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BRETTON WOODS AND ITS PRECURSORS: RULES VERSUS DISCRETION IN THE HISTORY OF INTERNATIONAL MONETARY REGIMES

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ABSTRACT

In recent years, the theory of rules and discretion in monetary policy has fascinated scores of academic economists and policymakers alike. This paper asks whether it can be applied to understand the history of the world monetary system, by focusing on the setup and the experience of the Bretton Woods regime, and comparing it with its predecessors, in particular the classical gold standard. The paper first discusses the underpinnings, and some of the problems, of a theory of the evolution of the international monetary regime based on alternating rules and discretion. It then assesses the ability of such theories to explain the historical record. It first reviews the rules that characterized the classical gold standard, and the motivations to return to gold in the interwar period. Then it evaluates the British and US plan for world monetary reform published in 1943, and the IMF Articles of Agreement. Finally, the paper analyzes the data on interest rates and exchange rates during the classical gold standard and the Bretton Woods period to assess the stabilizing properties of the two exchange-rate regimes.

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1 Introduction

Are there predictable cycles in exchange-rate regimes? Can these cycles be predicted in terms of the rules-versus-discretion theory of monetary policy? Historical experience of the last 100 years provides a fascinating testing ground for this hypothesis. The classical gold standard was disrupted by the World War I. After that, the majority of countries in the world returned to gold. The subsequent abandonment of gold occurred at a time of unprecedented economic and financial instability, and was followed by beggar-thy-neighbor trade policies and further political and economic instability. In the second postwar period, fixed exchange rates were reestablished. They broke down with the Viet-Nam era and the oil shock. They are being pursued again by European countries, both within and outside the European Community.

These events seem to suggest that floating rates are temporary arrangements are resorted to whenever large enough shocks hit the world economy, but that, in the absence of shocks, countries go back to fixed rates. The rules-versus-discretion theory says that fixed exchange rates provide valuable commitments to national monetary authorities. Governments abandon these commitments only when exogenous shocks make it too onerous to "tie the hands" of monetary authorities.

In recent years, the theory of rules and discretion in monetary policy has fascinated scores of academic economists and policymakers alike. This paper asks whether it can be applied to understand the history of the world monetary system, by focusing on the setup and the experience of the Bretton Woods regime, and comparing it with its predecessors, in particular the classical gold standard. Section 2 discusses the underpinnings, and some of the problems, of a theory of the evolution of the international monetary regime based on alternating rules and discretion. Section 3 describes the rules that characterized the classical gold standard, and the motivations to return to gold in the interwar period. Section

4 evaluates—in light of the theories discussed in section 2—the British and US plan for world monetary reform published in 1943, and discusses the IMF Articles of Agreement. Section 5 contains an empirical analysis of the stabilizing properties of the gold standard and Bretton Woods rules. Section 6 offers a few concluding remarks.

2 Elements of a Theory of Exchange-Rate Regimes as Rules and Discretion

In the debate on monetary policy, the idea that fixed rules might improve the performance of monetary institutions has been a recurrent one. The earliest proponents of the superiority of rules were the members of the so called currency school, opposing the banking school in the debate on the statute of the Bank of England. In the first half of the 20th century, the superiority of rules was most prominently claimed by the Cunliffe Committee (1918) and Simons (1936).[1] The same idea has spurred a large amount of academic research on monetary policy in the last fifteen years, after the work of Kydland and Prescott (1977) Calvo (1978), Fischer (1980) and Barro and Gordon (1983) and has been exploited in the very recent discussions on the European Monetary System and exchange-rate policies of European countries outside the European Community. Several European policymakers, both within and outside the European Monetary System, have claimed that the "discipline" associated with a fixed exchange rate system, rather than making the job of monetary authorities harder, could actually help them fighting inflation more effectively.

In this section I explore an application to the rules-versus-discretion theory of monetary policy to the history of international monetary regimes. The basic hypothesis is that, if monetary policy rules are, under some conditions, preferred over discretion, countries would have a tendency to use them to constrain monetary authorities.

I do not present a formal model of the advantages of monetary policy rules for two reasons. First, a model of monetary policy rules, to add significantly to the existing literature,[2]

needs some detail on the monetary transmission mechanism, which in the past 100 years has arguably adapted to technical progress and regulatory changes in financial markets, and to changes of wage contracting and pricing practices. Studying the effects of monetary policy and the adjustment mechanism during the Gold Standard and Bretton Woods is beyond the scope of this paper.[3] I will not refer to a specific model of the monetary transmission mechanism also to highlight the generality of the central results of the rules-versus-discretion literature.

The basic assumptions are three:

1. That monetary authorities' objectives do not coincide with the equilibrium the economy tends to settle at;
2. That monetary policies' effects on the economy depend on the extent to which they surprise the public;
3. That the public forms expectations rationally.

Two typical illustrations of assumption 1 are *(i)* the case of imperfectly competitive trade unions and/or price setters and *(ii)* the case of inflationary financing of budget deficits. In case *(i)* monetary authorities want to manipulate prices and exchange rates so as to affect the level of output (with monopolistic price and wage setters the level of output is "too low"). In case *(ii)* monetary authorities want to finance budget deficits at a minimum cost in terms of distortions. A third illustration, close to the second one, is that of monetary authorities attempting to lower the real interest rate to ease the cost of financing budget deficits.

Assumption 2 means that if the public can correctly anticipate policy actions, it will try to minimize any undesirable effects of them (see assumption 1 on the conflict between the monetary authority and the public), by taking actions so as to neutralize them. Assumption

3 means that monetary authorities cannot manipulate private expectations.

The implication of assumptions 1–3 is that in economies where monetary authorities are not subject to rules explicitly designed to prevent them from creating inflation, the equilibrium is one where the attempts of the authorities to surprise the public are frustrated by the public's anticipation of such behavior: inflation is higher and expansionary monetary policies are neutralized. What is the value of monetary rules? If such rules are credible, in the sense that the government cannot renege on them, the public forms expectations assuming that the rules are followed. To the extent that monetary rules are sufficiently restraining, the public's inflationary expectations will be stemmed, and therefore equilibrium inflation will be lower than under a discretionary regime. Since under discretion the government expansionary intentions are neutralized, equilibrium under rules is preferred to equilibrium under discretion as long as inflation is perceived to be costly. Thus, credible monetary rules are effective because they stabilize expectations.

Having established the desirability of rules as means of stabilizing expectations, we need to determine how the idea can be applied to the interpretation of the history of exchange-rate regimes, and in particular of the periodic abandonment of and return to fixed exchange rates. Assume, for a moment, that a regime of fixed exchange rates is a monetary rule, while a regime of floating rates is discretion (we go back to these assumptions below). How can a sequence of rules and discretion be endogenously chosen by monetary authorities, and hence be the equilibrium outcome of the interaction between monetary authorities and the public? We know that monetary authorities always have an incentive to abandon rules. This incentive can be stronger in situations where sticking to the rules is very costly (because, for example, of a negative supply shock, or because of unanticipated jumps in budget deficits). Indeed, one can find states of the world—which we can call "exceptional circumstances"—where the abandonment of rules would be desirable both by the monetary

authorities and by the public. A sequence of rules and discretion would hence be possible if rules are abandoned only under exceptional circumstances, which can be unambiguously identified both by monetary authorities and the public, and are reinstated whenever the reasons for the suspension are gone away, or at any rate after a reasonably predictable length of time.

A model of contingent monetary rules is presented in Flood and Isard (1989a,b, 1990).[4] The basic idea of this model is that combining a rule with discretion makes the discretionary policy more effective when it is used. A rule with an escape clause might be preferred to a simple rule whenever the costs of sticking to the rule are large: as Persson and Tabellini (1991) show, this happens, for example, when the exogenous shocks to which the monetary authority has an incentive to react are highly volatile.

Application of escape clauses models to exchange-rate regimes are provided by de Kock and Grilli (1989) and Bordo and Kydland (1990). The model by de Kock and Grilli is the first formal application of the escape clauses idea to the history of exchange-rate regimes. These authors consider a small economy's choice between a fixed exchange rate (the rule), an adjustment of the fixed exchange rate (the escape), and a floating exchange rate. They explore the conditions under which a combination of rules and discretion (which requires a known value of the exogenous shock beyond which the authority exercises discretion) is an equilibrium: the monetary authority has no incentives to renege on it and the public believes the monetary authority.[5] Bordo and Kydland (1990) discuss the experience with the gold standard in terms of a model of rules with contingencies or escape clauses. They consider two kinds of contingencies: wars and financial crises.

The attempt to use an escape-clause model to explain the evolution of international monetary regimes raises a number of questions, which are not fully answered by the authors cited above, who concentrate on issues that only partially overlap with the one addressed

in this paper. First of all, can a fixed exchange rate system that does not rely on any explicit nominal anchor be likened to a monetary rule? The obvious difference between a commodity standard (that is a fixed exchange rate system with a nominal anchor) like the gold standard and a fixed exchange rate regime under a fiat currency system is that in the latter regime there is nothing preventing participating monetary authorities to generate inflation arbitrarily, as long as they do so in a coordinated fashion, to preserve the fixed parities. This is just an illustration of the well known "$N-1$" problem: given N currencies, there are $N-1$ independent bilateral exchange rates. Maintaining these $N-1$ bilateral exchange rates fixed ties down as many national money stocks. Hence, there is one degree of freedom left. In the absence of exogenous rules the price level is arbitrarily determined by the remaining Nth country.

It could be claimed that, in practice, it is difficult to generate inflation through internationally coordinated monetary surprises, and therefore that a fixed rate regime is in general a powerful enough rule even in the absence of a commodity standard. Even accepting this claim, one would have to prove that a fixed exchange rate regime has built-in features that discourage worldwide inflation. For example, it can been argued that a fixed exchange rate system has a deflationary bias caused by liquidity constraints facing central bankers who try to finance balance-of-payments deficits. This view could provide a base for the hypothesis that even in a fiat currency system a fixed exchange rate regime is a satisfactory rule for monetary authorities. Thus, a candidate model of fixed exchange rates as monetary rules (a model of international monetary rules) relies on the proposition that fixed exchange rates have built in incentives towards monetary restraint, arising from the difficulties of financing balance of payments deficits.

An alternative candidate is the model of imported credibility. Under a fiat monetary system an independent central bank managed by a "conservative" governor (Rogoff, 1985)

achieves outcomes similar to those of a commodity standard because an independent and conservative central banker is "exogenous", like the convertibility rule of a commodity standard. The tenure and the behavior of the conservative central banker cannot be affected by the preferences of either the public or the fiscal authorities. The imported credibility model relies on the proposition that, by pegging the value of the national money to a currency managed by a conservative central banker, a country will import that banker's credibility, and reap the benefits highlighted by the "rules versus discretion" literature.[6]

The crucial logical link in both arguments presented above is of course that the fixed exchange rate is more credible than other policies. Why should a policy of pegging the currency to a low-inflation country be more believable than a policy of maintaining a low growth rate for the domestic money stock under a regime of floating exchange rates? To my knowledge, no general answers to this question have been offered so far. One notable feature of fixed exchange rates is that the price of a reference foreign currency is a highly visible, and unambiguous, target. Canzoneri (1985) shows that if the monetary authority has private information about, say, velocity shocks, it can lead the public to believe that it acts conservatively even when it does not. The strategies described by Canzoneri would not be possible under fixed exchange rates, because under that regime the monetary authority automatically accommodates velocity shocks. In general, it is easy to monitor compliance to a fixed-exchange-rate rule, and for that reason, the losses from suspending the rule might be larger (since the public knows exactly when the rule is suspended).

In sum, the answer to the first question—is a fixed exchange rate system under a fiat currency regime a monetary rule?—is "yes" only under two rather strong conditions: that the exchange rate is a more credible target than any other monetary target, and that the international system has built in features that discourage global inflation (penalties for deficit countries, or independent and conservative central bankers).

We can ask a second question on the application of the escape clause model to the history of the international monetary system: can floating rates be regarded as a temporary suspensions of the rules? It could be argued, for example, that exceptional circumstances only call for an adjustment of the exchange-rate peg, as in de Kock and Grilli, but not for a reversal to floating exchange rates. Alternatively, as Bordo and Kydland suggest, suspensions of convertibility at the time of financial crises are consistent with the escape clauses model. While this may well be true, its verification is beyond the objective of this paper, which seeks to determine whether the more important and longer term regime shifts can be explained by the model of rules with escape clauses.

Analytically it should be possible to build a model where discretion is exercised over a known period of time. Bordo and Kydland stress, however, that the length of this period should be known. In a more complicated setting, the time of return to fixed rates could be a non-stochastic function of available information. Hence the answer to the second question—can floating rates be regarded as temporary suspension of rules?—is again a "yes", if the public can form reasonable expectations that fixed rates will be reinstated when a set of objective and known conditions are met. Thus, while in theory it is possible to accommodate temporary reversals to floating rates, an historical assessment of this model requires a careful analysis of returns to fixed rates. To be consistent with the model, returns to fixed rates have to be easily forecastable, and have to be motivated by the desire to reinstate monetary rules.

In conclusion there are elements in the rules-cum-escape-clauses model that could be used to interpret the historical evolution of exchange-rate regimes. However, as I stressed in this section, there are also conceptual problems with this exercise. The international gold standard system was one where national convertibility rules were automatically made consistent by the working of international financial markets. Under a fiat currency system,

by contrast, it is not immediately apparent that a regime of fixed exchange rates can qualify as a monetary rule. If it does, under the conditions spelled out above, it is a very special kind of rule, purely international.

In the sections that follow I will try to provide evidence useful to verify the model. The exercise combines a discussion of the historical record with statistical work. Using the historical record, I will ask whether convertibility rules that characterize the gold standard were visible enough—a necessary condition to be credible—and whether the return to gold in the interwar years was regarded as a return to normalcy. I next examine in detail the setup of the Bretton Woods system, to determine whether in the minds of its builders such a system had to commit monetary authorities to price stability. The statistical analysis will discuss some evidence on the credibility of the gold points and of the fluctuation bands under the gold standard and Bretton Woods, respectively.

3 The Importance of Rules in the Experience of the Classical Gold Standard and the Return to Gold in the Interwar Period

In the classical gold standard, international monetary rules were not codified by an international government agency, but were the implication of convertibility rules embedded in national regulations, like central-bank statutes.

While gold provided the external numeraire (or nominal anchor) to both the gold standard and the Bretton Woods regime, under the former regime central banks were obliged to intervene in the gold market to support the parity: they were ready to exchange domestic banknotes for gold coins at a specified official value—the mint par. By contrast, under Bretton Woods central banks were not obliged to intervene in the gold market. In addition, under the gold standard central bank statutes fixed or regulated the ratio between gold reserves and note circulation.

The ease of official gold convertibility in different countries is the subject of historical debate. The general agreement is that convertibility was easiest at the Bank of England, while certain continental central banks, like the Reichsbank and the Banque de France, in several instances discouraged "internal" and "external" drains of gold reserves.[7]

Another noticeable difference between the classical gold standard and the Bretton Woods system is the existence of a network of financial facilities for balance-of-payments financing. No official arrangements were in place under the gold standard, and yet, Ford (1962) and Kindleberger (1984) report a number of instances were informal loans between the Bank of England and other European central banks helped stem speculative pressures.[8] By contrast, the IMF Articles of Agreement (discussed in more detail in section 4.3) provide a complex system of facilities for the purpose of balance-of-payments financing.

Despite the absence of international monetary institutions, the gold standard rule was extremely visible: a necessary condition to be credible. The visibility of the gold-standard rule was accompanied by public awareness on the value of commitment, especially in Britain. As Scammel's (1965) authoritative description of the classical gold standard succinctly puts it:

> The Bank (of England) regarded the maintenance of the convertibility of sterling to gold as paramount and any sustained gold movement always led to action sooner or later.

The extent to which policymakers and their advisers valued commitment can be gauged from an analysis of the debates preceding the reestablishment of the gold standard in the interwar years. The Cunliffe Committee strongly advocated the return to the gold standard rule to induce stability in financial markets:

> Nothing can contribute more to a speedy recovery from the effects of the war,

and to the rehabilitation of the foreign exchanges, than the re-establishment of the currency upon a sound basis.[Cunliffe Committee, 1918]

The return to the gold standard was discussed in the 1920 Brussels conference and in the Genoa conference in 1922.[9] The Committee on Currency and Exchange of the Brussels conference did not mention gold explicitly. However, it advocated the elimination of exchange controls, the restoration of central-bank independence, and the establishment of a common standard of value on which to base the new monetary system.

At the Genoa conference it was acknowledged that a return to gold at a parity different from the prewar would undermine the credibility of monetary authorities, by reminding investors of the authorities' control on gold parities. The delegates from France, Belgium and Italy were the strongest endorsers of the principle of the return to the prewar parity, and yet, as Eichengreen (1992) notes, the very same countries did not follow that principle a few years later.

Britain's resumption of the pre-war parity, announced by Churchill in April 1925, is traditionally regarded as the best evidence of that country's commitment to the gold standard rule. Soon afterwards, that decision was widely regarded as an error, which cost much to Britain and other countries. Whether the economic disruptions of the 1930's were caused by Britain's decision alone, or by the policies that followed it but were not necessarily caused by it, remains an open question.[10]

As Bordo and Kydland (1990) suggest, the experience of the gold standard and of its return after World War I is *prima facie* evidence in favor of the model of rules with escape clauses. There is, however, disagreement also with this interpretation of the facts. For example, Temin (1991, p.8) maintains that industrial countries resumed the gold standard because they considered it the "normal" way to run the world monetary system, and not necessarily because of their esteem of the discipline that characterizes a commodity

standard. I do not attempt to resolve this controversy here, but concentrate instead of the second resumption of fixed rates, the Bretton Woods regime.

4 The Importance of Rules in the Design of Bretton Woods Institutions

The international monetary institutions of the second postwar are the outcome of the negotiations between the United States and Britain.[11] The objective of this section is to determine whether the builders of the Bretton Woods regime believed that a credible commitment of monetary authorities to price stability should be a crucial feature of the new monetary system.[12]

In 1943 the British and the U.S. Treasuries published two plans for international monetary reform, whose principal drafters were, respectively, John Maynard Keynes and Harry D. White. Both plans were characterized by an institution—the International Clearing Union in the British document and the International Stabilization Fund in the U.S. document—whose purposes were to help multilateral balance-of-payments financing, to economize in international means of payments, and to ensure a degree of exchange-rate stability. In the discussion below I leave aside the (substantial) parts of the two plans describing the mechanics of the international monetary institution except insofar as they relate to the question of the international monetary rule.

4.1 The British plan

The objectives of the British plan, some of which are reported below, highlight the concerns of British policymakers:

- We need an instrument of international currency having general acceptability between nations [...]

- We need an orderly and agreed method of determining the relative exchange values of national currency units, so that unilateral action and competitive exchange depreciations are prevented.
- We need a *quantum* of international currency, which is neither determined in an unpredictable and irrelevant manner as, for example, by the technical progress in the gold industry, nor subject to large variations depending on the gold reserve policies of individual countries [...]
- We need a system [...] whereby pressure is exercised on any country whose balance of payments with the rest of the world is departing from equilibrium in either direction [...].
- More generally, we need a means of reassurance to a troubled world, by which any country whose own affairs are conducted with due prudence is relieved of anxiety, for causes which are not due of its own making, concerning its ability to meet its international liabilities; and which will, therefore, make unnecessary those methods of restriction and discrimination which countries have adopted hitherto [...]

[British Information Services (1943a, p. 5).]

It seems clear that the establishment of a monetary rule whose aim is to discourage inflationary policies was not a declared intention of the British proposal. Indeed, the British document states plainly:

> The plan aims at the substitution of expansionist, in place of contractionist, pressure on world trade. [British Information Services (1943a, p. 12).]

implying a belief that monetary policy can be consistently employed to stimulate international trade and economic expansion.

In the views of the British Treasury gold remains a standard of monetary value because

> Gold still possesses great psychological value which is not being diminished by current events; and the desire to possess a gold reserve against unforeseen contingencies is likely to remain. Gold also has the merit of providing in point of form (whatever the underlying realities might be) an uncontroversial standard of value for international purposes, for which it would not yet be easy to find a serviceable substitute.

The British government suggested the introduction of an international currency for intergovernmental transactions, the *bancor*, to be defined in terms of a weight of gold. The value of *bancor* in terms of gold is however not unalterably fixed. Furthermore:

> What, in the long run, the world may decide to do with gold is another matter. [British Information Services (1943a, p. 16).]

The above quotations summarize well the position of the British government. Gold is regarded as a necessary element of the new world monetary order because of its heritage, but not because any value is attached to it as a rule for conduct of monetary policy. The reference to the "great psychological value" of gold suggests awareness of the importance of credibility in a monetary system, but the rest of the document seems to imply that gold should not be sought as a mechanism to insure such credibility. Indeed, both the possibility to change the dollar value of the *bancor*, without any explicitly stated formal constraint, as well as the implicit allowance of a complete phasing out of gold, indicate that the British government was not at all concerned with the question of providing a worldwide anchor for monetary policy. Rather, the British proposal's central concern was adjustment and symmetry: see in particular its position on capital controls,[13] and the provision of charging interest on the negative clearing positions while at the same time

taxing the creditor balances.

More importantly, changes in parities (defined in terms of *bancor*) did not require consultations, and were allowed whenever a criterion for unsustainability of external imbalances was met. The lack of concern with nominal anchors is confirmed by the following statement of the Chancellor of the Exchequer, Sir Kingsley Wood: "On the face of it, the (U.S. Treasury's) scheme appears to relate exchanges and balances more closely to gold than does the clearing union."[14]

In sum, the British proposal is based on the view that the international monetary system should not constitute an hindrance to expansionist monetary policies, and that monetary policies should not be used by individual countries to gain advantage from their neighbors' (hence the call for exchange-rate stability): all of this seems quite far from the rule-based view of international monetary systems. The British position was probably motivated by two major concerns: avoiding the troubles of the interwar years, and providing a world environment that would help Britain ease out of its war debts.

The records circulated by the British Information Services (1943b) do not contain any criticism of the Keynes plan from the House of Commons and the House of Lords. Perhaps because of the powerful intellectual influence of Keynes, the British government and the parliament not only were not advocating the imposition of rules in the world monetary order, but openly declared their aversion to them. Their mistrust of the equilibrating forces of the international monetary system[15] implied the belief that interventionist monetary policies were necessary to ensure the proper support to economic activity. These interventionist policies, as Meltzer (1988) stresses, were in Keynes's view to be subject to rules, which however were not simple and were not designed with the sole purpose of limiting incentives to inflate.

4.2 The U.S. Plan

Similarly to Britain, the objectives of the U.S. plan do not mention the importance of rules in the new international monetary system. They are:

- To help stabilize the foreign exchange rates of the currencies of the United Nations [...]
- To shorten the periods and lessen the degree of disequilibrium in the international balance of payments of member countries.
- To help create conditions under which the smooth flow of foreign trade and of productive capital among member countries will be fostered.
- To facilitate the effective utilization of blocked foreign balances accumulating in some countries as a consequence of the war situation.
- To reduce the use of foreign exchange restrictions [...]

The first two items grow from an interpretation of the interwar experience similar to the British: countries should not use exchange rates as beggar-thy-neighbor devices, and the international adjustment mechanism needs the intervention of governments. The last three, loosely inspired by the postwar U.S. philosophy based on multilateralism and non-discrimination, mainly regard the postwar reconstruction.

Despite the lack of mention of monetary restraint in its objectives, the U.S. Treasury proposal had strict rules on the linkage of the international currency, the *unitas*, with gold. According to the White plan, the *unitas* value was fixed in gold (137 and 1/7 grains of fine gold). Furthermore:

> No change in the gold value of the *unitas* shall be made except with the approval of 85 percent of the member votes. [...]

> The value of the currency of each member country shall be established in terms of *unitas* and may not be altered except [...] with the approval of three-fourths of the member votes including the representative of the country concerned.

These changes would not be considered, unless when essential to the correction of fundamental disequilibrium in the balance of payments of the country in question.[16]

The British parliament was critical of the White plan, whose stress on fixing the gold content of currencies, and liberalizing world financial markets[17] they regarded as "the very things that smashed the world economic system which prevailed before the war." (British Information Services, 1943b, p. 40).[18]

Surprisingly, there is no evidence that the two plans faced significant opposition at home. The best known critic of the plans is John Williams.[19] Williams's strong prior is that the success of the international gold standard was due to the stability of its center country, Britain. Hence his suggestion that the post WWII system also rely on center countries (which, in his view, should be more than one). However these center countries can guarantee a smooth functioning of the world system only if they cooperate in monetary affairs much more tightly than envisaged by the Bretton Woods charter.

The most interesting critique I was able to find comes from Benjamin Anderson, a professor of economics at the University of California at Los Angeles. Anderson's position appears to be very close to the "rules" theory of international monetary regimes:

> Fixed rates in the foreign exchanges are eminently desirable. A temperature of 98.6 in the human body is eminently desirable, but a rigging of the thermometer so that it will always record 98.6 regardless of the fluctuations in the temperature of a sick patient is a rather futile performance. And a rigging of the foreign exchange markets so that they will record fixed rates among sound and unsound countries, regardless of a deterioration of the fundamentals governing the values

of the moneys of the unsound countries, merely masks the facts of financial disease and disorder, and defers the time when these fundamentals must be dealt with.[Anderson (1944, p. 10).]

Yet, the reason why professor Anderson values international monetary restrain is, together with a general aversion to inflation—as in the models discussed in section 2—a very concrete concern that the new monetary system would allow debtor countries, and in particular Britain, to surreptitiously default on their war debts. Anderson envisaged Britain exploiting the multilateral clearing system it proposed by paying for its imports and servicing its debt from the United States not in "good dollars" or "still pretty good sterling", but in the currencies of the countries of its exports: "the bad francs, lire, marks, Greek drachmae, etc.". The implicit assumption in this reasoning is, of course, that the real purchasing power of the "bad" currencies could not be ensured by the system of *bancor* or *unitas* parities, and by the linkage of these latter units of account with gold. In other words, Anderson viewed the fixed-rates regime transform itself into a regime of competitive inflation, caused by institutions that he regarded the most suitable to export the inflation tax.

4.3 The IMF Articles of Agreement

The Articles of Agreement of the International Monetary Fund contain elements of both the British and the U.S. proposal. In many ways, the Articles of Agreement further departed from the attempts to restore free capital movements and rules of conduct for monetary policy that appeared in the U.S. proposal.

The objectives of the IMF, spelled out in Article I, include international cooperation in monetary matters, high employment (through the expansion and balanced growth of international trade), exchange-rate stability, a multilateral payments system, balance of

payments financing and adjustment. As in the case of the two proposals, no direct mention is made of either price stability or free trade in financial assets.

The provision regarding the nominal anchor are contained in Article IV. All member countries are required to express a central parity of their currencies, either in terms of gold, or in terms of dollars "of the weight and fineness in effect on July 1, 1944." Maximum fluctuations bands are also established to be 1 percent in either direction.[20] The article also discusses changes in par values. Countries can change exchange parities after consultations with the Fund, given the need to correct a "fundamental disequilibrium."[21] The Fund concurs with the proposed change if it is satisfied that it can correct the fundamental disequilibrium. If the Fund does not concur, and the parity is changed nevertheless, the country becomes ineligible to the Fund resources, unless the Fund otherwise determines.

Article IV represents a significant deviation from the White plan, which required a majority of the board in order to grant a change in the parity of any member currency. The mechanism of approval from the IMF is meant to safeguard the international monetary system from competitive exchange-rate changes, but is substantially less restrictive than the original U.S. proposal.

Article VI deals with capital flight. It says that a country facing sustained capital outflows does not have access to Fund resources to finance the resulting balance-of-payments problems. The Fund may require that country to impose capital controls, in order to avoid reserve losses. The articles explicitly allows controls on capital movements that are not linked with the financing of international trade.

Finally Article VII, on scarce currencies, describes measures to replenish the Fund's holdings, as well as emergency measures to ration the scarce currency. No mention is made in the article of the fundamental problem that might give rise to the phenomenon of a scarce currency, divergent monetary policies, and of ways to correct the origins of the

problem. In other words, monetary policy coordination (which under fixed rates amounts to the coordination of domestic credit policies) is induced indirectly, through the various alarm bells set up by the Fund. However, it is never mentioned or encouraged explicitly. The Articles of Agreement attempt to substitute the fixed, exogenous gold-standard rules with a novel concept, monetary policy coordination. However, its official status is far below that of the convertibility rules of the gold standard: for this reason, this substitution seems to be incomplete, and not sufficiently effective.

Further light on the question of the importance of rules in the minds of the builders of the Bretton Woods system can be obtained from the replies of U.S. officials to various critics. Edwin Kemmerer (1945) echoed several of the concerns of Benjamin Anderson. He pointed to the ineffectiveness of the safeguards against changes in currency parities, noting that any country is free to generate "fundamental disequilibria" on its own, by pursuing expansionary monetary policies in support of budget laxity. To this and other similar criticism, Harry White responded:

> Englishmen have not forgotten that in the sterling crisis of 1931 social services were cut in the attempt to maintain the fixed sterling parity. To use international monetary arrangements as a cloak for the enforcement of unpopular policies whose merits or demerits rest not on international monetary considerations as such but on the whole economic program and philosophy of the country concerned, would poison the atmosphere of international financial stability. [White (1945, p. 8)]

White's thinking, which well represents the opinion of experts and policymakers responsible for the Bretton Woods system, is clearly very far from the Cunliffe Report philosophy. His response to the Bretton Woods critics is that international monetary rules cannot be used as scapegoats for unpopular domestic policies. For this reason, monetary rules have been studiously minimized in the IMF charter.

In conclusion, the analysis of the IMF charter and what went into it suggests that the establishment of the Bretton Woods regime of fixed exchange rates cannot be viewed as the return to a monetary rule in the sense specified in section 2. The discussion in section 2 stressed that a fixed-rates regime can be considered a monetary rule under one of two conditions:

- it is based on a convertibility rule which implies a set of bilateral exchange rates and provides a nominal anchor;
- it is centered around an independent and conservative monetary authority, or has some other feature discouraging any country from pursuing expansionist monetary policies. In this setup, however, exchange rate parities need to be credible, that is costly to change.

The concept of an independent conservative monetary authority is absent from the Articles of Agreement, and so are "private" convertibility rules. While the price of gold maintained an important role of reference, countries were not heavily constrained in changing their own gold parities through changes in dollar parities. Such constraints, as historical experience demonstrated (see, in particular, Houthakker 1978) appeared more binding in the case of the US, although—as Giavazzi and Giovannini (1989) stress—this could simply be a reflection of the asymmetry of the Bretton Woods regime.

5 Empirical Evidence on the Credibility of the Gold Standard and Bretton Woods Rules

In section 2 I have argued that the main implication of the models proving the superiority of monetary rules over discretion is that such rules help stabilize expectations. In this section I complement the discussion of the theory and of the historical record with empirical

evidence. This evidence is meant to illustrate the behavior of expectations during the gold standard and Bretton Woods.

The strategy is to study prices in those markets where monetary authorities should have followed the rules; to derive estimates of private expectations, and to determine whether, and in what direction, such expectations were significantly affected by the monetary rules. The literature on the "rules of the game" discussing central bank policies under the gold standard—sometimes extended to fixed exchange rates in general—often mentions "rules" of behavior for central banks that are supposedly required to make the gold standard work. The "rules of the game" should not be confused with the rules studied here. The rules of the game are policies meant to assure that the central banks will not generate too large gold outflows or inflows, thus permitting gold convertibility both at home and abroad. They are arbitrary, in the sense that they rely on assumptions about the effects of central-bank operations on financial markets and gold flows.[22] By contrast, the monetary rules discussed here are specific actions that central banks were required to take (like convertibility of banknotes into gold at a given official price), which were often codified by laws and well known to all market participants.

The markets where authorities should have followed monetary rules are the financial markets, the gold market during the gold standard and the foreign exchange market during the Bretton Woods regime. In addition to being more focused, an analysis of financial markets has two other advantages over an analysis based on the study of inflation and output performances: it does not require assumptions about the transmission of monetary policy to the rest of the economy and can rely on better quality data.

The basic exercise carried out below is as follows. The gold-standard and Bretton Woods rules imply a range within which exchange rates are supposed to fluctuate. From interest rates and forward exchange rates it is possible to derive estimates of expectations of

exchange-rate changes. Below, I will try to determine whether exchange rate expectations were:

- consistent with the parities implied by the international rules;
- affected by those rules, and in what direction.

I consider samples from the classical gold standard period and the Bretton Woods years. The interwar gold standard is not included because the extreme political instability and economic fluctuations in the interwar years have likely added substantial volatility in financial markets, thus complicating the interpretation of the evidence.

5.1 The Data

5.1.1 Foreign Exchange Markets and Fluctuation Bands during the Gold Standard

Foreign exchange rates during the gold standard were stabilized by gold. Private citizens could convert national currencies into gold, and *vice-versa* in transactions with national monetary authorities. Gold parities of individual national currencies implied bilateral exchange rates.

However, since arbitrage between the gold market and the foreign exchange market was costly, the bilateral exchange rates implied by the gold parities were not enough to tie down foreign exchanges in the financial markets. Exchange rates could fluctuate within a band whose size was determined by the costs of arbitrage between financial markets and the gold market. This band well exceeded the buying and selling points for gold used by central banks.

How did such arbitrage take place? Suppose, for example, that the dollar price of sterling in financial markets is less than the dollar price of sterling implied by the gold parity. The arbitrage consists in buying sterling for dollars in the financial market, and selling sterling

for dollars through the monetary authorities. Hence, sterling should be brought to the Bank of England for conversion into gold, gold should be shipped to the U.S., and dollars should be bought from the U.S. Treasury in exchange for gold.

Since however these operations take time, a proper account of the costs of the transactions should reflect the interest cost represented by the shipment of gold. Figures 1 and 2 show a diagram of the transactions involved in the arbitrage. Figure 1 describes the case of export of gold from England to the US. At time 0, dollars are borrowed to purchase sterling in the spot foreign exchange market. Gold is bought from the Bank of England and is shipped to the U.S.. When gold arrives at time 1 it is sold to the US Treasury, and the proceeds are used, in part, to repay the dollar loan. Figure 2 describes arbitrage involving imports of gold into England. The sterling proceeds of the gold sale are sold in the forward exchange market, at a price fixed at time 0. Hence the transactions in the two figures all occur at prices known to the arbitrageur at time 0. The purchases of sterling and dollars necessary to start the operations could be financed with an alternative set of transactions, which are easy to figure out using the diagrams. To the extent that covered interest parity holds, the cost of these alternative transactions is approximately equal to the cost of the transactions reported in the figures.

In the case of the dollar-sterling exchange, monthly gold points are computed following Clark (1984) and Officer (1986), over the period January 1889 to December 1908. The cost of shipping gold is broken down into the interest cost (borrowing money to buy gold) or the opportunity cost (foregone interest during the voyage) and the direct costs (freight, insurance, packing, minting and abrasion). Whenever the spot exchange rate (dollar per pound) is lower than the official exchange rate discounted by the cost, it is profitable to

import from the Britain to the U.S.:

$$S_t < \frac{X}{Y}\left(\frac{1}{(1+i_{us})^{\frac{k}{365}}+c}\right) \tag{1}$$

X is the official dollar price of one ounce of "fine" gold as paid or received by the U.S. Treasury, i.e. \$ 20.67183.[23] Y is the official pound sterling price of one ounce of fine gold as paid or received by the Bank of England, i.e. £4.2409–4.2477.[24] X/Y is the official exchange rate or "mint parity", *i.e.* \$ 4.8666–4.8744 per pound sterling. S_t is the cable currency spot exchange rate (expressed in dollars per pound sterling) at time t, reported in London at the end of the first week of each month. The interest rate in the U.S., i_{us}, is the monthly average of the weekly average call money rates in New York during the period of shipping. The interest cost is calculated during the period of voyage between London and New York. Following Clark (1984), I assume that the arbitrageur finances his gold shipments in his country of residence. The direct shipping costs, c, consist of freight and insurance costs, packing, loading and unloading, abrasion, charges for assay and minting and finally incidental expenses. The costs are expressed as a percentage of the initial dollar investment. k is the transatlantic shipping time from London to New York.

An import gold point (import to US from Britain) is therefore expressed as:

$$G_t^I = \frac{X}{Y}\left(\frac{1}{(1+i_{us})^{\frac{k}{365}}+c}\right) \tag{2}$$

In order to determine whether it is profitable to export gold from the U.S., one has to take into account the exchange risk involved in receiving the proceeds of the gold shipment in foreign currencies at the end of the voyage. For a given length of the voyage, such risk can be eliminated by taking a forward exchange contract whereby pounds are converted into dollars at the rate F_t (dollars per pounds) at the date of reception of the gold. Whenever the forward rate is greater than the official exchange rate discounted by the shipping cost

it is profitable to export gold from the U.S.:

$$F_t > \frac{X}{Y}\left((1+i_{us})^{\frac{k}{365}}+c\right) \tag{3}$$

Assuming that covered interest parity holds I compute the forward rate F_t for conversion of pounds into dollars at the date $t+k$ as:

$$F_t = S_t\left(\frac{1+i_{us}}{1+i_{uk}}\right)^{\frac{k}{365}} \tag{4}$$

Thus the gold export point becomes:

$$G_t^X = \frac{X}{Y}\left((1+i_{us})^{\frac{k}{365}}+c\right)\left(\frac{1+i_{uk}}{1+i_{us}}\right)^{\frac{k}{365}} \tag{5}$$

The british interest rate used, i_{uk}, is the weekly average of call money rate in London taken the first Friday of each month.

I calculate the gold points using the average direct costs of Officer (1889-1904: 0.65% - 1905-1908: 0.5%). Clark and Officer differ in their calculations because the former does not include the cost of abrasion, minting and assay. The duration of the voyage between New York and London was estimated to range between 7 and 14 days. Following Goodhart (1969) I assume a fixed length of 10 days, *i.e.* $k = 10$. I ignore commissions costs in the financial markets for lack of accurate data.

To compute the gold points between Berlin and London and Paris and London I use the same formulas as above but change both the time and the costs of shipping gold between the respective cities. Following Einzig's (1931) estimation of shipping time and costs, I take $k = 3$ days between London and Berlin, and $k = 1$ day between London and Paris. I estimate the cost of shipping from London to Berlin to be $c = 0.02\%$ and the cost of shipping from London to Paris to be $c = 0.025\%$.

I study the joint behavior of interest rates, exchange rates and the gold points. The criteria adopted in the choice of interest rates are matching maturity, international trade-

ability and comparable default-risk characteristics. Given the data I was able to access, the securities that most closely approximate the above criteria are:

- For Britain, the prime bill rate, of 90 day maturity. It is the rate at which British banks discount "first class" bills. Once banks have "accepted" such bills, they become tradeable in a secondary market in London, where actors include discount houses and commercial banks. The prime bills rates were almost identical to the Treasury bills rate, which were not traded heavily until World War I. See Capie and Webber (1985).

- For the U.S., the commercial paper rate, of 60 to 90 day maturity. Issued in standard form by large distributors and manufacturers, eligible for rediscount, and with an active secondary market. See Macaulay (1938).

- For Germany, the market discount rate, of about 90 day maturity. This is the secondary market rate for bills accepted by the large incorporated banks and private banking houses. See Madden and Nadler (1935) and Bopp (1953).

- For France, the market rate of discount, of maturities ranging from 30 days to 6 months. The rates I used, taken from the US National Monetary Commission (which does not specify maturity), were very similar to the annual series of three-month rates reported by White (1933). This is a rate at which the large commercial banks bought in the market trade bills of the better quality. This secondary market was not as important as the London, New York or Berlin bills markets, because it lacked a strong group of intermediaries. Although most bills were discounted at the bank rate (which did not move for long periods of time), the market rate was much more sensitive to international financial news (see White (1933, p. 201).

5.1.2 Foreign Exchange Markets and Fluctuation Bands during Bretton Woods

For the Bretton Woods years, I assembled spot exchange rates, bilateral fluctuations bands, and forward rates for the period July 1955 to May 1971 (the time when the DM was floated), for the U.K., Germany and France relative to the U.S.. While official convertibility of the pound, the DM and the franc started only in December 1958, a well developed foreign exchange market was allowed to operate since May 1953, when the authorities of eight European Payments Union members, including the three European countries mentioned above, agreed to standardize bilateral fluctuation margins to 75 percent on either side of their respective parities, and permitted commercial banks to trade their currencies freely within those bounds (Yaeger, 1966). My sample begins in July 1955 since that is the date when the forward rates published by Grubel (1966) start.

As I mentioned in section 4.3, the cornerstone of the IMF rules was the system of dollar or gold parities, around which spot exchange rates were permitted to fluctuate as far as 1 percent in either direction. Unlike the gold standard, under Bretton Woods bilateral fluctuation bands are fixed by law.

A major difference between the Bretton Woods regime and the classical gold standard is the widespread use of capital controls in the more recent regime. In many countries, international asset trade was encouraged only to the extent that it was needed to finance international goods trade. The IMF did not oppose these restrictive practices. As shown by Giovannini and Park (forthcoming), if international trading firms cannot instantaneously shift their import and export flows by unlimited amounts to adapt to changes in interest rates, this form of restriction of capital account transactions induces wedges between interest rates in different countries. The implication is that domestic financial assets like treasury bills and interbank deposits cannot be considered internationally tradeable, and differentials between domestic and foreign interest rates include the tariff-equivalent of the

quantitative capital restrictions mentioned above. For this reason, rather than studying interest-rate differentials I concentrate on forward premia. Forward premia are accurate measures of exchange-rate expectations to the extent that the required risk premia from foreign exchange speculation are small. Indeed, in the presence of capital controls deviations from covered interest-rate parity can be used as a tariff-equivalent measure of capital controls.[25]

5.2 The Evidence

5.2.1 Gold Standard

The gold points represent valid bounds for the fluctuations of exchange rates if all the transactions that are implied by them can take place at the given prices. A crucial link are the transactions with monetary authorities, exchanging gold for national currencies. The basic monetary rule of the gold standard is that monetary authorities should stand ready to exchange gold at the stated parity.

Figures 3, 4 and 5 report logs of the spot exchange rates of the pound relative to the dollar, the Reichsmark and the franc, respectively, together with my estimates of the gold points. I use logs to highlight the size of the fluctuation bands, which were less than 2 percent wide in the case of the dollar, and less than 1 percent wide in the case of the franc and the Reichsmark. Note also that the export (upper bound) and import (lower bound) points of gold fluctuate, especially in the case of the dollar. The estimates of the gold points for the US dollar (figure 3) broadly match those of Officer (1986). The spot exchange rate touches the gold export point only on one occasion, in August 1895, most likely in correspondence of the collapse of the Morgan-Belmont syndicate.[26]

The Reichsmark rate (figure 4) crosses the import points on a few occasions in the three years after the Baring crisis of November 1890. The export point is touched in 1900, a year

when stock prices collapsed, and many banks failed. A minor panic followed in December of that year. In March 1907, when another violation of the gold point is observed in figure 4 stock prices declined in Berlin and triggered a chain of bankruptcies. The franc crosses the gold point more often, but never by large amounts. Notice in particular the instance of the beginning of 1889, at the time of the collapse of the *Bourse* caused by the Panama Canal failure (January) and the breakdown of the copper corner (March).

Are the crossings of the gold points to be interpreted as unexploited arbitrage profit opportunities? I am reluctant to take that position, especially because my calculations do not account for commission in financial markets. It is conceivable that in periods of great uncertainty these commissions widen considerably, thus widening the gold points.

Figures 6, 7 and 8 plot the US, German and French interest rates together with bounds implied by the gold points. The two bounds are derived as follows. If the gold export point observed on any month is regarded by investors as the maximum value that the exchange rate can take over the maturity of short-term financial instruments, and if risk premia and other ex-ante rate-of-return differentials are second-order, then the interest rate on dollar, mark and franc assets can never exceed the following value:

$$\bar{R}_t = \left[(1 + R_t^*)\frac{\bar{S}}{S_t} - 1\right], \tag{6}$$

where $\bar{S}$ denotes the gold export point, R_t^* is the rate of return on sterling financial assets in the money market, while S_t is the spot sterling exchange rate at time t. Similarly, the dollar, mark and franc money-market interest rates can never be lower than:

$$\underline{R}_t = \left[(1 + R_t^*)\frac{\underline{S}}{S_t} - 1\right], \tag{7}$$

where $\underline{S}$ is the gold import point.

$\bar{R}_t$ and $\underline{R}_t$ are observable at every time t. If the actual interest rates denominated in dollars, marcs and francs at t are outside of these two bounds, either the margins are not

credible—that is, agents expect that, *over the maturity of the interest rates considered*, the exchange rate can cross the margins—or required (ex-ante) rate-of-return differentials are non-zero (we assumed them to be zero to derive the upper and lower bounds for the interest rates).

The maintained assumption in these calculations is that investors do not require, *ex ante*, significantly different returns on assets denominated in different currencies. In other words, I assume that foreign exchange risk premia are insignificant. This assumption is corroborated by the lack of ability of asset pricing models to deliver sizable risk premia, given realistic processes for the variables driving risk and return in international financial markets.[27] Indeed, the observation that rate-of-return differentials in foreign exchange markets often seem to be highly persistent and therefore predictable might well be due to the phenomena discussed here, as for example in the famous case of the Mexican Peso in 1976.

A complication of these calculations is that, as noted above, the gold points fluctuate stochastically. Therefore the appropriate thresholds for the calculations of the credibility bounds for interest rates are represented by the expectation of the gold points prevailing at the end of the maturity of the financial assets under consideration, under the assumption that gold parities are not changed. In practice, the fluctuation of bounds reported in figures 6 to 8 accounted for by the fluctuation of gold points is not recognizable with a naked eye. To verify this, I reproduced the three figures assuming constant gold points, equal to the average of the numbers computed above. The figures thus obtained were indistinguishable from figures 6 to 8.

Figure 6 shows that the dollar rate of interest is almost always within its credibility bounds. The big exceptions are the May-August 1893 financial panic and the 1895-96 period. In May-August 1893 convertibility was suspended and later a number of large non-financial business went bankrupt and stock price declined. In the second half of 1895

the Belmont-Morgan syndicate collapsed (see above), in 1896 there was a bank panic with decline in stock prices. In general, US interest rates maintain consistently close to the upper bound. In the case of the Reichsmark, reported in figure 7, the upper credibility bound is surpassed clearly in 1907, at a time of the US financial crisis, which was accompanied by stock price declines and business failures in Berlin. In the case of the franc (figure 8) the crossing of the bounds occur mostly—but not by large amounts—at the lower level, except for the January 1889 stock exchange collapse due to the Panama canal crisis mentioned above.

In general, figures 6, 7 and 8 suggest that the international co-movement of interest rates was substantial, and could very well be due to the credibility of the gold standard, which induced the belief that exchange rates could not cross the gold points.

Figures 9, 10 and 11 contain scatter plots, relating the percent deviation of the spot exchange rate from the middle of the gold points to the interest-rate differential. Under the hypothesis that the gold-standard rules stabilize expectations, such relation should be negative: the expected exchange-rate change decreases whenever the spot exchange rate reaches the upper fluctuation limit, and *vice versa*. The figures show that the relation is positive for the US dollar, and negative for the Reichsmark and the franc. For all three currencies such relation is, however, not significant.

The absence of a negative relation between interest-rate differentials and the position of the exchange rate within the band raises a question about the credibility of the bands. Indeed, one would expect this relation not to be negative whenever agents forecast either suspensions of convertibility or changes in gold parities. Expectations of parity adjustments would interfere with the expectation of mean reversion of the exchange rates induced by the presence of the band. In this specific sense the rules of convertibility under the gold standard would not have much stabilizing power.

To obtain more precise estimates of expectations of parity adjustments, I rely on the method originally developed by Rose and Svensson (1991) and Svensson (1991), and modified by Chen and Giovannini (1991). The time-varying conditional expectation of devaluations is obtained by subtracting from the interest-rate differential 95 percent confidence bounds for the conditional expectation of exchange rate depreciation within the fluctuation band. The latter is computed, as in Chen and Giovannini (1991), from the projection of a non-linear transformation of the exchange rate within the band into variables in agents' information sets.[28] The nonlinear transformation is a way of making sure that agents actively exploit the information about the existence of the gold points.

The results for these calculations are a band for the null hypothesis of no changes in convertibility rules or gold parities expected for month τ. The null hypothesis is not rejected whenever zero is included in the bands' interval at month τ. These bands are reported in figures 12, 13 and 14. Only in the case of the US dollar the 95 percent confidence intervals can be seen to move away from zero by sizable amounts, in the two years noted above, 1893 and 1895. This is not the case of the Reichsmark and the franc, despite the fact that for these two currencies fluctuation bands are roughly half the size of the dollar fluctuation bands. Thus, figures 12, 13 and 14 are consistent with the evidence from the scatter plots: figure 9 shows that the relation between the interest-rate differential and the position of the dollar/sterling rate in the band is positive (but insignificant), unlike the case of the franc and the Reichsmark. The absence of a stabilizing feature of the dollar/sterling gold points is most likely caused by the sizable fluctuations in expected gold parity changes.

5.2.2 Bretton Woods

Figures 15, 16 and 17 report the 3-month forward rates—Deutsche marks per dollar, sterling per dollar, French franc per dollar—together with the Bretton Woods fluctuation bands

for the three currencies. These figures are equivalent to the plots of interest rates and credibility bounds reported for the gold standard. If the forward rate is a good proxy for the expected future spot exchange rate, a movement of the forward rate beyond the Bretton Woods limit indicates lack of credibility of the fixed-exchange-rate system.

In the case of the DM (Figure 15), the forward rate goes out of the bounds immediately after the 1961 realignment and, more noticeably, before the October 1969 revaluation. The 1969 episode was noted (Argy, 1981) as a franc-mark crisis, characterized by heavy speculative activity involving these two currencies. Figure 17 shows that, before the franc devaluation of August 1969, the forward rate reaches the upper fluctuation band for that currency. Figure 17 also shows that the largest deviation of the forward rate from the Bretton Woods bounds for the French franc occurs in September, November and December 1956 at the time of the Algeria and Suez crises. The experience of sterling is reported in figure 16. The forward rate exceeds the upper fluctuation limit at the time of the Suez crisis, and, significantly, after the November 1967 devaluation of sterling. As Tew (1977) notes, however, the Bank of England intervened in the forward market for sterling from the last quarter of 1964 to the devaluation of 1967. Whether these interventions were successful at keeping the forward premium below the level that reflected expectations of devaluation of sterling remains an open question.

Figures 18 and 19 show the scatter relations between the percent deviations of spot exchange rates from central parities and forward premia for the Deutsche mark and sterling. An equivalent figure for the French franc is missing, because of data problems with the market spot exchange rate for that country. For both currencies the diagrams do not show any systematic relation. Once again, this result might be due to the substantial fluctuations of the expected changes in the central parities of both the Deutsche mark and sterling, reported in figures 20 and 21. The figures reproduce calculations from Chen

and Giovannini (1991), along the lines described above.[29] In the case of both currencies there are significant and sizable expectations of parity realignments towards the end of the sample. In the case of the Deutsche mark, expectations of revaluation are also observed in correspondence to the March 1961 realignment.

5.3 Discussion of the Evidence

The evidence presented above can be summarized as follows. For the gold standard period, we find that fluctuation bands are particularly narrow in the case of European currencies (Reichsmark and franc), while the dollar/sterling band is of comparable magnitude to those of Bretton Woods. The narrow European bands appeared to be quite effective in linking sterling, franc and mark interest rates. There is some evidence of stability of expectations induced by the bands, measured by a negative correlation between interest rate differential and the position of exchange rates in the bands. This negative correlation, however, is not very strong in the sample. Tests of credibility of the convertibility rules do not seem to indicate that sizable violations of convertibility rules were expected to occur in the case of the franc and Reichsmark.

In the case of Bretton Woods the stabilizing properties of fluctuation bands appear to be even weaker than in the case of the gold standard, witness the less systematic relations between forward premia and the position of the sterling and Deutsche mark exchange rates in the bands. Estimates of expected exchange rate realignments appear sizable and significant towards the end of the Bretton Woods period, and surely explain, at least in part, the absence of systematic evidence on the stabilizing properties of the bands.

The natural question raised by this evidence is, was the gold standard a more credible regime than Bretton Woods? The discussion of the historical record suggests a positive reply, but the statistical evidence presented above is inconclusive. The evidence is incon-

clusive because it is a comparison of the two regimes which does not explicitly account for the exogenous shocks hitting the countries included in the samples. Hence the evidence cannot tell whether a world economy that functions under a gold standard can withstand turbulence better than a world economy functioning under a Bretton-Woods-type regime.

Despite the fact that the evidence presented above cannot be exploited to make statements about the relative credibility of the two regimes, the covariation of national interest rates during the gold standard seems particularly striking. It is striking because of the size of the fluctuation bands implied by the gold points. On average, the gold points fluctuation bands for European currencies were about half those prevailing during the Bretton Woods years for the same European currencies relative to the dollar. Despite these narrow bands, interest-rate differentials very rarely reflected expectations of exchange-rate changes outside the band. While the maturity of the interest rates somewhat decreases the power of the credibility tests of the previous section, it should be recalled that, for example, in the case of the European Monetary System fluctuation bands are as wide as 4.5 percent, and yet 3-month interest rates have violated them in several instances.[30]

6 Concluding Remarks

This paper has looked at the Bretton Woods system from the perspective of a theory of the history of international monetary systems based on rules and discretion in monetary policy.

An application of the rules-cum-escape-clauses view of the history of the world monetary system runs into a number of problems. First, it is not clear that the model can be applied as is to fixed exchange-rate regimes under a fiat currency system. The difficulty of associating fixed exchange rates with monetary rules is a crucial one, given that the Bretton Woods regime cannot be likened to a commodity standard: banknotes were not convertible into

gold, monetary authorities were not required to intervene in the gold market. Hence, even conceptually, it is not clear whether the return to fixed exchange rates after WWII is to be considered a reinstatement of a monetary rule.

The second, and probably most serious, problem of this theory of the world monetary system comes from an analysis of the historical record on the setup of the Bretton Woods institutions. In the second postwar period policymakers brushed aside the concept that credible monetary commitments are valuable—a concept used to justify the return to gold in the interwar years—and attempted to substitute the fixed convertibility rules of the gold standard with some form of monetary policy coordination. This compromise solution was probably caused by the keen resistance of the British delegation against any codification IMF Articles of Agreement of rules which would have forced a degree of monetary discipline on individual member countries' monetary authorities. Hence this compromise solution is the best evidence that the return to fixed exchange rates in the second postwar was not considered to be the reestablishment of monetary rules over discretion.

Analysis of the behavior of interest rates and exchange rates under the gold standard and Bretton Woods indicates that at times of large shocks official parities were not credible. In general, however, the statistical evidence is ambiguous on whether monetary rules have been credible under the gold standard and the Bretton Woods regime, or on whether one regime was more credible than the other. Yet, the data show that the very narrow gold standard bands contributed to keep European interest rates within narrow margin for many years. However, the emergence of significant realignments expectations in a number of cases is evidence not inconsistent with the rules-cum-escape clauses view of the world.

In sum, this paper has shown that there might be value in credible monetary rules, witnessed by the stability of interest rates in a number of different periods, but that the return to fixed rates after WWII was not inspired by the desire to reinstate credible in-

ternational monetary rules. This was probably because the interwar experience made the return to gold anachronistic and, as reiterated by the 1982 Gold Commission, impractical. The alternative sought out by the builders of the IMF was however little credible.

The rejection of the rules-cum-escape-clauses model raises the question of alternative interpretation of the evolution of the world monetary system. How then do we interpret the periodic returns to fixed exchange rates? Several authors do not seem to subscribe to the theory of rules and discretion explaining the abandoning and return to the gold standard. For example, Dornbusch and Frenkel, following Keynes (1930), have argued that gold convertibility was always suspended if there was a need to. Dornbusch and Frenkel, like Keynes, do not claim that the resumption of convertibility was motivated by the value of the gold standard as a rule: while concentrating on the ease with which rules were abandoned, they are silent on the reasons to readopt them. They probably would subscribe to Temin's (1991) view that the gold standard was just regarded as the "normal" way of operating the world monetary system.

One alternative to the simple escape-clauses model probably inspired the officials who amended Article IV of the IMF Articles of Agreement (French and US delegations in Rambouillet in November 1975, Williamson (1977)), which allowed countries to choose the exchange-rate regime they please. This theory is based on a Poole-like analysis of output fluctuations under alternative exchange-rate regimes,[31] and stresses the role of different shocks and their transmission under fixed and flexible rates as the main determinants of the choice of fixing or floating a country's currency. In a nutshell, this theory states that when LM shocks prevail, fixed exchange rates are superior, while floating rates are more desirable when IS shocks are more frequent. I do not know of attempts at applying this theory to the historical record, and I suspect that such attempts could be arduous, given the difficulty in identifying IS versus LM shocks.

I would propose a second alternative, inspired by several observations by Milton Friedman (see, for example, Friedman, 1968). According to this view, fixed rates, as well as floating rates, are abandoned because governments "try to do too much" with monetary policy instruments, necessarily lead monetary regimes to strains or breakdown, and are then drawn to experiment with alternative arrangements. In other words, this view maintains that in modern economies the pressures on monetary authorities to affect the allocation of resources probably far exceed the actual ability of monetary authorities to affect the real economy, given by the instruments at their disposal. This tension is what generates cycles in monetary regimes.

An exploration of these alternative models is called for to help refine theory of monetary institutions, and improve our understanding of the history of the international monetary system.

Appendix A Data Sources

A.1 Gold Standard

The period covered is January 1889 to December 1908. The National Monetary Commission (1910) volumes have been used for the following data:

- Britain weekly average call money rate reported the first Friday of every month: Table 18, pp. 43-62.
- France market rates of discount reported the first Thursday of each month from weekly averages. Table 4, pp. 315-316.
- London spot exchange rates for dollar/pound, Mark/pound and franc/pound reported the end of the first week of each month. The monthly data between 1889 and 1898 are in Table 3, pp. 67-69 and the weekly data from 1899 to 1908 are in Table 4, pp. 70-74.

The U.S. call money rate and the U.S. commercial paper rate are reported in Macaulay (1938). The original source is the *Commercial and Financial Chronicle* and its *Financial Review*. The data I use are in the Appendix, pp. A150-A154. Both the call money rates and the commercial paper rates are given monthly and represent averages of weekly data. The commercial paper rates have maturities of 60 to 90 days.

The British Prime Bank Bill rate is reported in Capie and Weber (1985, Table III.(10), column V, pp. 509–512). The original source is *The Economist*. The data are end-of-month and have a maturity of three months.

The German market rates of discount are reported in Bopp (1953, Appendix pp.79–87). They are monthly averages of market discount rates. The original source is *Die Reichsbank, 1876–1910.*

The estimation of the costs and duration of shipping between London, Paris and Berlin is based on the calculations of Einzig (1931, Appendix pp. 148–154). For the costs and duration of the voyage between London and New York I follow the estimations of Clark and Officer.

A.2 Bretton Woods

The data for the spot exchange rates and the 3-month forward exchange rates for the United Kingdom, Germany and France from January 1957 to December 1960 are reported in Grubel (1966). All rates are end-of-month figures for weekly averages of daily observations. The original sources of the data are the Dresdner Bank, the Samuel Montagu's Review of Foreign Exchanges and the Morgan Guaranty Trust Company.

British, German and French spot and forward exchange rates from January 1961 to May 1971 were obtained from the International Financial Statistics of the International Monetary Fund. All rates are end-of-month figures. The spot rates are market rates and the 3-month forward rates are reported as annual discounts or premiums on the spot rates.

Notes

1. The latter claimed that a set of rules for monetary policy are the hallmark of a liberal system, while discretion, that is active management of the currency, "along with protectionism, is the prototype of all current 'planning' schemes." (1936, p. 3).

2. See, in particular, the surveys in Persson and Tabellini (1990) and Canzoneri and Henderson (1991).

3. On adjustment during Bretton Woods, see the paper by Maurice Obstfeld in this volume.

4. See also Persson and Tabellini (1990) for an illustration and a discussion of these models, as well as Lohmann (1990) and Flood and Isard (1990). Grossman and Van Huick (1988) exploit the same idea in an analysis of government debt repudiation.

5. In the paper by de Kock and Grilli (1989) the public punishes the authority which adopts a discretionary strategy even under "normal" realizations of the exogenous shock by reverting to floating exchange rates forever.

6. See Giavazzi and Pagano (1988).

7. See Bloomfield (1959).

8. Eichengreen (1992) also emphasizes the importance of these swap facilities. However, these swap facilities were informal, not codified in any official agreement.

9. See Eichengreen (1992).

10. See Eichengreen (1992) for a discussion.

11. Despite the fact that the countries participating to the Bretton Woods conference—the so-called United Nations—were 44.

12. For a discussion of the U.S.-British negotiations preceding the 1943 proposals, see in particular Gardner (1969). The relevant episode is the Atlantic conference of 1941 during which the general U.S. stance, multilateralism and nondiscrimination, was adopted by the Britain. At the same time the Lend-Lease program became law, and allowed the U.S. president discretion in assisting any country, but especially Britain, whose defense was considered vital for the U.S..

13. "it is widely held that control of capital movement, both inward and outward, should be a permanent feature of the postwar system." p. 17, para 33.

14. British Information Services (1943b, p.13)

15. Keynes writes to Richard Kahn in August 1941:

> In the past five hundred years there have been only two periods of about fifty years each (the ages of Elizabeth and Victoria in English chronology) when the use of money for the conduct of international trade can be said to have 'worked',—first whilst the prodigious augmentation of the supply of silver from the new world was substituting the features of inflation for those of deflation (bringing a different sort of evil with it), and again in the second half of the nineteenth century when (for reasons to be developed below) the system of international investment pivoting on London transferred the *onus* of adjustment from the debtor to the creditor position.
>
> To suppose that there exists some smoothly functioning automatic mechanism of adjustment which preserves equilibrium if only we trust to methods of *laissez-faire* is a doctrinaire delusion which disregards the lessons of historical experience without having behind it the support of sound theory. Keynes(1980, p. 21–22.).

16. The plan adds two transitional provisions, for the immediate postwar period, meant at making the procedure of exchange-rate adjustments less restrictive, with a view that equilibrium rates might be harder to determine immediately at the end of World War II.

17. J.M. Keynes, in his presentation in the House of Lords, suggested that this is in fact a misreading of the White plan, which advocated liberalization of only current transactions.

18. Bob Boothby, in his statement at the House of Commons "We can never go back to the gold standard [...] we can never tolerate any outside interference with our inalienable right to impose such restrictions on the export of capital from this country as we wish.".

19. See Williams (1943).

20. The article does not explicitly say whether these bands apply only to the dollar exchange rates or to all possible bilateral exchange rates.

21. Exchange-rate realignments below 10 percent do not need the Fund's approval.

22. For a discussion, see Giovannini (1986).

23. The official buying and selling prices of gold at the U.S. Treasury were identical. By contrast, the Bank of England charged a bid-ask spread.

24. These numbers are obtained from Einzig (1931). The appropriate side of the spread is taken for each calculation of the gold points

25. See the Appendix for a description of the data sources.

26. See Friedman and Schwartz (1963). Garber and Grilli (1986) also provide a discussion of this period.

27. A discussion of the evidence on risk premia in foreign exchange markets appears in Dornbusch and Giovannini (1990).

28. Specifically, if x_t is the percent deviation of the exchange rate from the center of the band at month t, and L is the half-width of the band, and let $y_{t+3} = \ln[(L+x_{t+3})/(L-x_{t+3})]$. I project y_{t+3} on information available at month t, (including x_t, the 3-month interest-rate differential, y_t^2 and y_t^3), since the interest rates I use have a maturity of 3 months. I then obtain conditional expectations for the left-hand side variable, and 95, percent confidence intervals for the conditional expectation. These are transformed to obtain 95 percent confidence intervals for x_{t+3}. The confidence intervals for the of future exchange rates within the fluctuation bands are then subtracted from the interest rate differentials (adjusted by the current position of the exchange rate in the band) to obtain 95 percent confidence intervals for the expected devaluation. The procedure is complicated in the case of the gold standard because gold points have not been fixed over the years, and some violations of the gold points are observed. This complication is bypassed by taking the average gold points to compute the dependent variable in the projection equation described above, and taking the very few violations of the gold points to be almost of the edge of the newly computed band. Such manipulations of the data are, in a sense, consistent with the observation above: the observed "violations" of the gold points might actually not be such, since the computed gold points do not account for financial commissions, and these might have been particularly high at times of crises.

29. In this case the variables included in the projection equations were various dummies

corresponding to the subperiods when given parities were prevailing, y_t, y_t^2, y_t^3, the interest-rate differential and the log of relative money supplies.

30. For a discussion of the credibility of EMS bands, see Giovannini (1990).

31. For an illustration, see Obstfeld (1988).

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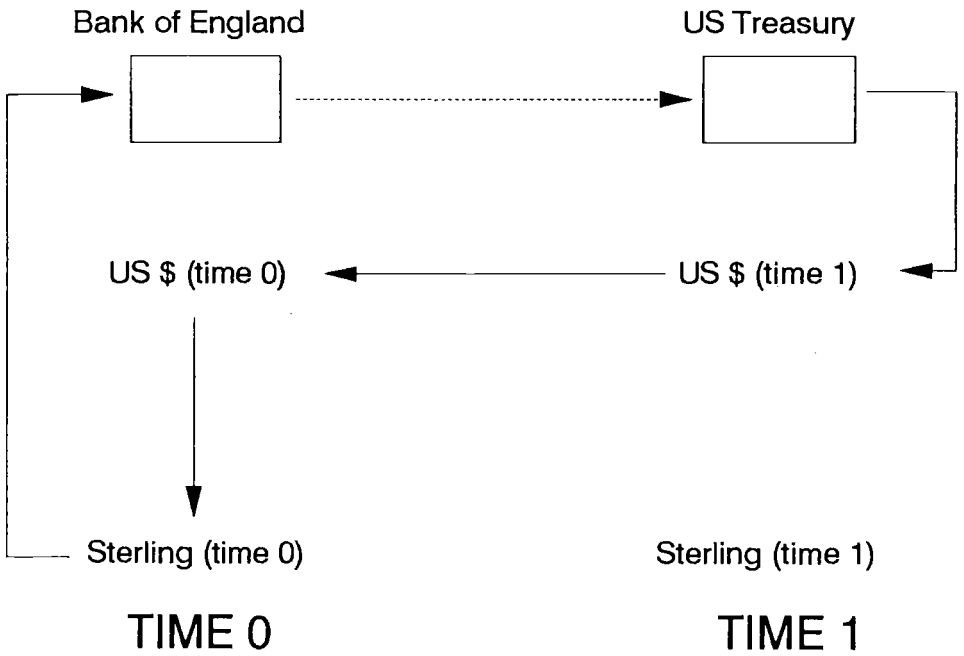
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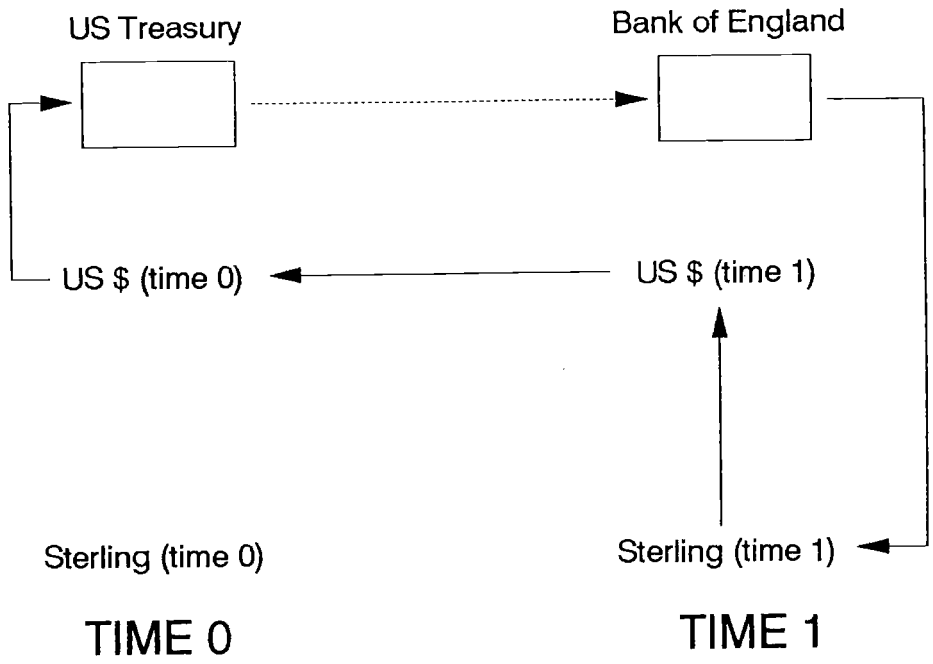
TIME 0
TIME 1

Figure 1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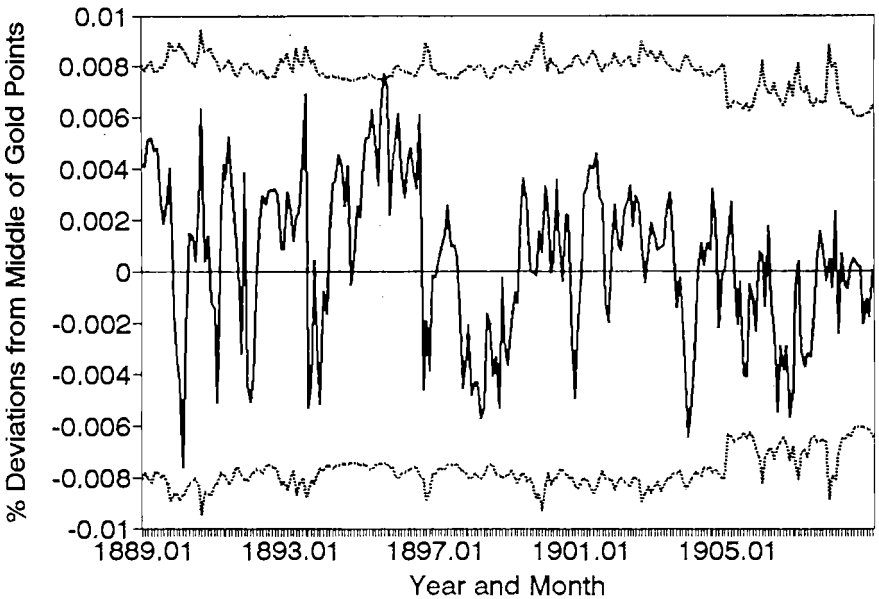
TIME 0
TIME 1

Figure 2

Figure 3:
Dollar Spot Rate and Gold Points



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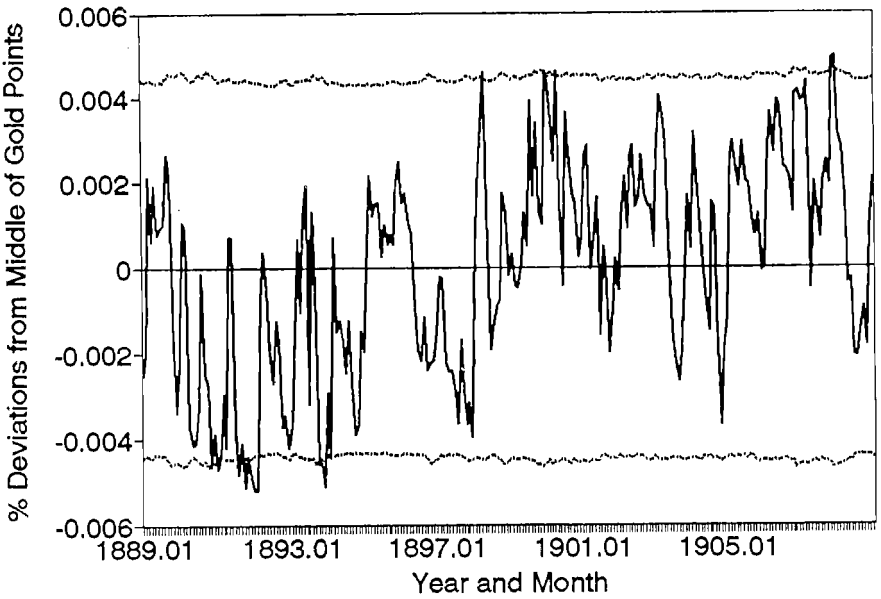

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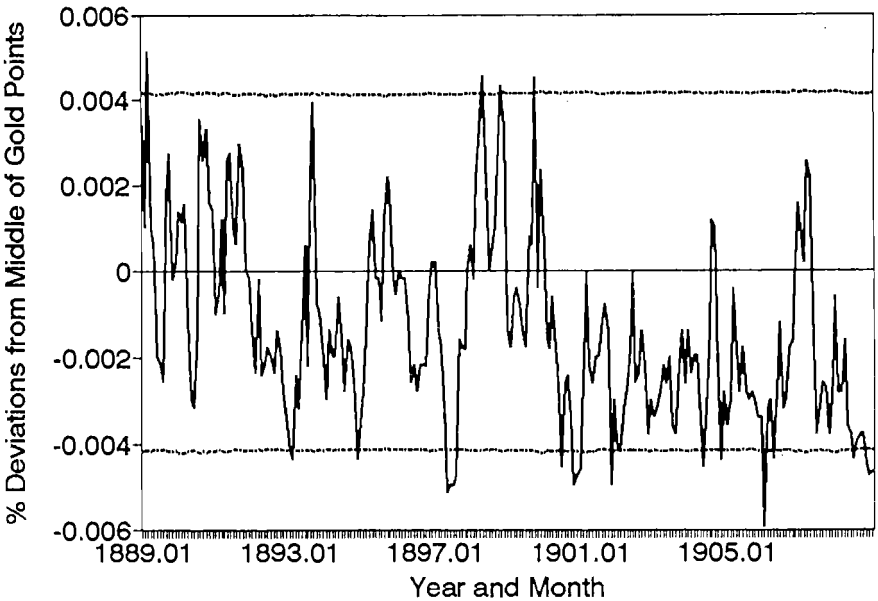

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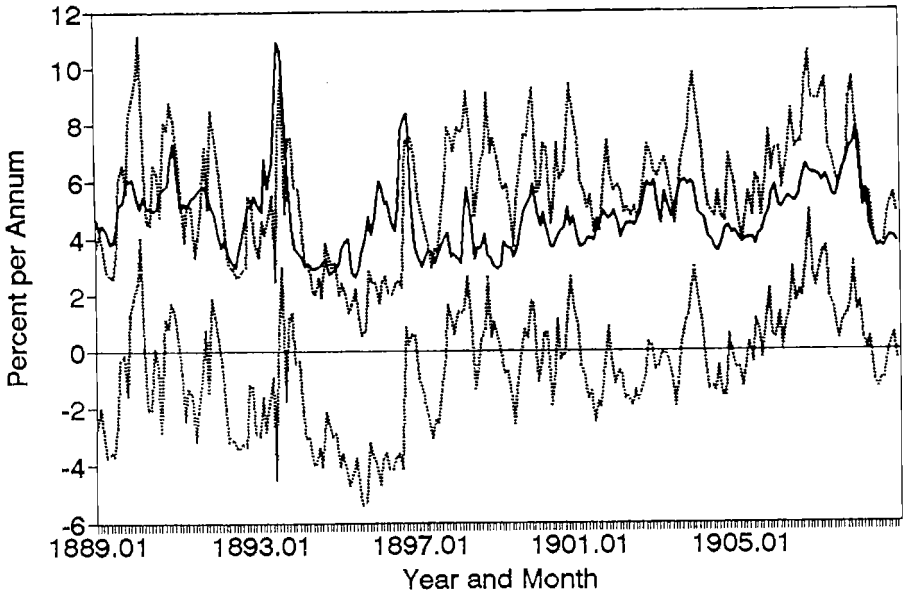

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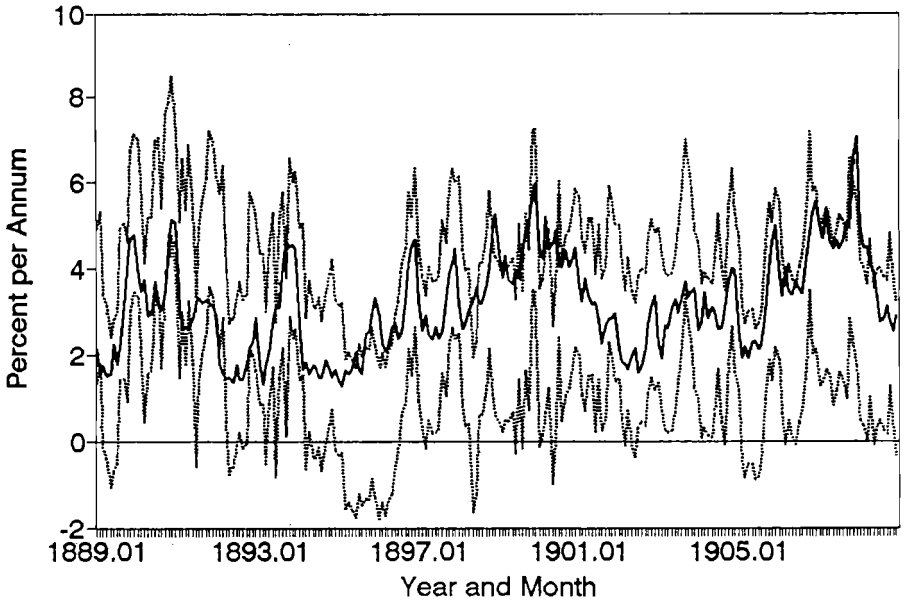

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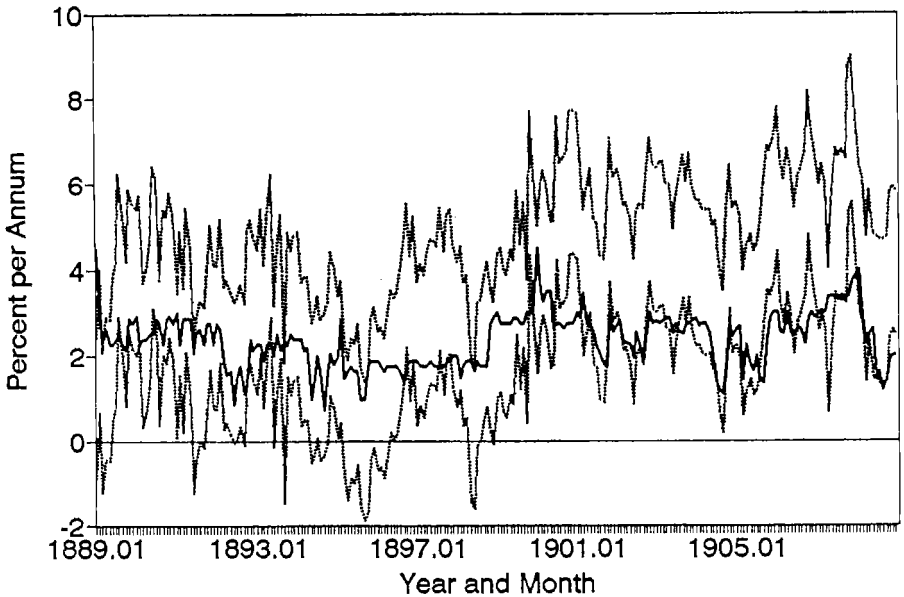

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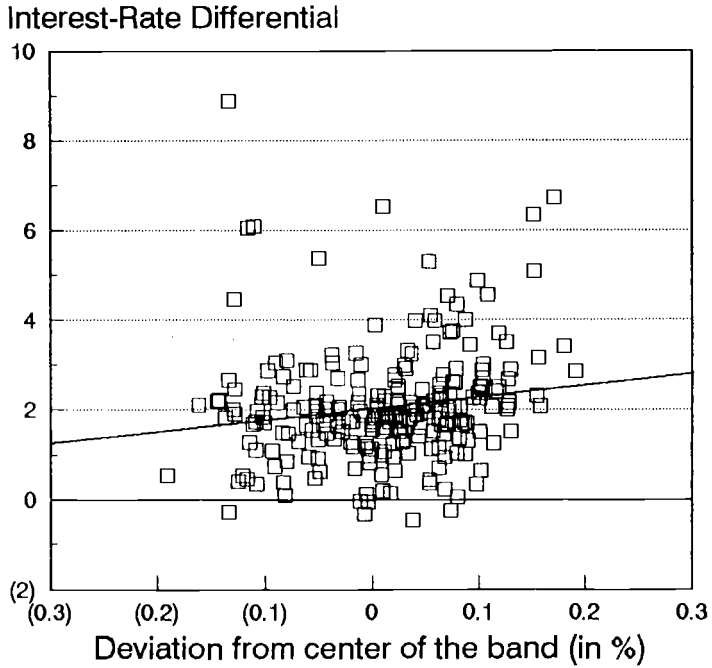

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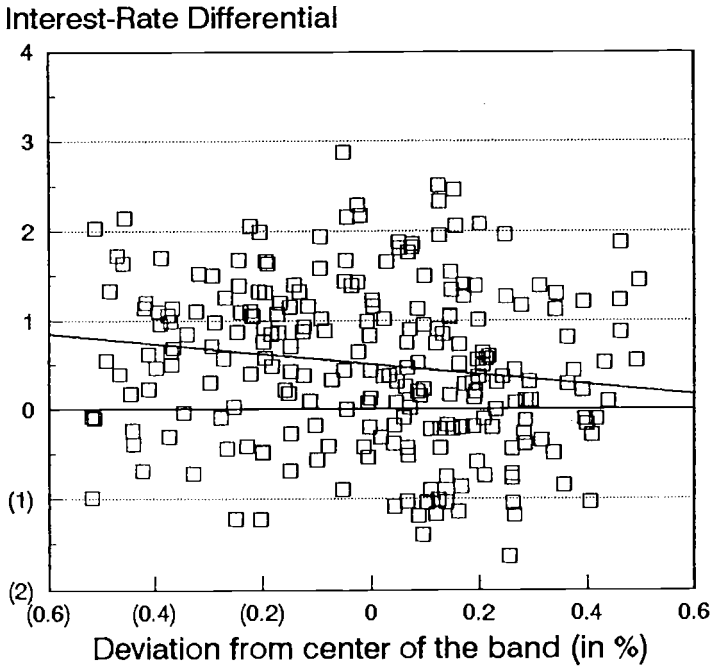

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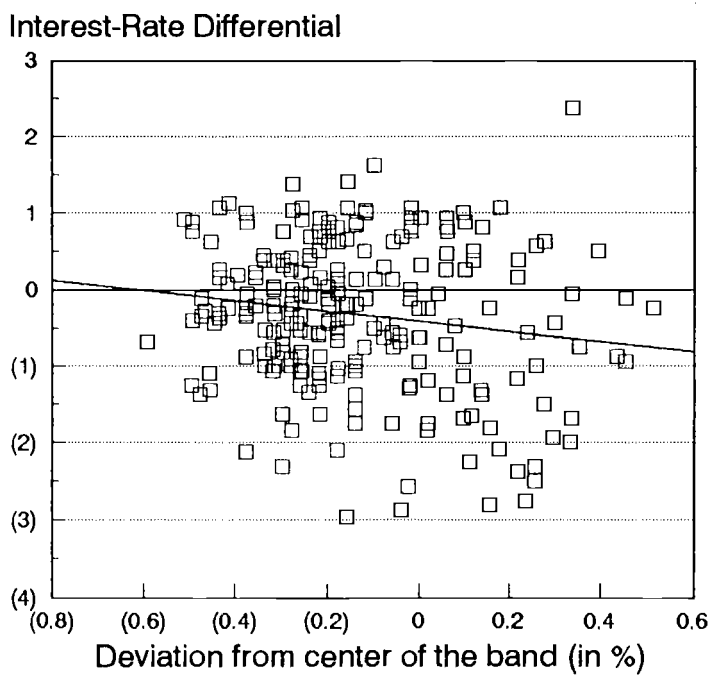
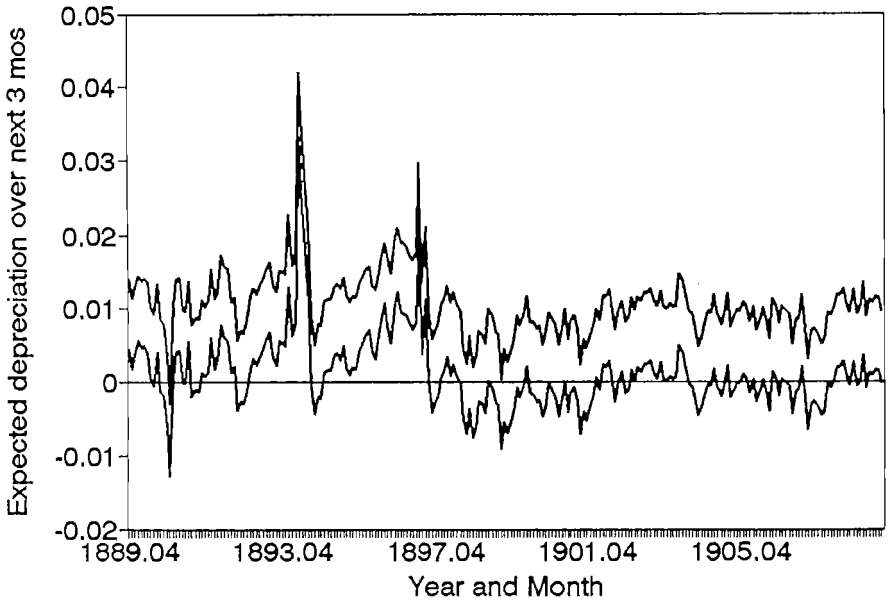


Figure 12:

Expected Depreciation of US Dollar



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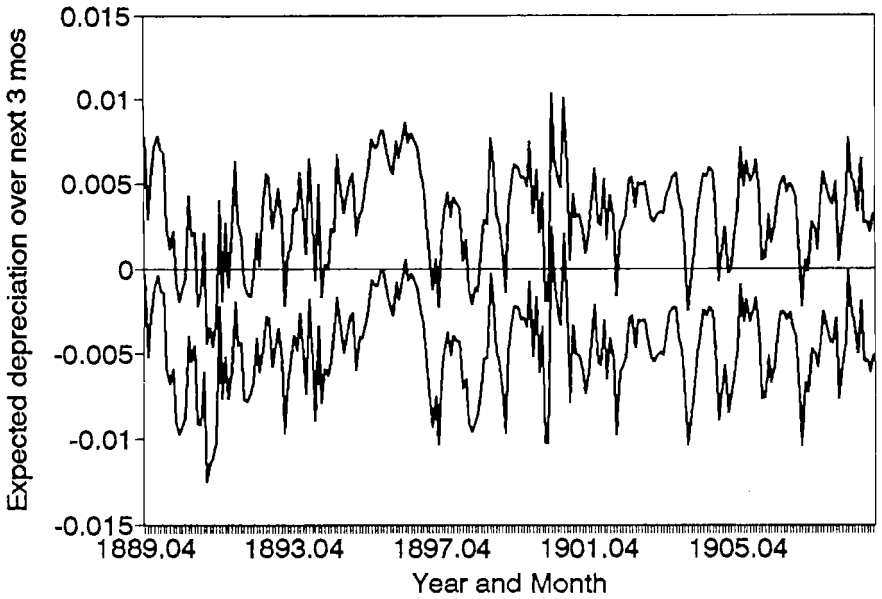

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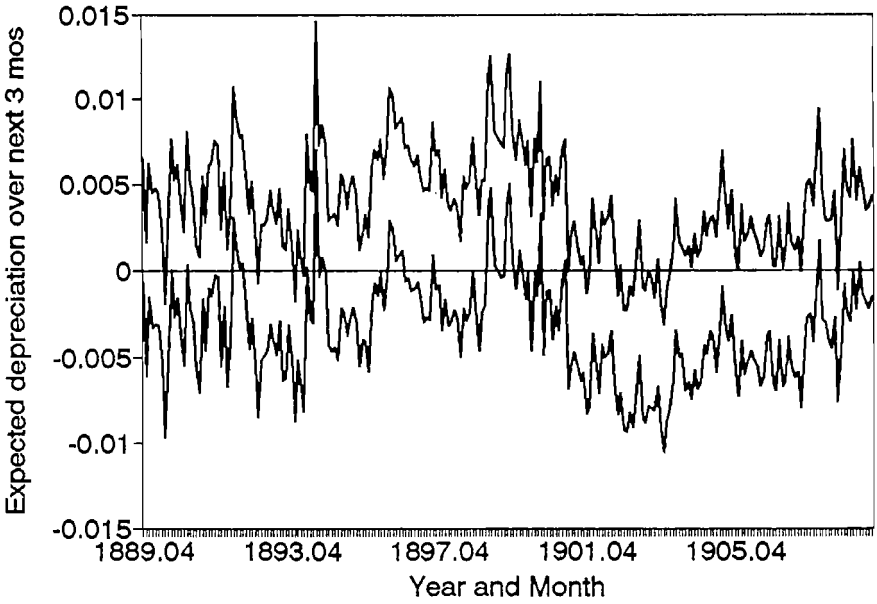
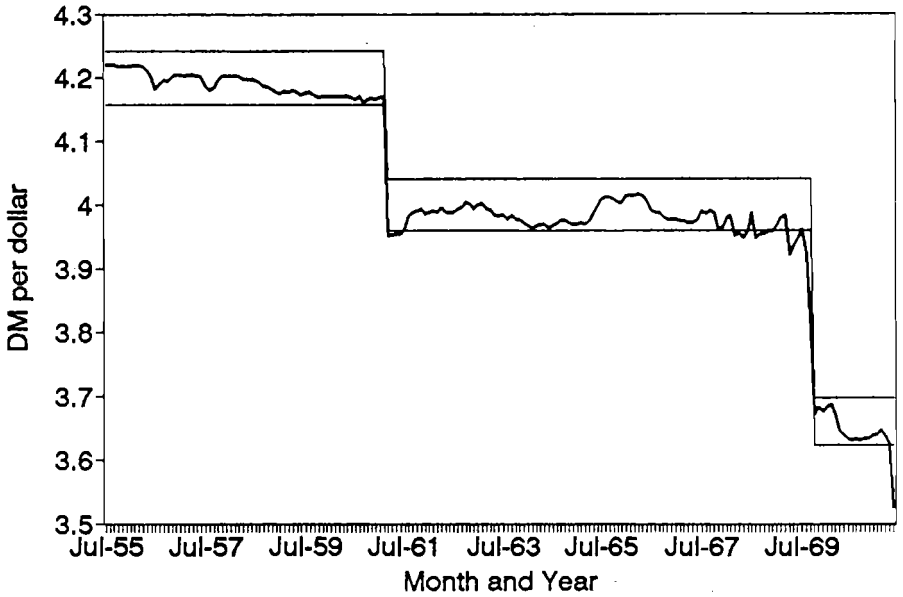


Figure 15:

DM/$ 3-Mo Fwd Rate and Parity Bounds



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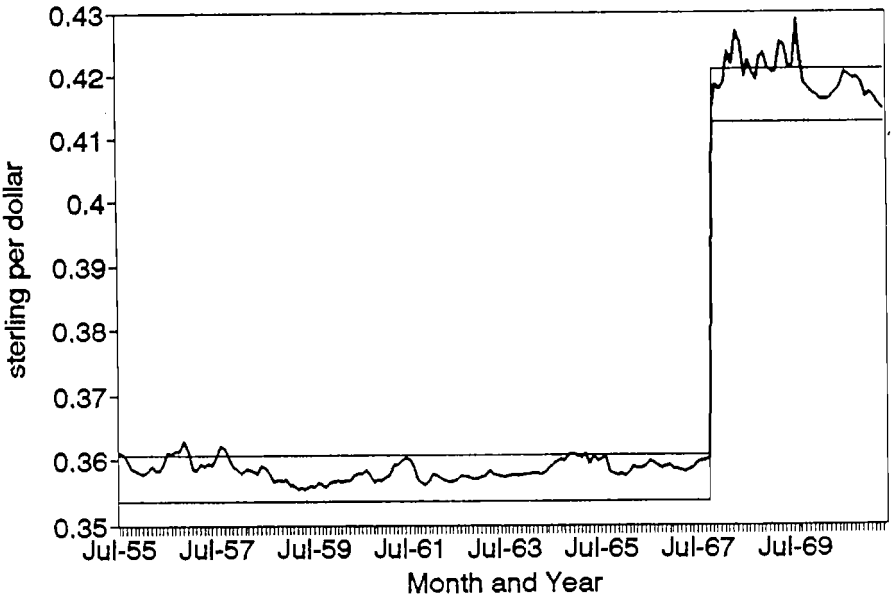

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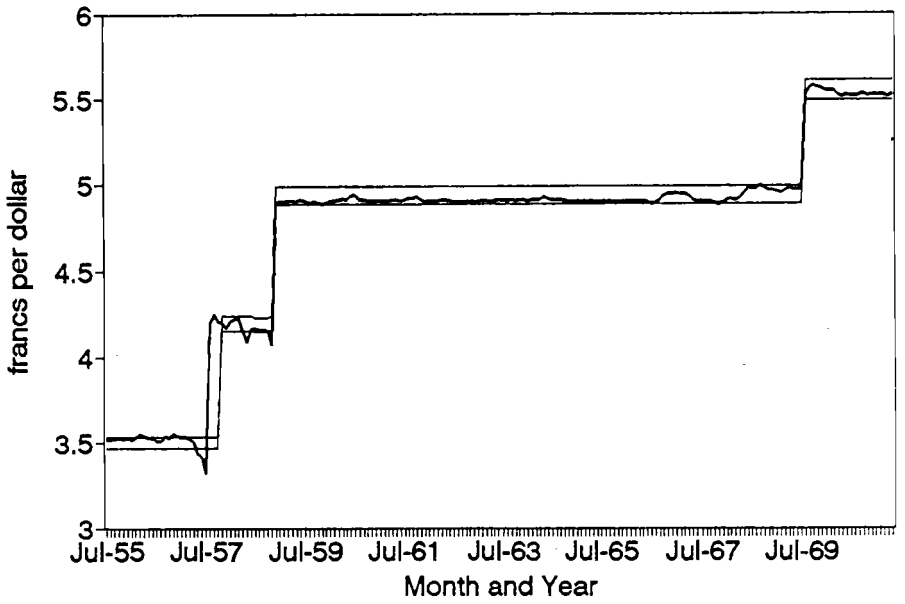

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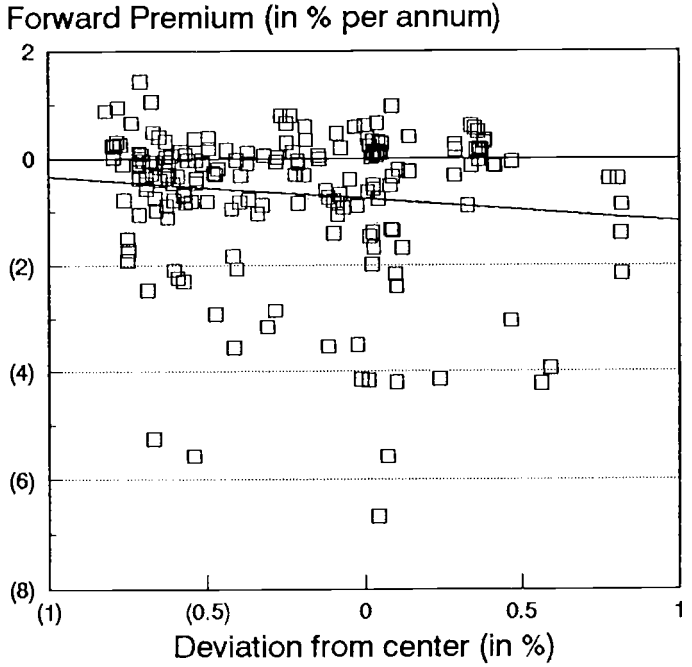

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Relation Between Forward Premia and the Position of the Exchange Rate (UK)

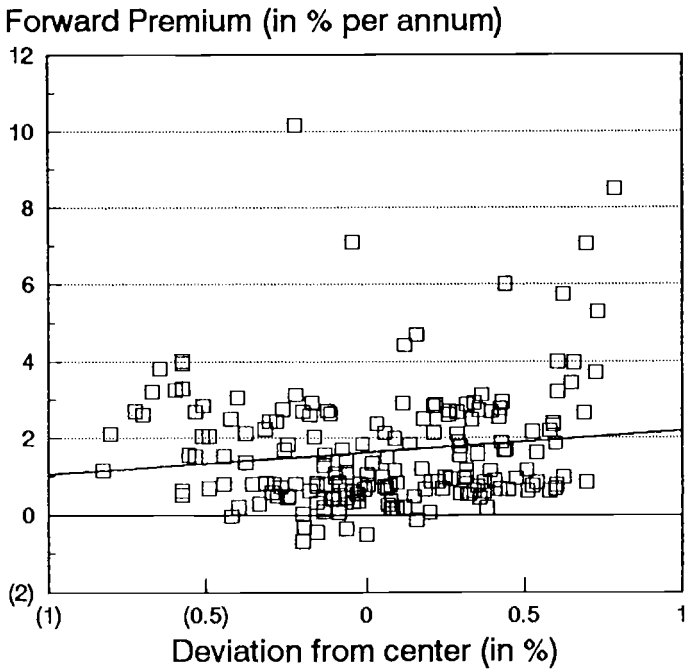
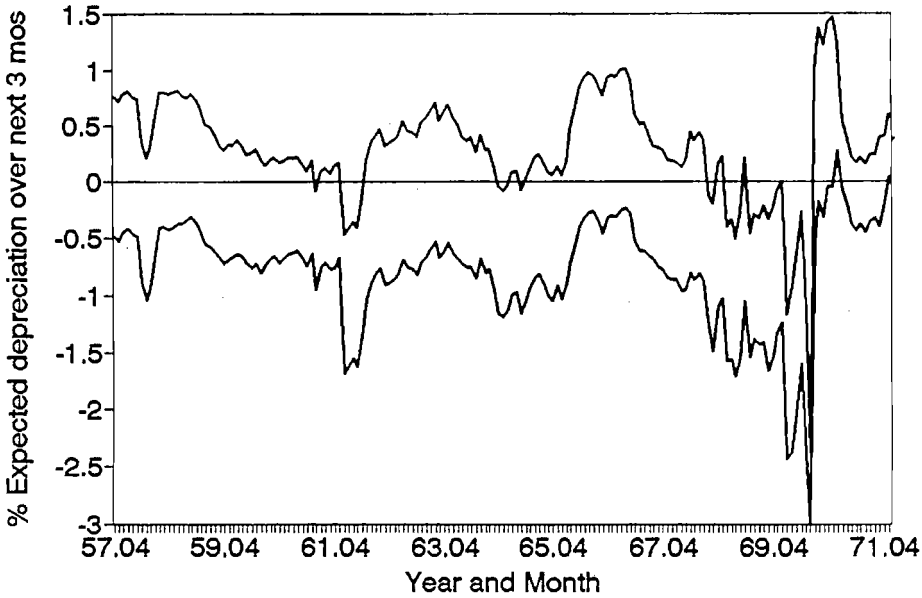


Figure 20:

Expected Depreciation of Deutsche Mark



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Expected Depreciation of Sterling