 1927/28 only).

M1: Austria, Costa Rica, Nicaragua, Paraguay, Guatemala, and Czechoslovakia (1937/38), Switzerland, Argentina (1926/27), France and the Netherlands (1937/39 only).

Volume of Exports: Ecuador, Nicaragua, Yugoslavia, Guatemala, Czechoslovakia, Paraguay, Italy, Switzerland and Argentina (1926/27).

Volume of Imports: Same as Volume of Exports, except Uruguay is also excluded.

Nominal Imports and Nominal Exports: Switzerland and Argentina (1926/27).

WPI: Costa Rica, Nicaragua, Guatemala and Paraguay.

Reserves: Paraguay, Mexico, Costa Rica, Greece, Nicaragua, Brazil, Switzerland, Bulgaria (1927/28 only), Denmark (1936/37 only), Chile (1930/31), New Zealand (1928/29) and Argentina (1926/27).

APPENDIX B
Construction of Effective Exchange Rates

From the League of Nations International Trade Statistics volumes, I gathered annual data on bilateral imports and exports among the following countries: Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland, the United Kingdom, and the United States. Trade weights, for each country, w_{ij}, were constructed as:

$$w_{ij} = \frac{x_{ij} + m_{ij}}{x_i + m_i}$$

where x_{ij} and m_{ij} are the value, in the currency of country i, of the exports and imports of country i with country j; and x_i and m_i are the sums of the x_{ij} and m_{ij} (summing across all 11 trading partners considered in this study).

When considering a subset of the 12 country sample, I do not alter the trade weights, w_{ij}.

These trade weights are annual, whereas the exchange rate data are monthly. I interpolate to develop monthly weights. For example, the January 1931 trade weight for each country equals 50% of the 1931 and 50% of the 1932 annual trade weights. Effective nominal and real exchange rates are then construted as:

$$EER_{i,t} = \sum_{j=1}^{11} w_{ij} S_{ij}$$

S_{ij} = spot exchange rate in units of currency of country j per unit of country i's currency

t = time, monthly

and:

$$REER_{i,t} = \sum_{j=1}^{11} w_{ij} S_{ij} \frac{P_i}{P_j}$$

where P_i = price level of country i

P_j = price level of country j

APPENDIX C
Macroeconomic Data for Tables 4-11

Exports and Imports. Special trade, which excludes gold and silver bullion and specie. Current values, in local currency, are from League of Nations publications on trade when available, and supplemented with Mitchell (1981).

Volume of Exports and Imports. These data are special trade whenever possible. However, in several cases, volume figures were reported for general trade only. Source is the League of Nations publications on trade, supplemented with Thorp (1984) for Latin America where League of Nations data were not available. The League of Nations publications report volume figures for 1927 to 1935 only. For 1936 to 1938, I used nominal exports (imports) divided by League export (import) price indices.

Wholesale Price Indices (WPI). European figures are from the League of Nations Statistical Yearbooks. For Latin America, Mitchell and Thorp were also used. The base year is 1929. For some Latin American countries for which consistent wholesale price indices were not available, consumer price indices were used instead. For El Salvador and Ecuador, national government publications were used. Butlin (1962) was used for Australia.

Industrial Production. Data for Belgium, Ireland, Poland, and New Zealand are from Mitchell (1981, 1983). For Central and South America, except Chile, Thorp (1984) was used. The League of Nations Statistical Yearbooks provided data for all other countries.
Money Supply. Derived from the League of Nations Memorandum on Currency and Finance. M1 is the sum of coins and currency in circulation and demand (sight) deposits.

Reserves. Foreign reserves are the sum of gold and foreign exchange held as reserves by each country's monetary authority in local currency at current exchange rates. These are reported as separate items in the League of Nations Statistical Yearbooks and Memorandum on Currency and Banking. Gold reserves are reported at constant parity.

Sources and Documents Cited in Appendix C

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