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THE ROLE OF INTERNATIONAL ORGANIZATIONS IN THE BRETTON WOODS SYSTEM

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ABSTRACT

This paper examines the roles played by organizations in maintaining the Bretton Woods System. Theory indicates that even if countries understand that cooperation will lead them to a Pareto superior outcome, they need not cooperate unless they are convinced that other countries are also committed to doing so. In this context international organizations can facilitate cooperation by serving as commitment mechanisms. Cooperation in the Bretton Woods System involved the maintenance of stable exchange rates and unrestricted trade among member countries. The commitment mechanisms that the Bretton Woods Institutions provided member countries included: rules of cooperation, financial resources to enable them to play by the rules, and a centralized source of information on each others' commitment to the rules. Post-war history suggests that information monitoring and sharing has been a relatively effective commitment mechanism for international organizations.

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I. INTRODUCTION

With the world at war, participants from each of the Allied countries convened on July 1, 1944 in Bretton Woods, New Hampshire to create a new international monetary system. The breakdown of the inter-war gold standard, and the mutually destructive economic policies that followed, convinced leaders that a new set of cooperative monetary and trade arrangements was a prerequisite for world peace and prosperity. The outcome of the conference, known as the Bretton Woods Agreement, included the creation of an adjustable peg exchange rate system and the establishment of two international organizations that would maintain economic cooperation among the participating countries. To this end, the conference participants drafted charters for the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (World Bank). At the Havana Conference in 1947 participants formulated a charter for the International Trade Organization (ITO).[1] Member countries subsequently ratified the charters for the IMF and World Bank,[2] while the General Agreement on Tariffs and Trade (GATT) eventually subsumed some of the original goals of the ITO.

This paper examines the roles played by these organizations in maintaining the Bretton Woods System. Theory indicates that even if countries understand that cooperation will lead them to a Pareto superior outcome, they need not cooperate unless they are convinced that other countries are also

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[1] Discussions and disagreement between the U.S. and Britain on trade policy began as early as 1940 and continued throughout the war in the context of Article VII of the Mutual Aid Agreement (Lend Lease). In September 1943 the two countries reached a short-lived "understanding" on trade, the Washington Principles. But by 1944 the US backed away from this broad, across the board approach to trade liberalization and the U.K. followed suit. As a consequence, the British delegation to the Bretton Woods Conference was under a strict cabinet directive not to discuss trade policy with their U.S. opposite numbers. The U.K. reluctantly agreed to support a U.S. proposal for an international conference on trade and employment (the Havana Conference) during the Anglo-American Financial Agreement negotiations.

[2] With the exceptions of the U.S.S.R., Liberia and New Zealand, all of the nations which participated in the Bretton Woods Conference ratified the charters for the IMF and the World Bank.

committed to doing so. In this context international organizations can facilitate cooperation by serving as commitment mechanisms. Cooperation in the Bretton Woods System involved the maintenance of stable exchange rates and unrestricted trade among member countries. The commitment mechanisms that the Bretton Woods Institutions provided member countries included: rules of cooperation, financial resources to enable them to play by the rules, and a centralized source of information on each others' commitment to the rules.

In practice the two Bretton Woods Institutions and the GATT had limited success convincing their members to maintain cooperative arrangements. The evidence suggests that both the carrot and the stick that the institutions employed were weak commitment mechanisms. First, the main institutional carrot, financial assistance, was not always available to countries that played by the rules-of-the-game. Countries were ineligible for assistance once their accumulated debt exceeded their capacity to repay. Second, the historical record shows that the institutions rarely wielded the stick, in that they did not consistently enforce the rules of the system. Third, GATT's relatively relaxed rules-of-the-game effectively provided countries a trade controls escape route from the limits that the IMF required to be observed for exchange controls.

While all three organizations were ultimately unable to convince countries to maintain the cooperative behavior envisioned by their architects in the 1940s, the organizations survived the collapse of the Bretton Woods System by evolving with the changing economic environment. The IMF, in particular, broadened its role as a centralized source of information on member country economic performance. Post-war history suggests that information monitoring and sharing has been a relatively effective commitment mechanism for all three international organizations.

The organization of the paper is as follows. Section II describes the international cooperation problem in theory. A stylized exchange rate game is presented to highlight individual country incentives to cooperate. Practical difficulties in achieving decentralized cooperation are then

described along with three potential solutions to the problem. Section III examines the goals of the architects of the Bretton Woods System and the institutions that were created to facilitate the achievement of those goals. Section IV presents two examples that illustrate the conditions under which institutions can provide countries effective incentives to maintain cooperation and section V presents empirical evidence on the actual performance of the post-war institutions. Section VI discusses the more recent evolution of the IMF's role in maintaining international cooperation. Section VII presents conclusions and lessons for future cooperative arrangements.

II. THE INTERNATIONAL COOPERATION PROBLEM IN THEORY

Many of the participating countries at the Bretton Woods Conference contributed both to the establishment and to the breakdown of cooperative arrangements in the inter-war period. They were thus well aware of the incentives that led countries to defect from the gold standard. Game theory allows us to examine these incentives formally. When two countries interact in a game in which each can do better individually by taking a particular action, a unique Nash equilibrium exists in which both take the action even though they are jointly worse off. In such games it is easy to show that an outcome in which neither country takes the action is Pareto superior to the uncooperative solution to the game. Even when both countries understand this, it is typically difficult to arrive at this better equilibrium without the help of a commitment mechanism. Neither country will cooperate unless they can be convinced that the other is also committed to doing so.

Part A of this section provides a stylized example of the sort of exchange rate game played by countries in the inter-war period. In the game countries have an incentive to devalue, but can be made better off if they commit not to do so. Part B discusses why the Pareto superior cooperative solution is difficult to achieve and part C presents three possible solutions to this problem.

A. The Devaluation Game

Consider a model in which two countries, home (H) and foreign (F), face an established fixed exchange rate system. Assume that both countries initially declare par values against gold. Each country in this model then has two policy options, to defect from the system by devaluing the domestic currency against gold, or to maintain the par value of the domestic currency. If one country devalues and the other maintains its par value, the country that devalues gains a trade surplus (α).[3] However, a country that devalues also incurs a cost (C) for defecting from the fixed exchange rate system. The existence of this devaluation cost is a common assumption in the literature. Eichengreen describes it as, "a transactions cost associated with the existence of more than one currency (analogous to extra costs of interstate trade in the United States if there existed 50 state monies, all floating against one another)" (Eichengreen, 1987,7). More generally, countries would presumably not agree to be members of a fixed exchange rate system unless they believe to some degree that exchange rate instability is costly. Assume, however, that the benefits from unilateral devaluation outweigh the costs ($\alpha > C$). The payoffs for each country in this game are described in Figure 1.

FIGURE 1. PAYOFF MATRIX FOR DEVALUATION GAME

		FOREIGN	
		NOT DEVALUE	DEVALUE
HOME	NOT DEVALUE	0,0	$-\alpha,\alpha$-C
	DEVALUE	α-C,$-\alpha$	-C,-C

[3] This abstracts from complications arising from J-curve effects and the failure of the Marshall-Lerner condition to hold.

This game is an example of the classic Prisoner's Dilemma, and has an equilibrium in dominant strategies in which both countries devalue. And, as long as devaluation is costly ($C > 0$) this is the only Nash equilibrium for the game.[4] Moreover, when $C > 0$ the Nash equilibrium is Pareto inferior to the cooperative solution where neither country devalues.

This is the type of cooperation problem that participants at the Bretton Woods Conference in 1944 had in mind when they set about creating a new international monetary system. During the 1930s many countries defected from the gold standard system that was established after WWI. Countries engaged in competitive devaluations hoping both to conserve gold and to shift world demand toward domestic output. The devaluations largely offset each other but countries combined beggar-thy-neighbor exchange rate policies with trade and capital restrictions that left all countries worse off.[5]

Much of the discussion that led up to the Bretton Woods Conference centered around the creation of international organizations that would insure against a repeat of the collapse in cooperation that occurred in the 1930s. Before examining the possible roles of these organizations in the maintenance of the system, it is useful to determine whether there exist conditions under which countries have individual incentives to achieve the cooperative equilibrium. The Folk Theorem suggests that if we place our model in a repeated game setting, a cooperative outcome may emerge without the help of external institutions.[6]

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[4] If devaluation is costless ($C=0$), the only Nash equilibrium will be one in which both countries devalue, but it no longer involves the use of (strongly) dominant strategies.

[5] Bordo (in this volume) suggests that the perception, during and after WWII, that country's policies in the inter-war period were destructive, was incorrect. However, for purposes of explaining the goals of the participants at the Bretton Woods Conference it is the perception, and not the reality, that is important.

[6] See Kreps (1990), chapter 14, for a general discussion of equilibrium concepts in repeated games.

In the one-period game each country maximizes its payoff taking the actions of the other as given. If instead, the game is played repeatedly, countries can condition their actions in each period on what has occurred in the past. Let P_t^H (P_t^F) be the payoff to the home (foreign) country in period t, and π^H (π^F) its total stream of payoffs from the game, appropriately discounted,

$$\pi^H = \sum_{t=0}^{\infty} \delta^t P_t^H \tag{1}$$

where δ is the common discount factor ($0<\delta<1$).

Consider the following strategy:

(1) If no country in the past history of the game has devalued, do not devalue.

(2) If a country in the past history of the game has devalued, devalue.

This tit-for-tat strategy can be shown to lead to a subgame-perfect equilibrium. In other words, if both countries follow this strategy, then neither benefits from deviating from either phase 1 (cooperation) or phase 2 (punishment). During phase 2 both countries play their one-shot equilibrium strategies, so punishment is sustainable. A comparison of the gains from deviating in any one period, less the costs incurred during the punishment phase, against the gains from following the proposed strategy, shows that the cooperative phase is feasible.

If the home country follows the cooperative strategy, its expected payoff is zero ($\pi^{H*}=0$). If the home country deviates in any period, it stands to gain (α-C) immediately, but will incur costs (C) forever after.[7] The expected payoff therefore is:

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[7] This assumes that once a country devalues it is never forgiven, its reputation as a defector is irreversible. An alternative assumption is that after the defecting country has been punished with a retaliatory devaluation, both countries return to the cooperative equilibrium. In this case costs are incurred in only two periods. Axelrod's (1984) version of tit-for-tat is of this latter form; it is a one-round punishment strategy. The qualitative results of the game do not depend on which of these assumptions holds.

$$\pi^H = \alpha - C + \sum_{t=1}^{\infty} \delta^t(-C) = \alpha - \frac{C}{1-\delta}. \qquad (2)$$

In order to sustain cooperation the payoffs to cooperation must exceed the payoffs from devaluing ($\pi^H \leq \pi^{H^*}$). This implies:

$$\alpha - \frac{C}{1-\delta} \leq O, \quad or \quad \delta \geq 1 - \frac{C}{\alpha}. \qquad (3)$$

Thus, as long as the cost of devaluation is positive ($C>0$) and the discount rate (δ) is high enough, the cooperative solution is one possible subgame perfect equilibrium. If devaluation is costless ($C=0$), then the threat of reversion to the devaluation equilibrium has no bite, and the cooperative solution is not feasible.[8] This result, therefore, suggests that countries can maintain cooperative behavior (fixed par values) as long as the game is repeated and there exist positive costs to devaluation.

B. Practical Difficulties with Decentralized International Cooperation

While the devaluation game illustrates that a cooperative outcome is both feasible and sustainable under fairly unrestrictive conditions[9], the experience of countries in the inter-war period indicates that there must be more to the problem than the game suggests. The game abstracts from at least three important and potentially interrelated problems: the existence of more than two countries, incomplete information, and asymmetries among countries.

The number of potential equilibrium outcomes increases when more than two countries are introduced to the model. As the number of countries increases it becomes less likely that countries

[8] Of course, if devaluation is costless ($C=0$), then the payoffs in the cooperative and competitive devaluation equilibriums are identical so there is no incentive to cooperate.

[9] The cooperative outcome also depends on the assumption that both countries follow the tit-for-tat strategy.

will achieve the cooperative outcome. The problem is a classic one, collective action. As the number of countries increases so also does the number of potential defectors.

In the two-country game both countries were assumed to know with certainty both the benefits and costs of devaluation. Moreover, in order to focus on generic incentives, benefits and costs were assumed to be identical across countries. In practice neither class of assumptions is likely to hold. The benefits of a unilateral devaluation are likely to be a complicated function of the magnitude of the devaluation, the elasticities of import and export demands, and the prospective actions of the other country. It is unlikely that each country can predict the effect of its own devaluation, let alone the costs such an action might impose on other countries. Each country's incentive to maintain cooperation necessarily depends on its knowledge of the costs and benefits of defection; if these are uncertain or unknown, then the likelihood of a cooperative outcome may be reduced.

The benefits and costs of devaluation in practice may also vary across countries. The impact of a devaluation is likely to be greatest for smaller countries with the most open economies. Country heterogeneity could affect the equilibrium outcome of the game in various ways depending on the relative sizes of α and C for each country. For example, if both α and C are large for the smaller country and small for the larger country, a cooperative solution may still be feasible. However, if countries share the same C but one receives a larger α, that country will have a greater incentive to defect and a better prospect that the other country, recognizing the asymmetry, will not defect in response.

C. Three Possible Solutions to the Cooperation Problem

There are several different approaches one can take to solve the cooperation problem. Economists often focus on rules-based solutions, while political scientists are more likely to study the role of institutions and negotiations in the achievement of cooperative outcomes. Rules-based solutions are typically designed to be simple but rigid. Rules are formulated to be simple so that they

can easily be followed, but rigid so that countries cannot maneuver around them. Institutions and negotiations tend, in contrast, to be flexible, but allow for complexities in arrangements.

The advantage of a rules-based solution is that, once formulated, it is easy to implement. "If appropriate rules can be found, rule-based regimes have the advantage over non-cooperative regimes of leading to superior outcomes, while at the same time preserving the reality of national autonomy and decentralization in economic decision-making" (Cooper, 1985,1227). A major problem with the rules-based approach is formulating rules that are acceptable to all countries. Rules typically predetermine the distribution of the gains from cooperation and countries that perceive that they have bargaining power may be reluctant to play by the rules.

Alternatively, hegemonic theories suggest that countries with the majority of bargaining power are more likely to agree to rules because they can set the rules. "Hegemonic structures of power, dominated by a single country, are most conducive to the development of strong international regimes whose rules are relatively precise and well obeyed" (Keohane, 1980,132).

Apart from the problems for countries of setting and agreeing to abide by rules, this solution often collapses in the face of change. Rules are unlikely to cover all contingencies and as soon as conditions change, countries are unlikely to stick to the rules.

A second solution to the cooperation problem, international negotiations, is the starkest alternative to cooperation by rules. Negotiations provide a process of communication between countries. This process can potentially lead to the formulation of rules or the creation of an organization, the third solution, but they need not. International negotiations often take the place of the rules-solution when cooperation is in danger of collapsing.[10] More generally, negotiations are typically ongoing and not necessarily cumulative, so that they represent one of the most flexible

[10] Indeed the G-7 Summit negotiation process arose in the wake of the Bretton Woods System collapse (Putnam and Bayne (1987)).

means for countries to achieve a cooperative solution.

International negotiations may also serve to promote cooperation at the domestic level. In countries in which there is no policy consensus at the domestic level, governments may welcome the pressure to comply with policies agreed upon in international negotiations. In this manner, "[i]nternational negotiations sometimes enable government leaders to do what they privately wish to do, but are powerless to do domestically" (Putnam, 1988,457).

The third potential solution to the cooperation problem is the creation of international organizations. Organizations often serve to promote cooperation by enforcing rules-based solutions and providing a forum for international negotiations. In addition, organizations can serve to promote cooperation by providing a centralized source of information to its members. Milgrom, North and Weingast (1990) show that when information problems are substantial, repeat play and tit-for-tat strategies are insufficient to sustain cooperation. They study the medieval Law Merchant system in this context and find that by efficiently gathering and disseminating information to traders, the organization played a pivotal role in history. "The history of long-distance trade in medieval and early modern Europe is the story of sequentially more complex organization that eventually led to the 'Rise of the Western World'. In order to capture the gains associated with geographic specialization, a system had to be established that lowered information costs and provided for the enforcement of agreements across space and time" (Milgrom, North, Weingast, 1990,4).

The participants at the Bretton Woods Conference incorporated all three solutions to the cooperation problem in the creation of the new international monetary system. The par value system was rules-based and institutions were created to facilitate compliance with the rules, provide a forum for further negotiations and to establish a centralized information system.

III. POST-WAR GOALS AND THE BRETTON WOODS AGREEMENT

With the breakdown of gold standard arrangements in the early 1930s, countries engaged in numerous policy actions that led to exchange rate instability. Countries resorted to competitive depreciation, exchange controls and tariff warfare[11] in unilateral efforts to emerge from the world depression at the expense of neighboring countries. In a classic study, the League of Nations (1944) warned of the self-defeating nature of these beggar-thy-neighbor policies. It was against this background that leaders in various countries recognized the need for a new approach to international cooperation.

A. Goals

Seven hundred and thirty participants from forty five countries met on July 1, 1944 in Bretton Woods, New Hampshire to create a new international monetary system.[12] While the U.S. was the official host, the conference was the culmination of the efforts of two men: John Maynard Keynes and Harry Dexter White.[13] Keynes and White both began circulating proposals for a new international monetary system domestically as early as 1941. Both men believed that the economic stresses that countries faced in the inter-war years contributed to the start of WWII. While significantly different in detail, both proposals included a return to a modified gold standard exchange rate system and the creation of international organizations that would facilitate cooperation among member countries.

One of the main concerns of the U.S. at the time centered around the growth of preferential trading systems from which its exports were discriminated. The most important of these

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[11] For example, the U.S. passed the Smoot-Hawley Tariff in 1930.

[12] Prior to the main conference, technicians from 17 of these countries met for a preliminary drafting conference in Atlantic City, New Jersey in June 1944.

[13] An excellent detailed account of the pre-history to the Bretton Woods Conference and the negotiations that took place at the Conference are contained in Horsefield (1969) Volume I: Chronicle.

arrangements was the imperial preference system. The trading blocs served to divert trade away from countries outside the bloc using a combination of differential tariffs and exchange controls. It was this latter policy that White's plan was most bent on eliminating. The White Plan centered on the creation of two organizations, an international stabilization fund and a bank for reconstruction and development. The Fund's roles included: promoting currency stability, encouraging capital flows and facilitating international settlements. The stabilization Fund was to be contributory, with total resources of $5 billion (the U.S. contribution was to be $2 billion). While the U.S. Plan gave the Fund limited resources, it granted it substantial decision-making power. Most importantly, the Fund was to have veto power over a country's decision to change its exchange rate.

The British Plan, like the U.S. one, focused on the U.K.'s main economic concerns, unemployment and the convertibility of sterling. In 1944 the U.K economy was in disarray and sterling balances were large relative to Britain's gold reserve. The key component of the Keynes Plan was the International Clearing Union (ICU), a bank for central banks with its own international currency called bancor. Keynes's ICU resembled the British overdraft system. Debit balances in this system took the form of overdrafts rather than loans. In this way the burden of balance of payments adjustments would rest with creditor countries who were required to accept bancor as payment for net exports. Keynes's Plan was both more tolerant of exchange controls and potentially more expensive for creditor countries. The U.S. burden, for example, could in principle exceed $20 billion dollars, the total drawing rights of the other member countries.

The final Bretton Woods Agreement was a compromise between the two plans, with a more limited financial commitment from the creditor countries than the Keynes Plan, and a more tolerant view toward exchange rate management than the White Plan. The compromise plan established two international organizations, the International Monetary Fund and the World Bank. Both organizations required contributions from members based on their relative economic resources. Although exchange

rates were to be fixed in value against gold, member countries were permitted to adjust the values of their currencies under certain conditions. Also exchange controls were allowed on capital transactions, hut not normally on current transactions.

B. The Exchange Rate Arrangement

One of the principal duties given the IMF in the Bretton Woods Agreement was the promotion of exchange rate stability. The conference participants set out the rules for establishing and maintaining the new par value system principally in Articles IV and XX of the IMF charter. IMF members that were not occupied by the enemy during WWII were obligated to establish par values, expressed either in terms of gold or the U.S. dollar, within 30 days of the official commencement of the Bretton Woods System. All current account exchange transactions were to be made within 1% bands of the established par values. The rules did not permit members to change par values (other than a one-time change of 10 percent), except to correct a fundamental balance of payments disequilibrium and only after consultation with the IMF. Moreover, if a member changed the par value of its currency over the objections of the IMF, then the member would be ineligible to use IMF resources.

One of the more heated debates among the architects of the Bretton Woods System was over the scarce currency clause in Article VII of the IMF Charter. The British and other European countries were concerned about the possibility of a post-war depression. They argued that this could lead to a circumstance in which the total amount that countries were in deficit to the Fund exceeded the amount of available credit. As a consequence the IMF might not have the resources to provide adequate financial assistance, even though countries were following the rules-of-the-game. The scare currency clause effectively allows the Fund in this circumstance to put pressure on surplus countries. Once the Fund declares a surplus country's currency as scarce, debtor countries have the right to discriminate against transactions in the scarce currency.

Under Article VIII of the IMF charter countries that have declared par values are required to make their currencies convertible for current account transactions. Article XIV, however, provides countries a convertibility escape-clause. This article allowed countries to maintain existing exchange controls for an initial three year transition period after the establishment of the Fund, and thereafter with the provision that they justify their position to the Fund.

C. Creation of International Organizations

Of the two organizations created at Bretton Woods, the IMF was the most important in terms of member country day to day operations. The World Bank was designed chiefly to supply the capital needed for post-war reconstruction and long term development projects. Although the two institutions are explicitly separate in terms of charter, funding and staff, membership in the IMF is a prerequisite for membership in the World Bank.

The main features of the IMF are similar to those in White's original plan. Each member of the IMF has a quota equal to its subscription to the Fund. The original quotas totalled $8.8 billion with a U.S. contribution of $2.75 billion. A member's quota determines its financial contribution, its voting power in the IMF (based on one vote for each $100,000 of quota), and its access to the financial resources of the IMF.[14]

Subscriptions called for by quotas represent the principal source of assets for the IMF. Members were required to pay 25% of their quota in gold and the rest in their domestic currency. The IMF also derives income from charges on member drawings and has the authority to borrow to augment quota resources when necessary.

As described earlier, the establishment of an initial par value is, by Article XX, section 4(c),

[14] See Altman (1956) for a detailed description of the quota system.

a prerequisite to the use of the IMF's resources.[15] "The rules governing access to the use of Fund's resources apply uniformly to all members. However, Article V, Section 12(f) (ii) and (iii), allows the Fund to make balance of payments assistance available on special terms to 'developing members' in difficult circumstances" (Chandavarkar, 1984,31). Balance of Payments assistance takes the legal form of a purchase or drawing (not a loan) of a strong currency (or SDRs[16]) for the members' own currency.

Member drawings fall into four categories. Drawings up to the first 25% of a country's quota are in the gold tranche. The next three categories are called credit tranches. Transactions in the first credit tranche bring the IMF's holdings of a member's currency above 100% but not above 125% of its quota. Drawings in the second, third and fourth credit tranches require substantial justification and typically involve *conditionality*, terms and conditions to guarantee that the country is able to repurchase its currency in a timely fashion. Any drawing or stand-by arrangement exceeding 25% of the member's quota within any 12-month period (unless the IMF holds less of the member's currency than 75% of the quota), and any cumulative drawing that exceeds 200% of a member's quota, requires a waiver.[17]

Stand-by arrangements were first introduced in 1952. A stand-by arrangement involves the IMF granting financial assistance to members in advance of difficulties. "Indeed, a stand-by arrangement presents the contradiction that the drawing country does not have to establish need at the time the arrangement is entered into and the Fund in effect waives any power to judge need at the time the drawing is made" (Dam, 1982,122). While stand-by arrangements do not involve

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[15] Exceptions to this were possible to members whose metropolitan territories had been occupied by the enemy (Article XX, section 4(d)).

[16] Special Drawing Rights (SDRs) were introduced in 1969 to supplement reserves.

[17] In the 1960s the IMF established a number of compensatory financing facilities that granted automatic waivers of the 200% rule.

justification by the member country, they typically involve commitments to performance criteria.[18]

The second organization created at the Bretton Woods Conference was the International Bank for Reconstruction and Development. It was designed to help finance investment projects for reconstruction and development, particularly in underdeveloped regions. Along with providing long-term loans and technical assistance, the World Bank was to promote private foreign investment by guaranteeing and participating in loans by private investors. Member country's subscriptions in the World Bank take the form of shares of capital stock. 20% of subscribed capital is paid-in, and of this, 2% is in the form of gold or U.S. dollars and 18% is paid to the Bank in each member's domestic currency (and cannot be used for loans without the consent of the member whose currency is to be lent). The remaining 80% of the World Bank's subscribed capital is subject to call by the Bank only when required to meet its own obligations on its borrowings or guarantees.

The drafters of the Bank's Articles of Agreement were intent on avoiding the perceived capital market failures of the inter-war period. To that end, the Bank's charter contains a number of protective provisions governing loans to be made or guaranteed by the Bank. World Bank loans "must be for productive purposes and, except in special circumstances, must be to finance the foreign exchange requirements of specific projects of reconstruction or development" (IBRD, 1954,7) The borrower need not be a member government, but the loan must be guaranteed by the member government in the country where the project is located. The borrower must be in a position to repay the loan; and the Bank is required to make arrangements to ensure that the loan is used for its original purpose. Finally, "the Bank must be satisfied, before making or guaranteeing any loan, that in the prevailing market condition the borrower would be unable to obtain the loan from private sources under reasonable conditions" (IBRD, 1954,7).

The division of labor between the IMF and the World Bank has always been somewhat

[18] See Gold (1970).

blurred. In White's first complete draft of his plan he stated, "The objectives of the Bank, it will be noted, are similar in some respects to those of the Fund, but a careful examination will reveal that in their most important aspects they are different" (Oliver, 1975, 297).[19] The Fund was to provide short-term balance of payments assistance while the Bank was to provide longer-term project assistance. Keynes originally advocated close financial collaboration between the two organizations, but later changed his tune. In an often quoted passage, Keynes stated, "I should like to see the Board of the Fund composed of cautious bankers, and the Board of the Bank of imaginative expansionists" (Moggridge, 1980, 194).[20]

Resolution VII at the Bretton Woods Conference recommended the creation of a third organization whose purpose was to promote cooperation in international trading arrangements. Preparatory discussions in 1946 and 1947 led to the Havana Conference which produced a charter for the International Trade Organization (ITO). The U.S. had pushed for a powerful ITO that would work to abolish tariffs, quotas and preferential trading arrangements. Most of the other countries were concerned about safeguarding their weaker national economies against U.S. export competition. After extensive negotiations the original objectives of the ITO proposals were only nominally maintained. The combination of an equal vote for every country and escape clauses basically left every country to do as it liked. In this form the charter was unacceptable to the U.S. and the Senate failed to ratify it.[21] During the deliberations on the ITO, a multilateral trade agreement known as the GATT was drafted as a stop-gap measure. Twenty-three countries signed the GATT in 1947, but it was not until the mid-1950s that the GATT officially became a permanent international

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[19] As cited in Feinberg (1988), pp.546.

[20] Ibid, pp. 547.

[21] Of the 56 nations represented in Havana, 53 signed the ITO charter, but only one nation subsequently ratified it.

organization.

The GATT's mission is to set and regulate a code of conduct for international trade. The GATT is founded on three principles: nondiscrimination among trading partners (the most-favored-nation clause), no export subsidies or quantitative restrictions, and offsetting reductions in old tariffs to compensate for any introduction of new tariffs. It was hoped that if countries complied with these three principles, then at the very least trade restrictions between countries would not increase.

The GATT provides a rules-based cooperative solution for trade disputes among countries. In the context of GATT trade rounds, countries agree to provide tariff concessions as long as all other countries also do so. If a country raises its tariff above the agreed level, or imposes a trade restriction on the product, then the other countries retaliate with a "compensatory suspension of concessions". The GATT was not equipped with either carrots or sticks to compel its members to honor negotiated trade agreements. "A violation of the General Agreement -- for example, the nullification of a concession -- leads not to the imposition of punitive measures, but rather to the creation of a mere right on the part of the injured contracting parties to withdraw concessions (or other GATT obligations) running to the offending contracting party" (Dam, 1970, 21) While the IMF and the World Bank can refuse members access to resources if they deviate from the rules, all that the GATT can effectively do is allow its members to play a tit-for-tat strategy.

The architects of the post-war international order recognized that if they did not coordinate rules on trade and exchange restrictions, countries could easily use one as an escape valve from rules against restrictions in the other. In order to avoid this possibility, Article XV:4 of the GATT provides that contracting parties shall not, by exchange action, frustrate the intent of the provisions of the GATT, nor, by trade action, the intent of the provisions of the Articles of Agreement of the IMF. The IMF for its part agreed to provide the GATT both with relevant statistical information on member country exchange restrictions as well as analysis of the causes and effects of import

restrictions maintained for balance of payments reasons.[22]

IV. MAINTAINING COOPERATION – THE ROLE OF FINANCIAL ASSISTANCE

Whereas the IMF and the World Bank both provide member countries financial incentives to maintain cooperation, the GATT does not. Do carrots provide an effective commitment mechanism for organization that hope to promote international cooperation? In this section I analyze two games that illustrate under what conditions financial assistance can play an effective role.

A. The Role of Financial Assistance in International Negotiation

The most general mandated function of each of the post-war institutions was to promote cooperation by providing a forum in which members can consult and negotiate with each other on international monetary and trade matters. To investigate the role of financial assistance in international negotiations an example is useful.

Consider first an example of domestic tax policy negotiations between opposing groups within the home government. Assume that both groups agree that taxes should be raised to eliminate an existing government budget deficit, but the groups disagree on the allocation of the total tax burden to be borne by each group. Assume further that if the two groups cannot negotiate a compromise, the government will be forced to rely on an inflation tax to finance the deficit and this will, in turn, force the country to devalue its currency. Alesina and Drazen (1991) characterize the process leading to the compromise as a "war of attrition". Each group believes that the longer they refuse to compromise with the other group the more likely that the other group will concede. Whichever group concedes first ends up bearing a disproportionate share of the tax increase. Even though the country as a whole benefits from any compromise, Alesina and Drazen suggest that compromises will often be

[22] See chapter 16, "Collaborating with the GATT" in de Vries and Horsefield (1969) and "The Role of the International Monetary Fund" in Dam (1970) for further discussion of the relationship between the IMF and GATT.

delayed as groups attempt to shift the allocation of burdens in their favor.

One possible solution to this problem is for the executive branch of the government to take a more active role in the negotiating process. For example, the executive might declare that it will impose a penalty on whichever group refuses to support a government-sponsored compromise. Assuming that the executive is in office for a finite term, the problem with this solution is that as long as the executive's objective is to maximize the country's welfare, (defined as the unweighted sum of the welfares of both groups), the executive will never have an incentive to follow through with its threat. This is the classic problem of time consistency, that once a compromise is reached, it is not in the executive's interest to punish either group. If the groups are rational, they will foresee this and disregard the executive's threat.

Alternatively, an outside party or organization, one that is not subject to the time inconsistency problem that the domestic government faces, can play an important role. Assume both that the IMF has a longer time horizon than the domestic government,[23] and that the IMF's objective is to maximize global welfare. During the period that the Bretton Woods system was in place, any set of domestic policies that would lead a country to devalue would reduce global welfare from the IMF's perspective. It is in the IMF's interest in this circumstance to provide the executive in the home government an incentive to follow through with its threat. The IMF can offer the government financial assistance if it achieves a compromise and staves off a currency devaluation. As long as the value of the financial assistance exceeds the value of the penalty imposed on the group that refuses to compromise, the executive's threat will be credible.

Governments face similar credibility problems in the context of trade policy. Although a country can be made better off with less restrictive trade policies, certain import-competing industries have incentives to pressure members of the legislature not to agree to trade concessions. Any threats

[23] In other words assume that the government has a higher rate of discount than does the IMF.

to penalize the protectionist groups will not be credible unless they are time consistent. But without the ability to provide financial assistance, the GATT can do little to help governments forge a trade policy compromise.

B. The Role of Financial Assistance in the Par Value System

A second function primarily of the IMF, but also to some extent the World Bank, is to provide members with financial assistance to facilitate their compliance with the par value system. A modified version of the devaluation game described in Section II can clarify the potential role of financial assistance in an adjustable peg exchange rate system. The two countries, home (H) and foreign (F) now move sequentially, the home country makes the first move (in period 1) and moves in all subsequent odd-numbered periods. Likewise, the foreign country moves in all even-numbered periods. This assumption allows us to examine countries' immediate reactions to each other's moves.[24]

Let e^H (e^F) be the price of one-ounce of gold in units of the home (foreign) country's currency. To place the model in the Bretton Woods System context, the countries now have three policy options during a move, (i) a large devaluation against gold ($\Delta e=M$), (ii) a small devaluation against gold ($\Delta e=m$), and (iii) no devaluation ($\Delta e=0$). Assume that a large unilateral devaluation produces a large trade surplus for the devaluing country ($\alpha=1$). A small devaluation produces a smaller trade surplus ($\alpha<1$). Assume initially that countries cannot borrow money.

The payoffs for each country in any given period (regardless of whose turn it is to move) will be P_t - C if either devalues and P_t if neither does. Both countries incur a devaluation cost in period t if a country devalues in that period. Here international monetary stability is considered a public good so that the cost of its disintegration is borne by both countries.[25]

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[24] See Maskin and Tirole (1988) for an analogous alternating-move infinite horizon model set-up.

[25] See Eichengreen (1987).

Let $\tilde{P}_t^j = P_t^j - I_t C$ be the total payoff to country j (j=H,F) in period t, in which I_t is an indicator function equal to 1 if a country devalues in period t and zero otherwise, and let e_t^j be the price of one ounce of gold in units of country j's currency in period t. The home country will receive one of five possible payoffs in each period depending on its own actions and those of the foreign country:

$$P_t^H = \left\{ \begin{array}{lll} -1 & if & e_t^H - e_t^F = -M \\ -\alpha & if & e_t^H - e_t^F = -m \\ 0 & if & e_t^H - e_t^F = 0 \\ \alpha & if & e_t^H - e_t^F = m \\ 1 & if & e_t^H - e_t^F = M \end{array} \right\} \tag{4}$$

Payoffs and costs accrue at the end of each period, and each country knows the full discounted stream of payoffs and costs ahead of them. The total discounted stream of payoffs for each country in the game are:

$$\pi^j = \sum_{t=1}^{\infty} \delta^t \tilde{P}_t^j = \sum_{t=1}^{\infty} \delta^t (P_t^j - I_t C). \tag{5}$$

The game starts in period 1 with inherited exchange rates $e^H = e^F$. If neither country devalues the cooperative profits are zero ($\pi^{H*} = \pi^{F*} = 0$). Consider first each country's incentives to engage in a competitive devaluation strategy (*cd*). In the *cd* strategy each country undertakes a large devaluation. The total profits for each country if both countries follow the *cd* strategy are:

$$\begin{aligned} \pi^{H^{cd}} &= \sum_{t=1}^{\infty} \delta^t [(-1)^{t+1} - C] = \frac{\delta}{1+\delta} - \frac{\delta C}{1-\delta} \quad \textit{and} \\ \pi^{F^{cd}} &= \sum_{t=1}^{\infty} \delta^t [(-1)^t - C] = \frac{-\delta}{1+\delta} - \frac{\delta C}{1-\delta}. \end{aligned} \tag{6}$$

The home country is better off than the foreign country in this case because it has the first mover

advantage.[26] As long as $C < 1-\alpha$, the most profitable strategy for the home country is to devalue hy a large amount. A proof that this competitive devaluation (*cd*) strategy leads to a subgame perfect equilibrium is provided in Appendix I.

Now consider each country's incentives to maintain fixed exchange rates. The stability strategy (*s*) involves each country maintaining a fixed exchange rate unless a devaluation occurred in the past, and devaluing by a large amount (M) otherwise.[27] Using (6) the *s* strategy can be shown to be a subgame perfect equilibrium if the cost of devaluation lies between $(1-\alpha)$ and $(1-\delta)/(1+\delta)$.[28] Countries have no incentive to devalue if there is no history of past devaluation and $(1-\alpha) > C > (1-\delta)/(1+\delta)$, because in this case the payoff is negative ($\pi^{H^{cd}} \leq 0$). If a devaluation has occurred, then, because the *cd* strategy is subgame perfect, there is also no benefit from deviating from the punishment phase of the *s* strategy. If both countries follow the *s* strategy the payoff for both is zero ($\pi^{H^s} = \pi^{F^s} = 0$).

To summarize, under the assumption that $C < 1-\alpha$, if the competitive devaluation outcome is Pareto inferior to the stability outcome, then the latter is sustainable as a subgame perfect equilibrium of this game. Otherwise, the competitive devaluation outcome is an equilibrium, but the stability outcome is not. If $C \geq (1-\delta)/(1+\delta)$, then the game has two equilibria. If $0 < C < (1-\delta)/(1+\delta)$, stability is not sustainable as a subgame perfect equilibrium.

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[26] We can rewrite $\pi^{H^{cd}}$ in terms of $\pi^{F^{cd}}$ because if at t it is H's turn to move, at t+1 H will be in the same position as F in period t:

$$\pi^{H^{cd}} = \delta(1 - C + \pi^{F^{cd}}).$$

[27] It is worthwhile to note that defection in this example involves taking an action, while cooperation involves no action. If our example of cooperation involved trade policy, the opposite would be true. Defection would involve no action and cooperation would involve the removal of trade restrictions. This may provide yet another explanation for why cooperation in trade policy is so difficult to achieve.

[28] A proof of this proposition is provided in Appendix I.

The world as a whole loses when countries follow the competitive devaluation (*cd*) strategy, and the world's welfare in the *cd* equilibrium is lower the larger is C:

$$\pi^{H^{cd}} + \pi^{F^{cd}} = -2\frac{\delta C}{1-\delta}. \tag{7}$$

Further, there are winners and losers in the competitive devaluation equilibrium relative to the stable equilibrium. Losers are the second movers, those countries that react to devaluations by other countries. In particular, countries with hard currencies (currencies to which other currencies are pegged) are likely to be losers. It is, therefore, likely that hard currency countries would actively seek to devise a commitment mechanism that would ensure exchange rate stability. This may explain why the U.S. and Britain were so anxious to create organizations at the Bretton Woods Conference that would provide incentives for countries to maintain fixed exchange rates.

Consider how the game changes when the IMF is introduced. The IMF requires countries to declare par values that are consistent with long run balance of their trade accounts. If a country experiences temporary balance of payments difficulties but is otherwise in compliance with the par value system, it is eligible to borrow from the IMF at an interest rate, r. A country is also allowed to change its par value to the extent needed to make the present discounted value of its trade deficits and surpluses zero.

The key features of the IMF strategy (*f*) can be described in three parts:

(1) If it is a country's turn to move and its balance of payments is intertemporally balanced, then it should maintain its par value.

(2) If it is a country's turn to move and its balance of payments is not intertemporally balanced, then it should change its par value by an amount that is consistent with long term balance.[29]

(3) If it is not a country's turn to move and it suffers a current account deficit, then it can draw on the IMF for funds equal to the deficit, provided it has followed *f* so far.

Finding the conditions under which *f* leads to a subgame perfect equilibrium where $\pi^{H^f} = \pi^{F^f} = 0$ is more complicated than was the case for the previously described strategies. Under *f*, countries must both borrow and devalue in reaction to balance of payments imbalances. But countries have a limited ability to borrow, since accumulated debt cannot exceed a country's capacity to repay. This limit on borrowing leads to a breakdown of strict recursivity because a country's optimal strategy depends on the level of debt incurred so far.

Suppose that the foreign country will play *f* forever, and the home country will deviate in its first n^* turns and adhere to *f* forever after. Recall that the home country moves in odd periods, so that its last devaluation takes place at $t^*-1=2n^*-1$, and the foreign country's last devaluation occurs at $t^*=2n^*$. In this case, the foreign country will accumulate debt (D_t) according to part (3) of *f*, where D_t obeys:

[29] Here we assume away issues of moral hazard. The IMF is assumed to be able to distinguish between countries that are truly experiencing balance-of-payments difficulties and those that claim that they are, when they are not, in order to receive IMF permission to devalue.

$$\textit{odd periods}: \quad D_{2v+1} = \frac{(1+r)^{v+1} - 1}{r}$$

$$\textit{even periods}: \quad D_{2(v+1)} = \frac{1+r}{r}[(1+r)^{v+1}-1], \textit{ for any } v \geq 0. \tag{8}$$

The value of v that first raises the value of F's debt beyond its capacity to repay, even under the best circumstances (i.e. when F's last devaluation, at $2v^*+2$, leads to a surplus equal to 1), can be found using the following inequality:

$$\frac{1}{1-\delta} = \frac{1+r}{r} < \frac{1+r}{r}[(1+r)^{v+1}-1],$$

$$\textit{solving for } v: \quad v > \frac{ln2}{\ln(1+r)} - 1. \tag{9}$$

Define v^* to be the smallest integer value of v that satisfies the inequality. This tells us that after time $t=\max[2v^*-1,0]$ the IMF will not provide full financing of F's deficits. The discounted payoff to the home country for following the deviation strategy (*d*) in its first n^* turns is:

$$\pi^{H\,d} = \frac{-\delta(1-\delta^{2v^*})C}{1-\delta} \leq 0 = \pi^{H\,f}. \tag{10}$$

More generally, at any given odd period $t=2v-1<2v^*-1$, an additional deviation by the home country, followed by subsequent adherence to *f*, yields a negative gain of $-\delta C$. Therefore any finite number of deviations, such that $0<n^*\leq v^*$, does not pay. However, once the home country devalues the $n^*\geq v^*+1$ time, H will force the foreign country beyond its borrowing limit. If the home country deviates for v^*+1 periods, its discounted payoff is:

$$\pi^{H\,d} = \frac{\delta}{1-\delta}\left[\frac{(1+r)^{v^*+1}-2}{r} - (1-\delta^{2(v^*+1)})C\right]. \tag{11}$$

This indicates that if the cost of devaluations is small enough, v^*+1 deviations will pay. That is, from period $2v^*+1$ onward, the game degenerates into either the *cd* or the *s* strategy game, although

the foreign country is formally following the IMF strategy, *f*.

Next consider the foreign country's incentives to deviate from *f*. Assume that a number n ($0<n<v^*$) deviations have occurred in the past, and that it is the foreign country's turn to move. Under *f*, the foreign country must devalue in such a way as to obtain a surplus $\hat{\alpha} < 1$, yielding payoffs $-\delta C$. If the foreign country deviates from *f* by, for example, engineering a surplus equal to 1, then it loses its right to borrow from the IMF in the future. Such a devaluation would also induce the home country to devalue in the following period. This indicates that if the foreign country deviates from *f*, the game collapses into the *cd* game previously described.

These results are surprising in that they indicate that the promise of IMF financial assistance provides countries no more incentive to maintain fixed exchange rates than does the *s* strategy, which they can achieve without IMF participation. Once a country hits its borrowing limit, the necessary condition for *f* to lead to a subgame perfect equilibrium is $1-\hat{\alpha} \geq C \geq (1-\delta)/(1+\delta) = r/(2+r)$ which is identical to what we found earlier for *s*.[30] It is only under the strict condition that countries never hit their borrowing limit that the *f* strategy provides a subgame perfect equilibrium when *s* does not.[31]

Much of the debate at the Bretton Woods Conference between Keynes and White was over the level of financial resources that would be made available to member countries in need of assistance. White wanted to limit country access to resources because he felt that the U.S. would ultimately bear the bulk of the financial burden of a more generous system. According to Edward Bernstein, the chief technical advisor and spokesman for the U.S. delegation at Bretton Woods, under the White

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[30] For both the *cd* and the *s* strategies α is an arbitrary constant, such that $\alpha \leq 1$. Under the *f* strategy, $\hat{\alpha}$ is the maximum surplus a country can obtain when trying to restore balance. That is, $\hat{\alpha}$ is the surplus the foreign country needs to restore long term balance after the home country has deviated n^* times.

[31] In this case the necessary condition for *f* to be a subgame perfect equilibrium is that the countrys' discount rates are equal to the IMF's interest rate: $\delta^{-1}=1+r$, $r>0$.

Plan "the Fund would give each country the currency it needed to meet its deficit and the country would give its currency to the Fund. But then it would be obligated to repay the money it drew and it had to begin to correct its balance of payments. In the Keynes Plan there was no obligation to repay unless it developed a balance of payments surplus" (Black, 1991, 37-38). In the context of the model presented in this section, under the Keynes Plan countries would be less likely to hit their borrowing limit, and as a consequence, countries would have a greater incentive to stick to the rules-of-the-game.

V. EMPIRICAL EVIDENCE FROM 1944-1971

"The effectiveness of institutions for deterring breach of contract might best be judged like that for peacetime armies -- by how little they are used." (Greif, Milgrom, Weingast, 1991,1)

Each of the post-war institutions has come in for criticism, not so much because they have been little used, but because international monetary and trade relations did not achieve the level of cooperation that was first promised. An empirical assessment of this proposition, however, is difficult. First, it is difficult to formulate a testable hypothesis. What one might like to know is how countries would have behaved had the IMF, World Bank and GATT not existed. If economic conditions were comparable before and after WWII, one could examine the different levels of cooperation achieved between countries in the two periods. Alternatively, had a significant number of countries not become members of the Bretton Woods Institutions one might compare economic growth and cooperative arrangements across the two groups of countries. But most of the developed countries (with the notable exceptions of Switzerland and the USSR) and the majority of developing countries are members, precluding any such comparison.

A second problem that arises with any quantitative study of the effectiveness of these

institutions is that much of the requisite data remains confidential. This is particularly a problem for an assessment of the effectiveness of international negotiations within each of the organizations. For example, country requests for par value changes or drawings that were not approved by the IMF are not necessarily part of the public record.

In light of these problems, this section presents available empirical evidence on the main accomplishments of each of the three post-war institutions relative to their original missions. I begin with brief summaries of the activities of the World Bank and GATT. There is less to say about these two institutions because the goals of both are intrinsically open-ended relative to those of the IMF. The empirical assessment of the IMF is provided in two parts. The IMF's role in the par value system is presented in Part A, and Part B presents the IMF's record for balance of payments assistance.

The World Bank's original mission was to provide capital for European reconstruction. The World Bank's resources were from the beginning limited, but the intention was that the Bank would encourage private investment by providing loan guarantees. The President of the World Bank in 1947, John McCloy, "thought of the Bank as a temporary institution which would go out of business if it were successful, for it would no longer be needed as an intermediary between productive borrowers and private lenders" (Oliver, 1975, 259). It was soon realized that the task of reconstruction was beyond the Bank's scope and the Marshall Plan, implemented in 1948, largely took over the job.[32] The Bank then shifted its resources and focus to financing development projects in underdeveloped regions. Rather than serving as a guarantor of private investment, as the Bretton Woods participants had envisioned, the Bank took on an intermediary role, borrowing funds from private investors and lending them to developing countries.

[32] In 1947 the Bank did make four reconstruction loans: to France ($250 million), the Netherlands ($195m), Denmark ($40m) and Luxembourg ($12m).

The average yearly World Bank loan level for the period 1947 through 1957 was only $283 million. Average project lending in the next ten years increased substantially to $764 million. But it was not until the late 1960s, after Robert McNamara became president, that lending steadily began to increase. In 1978 alone, World Bank loans exceeded 6 billion dollars.[33]

The Bank's slow start was in part due to its passive approach toward development lending. In 1950 the President of the Bank, Eugene Black, explained that the reason the Bank had not made many loans to developing countries "has not been lack of money but the lack of well-prepared and well-planned projects ready for immediate execution" (Mikesell, 1972, 72). Applications for development loans reportedly consisted of lists of projects that the member governments had under review with no indication of priorities or feasibility. It was against this background that the Bank organized its first economic survey mission to Columbia in 1949. Although these missions initially received mixed receptions, the World Bank increasingly took the view that it needed to assist countries in formulating long-term development programs. Robert Garner, Vice President of the Bank in 1947, reflected later that, "[a]dvice was more important than money" (Oliver, 1975, 255).

It is difficult to give an overall assessment of the Bank's record. After a shaky start, the Bank greatly expanded its loan portfolio and actively involved itself in analyzing and centralizing information on member country development programs. However, even given its impressive and improving recent record, the Bank's resources are meager compared to the financing needs of developing countries.

The ITO's mission, taken up by the GATT, was to facilitate an open, liberal and competitive international trading system. To the GATT's credit, post-war trade restrictions have declined substantially, but cooperation in trade has not been uniform across countries or industries and has progressed slowly. The GATT's principles are subject to numerous exceptions. Customs unions,

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[33] World Bank loan data is from various issues of *World Bank Annual Reports*.

free-trade areas and certain preferential trade arrangements are all excluded from the principle of nondiscrimination. Agricultural subsidies are excluded, as are import quotas for developing countries.

The GATT has been most successful in its role as facilitator of multilateral trade negotiations among developed countries. As a result of six major rounds of negotiations in the first 20 years of GATT, tariff rates of the industrial countries fell from an average of 40% in 1947 to 13% by the late 1960s. There has been less success with liberalizing developing country trade policies.

Most recently, the GATT has come in for criticism over the relevance of its rules-of-the-game. While the GATT continues to focus on reducing tariffs worldwide, countries have found an effective escape valve by creating so-called nontariff barriers. Countries have learned to replace tariffs with other forms of trade restriction that are not subject to GATT rules.

The IMF's two original responsibilities were to administer the par value system and provide members financial assistance to enable them to maintain their par values in the face of short-term balance of payments shortfalls. The next two parts present an empirical assessment of the IMF's record in these two areas.

A. The Par Value System

The IMF elected to treat an exchange rate change as unauthorized on only one occasion, France in 1948. "Indeed, the Fund on some occasions did not even require a member to assert that it was in 'fundamental disequilibrium' when passing upon a proposed change in par values. As time went on and it became apparent that a key problem under Bretton Woods was not the instability that White had feared but rather an unwillingness of members to make par value changes promptly enough, considerable effort was expended on making it clear that the 'fundamental disequilibrium' requirement was not really a limitation on prompt and small exchange rate changes" (Dam, 1982,92).

Initially the IMF was determined that new members declare par values within the 30 day

period specified in Article XX 4(a). But over time the IMF became less resolute on this as well as some of the other exchange rate rules set out in the Articles. In a series of decisions over the course of 1947 through 1951 the Executive Board declared that any change in a member's exchange rates (whether or not it involved a change in the member's par value) was subject to review by the IMF. But on numerous occasions countries changed both exchange rates and par values without prior approval of the IMF.[34]

There were 44 proposed exchange rate changes between 1948 and 1949. In 1948 both France and Mexico suspended their par values without IMF approval and allowed their currencies to float. In 1949 both Belgium and Peru were granted permission by the IMF to allow their currencies to float temporarily. While Belgium declared a new par value two days later, Peru had yet to declare a new par value in 1965. Even without a declared par value, however, Peru was permitted to make IMF drawings.

During 1949 the Bretton Woods System experienced its first major round of devaluations. During the summer of 1949, gold and dollar reserves of the sterling area fell by over 30%. In September the U.K. government finally asked for approval for a 30% devaluation, this was immediately approved by the IMF. The devaluation of the pound sterling was followed by major devaluations by the other sterling bloc countries as well as all the Western European countries.[35] Table 1 shows the extent of these devaluations; in total 19 countries devalued in 1949.

While there was some grumbling over the perception that the IMF had really just rubber-

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[34] See de Vries and Horsefield (1969) Volume II: Analysis, for detailed descriptions of member country exchange rate policies during 1945-1965.

[35] Obstfeld (this volume) refers to the 1949 devaluations as competitive; the very policies that the Bretton Woods System was set up to avoid. An alternative interpretation is given by Edward Bernstein: "[i]n the environment of 1949, when European recovery had been only partially achieved, it was impossible to make fine distinctions between the appropriate change in the parity of the Netherlands guilder, for example, and the parity of sterling. That is why the European devaluations in 1949 were nearly the same" (Bernstein, 1972, 53).

stamped the U.K. request to devalue, there was more serious discussion within the IMF over the approval of the subsequent devaluations.[36] "The Latin American Directors, exercised lest the devaluations of the outer sterling area in line with that of the pound sterling should harm the export prospects of their countries, thought that there was a need for a 'definitional examination' of competitive depreciation" (de Vries and Horsefield, 1969,100). The countries that opposed the IMF's decision to approve the devaluations had reason to feel this was an important issue. The countries that devalued in 1949 accounted for almost half of the world's exports and about 60% of the exports of industrial countries.

In the years to follow, the IMF became increasingly tolerant of member countries' refusals to play by the rules of the par value system. In 1950, Canada informed the IMF of its decision to allow its currency to float because of a heavy capital inflow (mainly from the U.S. during the Korean war). After debating the issue at length, the IMF made no official pronouncement. Canada's exchange rate floated for 12 years, yet the country was not denied access to IMF resources.[37]

Ten years after the establishment of the par value system only nine countries had accepted the obligations of Article VIII and had fully convertible currencies.[38] With the exceptions of the U.S. and Canada all the developed member countries took advantage of the convertibility escape clause provided in Article XIV. Not only did they avail themselves of the automatic three year transition

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[36] In Bernstein's recollections he states, "Early in 1949, the U.S. Executive Director began to press for discussions on the devaluation of the European currencies" (Black, 1991, 66). This may explain why the U.K. devaluation proposal was accepted by the Fund so quickly. Bernstein goes on to say that the U.S. view was not made public because they were worried that this would lead to a speculative attack against the European currencies.

[37] However, in practice, Canada did not draw on Fund resources until 1962, the year it re-established a par value.

[38] The nine countries with Article VIII status in 1956 included: Canada (1952), Dominican Republic (1953), El Salvador (1946), Guatemala (1947), Haiti (1953), Honduras (1950), Mexico (1946), Panama (1946), United States (1946).

period, but all the European currencies remained inconvertible for twelve years. Although most currencies were de facto convertible by 1959, the European countries did not officially assume Article VIII status until February, 1961.

Although a number of developing countries accepted Article VIII status before the developed members, most of them experienced chronic balance of payments problems throughout the Bretton Woods era. As a result of these difficulties, many developing countries became increasingly dependent on a wide range of exchange and trade restrictions. By the mid-1960s "while the industrial countries were able to maintain their external economic relations with few limitations on the acquisition or use of foreign exchange, many of the developing countries continued to rely on restrictions, sometimes in combination with multiple exchange rates" (de Vries and Horsefield, 1969, 294).

By the end of 1966, the IMF had 104 members, 23 of whom had not established par values. After twenty years, only 58% of the member countries maintained 1% bands around fixed par values. However, Table 2 shows that if we include countries that maintained fixed unitary exchange rates, although without a par value, and countries with fluctuating rates that remained stable for at least three years, then the percentage of countries with effectively stable rates in 1966 rises to 87%.

The par value system came under a new set of strains in the late 1960s and finally collapsed in the early 1970s. "This was due to rapid changes in competitive positions among the major industrial countries, reflecting divergent rates of productivity, growth in favor of continental Europe and Japan, to widening disparities in rates of inflation, and to the reluctance of many countries to make timely and adequate exchange rate changes" (Hooke, 1982, 5). With the exceptions of devaluations by France in 1958 and 1969, revaluations by the Germany in 1961 and 1969 and the Netherlands in 1961, and another sterling bloc devaluation in 1967, members of the developed

countries made little use of exchange rate policy between 1950 and 1970.[39] The reverse was true for members from developing countries. 82% of developing country members devalued by more than 30% between 1949 and 1966, and 25% of these devalued by more than 75%.[40] In 1970 Canada was the first country to allow its currency to float, but it was soon followed by Germany in 1971 and the U.K. in 1972. In March 1973 the par value system officially collapsed following the U.S. announcement that it would devalue the dollar by 10%.

The empirical evidence on the par value system indicates that the rules of the system were rarely enforced and the goal of the architects of the system, stable exchange rates, was only achieved by a small number of countries for a short time period. During the so-called heyday of the Bretton Woods era, 1959 through 1967, most developed countries did maintain stable and convertible exchange rates. However, few developing countries were able to maintain stable rates without the help of exchange and trade restrictions.

B. Member Drawings

The participants at Bretton Woods had originally envisioned use of the IMF's resources as a privilege granted to members that were otherwise in compliance with the IMF's rules and in need of short-term balance of payments assistance.[41] But as was the case with the par value system, the IMF took on an increasingly broad definition of member eligibility for Fund resources.

Uruguay was the only original member that did not have the right to purchase exchange from the IMF because it had not agreed to a par value. Once Uruguay established a par value in 1960, however, the IMF decided to permit member countries to draw on Fund resources even if they had

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[39] See de Vries (1976) for detailed descriptions of member country exchange rate policies during 1966-1971.

[40] See de Vries (1968).

[41] Keynes and White had a difference of opinion on this point. Keynes felt that members should, at the very least, have an indisputable right to draw from the gold tranche.

not established a par value.

France was the first country to be declared ineligible to use IMF resources because of non-compliance with the par value system. In 1948 France introduced multiple currency practices that were not approved by the IMF. The only other country to be denied access to IMF resources in response to a par value violation was Czechoslovakia in 1953. Czechoslovakia eventually left the IMF in 1955, partly over this issue.

Bolivia and Cuba were each denied access to IMF resources, in 1958 and 1964, respectively, for non-compliance with the conditions of earlier drawings. Bolivia was unable to carry out the conditions of its stand-by arrangement and Cuba failed to repurchase its 1958 drawing within five years. Cuba, however, resigned from the IMF before the ban on future drawings was put in place.

Like the World Bank, the IMF got off to a slow start with its lending practices. "There was a sharp division in the Board between those who believed that members had automatic rights to draw on the Fund's resources and others ... [who] took the line that access to the Fund's holdings of dollars should be made subject to fairly strict conditions. This atmosphere resulted in many decisions by the Board which in effect tied the Fund's hands in its initial years: there were to be few transactions, no participation in European payments arrangements, and little action against restrictions" (de Vries and Horsefield, 1969, 32). Indeed, in 1949, only $102 million was drawn from the Fund. Nothing was drawn in 1950. In the years 1951-55, borrowings averaged less than $100 million per year. Likewise, only five countries have ever been officially denied access to IMF resources[42].

In 1952, the Board decided to grant countries the unconditional right to draw up to 25% of their quota (the gold tranche) as a means of encouraging members to use IMF resources. However, the maximum amount that countries were eligible to draw from the IMF in any one year period was

[42] See de Vries and Horsefield (1969), de Vries (1976) and de Vries (1985) for detailed descriptions of member country drawings over the period 1948 through 1978.

25% and not more than 200% of their quota in total. In 1953, in yet another effort to encourage more countries to make drawings, the IMF began routinely issuing waivers of the 25% rule.[43]

IMF drawings beyond the gold tranche are subject to conditionality. Members are required to pursue specific economic policies in order to receive Fund resources. These policies vary from case to case, but typically include ceilings on domestic credit and public sector expenditures, elimination (or reduction) of restrictions on trade and payments and elimination of price controls. Conditionality is intended to help countries attain viable balance of payments without resort to trade or exchange restrictions. However, at least publicly, countries are rarely pleased to relinguish their policy discretion to the IMF. "Typically some -- and sometimes many -- of the requirements embodied in the Fund's proposals for conditionality are difficult for the member to accept... If performance clauses are not met, further drawings on the Fund automatically cease" (Polak, 1991, 52).

The stringency of IMF conditionality increases with the size of a member's drawing. This may have discouraged members from making large drawings. Table 3 shows the amounts of member drawings over the period 1947 to 1965. Before 1961, "no country had outstanding drawings or a stand-by arrangement with the Fund for amounts that in the aggregate exceeded 100% of its quota. The first approval for a larger amount was given in connection with a combined drawing and stand-by arrangement requested by Chile" (Mookerjee, 1966,432). The first sizable drawings in the fourth credit tranche did not occur until 1965.[44]

In the IMF's first two decades of operations, drawings by industrial countries accounted for over half of total Fund credit. The share of developing country drawings did not exceed that for

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[43] Turkey was the first country allowed to draw over 25% of its quota over a 12-month period starting in August, 1953. Over the period 1956-1965 waivers were granted in 144 of 155 stand-by arrangements and 43 of 75 direct drawings.

[44] This changed in the late 1970s when a number of developing countries were granted permission to draw amounts two and three times their quota. For example, in 1980 a stand-by arrangement for Turkey involved permission to draw up to 625% of its quota.

industrial countries until the late 1970s. Table 4 shows the relative magnitudes of drawings by developed and developing countries over the period 1947 to 1978. The first large drawings on the Fund were made by the U.K. and France in 1948 before the Marshall Plan disbursements began. The Marshall Plan was in effect from 1948 through 1952 and under its auspices the U.S. provided $11.6 billion in grants and $1.8 billion in loans to European countries and $950 million in grants and $275 in loans to Japan. Countries that were eligible for Marshall Plan funds were to make Fund drawings only in exceptional or unforseen cases. But even in this four year period, when developed countries were essentially ineligible for Fund credit, total drawings by developing countries did not exceed $250 million.

An increasing fraction of drawings after 1952 were in the form of stand-by arrangements. Although these arrangements were originally "considered as something in the nature of a confirmed line of credit that gave a member an absolute right to make purchases... [they have] become the main instrument for conditionality" (de Vries and Horsefield, 1969, 533). This may explain why many of these credit arrangements were never actually used. Table 5 provides data on the amounts drawn under stand-by arrangements from 1947 to 1965. Only 23 percent of these arrangements were fully drawn upon. This trend continued in the late 1960s and 1970s. Over time stand-by agreements served less as a financial resource and more as a signal to both private banks and investors that the country had the IMF's stamp-of-approval.

The evidence on drawings and stand-by agreements confirms that the original rules-of-the-game set at the Bretton Woods Conference did not remain hard and fast. There were few instances in which countries were declared ineligible for IMF resources, even when countries did not follow the rules of the par value system. There were even fewer instances of countries getting close to their credit limits. One explanation for this pattern is that the IMF used conditionality as its stick. Countries were de facto ineligible for Fund resources if they did not agree to pursue IMF-dictated

adjustment policies. Over the Fund's first three decades, the industrial countries were the major recipients of Fund resources and conditionality. However, since 1978 most drawings on the IMF have involved developing countries. With conditionality as the Fund's major means of enforcing its rules, this change in the IMF's clientele has effectively led to a two-tier membership system. Those developing countries that rely on IMF credit are subject to the rules-of-the-game, while the developed countries are not.

VI. THE EVOLUTION OF THE IMF'S ROLE IN MAINTAINING COOPERATION

By the end of the 1960s the IMF's role in promoting international cooperation had fundamentally changed. The participants at the Bretton Woods Conference assigned the IMF two main tasks: to enforce the rules of the par value system, and to provide members with financial assistance when necessary to enable them to observe the rules. But the historical record indicates that the par value system never was widely adhered to, and it was soon to be abandoned altogether. Likewise, as the world's private capital markets developed, developed countries no longer needed to rely on IMF resources for their financing needs.

The IMF responded to the changing economic environment by turning its focus from the developed world to developing countries. But rather than competing with private capital markets for business, the IMF took on a new role as a monitor of developing country stabilization programs. Although the commercial banks might have preferred that the IMF directly provide them information about the economic prospects of countries, the confidential nature of member country information precluded such an arrangement. "Commercial bankers were not in a position to monitor the borrowing government's implementation of economic policy measures, and they gradually came to view that the best approach was to ask the country to enter into an upper credit tranche stand-by arrangement with the Fund" (Mentre, 1984,31).

A simple two period model of a country that wishes to borrow can provide insight into the potential monitoring role for an international organization. Part A presents the model and part B presents empirical evidence.

A. A Monitoring Role for the IMF

Consider a model in which a country's population can be represented hy a single agent, the government, with utility function, $U(C_1) + \delta U(C_2)$, in which U is a standard concave function, δ is a discount factor $(0<\delta<1)$ and C_i is ith period consumption. The country enters period 1 with endowment Y to be allocated between consumption in period 1 and investment in period 1. The country can borrow an amount b in period 1. In period 2, the capital invested during period 1 produces according to a concave production function, f(k), modified with an efficiency parameter θ. Debts must be repaid with interest accruing at rate r. If it is assumed that debt contracts are perfectly enforceable, then consumption in period 1 is $C_1 = Y + b - k$, and in period 2, $C_2 = \theta f(k) - (1+r)b$. If the government chooses k and b to maximize utility, it will follow the golden rule: $\theta f'(k^*) = 1+r$.

If contracts are not perfectly enforceable, then banks will need a means to punish debtors that default on their loans in period 2. It is common in the debt literature[45] to assume that banks cannot recoup anything from a sovereign country that defaults and cannot charge discriminatory interest rates. Adopting such a framework, the only recourse banks have when a country defaults is to refuse to grant trade credit. This, in turn, causes a loss of a fraction ρ of the defaulting country's output. Given such a penalty, a country that invested k and borrowed b in period 1 will repay its debt when $\theta f(k) - (1+r)b \geq (1-\rho)\theta f(k)$. Banks can foresee this choice and will not lend more than a country will repay.[46] This establishes a credit ceiling $b^c = \rho\theta f(k)/(1+r)$. As long as θ is fully observable by

[45] See the appendix in Bulow and Rogoff (1989).

[46] Eaton and Gersovitz (1981) present the classic analysis of lender and borrower incentives under these conditions.

both the country and the bank and the credit ceiling is binding,[47] the country will choose k to maximize utility such that:

$$\theta f'(k^c) = \theta g'(k^c)(1+r) + (1-\theta g'(k^c))\frac{U'(C_1^c)}{\delta U'(C_2^c)}, \quad \text{where} \quad g(k) = \frac{\rho f(k)}{1+r}. \tag{12}$$

which says that capital is accumulated until its marginal productivity equals the effective interest rate, a weighted combination of the market rate and an implicit rate. The weights are proportional to θ, indicating that low-θ countries are likely to face higher effective interest rates than high-θ countries.

If θ is unobservable, the problem for the banks and countries is more complicated.[48] Assume that there are two types of countries, a proportion γ of low efficiency types (θ_l) and a proportion $(1-\gamma)$ of high efficiency types (θ_h), with $\theta_h > \theta_l$. If banks can observe θ, they will offer low-θ types loans up to b_l^c and high-θ types loans up to b_h^c. The low-θ types will borrow all they can and the high-θ types will borrow their optimal amount, $b_h^* < b_h^c$. On average, a representative country therefore receives $\gamma b_l^c + (1-\gamma)b_h^*$ in loans. But if banks cannot observe θ they can only be sure to be repaid on those loans that do not exceed the credit ceiling that applies to θ_l types, b_l^c [49]. In this case low-θ countries are unaffected, while both the banks and high-θ countries are hurt. Banks earn fewer profits because potentially profitable loans to high-θ countries are not made. This inefficiency

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[47] If the credit ceiling is not binding the maximization problem again yields the golden rule.

[48] Here the assumption is that θ is given but unobservable, countries are assumed to have no control over efficiency. This assumption leads to a classic adverse selection problem. Countries that know they have low θs will try to exploit bank's inability to distinguish them from high-θ countries. An alternative assumption made by Gertler and Rogoff (1990) is that investment (k) is unobservable. Lenders observe the total amount borrowed, realized output, and the country's production function, but do not observe what the borrower does with the funds. This assumption leads to a moral hazard problem. The IMF can serve an important role in the context of either problem. But if the problem is moral hazard, then the IMF role would involve conditionality rather than monitoring.

[49] Stiglitz and Weiss (1981) show that even if banks can charge discriminatory interest rates, credit rationing will arise if borrowers are not distinguishable because the interest rate will itself affect the riskiness of loans.

is difficult to avoid, because low-θ countries have an incentive to imitate the behavior of high-θ types in order to borrow more.

Define $U(\theta_l,\theta_l)$ to he the level of utility of a correctly identified low-θ type and let $U(\theta_l,\theta_h)$ be the utility of a low-θ type that imitates a high-θ type, such that:

$$U(\theta_l,\theta_l) = U(Y + b_l^c - k_l^c) + \delta U(\theta_l f(k_l^c) - (1+r)b_l^c),$$
$$U(\theta_l,\theta_h) = U(Y + b_h^* - k_h^*) + \delta U\{\max[\theta_l f(k_h^*) - (1+r)b_h^* ; (1 - \rho)\theta_l f(k_h^*)]\}. \quad (13)$$

Visually comparing these levels of utility we see that a low-θ type that imitates a high-θ type can consume more in the first period than if it were correctly identified. This is because the consumption smoothing properties of a concave utility function assures that high-θ types consume more in both periods than low-θ types do.

One solution to this problem, from the standpoint of banks and high-θ countries, is for high-θ countries to signal their true type.[50] The problem for the high-θ country is to maximize its utility subject both to the credit constraint, and the constraint that an imitating low-θ country's utility is not higher than in would be if correctly identified, $U(\theta_l,\theta_h) \leq U(\theta_l,\theta_l)$. The first order conditions from this maximization problem[51] indicate that a high-θ country is likely to borrow less when it needs to

[50] See Milgrom and Roberts (1982) for an analysis of a similar signalling problem.

[51] See Appendix II for details.

signal:

$$(1+r) = \theta_h f'(k_h)\left[1 - \lambda(1-\rho)\left(\frac{\theta_l}{\theta_h}\right)\frac{U'[(1-\rho)\theta_l f(k_h)]}{U'(C_{2h})}\right] \qquad (14)$$

Borrowing adds to both the high-θ country's utility in period 1 and the imitator's utility because the latter depends on the actions of the country being imitated. The usual benefits from borrowing in period 1, $\delta\theta f'(k)U(c_2)$, are modified by the last term in the first-order-condition. The costs of borrowing for the high-θ country, under these circumstances, will be larger the larger is θ_l/θ_h, and the lower is the loss of output to the imitator when it does not repay its loan (ρ). More generally, the high-θ types incur the full cost of repayment $(1+r)U'(C_{2h})$, but do not reap the full benefits of investing, because some of the benefits leak to the imitators.

This model suggests that countries can benefit from a credible monitoring technology that would help banks distinguish between low-θ and high-θ types. Assume that the cost of monitoring i countries is C(i) = C + wi, in which C(i) exhibits decreasing average costs or economies of scale in monitoring. This assumption reflects that an organization, once set up, can monitor additional countries at small cost. Further, assume that the fixed cost C is high enough that it does not pay individual banks to incur the costs of monitoring. (Nor can high-θ types afford to pay for the costs of individual bank monitoring.) If there are j debtor countries and the IMF monitored all of them, its average monitoring cost would be C/j + w. As long as C and j are large enough, high-θ countries will both request the IMF to monitor them and can even offer to pay for the service. Further, as long as monitoring is credible, low-θ types (that seek to imitate high-θ types) have no incentive to go to the IMF to be monitored, because they will be found out. Therefore, the very action of going to the IMF conveys all the information to the banks that is needed to distinguish correctly between true high-θ types and imitating low-θ types.

B. Empirical Evidence

The two oil crises in the 1970s were particularly damaging to the terms of trade of non-oil developing countries. While the IMF responded to these developments by introducing two temporary oil facilities in 1974 and 1975, it was the commercial banking sector that responded with substantial financial assistance. The proportion of external debt of developing countries owed to private banks rose dramatically over the period 1973 through 1982. Table 6 presents this data, along with the relatively smaller magnitudes of developing country debt owed to governments and international institutions over the same period.

Although the model described above suggests that the IMF could have helped private banks distinguish between types of developing country borrowers in this period, there is little evidence that any such certification took place. Commercial bank loans continued to be readily available for many developing countries throughout the 1970s, but banks gradually began to restrict capital flows toward certain regions. It was at this time that the IMF's information and monitoring role began to take shape. "Both in Eastern Europe and later in Latin America, certain countries found their access to capital markets restricted, partly because the debt problems in neighboring countries had changed bankers' assessment of their creditworthiness. In some cases, the Fund, at the request of the debtor authorities, has been the conduit of information between the countries and their creditors, in an effort to help ensure that market sentiments be guided by more comprehensive and reliable economic information" (Brau and Williams, 1983,14).

By 1978, certain heavily indebted countries began to have difficulty servicing their loans, and approached both official and private creditors for debt restructurings. It was at this time that the IMF's monitoring role became established. Both official creditors and bank creditors began to require that countries experiencing payments difficulties negotiate upper credit tranche arrangements with the IMF prior to the conclusion of their restructuring negotiations. In 39 of 47 restructurings negotiations

with commercial banks over the period 1978 to 1983, the new terms were made conditional upon an IMF arrangement.[52]

Upper credit tranche stand-by arrangements well serve this monitoring role because they typically involve substantial conditionality.[53] Further, the IMF disburses portions of its financial assistance over time, usually over the course of one or two years. This permits the IMF to monitor the adjustment program and potentially cancel financial support for a member that does not comply with the conditions of the arrangement.

VII. LESSONS FOR FUTURE INTERNATIONAL COOPERATIVE ARRANGEMENTS

While the institutions created by the Bretton Woods Agreement (and subsequently) fell short of achieving the goals that were originally set for them, they all survived the collapse of the Agreement. The IMF was not able to maintain the par value system, the World Bank was not able to satisfy the financing needs of post war reconstruction and development, and the GATT was not able to eliminate trade restrictions between countries. But to their credit, each of these organizations had the flexibility to evolve with economic circumstances and take on new roles in the maintenance of international cooperation.

The models presented in the paper indicate that international organizations can facilitate cooperation by serving as commitment mechanisms. Even when countries understand that cooperation will lead to a Pareto superior equilibrium, they will be reluctant to cooperate unless they are convinced that other countries are also committed to doing so. The post-war institutions each

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[52] See Table II (pages 30-34) in Brau and Williams (1983).

[53] De Long and Eichengreen (1991) argue that it was the conditionality that went with the Marshall Plan financial aid that deserves the credit for that program's success. "Conditionality pushed governments toward political and economic orders that used the market to allocate resources and the government to redistribute wealth, and that turned out to be highly successful at inducing rapid economic growth" (page 2).

provided member countries with commitment mechanisms, but evidence suggests that some of these were not credible. The IMF and the GATT both provided member countries with a set of rules of cooperation. However, the record indicates that these rules were not consistently enforced. Likewise, the IMF and the World Bank provided members financial resources to enable them to play by the rules. But these resources were so restricted as to tie a country's incentive to cooperate to the level of its accumulated debt. All three institutions provided members a centralized source of information on each others' commitment to the rules. Of the three forms of commitment mechanism, evidence suggests that this was the most effective, in that it remains an important function for each institution.

If the IMF, World Bank and GATT had not been established after the war, would it have been necessary to create them subsequently? It is difficult to find evidence that they were indispensable. History suggests that more recent architects would have less ambitious goals than the ones formulated at Bretton Woods. Further, the evolution of commitment mechanisms used by the post-war organizations indicates that more recent organizations would have relied less on rules and more on the provision of centralized information to promote international cooperation.

Our post-war experience with international organizations provides us three broad lessons. First, commitment mechanisms are effective only if they are credible. The IMF's original rules-of-the-game were too strict and thus not credible. The Fund effectively turned to a more flexible commitment mechanism, conditionality, to influence member country behavior. Second, an international organization can convince domestic parties to undertake policies that improve global welfare by providing the country's government with financial incentives that override its time inconsistency problem. Governments can draw on IMF and World Bank resources to credibly forge compromises among conflicting domestic interest groups. Third, evidence suggests that international organizations can effectively promote cooperation by providing their members with a credible monitoring technology. Both the IMF and the World Bank are able to certify their member's

commitment to cooperative behavior by exploiting access to confidential information on members' economic performance.

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APPENDIX I

Proposition 1: The *cd* strategy induces a subgame equilibrium in the devaluation game when

$$C < 1-\alpha.$$

Proof: Without loss of generality, assume it is H's turn to move at time t. As of this moment the state of the game is summarized by Δ_t defined as

$$\Delta_t = e^H_{t-1} - e^F_{t-1}$$

$\Delta_1 = 0$, and for $t > 1$, Δ_t can take any one of the values {-M,-m,0,m,M}. In all of these cases, except the last one, $\Delta_t = M$, the *cd* strategy requires H to devalue at t, yielding profits $\pi^{H^{cd}} = \delta(1-C+\pi^{F^{cd}})$. If $\Delta_t = M$, *cd* calls for no devaluation and yields $\pi^{H^{cd}} + \delta C$. Consider deviations which consist of setting e^H_t such that (recall $e^F_t = e^F_{t-1}$) $\Delta^H = e^H_t - e^F_t = \{m,0,-m,-M\}$ assuming that, starting at t+1, F will stick to the *cd* strategy. Equations (1)-(8) show that the payoffs to H from following any one of the deviations Δ^H, are smaller than $\pi^{H^{cd}}$, and thus also smaller than $\pi^{H^{cd}} + \delta C$.

(1) *If* $\Delta^H = m$ *and* $\Delta_t \neq m$, $\pi^{H^m} = \delta(\alpha - C + \pi^{F^{cd}}) < \pi^{H^{cd}}$.

(2) *If* $\Delta^H = m$ *and* $\Delta_t = m$, $\pi^{H^{m,m}} = \delta(\alpha + \pi^{F^{cd}})$, *and* $\pi^{H^{m,m}} \leq \pi^{H^{cd}}$ *if* $\alpha \leq 1-C$ *as assumed.*

(3) *If* $\Delta^H = 0$ *and* $\Delta_t \neq 0$, $\pi^{H^0} = \delta(-C + \pi^{F^{cd}}) < \pi^{H^{cd}}$.

(4) *If* $\Delta^H = 0$ *and* $\Delta_t = 0$, $\pi^{H^{0,0}} = \delta\pi^{F^{cd}} < \pi^{H^{cd}}$.

(5) *If* $\Delta^H = -m$ *and* $\Delta_t \neq -m$, $\pi^{H^{-m}} = \delta(-\alpha - C + \pi^{F^{cd}}) < \pi^{H^{cd}}$.

(6) *If* $\Delta^H = -m$ *and* $\Delta_t = -m$, $\pi^{H^{-m,-m}} = \delta(-\alpha + \pi^{F^{cd}}) < \pi^{H^{cd}}$.

(7) *If* $\Delta^H = -M$ *and* $\Delta_t \neq -M$, $\pi^{H,-M} = \delta(-1 - C + \pi^{F,cd}) < \pi^{H,cd} - \delta^2 C$,

because $C \leq \frac{2}{\delta^2}$ *as assumed.*

(8) *If* $\Delta^H = -M$ *and* $\Delta_t = -M$, $\pi^{H,-M,-M} = \delta(-1 + \pi^{F,cd}) < \pi^{H,cd} - \delta^2 C$,

because $C \leq \frac{2}{1+\delta^2}$ *as assumed. QED*

Proposition 2: Strategy (s) is a subgame perfect equilibrium if

$$(1-\alpha) > C > (1-\delta)/(1+\delta).$$

Proof: Assume no devaluation has occurred in the past, then any devaluation triggers competitive behavior. If it is the home country's turn to move and the foreign country has just devalued, then the home country has four options, $\Delta e^H = \{-M,-m,m,M\}$. Clearly, $\pi^{H,-M} < \pi^{H,-m} < \pi^{H,m} < \pi^{H,M}$ so that the only sensible option consists of setting $\Delta e^H = e_t^H - e_t^F = M$ yielding the payoff $\pi^{H,cd}$. But it was shown previously that $\pi^{H,cd} < 0$ when $C > (1-\delta)/(1+\delta)$. If a devaluation already occurred then the proof of proposition 1 assures that the punishment phase of strategy s is also one-step unimprovable. QED

Proposition 3: Assume that $\delta^{-1} = 1+r$, $r>0$. Given the assumption of proposition 2, $1-\alpha \geq C \geq (1-\delta)/(1+\delta) = r/(2+r)$), and the necessary condition that $\alpha = \hat{\alpha}$, the *f* strategy induces stability as a subgame perfect equilibrium.

Proof: The arguments presented in the text indicate that if F follows *f*, H will either deviate an infinite number of times, or H will not deviate at all. This is because any number of deviations $n \leq v^*$ is worse than not deviating at all. And an infinite number of deviations is better than any finite number $n > v^*$. Thus, a first deviation by H implies an infinite number of deviations to follow. Under these conditions, the maximum discounted value of F's surpluses and deficits is $-\delta/(1+\delta)$, an amount that F does not have the capacity to repay. This implies that the game with the IMF collapses to the one described in proposition 2 during the very first period, and its outcome is the same as in that game, although F is formally following strategy *f*.

If F, reacting to H's *d* strategy, deviates from *f* by devaluing by more than is necessary to maintain external balance, it gains $\pi^{H^{cd}}$ minus $(1+r)\delta$ because it must still repay its accumulated debts to the IMF. But $-\delta C > -\delta(1+r) > \pi^{H^{cd}} - (1+r)\delta$.

If F postpones adjustment two periods, F's profits will be $-\delta^3 C-\delta^2-\delta = -\delta(\delta^2 C+\delta+1)$ net of payments to the IMF, because F will not be eligible for loans in the intermediate periods. But, $-\delta C+\delta^3 C+\delta^2+\delta = \delta[(\delta^2-1)C+\delta+1]$. This is non-negative if $1+\delta \geq C(\delta^2-1)$, which is true for any $C>0$. Alternatively, putting off the payment triggers the *cd* outcome, as it makes any further IMF intervention impossible. Profits in this case are, $-\delta(2+r)-\delta^2+\delta^2\pi^{H^{cd}}$ and this is smaller than $-\delta(1+r)<-\delta C$. QED

APPENDIX II

The borrowing country's maximization problem in the case where debt contracts are perfectly enforceable is:

$$max_{b,k}\ U(Y+b-k) + \delta U(\theta f(k)-(1+r)b)$$

$$f.o.c.:\ U'(C_1^*) = \delta(1+r)U'(C_2^*)$$

$$U'(C_1^*) = \theta\delta U'(C_2^*)f'(k^*)$$

combining the first order conditions we obtain the golden rule for investment: $\theta f'(k^*) = 1+r$, which determines k^*. Substituting k^* in either f.o.c. yields b . Assume that while all countries have the same δ, U(), and f(), k^* and b^* differ among countries depending on the country's level of efficiency (θ). In order to show that $k^*(\theta)$ and $b^*(\theta)$ are monotonically increasing in θ, first differentiate the golden rule with respect to θ:

$$f'(k^*(\theta))d\theta + \theta f''(k^*(\theta))dk^*(\theta) = 0$$

$$rearranging:\ \frac{dk^*(\theta)}{d\theta} = \frac{-f'(k^*(\theta))}{\theta f''(k^*(\theta))} > 0.$$

Next differentiate the first f.o.c. taking $dk^*(\theta)/d\theta$ into account:

$$U''(C_1)\left[db^* - \frac{dk^*(\theta)}{d\theta}d\theta\right] = \delta(1+r)U''(C_2)\left[-(1+r)db^* + f(k^*)d\theta + \theta f'(k^*)\frac{dk}{d\theta}d\theta\right]$$

rearranging:

$$\frac{db^*(\theta)}{d\theta} = \frac{[U''(C_1) + \delta(1+r)\theta f'(k^*)U''(C_2)]\frac{dk^*(\theta)}{d\theta} + \delta(1+r)U''(C_2)f(k^*)}{U''(C_1) + \delta(1+r)^2U''(C_2)} > 0$$

If debt contracts with sovereign countries are not perfectly enforceable, and the only recourse for banks when countries default is to refuse to grant trade credit, the country's maximization problem includes an additional constraint. Banks will not lend more than they expect will be repaid.

Borrowing countries will therefore be faced with a credit ceiling, such that $b \leq \theta g(k)$. (where $\theta g(k) = \rho\theta f(k)/(1+r)$, and ρ is the fraction of output countries will lose if banks refuse to grant trade credit.) If this borrowing constraint is binding, the country's problem becomes:

$$max_k \quad U(Y-k+\theta h(k)) + \delta U(\theta f(k)-(1+r)\theta g(k))$$

$$f.o.c.: \; U'(C_1^c)[\theta g'(k^c)-1] + \delta U'(C_2^c)[\theta f'(k^c)] - \delta(1+r)U'(C_2^c)\theta g'(k^c) = 0$$

rearranging terms:

$$\theta f'(k^c) = \theta g'(k^c)(1+r) + (1-\theta g'(k^c))\frac{U'(C_1^c)}{\delta U'(C_2^c)}.$$

If θ is unobservable, but there are two types of countries, high efficiency (θ_h) and low efficiency (θ_l), high-θ countries will have an incentive to signal to banks their true type. The high-θ country's problem is:

$$max_{k_h,b_h} \quad U(Y+b_h-k_h) + \delta U[\theta_h f(k_h)-(1+r)b_h]$$

$$s.t.: \quad b_h \leq \theta_h g(k_h)$$

$$U(\theta_l,\theta_h) \leq U(\theta_l,\theta_l)$$

The first-order conditions when the credit ceiling is not binding are:

$$U'(C_{1h})(1-\lambda) = \delta\theta_h f'(k_h)U'(c_{2h})\left[1-\lambda(1-\rho)\left(\frac{\theta_l}{\theta_h}\right)\frac{U'[(1-\rho)\theta_l f(k_h)]}{U'(c_{2h})}\right]$$

$$U'(c_{1h})(1-\lambda) = \delta(1+r)U'(c_{2h})$$

combining:

$$(1+r) = \theta_h f'(k_h)\left[1-\lambda(1-\rho)\left(\frac{\theta_l}{\theta_h}\right)\frac{U'[(1-\rho)\theta_l f(k_h)]}{U'(C_{2h})}\right].$$

Table 1

Devaluations by Countries in the Bretton Woods System, 49-50

Country	Devaluation relative to $ (%)
Greece	33
Denmark	30
Egypt	30
Finland	30
Netherlands	30
Norway	30
Sterling area except Pakistan*	30
Sweden	30
France	22
Germany	20
Belgium	13
Portugal	13
Canada	9
Italy	8

* includes Australia, Iceland, India, Iraq, Union of South Africa and the U.K.

Source: IMF, International Financial Statistics.

Table 2

Adherence to Par Values, 1946-1966

Year	All Members	Without Par Values	With Par Values	% Effectively Stable*
1946	40	8	21	70
1947	45	8	23	67
1948	48	8	23	63
1949	48	8	24	67
1950	49	9	24	61
1951	50	7	25	62
1952	54	10	20	57
1953	55	6	22	62
1954	56	7	20	59
1955	58	9	22	59
1956	60	11	24	57
1957	64	13	27	63
1958	68	15	31	63
1959	68	12	33	68
1960	68	9	37	72
1961	74	13	40	80
1962	82	17	47	84
1963	102	30	54	85
1964	102	30	54	84
1965	103	28	57	86
1966	104	23	64	87

* includes countries with minor multiple currency practices in addition to par values and countries without par values but with fixed or stable unitary rates.

Source: de Vries (1966), pp. 506-507.

Table 3

Amounts of Fund Transactions by Tranches, 1947-1965

(In millions of U.S. dollars)

Year	From Net Creditor Position	Gold Tranche	First Credit Tranche	Second Credit Tranche	Third Credit Tranche	Fourth Credit Tranche
1947	-	398.8	68.9	-	-	-
1948	-	89.9	118.1	-	-	-
1949	-	56.7	44.8	-	-	-
1950	-	-	-	-	-	-
1951	-	6.6	28.0	-	-	-
1952	-	13.9	43.2	28.0	-	-
1953	-	158.5	62.5	8.5	-	-
1954	-	49.9	12.5	-	-	-
1955	-	12.5	12.5	2.5	-	-
1956	-	294.6	369.0	20.8	8.1	-
1957	-	421.2	452.1	103.2	0.6	-
1958	-	54.6	55.7	211.7	16.0	-
1959	-	42.6	64.0	69.2	3.9	-
1960	-	61.7	106.9	104.5	6.6	-
1961	37.5	722.5	869.0	785.0	64.3	-
1962	24.3	167.6	214.1	93.4	64.0	20.2
1963	-	8.4	15.9	112.3	138.6	44.8
1964	157.5	1140.7	514.2	60.2	18.7	57.5
1965	-	462.7	69.7	777.3	528.1	491.0

Source: Mookerjee (1966).

Table 4

Drawings on the IMF, 1947-1971 (US $m), 1971-1978 (SDRs)

Year	Developed* Countries	Other Countries	Number of Countries
1947	431	37	8
1948	132	76	11
1949	29	73	6
1950	0	0	0
1951	0	35	2
1952	34	51	6
1953	129	100	6
1954	0	62	3
1955	0	27	2
1956	561	131	11
1957	540	437	20
1958	190	148	14
1959	50	130	12
1960	19	260	14
1961	1775a	703	22
1962	300	284	18
1963	30	304	15
1964	1762b	188	22
1965	1885c	443	23
1966	892	556	34
1967	425	410	29
1968	2864d	689	37
1969	2476	395	36
1970	1513	326	41
1971	1473e	427	35
1972	1416f	613	30
1973	599	577	26
1974	533	525	24
1975	3228g	1874	50
1976	4062h	2530	57
1977	2874i	2036	55
1978	1912j	591	31

* Includes *industrial countries*: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, U.K., U.S. and *other developed areas*: Australia, Austria, Denmark, Finland, Iceland, Ireland, Israel, New Zealand, Norway, Portugal, South Africa, Spain, and Yugoslavia.

(a) 1,500 of which was to U.K.; (b) 1,000 to U.K., and 525 to U.S.; (c) 1,400 to U.K., and 435 to U.S.; (d) 1,400 to U.K., and 745 to France; (e) 1,362 to U.S.; (f) 1,312 to U.S.; (g) 1,942 to Italy; (h) 1,700 to U.K.; (i) 1,700 to U.K.; (j) 1,250 to U.K.

Source: IMF, International Financial Statistics.

Table 5

Amounts Drawn Under Stand-by Arrangements, 1947-1965.

Amount Drawn as % of Amount Available	% of Total Number of Stand-by Arrangements
0	30
1-25	6
26-50	16
51-75	13
76-99	12
100	23

Source: Mookerjee (1966).

Table 6

External Debt of Non-Oil Developing Countries, 1973-1982
(in billions of U.S. $)

Year	Total Debt Outstanding	Government	International Institutions	Private Banks
1973	130.1	37.3	13.7	60.8
1974	160.8	43.4	16.6	77.9
1975	190.8	50.3	20.3	95.1
1976	228.0	57.9	24.8	114.8
1977	278.5	67.6	31.0	137.3
1978	336.3	79.1	38.4	169.1
1979	391.1	89.1	45.6	199.7
1980	467.6	101.7	53.2	229.5
1981	550.8	113.4	62.7	275.5
1982	614.2	125.7	71.0	300.8

Non-oil developing countries include: all Fund members except industrial countries and countries where oil exports account for at least two-thirds of total exports.

Source: IMF, Annual Report, various issues.