Working Paper No. 78/03

The Post-War Rise of World Trade: Does the Bretton Woods System Deserve Credit?

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September 2003

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I. Introduction

During the two decades after the Second World War, international trade expanded at its most rapid pace of the twentieth century. Between 1948 and 1968, the total volume of merchandise exports from non-communist countries grew by a remarkable 290 percent.[2] And the growth of world trade during this period far exceeded the expansion of world output. Growth rates of this magnitude have attracted considerable attention from economic historians, who have attempted to extract explanations. Textbook accounts focus primarily on commercial policy or technological factors. However, these traditional explanations largely ignore the role of the Bretton Woods international monetary system in providing a stable environment for multilateral payments, in which trade could flourish.

This oversight is particularly unfortunate, given that the greatest expansion of world trade occurred in the 1960s, during the heyday of Bretton Woods. Furthermore, empirical evidence demonstrates that conventional explanations fail to adequately account for the post-war surge in world trade. More recently, economists have focused on the role of monetary unions in facilitating international trade. In a groundbreaking study, Rose (2000) demonstrates that countries sharing a common currency trade over three times more with each other than with comparable countries using different currencies, *ceteris paribus*. Estevadeordal, Frantz and Taylor (2001) apply similar methodology to the classical gold standard and find that joint-participation in the

[1] I am grateful to Nicholas Crafts for excellent advice and support. I also received invaluable insights from Barry Eichengreen and Alan Taylor. Douglas Irwin, Carmen Reinhart, Kenneth Rogoff and Marko Tervio generously shared data. Philip Epstein and Paul Johnson provided helpful assistance with my econometric analysis. The usual disclaimer applies.

[2] Ashworth (1987), p. 285.

gold standard increased bilateral trade by more than 90 percent. The coefficients from these studies may overestimate the effect; however, even a smaller statistical relationship would support the significant benefits of joining a common currency area. Therefore, this paper seeks to determine whether the Bretton Woods System, acting as an effective common currency, increased international trade in the 1950s and 1960s. I hypothesize that joint-participation in the Bretton Woods System exerted a positive influence on bilateral trade, holding other factors constant.

The remainder of the paper is organized as follows. Section II analyses the textbook explanations and empirical evidence on the rapid growth of world trade during the post-war period. The section concludes by arguing the need to find an alternative explanation of the post-war rise of world trade. Section III evaluates the role of payments frictions in hindering international trade. This section includes an assessment of the empirical literature on the historical impact of exchange rate regimes on bilateral trade. In Section IV, I analyze the function of the Bretton Woods System, focusing specifically on the channels through which the system may have increased bilateral trade by acting as an effective common currency. The section is divided into discussions of current account convertibility, exchange rate stability and general credibility. I conclude that the Bretton Woods System achieved these characteristics, if only for a short period approximately during the decade after 1958. Section V introduces the model and data used in my empirical analysis. To investigate the hypothesis, I employ an augmented "gravity model" of bilateral trade—a technique that has recently gained popularity for studying the historical impact of monetary unions. This section also defines several aspects of "participation" in the Bretton Woods System, which I use to evaluate its influence on trade. Section VI presents the empirical results, including an analysis of their robustness. My estimates suggest that joint-participation in Bretton Woods increased trade between countries by about 20 percent, *ceteris paribus*. From these results, Section VII draws broader implications for the decision to join a monetary union and provides new

historical perspectives on the Bretton Woods System. Finally, Section VIII concludes.

II. The Post-War Rise of World Trade: Textbook Explanations

The end of the Second World War marked the beginning of a new era for the world economy. Policymakers increasingly embraced international trade as essential for economic growth, shifting away from the isolationist policies of the inter-war period. Within this new framework of cooperation, international trade grew rapidly and consistently during the 1950s and 1960s (see Chart 1). Between 1948 and 1960, the total value of merchandise exports of non-communist countries rose from $53 billion to $112.3 billion, at an average growth rate of more than six percent per year. Growth was even faster in the 1960s, when the average annual rate of export volumes increased to more than eight percent. [3] These growth rates far exceeded the rate of expansion of world trade experienced in the half-century before 1914, the period that hosted the highly celebrated "first globalisation". Since 1973, world trade has grown at a slower average pace of about 4 percent per year and has been considerably more erratic.

More importantly, in the 1950s and 1960s the growth of world trade consistently outpaced the growth of world output. For example, from 1953 to 1963, trade in manufactured products increased by 83 percent, while manufacturing output rose by only 54 percent.[4] Chart 2 illustrates the rapid growth of trade relative to output during these two decades. The increase of this ratio continued until the early 1970s. Trade also grew most rapidly among industrialized nations: by 1973, this "intra-trade" between developed countries accounted for more than 54 percent of world trade. [5] The growth of intra-trade paralleled the compositional shift toward manufactured goods. Industrial

[3] Kenwood and Lougheed (1992), p. 286, and Ashworth (1987), p.285.
[4] Ashworth (1987), p. 285.
[5] Kenwood and Lougheed (1992), p. 286, 288.

economies increasingly engaged in trade of similar final goods and traded components from different stages of production (Krugman 1995).

The remainder of this section critically analyses the textbook determinants of the rise of world trade during the post-war period. Traditional explanations emphasize tariff reductions, transportation and communication technology, Heckscher-Ohlin style models, and income growth and convergence. But many of the statistics above contradict these theories. Furthermore, empirical evidence illustrates the inadequacy of these explanations. The conclusion of this section emphasizes the need for an alternative explanation of post-war trade.

Economic historians most frequently cite the liberalization of trade policies as the primary cause of the post-war trade boom. In the decades after the Second World War, the barriers to trade that were erected during the interwar period were gradually torn down through a series of political agreements. The 1947 General Agreement on Trade and Tariffs (GATT) is the most celebrated of these accords. At the Geneva conference, 23 nations agreed upon 123 negotiations covering 50,000 tradable items.[6] GATT's effectiveness was most evident for the United States, which had reduced its duties by more than 50 percent by the mid-1950s.

However, the other twenty-two original parties made only minimal concessions. In an analysis of the post-war trade recovery, Irwin (1995, p. 5) concludes: "The formation of GATT does not appear to have stimulated a rapid liberalization of world trade in the decade after 1947. . .." By the late-1950s, the inability of GATT to solve Europe's complex trading issues led to the formation of the European Economic Community (EEC), which created a common external tariff among six nations. Only in the late 1960s, after the Kennedy Round negotiations (1964-67), did countries begin to substantially reduce tariffs. Chart 3 illustrates the failure of countries to significantly reduce tariffs in the 1950s and 1960s for a 35-country sample. Thus, the post-war environment of free trade was achieved not instantaneously, but gradually, through continual negotiations.

[6] Irwin (1995).

The effects of tariff reductions on post-war trade are even more controversial. Krugman (1995) emphasizes that late-nineteenth century Germany and the United States, the two largest economies of the period, were highly protectionist. Thus, the massive growth in world trade before 1914 occurred in an environment of relatively high tariffs. Furthermore, the rise of world trade in the 1950s occurred in an environment of continued restrictions, particularly within Europe. Rose (1991) analyses the impact of tariff rates on the trade ratio using a diverse cross-sectional sample from 1951 to 1980. After including control variables for other traditional determinants of trade, Rose finds no statistically significant relationship between the tariff rate and trade ratio for developed countries. And as Irwin (1995, p. 17) asserts: ". . . there is considerable uncertainty about the effects of tariff cuts on trade. Because quantitative restraints and foreign exchange restrictions continued to be in place, it is not clear that the tariff reductions translated into more open market access for Europe." Therefore, although the gradual reduction of tariff rates during the post-war period probably contributed to increased trade, this explanation is by no means the end of the story.

Other arguments focus on decreased transportation costs as the main driver of the post-war rise in world trade. Using cross-sectional studies, several authors have identified transportation costs as more important than tariff barriers for US imports in the mid-1960s.[7] More recently, Obstfeld and Rogoff (2001) suggest an important role for transportation costs and technology in diverse models that explain the behaviour of post-war trade. Hummels (1999) makes a significant contribution to studying the effect of transport costs on trade by presenting a new database to measure trends in transportation costs using data on ocean freight, airfreight and overland transportation. Despite technological developments, such as the growth of containerisation for ocean shipping, Hummels finds that the price of bulk commodities has fallen faster than the unit

[7] See Waters (1970) and Fingers and Yates (1976). Samuelson (1968) provides a more general discussion of "natural" impediments to international trade.

cost of tramp shipping, which has resulted in no change or even a slight net increase in the barriers posed by shipping since World War Two (see Chart 4). Similarly, shipping costs for manufacturing products, which account for 70 percent of OECD trade, have actually risen. Indeed, Rose (1991) finds no statistically significant relationship between transport costs and the trade ratio for the post-war period. But Hummels cautions that the raw data from his study ignore an important component of improved quality of transportation, which may have benefited trade through increased speed.

This faster shipping may also explain post-war production organization that increasingly emphasized just-in-time vertical production across countries. Transportation technology improvements were closely related to the compositional shift of international trade after World War Two. Krugman (1995) emphasizes the post-war tendency for companies to "slice up the supply chain." Goods are now produced in multiple stages and in different countries. As a result, trade involved in the production of a final good may be several times the value added in all stages of production. The improvements in the speed of transport may have facilitated this type of trade.

Despite these improvements, a strong negative relationship between distance and trade persists. Frankel, Wei, Stein (1994) attribute this relationship to the barrier that distance poses to personal contact between managers. Therefore, improvements in communications through the use of computers and telecommunication technologies have made multi-national production processes easier to coordinate, thereby offsetting geographic constraints. The net result of these technological improvements in transportation and communication is the easier exchange of goods across distances and national boundaries. However, Krugman (1995) also emphasizes the possibility that the contribution of improvements in transportation and technology have been minimal. Proponents of this view argue that post-war technological improvements have had only marginal effects because the technologies that existed in the nineteenth century were already sufficient to support massive world trade. Thus, economic

historians must focus on alternative explanations for the post-war rise of world trade.

The increased trade among industrial economies also contradicts the traditional theory of Heckscher-Ohlin. This theory predicts that countries with different factor endowments will engage in trade because of comparative advantage. For example, a country with abundant labour relative to capital will have lower wages and therefore have a comparative advantage in the production of labour-intensive goods. This country will find it advantageous to export these labour-intensive goods to countries that are relatively endowed with capital, in exchange for capital-intensive goods. According to this theory, as countries become more similar in factor endowments they will tend to trade less. However, during the post-war era trade grew most rapidly between industrial economies with similar factor endowments. And these countries increasingly traded similar goods. Therefore, the post-war expansion of "intra-trade" among industrial nations broadly contradicts the predictions of textbook Heckscher-Ohlin style models.[8]

Income convergence may also offer some explanation for the behaviour of trade in the post-war period. After the Second World War, income per capita expanded rapidly and tended to converge across industrial economies. Several economists have argued that income convergence increases trade.[9] Since patterns of demand are partly determined by income, countries with similar income levels tend to trade more with each other. "Representative demand theory" suggests that as the volume of international trade rises, demand patterns become even more similar (Linder 1961). Thus, world trade should be positively

[8] But Kenwood and Lougheed (1992) argue that the higher levels of income per capita achieved by these industrial economies led to a diversification of consumer demand. Simultaneously, technological improvements led to widespread innovation. The rapid and uneven nature of these technological advances created a process of continual adjustment in comparative advantage between countries. This process, in which technology is treated as a type of factor endowment, facilitated the complex and rapid growth of post-war trade. This argument may help to explain the negative coefficient found by Rose (1991) on dispersion of capital to labor ratios for a cross-section of twelve countries between 1951 and 1985.

[9] See Helpman (1988) and Hunter and Markusen (1988).

correlated with similarity in income per capita. However, empirical evidence from the post-war period using cross-sectional data does not support either of these theories.[10] Again, convergence of income per capita does not appear to be the primary determinant of international trade during the post-war era.

In summary, economic historians have attempted to explain the post-war surge in international trade by the liberalization of trade policy, advance in transportation and communication technologies, traditional and modified Heckscher-Ohlin style arguments, and rapid income growth and convergence. However, empirical evidence lends little support to any of these theories. In a rigorous empirical evaluation of these determinants, Rose (1991) concludes: "There are few economically sensible and statistically significant results . . .. Thus, existing economic theory does not appear to provide a good explanation for the growth in the trade ratio." Given the inadequacy of textbook accounts of post-war trade, it is necessary to find alternative explanations. Therefore, the following section explores the role of payment frictions in determining the volume of international trade.

III. Payment Frictions: An Alternative Explanation of Trade

Payment frictions result from the direct and indirect costs of trading goods using dissimilar currencies. Firms trading with different currencies must address problems associated with exchange rate volatility and asymmetric information. Therefore, eliminating or substantially reducing these problems may lead to an increase in world trade. This section will focus on the historical evidence on the effects of payments frictions on trade. I will begin with an examination of the empirical evidence on the relationship between exchange rate volatility and trade. Next, I will focus on the historical impact of contemporary currency unions and the classical gold standard on world trade volumes. Existing empirical research demonstrates that monetary regimes that reduce payments frictions, such as

[10] See Rose (1991).

effective currency unions, exert a statistically significant positive impact on bilateral trade.

Exchange rate volatility is the most frequently cited payment friction that may reduce the volume of international trade. Exchange rate volatility affects trade through uncertainty, which hinders agents engaging in international transactions. Time-series studies of exchange rate behaviour conclude that exchange rate changes are largely unpredictable (Edison and Melvin 1990). This uncertainty makes international trade riskier and can thereby lead to increases in prices and decreases in quantities sold. Proponents of floating exchange rates argue that the existence of forward markets reduces the impact of volatility. In the absence of forward markets, firms can use options and futures to reduce uncertainty. However, all of these hedges involve costs, and these costs are likely to increase with the level of volatility.[11]

Since the collapse of the Bretton Woods System and subsequent move to floating exchange rates in the early 1970s, economists have attempted to test the effects of exchange rate volatility empirically. Researchers have examined periods of low and high volatility and attempted to link them to levels of trade. Their efforts are confounded by the fact that trade has continued to grow since the early 1970s, despite much higher exchange rate volatility. Unfortunately, time-series studies have produced no strong consensus on the impact of exchange rate volatility on trade.[12] As a result, in recent years researchers have largely abandoned this method for examining the effects of exchange rate volatility.

However, more recent studies that utilize cross-sectional methods have yielded important results. Frankel and Wei (1995) study the effect of exchange rate volatility using a cross-sectional dataset for multiple periods from 1965 to

[11] Another avenue through which volatility can reduce trade is its impact on international investment. Exchange rate volatility could discourage international investment and thereby hinder the development of export markets. This *indirect* effect may have a significant long run impact on international trade volumes. In addition, volatile exchange rates could lead to government actions (such as implementation of capital controls or other restrictions) that could adversely affect trade levels.

[12] See Hooper and Kohlhagen (1978) and Kenen and Rodrik (1986) for classic examples of these studies.

1980. The authors employ an augmented gravity model, in which bilateral trade between two countries is proportional to their GDP and inversely proportional to the distance between them.[13] Their findings support the hypothesis that real exchange rate volatility has depressed bilateral trade since 1965, although the magnitude of this effect is relatively small and has fallen slightly with the development of hedging devices. A more recent cross-sectional study by Rose (2000) supports the hypothesis that exchange rate volatility has a negative impact on trade. These empirical studies illustrate the significance of exchange rate volatility as a source of international transaction costs. Section IV explores the role of the Bretton Woods System in reducing exchange rate volatility during the 1960s.

The effect of exchange rate uncertainty on trade volumes is indirectly confirmed by the tendency of corporations to trade more heavily *within* countries than *between* countries, a phenomenon known as "home-bias" in international trade (McCallum 1995). Using data from 1988, McCallum estimates a gravity model of trade between Canadian provinces and U.S. states. The author finds that trade between Canadian provinces is more than 20 times greater than trade with U.S. states of comparable size and distance.[14] This result is particularly damaging to existing theory, given that tariff levels were already low in 1988 and that the linguistic division runs through Canada, not the United States. For example, in 1988 Ontario exported over three times more to British Columbia, with three million people, than it did to California, with thirty million people. Part of this home-bias effect may result from transaction costs associated with the payment frictions of trading in dissimilar currencies.

In a groundbreaking study, Rose (2000) seeks to explain the home-bias phenomenon by analysing the impact of currency unions on bilateral trade. Rose uses bilateral trade data for 186 countries from 1970 to 1990. In his dataset,

[13] The gravity model has recently gained considerable popularity in international trade literature. I will provide a detailed discussion of the theoretical justifications for this model in Section V.
[14] Helliwell (1996) confirms this result.

there are more than 300 observations for which countries use the same currency. His gravity model estimate suggests that countries sharing a currency trade over three times more with each other than with similar countries using different currencies, holding other variables constant. The author finds similar results using different specifications of his model, including instrumental variables and alternative definitions of a currency union. However, these results are obtained using data on smaller, developing economies, and therefore may not be directly relevant to the countries involved in the gold standard or the Bretton Woods System.[15] Rose's results have received criticism because they may rely on country characteristics that make two pairs more likely to trade. Persson (2001) uses different methodology that addresses this weakness and estimates a 66 percent increase in trade from a currency union.[16] But even this much smaller statistical relationship suggests that increased trade is a significant benefit of joining a currency union.

Using similar methodology, Estevadeordal, Frantz and Taylor (2001) test whether the classical gold standard, acting as an effective currency union, exerted a positive influence on bilateral trade. The authors emphasize the flaws of focusing entirely on commercial policy and transportation costs as the main determinants of the rapid increase in world trade during the period from 1870 to 1914. Estevadeordal, Frantz and Taylor (hereafter, "EFT") suggest that the gold standard exerted a positive influence on international trade by acting as a common currency. Their argument is consistent with Kenwood and Lougheed (1992), who describe how the development of a multilateral payments system under the gold standard supported the expansion of international trade. Similarly, Ashworth (1987) contends that the abandonment of the international gold standard after 1914 destabilized international trade by allowing the introduction of strict exchange controls.

[15] See Anderson and van Wincoop (2000).

[16] Other studies using alternative methods also find a much smaller effect. Nonetheless, these methods still yield a positive relationship between currency unions and trade. See Glick and Rose (2001), Frankel and Rose (2000), and Yeyati (2001).

To test their hypothesis, EFT build a model to measure the impact of the classical gold standard and other determinants on international trade. Their econometric analysis employs a gravity model that includes *payment frictions*, i.e. the effect of the gold standard, and *policy frictions*, i.e. the effect of measured tariff rates between countries. For 1913, their benchmark estimate on the gold standard coefficient is 0.65, suggesting that country-pairs that tied their currency together with gold traded over 92 percent more (since $\exp(0.65) \approx 1.92$) than country-pairs in which one country was not on the gold standard, *ceteris paribus*. The authors conclude that the "gold standard had a statistically and quantitatively significant effect on bilateral trade patterns in the early twentieth century, both before and after World War One."[17]

This result confirms the findings of a previous study by Lopez-Cordova and Meissner (2000). Using similar methodology, the authors examine the period from 1870 to 1910 for 1,140 country-pair trade observations. Their baseline gravity model regression suggests that two countries using the gold standard traded 60 percent more with each other than with countries using a different monetary regime, holding other factors constant. Furthermore, these results are robust to endogeneity tests and alternative specifications.

In conclusion, the historical evidence indicates that effective monetary unions exerted a strong positive impact on international trade. And empirical evidence on contemporary monetary unions suggests a potentially enormous effect on bilateral trade. Unfortunately, the exact mechanisms through which these monetary arrangements increase trade are not well understood (Rose 2000). Both the classical gold standard and contemporary currency unions probably affected trade by eliminating or reducing payments frictions. The strong relationships established in the above studies suggest the need to examine different periods using similar techniques. Thus, the remainder of this paper will analyse the impact of the Bretton Woods System on bilateral trade volumes during the 1950s and 1960s.

[17] Estevadeordal, Frantz and Taylor (2001), p. 22.

IV. Was the Bretton Woods System an Effective Monetary Union?

Given the inadequacy of conventional explanations, the rapid increase of international trade during the 1950s and 1960s deserves a re-evaluation. By 1968, more than 70 percent of all exports came from countries with developed economies—the same countries that comprised the core of the Bretton Woods System.[18] Furthermore, world trade grew most rapidly in the 1960s, during the golden era of Bretton Woods. Thus, simple correlation in timing suggests that the Bretton Woods System may have played a major role in the post-war trade boom. However, economic historians debate whether this great expansion of trade occurred because of the Bretton Woods System, or whether the success of the system resulted from the overall macroeconomic stability of the period. To find answers, one must frame the debate in historical context: did the characteristics of the Bretton Woods System provide a stable environment for international trade comparable to that of the classical gold standard? And is it appropriate to treat the Bretton Woods System as an effective currency union? If the Bretton Woods System achieved stability similar to that achieved through the gold standard or a currency union, then the system deserves considerable credit for the increase in international trade. As discussed in Section III, the precise mechanisms through which currency unions increase trade are not well understood. Nonetheless, I will focus on three features of an effective currency union that almost certainly increase trade: current account convertibility, exchange rate stability and overall credibility. The remainder of this section will evaluate whether each of these features characterized the function of the Bretton Woods System in different periods.

[18] Ashworth (1987), p. 285.

Current Account Convertibility

Bretton Woods was not a system of full current account convertibility throughout its operation; current account restrictions inhibited bilateral trade during its early stages. Consequently, economic historians typically divide analysis of Bretton Woods into two distinct sub-periods: the preconvertible phase (1946-58) and the convertible phase (1959-70).[19] Bilateral trade without restrictions was fundamental to the design of the system. As Eichengreen (1996, p. 99) describes: "The restoration of open, multilateral trade was to be the tonic that would invigorate the Bretton Woods System." By this definition, the system operated as it was designed for only twelve years. Clearly, inconvertible currencies posed a large obstacle to international trade.[20] Article VIII of the International Monetary Fund's *Articles of Agreement* prohibited countries from restricting current account payments or adopted discriminatory currency arrangements after a five-year "transition period" under Article XIV. In contrast, countries were encouraged to restrict capital account transactions. One of the IMF's original mandates was to oversee the rapid simultaneous restoration of current account convertibility. And by 1945, the U.S. and Canadian dollars were fully convertible.

However, early attempts to restore current account convertibility in Europe were severely hindered by the region's inability to produce enough goods for export. The destruction of infrastructure and physical capital during the war greatly limited Europe's means of production. Simultaneously, unsatisfied demand for foodstuff, capital goods and other merchandise led to a rise of imports, primarily from the United States. As a result, Europe's consolidated trade deficit with the rest of the world increased from $5.8 billion in 1946 to $7.5

[19] See Bordo (1993).

[20] Krugman and Obstfeld (2000, 549) describe the barrier posed by inconvertible currencies: "A French citizen might be unwilling to sell goods to a German in return for inconvertible marks because these marks would then be usable only subject to restrictions imposed by the German government. With no market for inconvertible francs, the German would be unable to obtain French currency to pay for French goods. The only way of trading would therefore be through barter, the direct exchange of goods for goods."

billion in 1947.[21] And by the end of the war, the United States held more than two-thirds of the world's gold reserves. Consequently, Europe and Japan suffered from an immediate post-war dollar shortage. The interwar experience made adjustment through wage deflation or increased interest rates politically impossible—politicians were no longer willing to sacrifice internal balance to achieve convertibility. Therefore, the dollar shortage led countries to bolster import restrictions in order to turn the terms of trade in their favour. Thus, early attempts at convertibility were ultimately delayed by a coordination problem. The designers of the Bretton Woods System expected that the IMF would solve this problem. However, the Fund's resources proved inadequate, and early rounds of GATT achieved few intra-European concessions. As a result, full convertibility under the Bretton Woods System took more than twice as long as the five years originally projected.

The Marshall Plan facilitated key initial steps necessary for solving the dollar shortage and restoring full convertibility. In recognition of Europe's need for reconstruction, the Marshall Plan transferred approximately $13 billion of U.S. aid to Western Europe between 1948 and 1952.[22] Among other aims, the aid was provided to finance the dollar deficit while European countries completed reconstruction and prepared for full convertibility. By 1952, the OEEC (Organization for European Economic Cooperation) countries had achieved a 39 percent increase in industrial production, a doubling of exports, a 33 percent increase in imports, and a current account surplus (Solomon 1976). Critically, the Marshall Plan also led to a permanent increase in European growth rates by improving productivity and investor confidence (Eichengreen and Uzan 1991). This rapid recovery was significant in reversing the trends that had led to the dollar shortage.

However, Marshall Plan aid alone was not enough to solve the dollar shortage problem. Although initial par values were declared at pre-war parities

[21] Eichengreen (1996), p. 98.
[22] Milward (1984).

in 1947, World War Two had significantly alerted the equilibrium exchange rates. Under pressure of massive reserve losses, in late-September 1949, thirty countries followed Britain and devalued their currencies. Thus, the original attempts to restore convertibility at pre-war parities proved premature and unworkable. The devaluations were effective in reducing the dollar shortage, as British reserves tripled within two years.[23] Despite the devaluation, it was not clear that convertibility could not be established within two years –trade within Europe was still severely hampered by current account restrictions.

Although European countries maintained current account restrictions until 1958, bilateral trade flourished within Europe under the European Payments Union (EPU); establishment of this institution was the key step toward full convertibility. The EPU came into operation in 1950 and effectively acted as a mini-Bretton Woods for Western European nations and their dependencies. The EPU Code of Liberalization required European countries to make their currencies convertible for intra-EPU trade. Reestablishment of intra-Europe trade was recognized as a necessary precondition for restoration of full convertibility under Bretton Woods. For the remainder of the 1950s, the EPU proved remarkably effective in facilitating intra-European trade, providing the foundation for the gradual liberalization of current account restrictions. As growth resumed in Europe and Japan, they strengthened their balance of payments and became attractive destinations for foreign investment. By the end of the decade, the dollar gap had disappeared and America lapsed into persistent current account deficits. With the redistribution of reserves away from America, European countries were ready to restore full convertibility on 27 December 1958. Chart 5 illustrates the dramatic increase in the number of countries that made their currencies convertible by turn of the decade. The establishment of current account convertibility marked the beginning of the Bretton Woods System's full operation.

[23] Eichengreen (1996), p. 106.

The Bretton Woods System's pre-1958 convertibility performance was particularly inferior to convertibility under the classical gold standard. Economic and political conditions of the late-nineteenth century allowed the European core to maintain a system of fully convertible currencies. The classical gold standard was anchored by the sterling's unrivalled position in the world economy. The monetary authorities enjoyed insulation from political pressure; this was necessary to maintain commitment to full convertibility above all other objectives. This commitment was reinforced by market confidence in convertibility, which meant free capital movements supported the operation of the system. In addition, the period was characterized by unprecedented international cooperation. Thus, under the classical gold standard, the existence of a truly multilateral payments system, supported by open markets, added powerful support to growth of trade between countries (Kenwood and Lougheed 1992).

However, in the 1950s the Bretton Woods System did not benefit from a comparable set of conditions that assured convertibility. The Second World War strengthened the position of labour in Europe and gave greater political power to labour-based parties of the Left. In exchange for moderation of wages, governments agreed to maintain commitment to full employment and economic growth (Maier 1987). This agreement limited the monetary authorities' mechanism for eliminating external deficits. Use of contractionary monetary policy to maintain external balance would have jeopardized the accommodation between capital and labour. As a result, European countries relied on exchange controls. Within these constraints, a truly multilateral payments network, which had proved so beneficial to world trade before 1914, could not develop in the 1950s.

Ultimately, in the 1950s the Bretton Woods System proved inadequate to re-establish open bilateral trade. Full convertibility required solving the dollar shortage and restoring intra-Europe on trade. Marshall Plan aid was necessary to accommodate the initial dollar shortage, and the EPU was required to facilitate

the simultaneous reduction of exchange controls within Europe. As Eichengreen (1996, p. 109) describes: "In effect, oversight of the restoration of convertibility and rehabilitation of trade was withdrawn from the Bretton Woods institutions, whose authority was diminished as a result." Therefore, Bretton Woods does not deserve credit for achieving full current account convertibility in the 1950s. However, once convertibility was established in 1958, the mechanisms of the Bretton Woods System could operate as intended. Therefore, any comparison of the system with other monetary regimes should emphasize the convertibility period of 1958 to 1970. After 1958, the Bretton Woods System proved remarkably effective for more than a decade at maintaining convertibility of the core currencies. Thus, the Bretton Woods System should only be characterized as an effective monetary union after the initial barriers to convertibility were overcome.

Exchange Rate Volatility

Effective currency unions also support international trade through absolute exchange rate stability. As discussed in Section III, recent cross-sectional studies using diverse countries and different time periods show a negative relationship between exchange rate volatility and trade. Rose (2000) emphasizes that hedging exchange rate risk may be more costly than is commonly believed. Therefore, if the Bretton Woods System significantly reduced exchange rate volatility, then it may have increased international trade. Again, discussion of the system should emphasize two distinct sub-periods defined by convertibility. Bretton Woods functioned very differently in the 1950s and 1960s, and levels of exchange rate volatility illustrate this difference. The remainder of this section evaluates the evidence on exchange rate volatility in the two eras of the Bretton Woods System.

The original design of Bretton Woods did not imply a system of zero exchange rate volatility. The designers of the system wished to avoid repeating

the painful experience during the interwar period under floating exchange rates, while allowing the flexibility necessary to correct disequilibrium. As a result, a system of adjustable pegs emerged: countries could adjust their exchange rates on the basis of a "fundamental disequilibrium", which was never clearly defined (Bordo 1993). Normally, countries were to declare a par value against gold or the U.S. dollar and maintain their currencies within a one percent margin. In the event of short-term imbalances, international reserves and IMF resources would serve as a buffer. If a shock or persistent inflation resulted in disequilibrium, the monetary authorities could alter parity after notification of the IMF.

In practice, this adjustment mechanism was rarely used. After the large devaluations of 1949, countries rarely altered the existing parities (Obstfeld 1993). Major devaluations of the franc occurred in 1957 and 1969. The pound was devalued in 1967, and the deutsche mark was revalued in 1961 and 1969. The *Articles of Agreement* sought to deter parity adjustments and especially discouraged anticipatory adjustments. As international capital mobility increased in the 1960s, governments believed to be contemplating devaluation suffered speculative attacks. A willingness to devalue once produced expectations that the government might devalue again (Eichengreen 1996). As a result, countries refused to use corrective realignments and Bretton Woods developed into a "de facto fixed exchange rate system" (Bordo 1993). Exchange rates became fixed because countries feared the consequences associated with changing them.

Bordo (1993) presents evidence on the stability of the Bretton Woods System using official exchange rate data. Chart 6 illustrates the behaviour of nominal exchange rates across the preconvertibility and convertibility periods. The author also compares exchange rate trends in these periods with trends during the gold standard and after the breakdown of Bretton Woods in the 1970s. The lowest mean rates of change for nominal exchange rates occurred during the Bretton Woods convertible period and during the gold standard period. The average rate of change for both of these periods was 0.8 percent. Furthermore, the Bretton Woods convertible period exhibited the lowest degree of divergence

across the sample. In contrast, nominal exchange rates during the preconvertible period were almost as volatile as during floating. Bordo emphasizes that this high volatility was mainly caused by the large devaluations in 1949.

Examination of real exchange rates demonstrates that the convertible Bretton Woods System again achieved the greatest level of stability. Real exchange rates exhibit the lowest mean rate of change and the least divergence across countries under the convertible Bretton Woods System (Chart 7). In comparison, real exchange rates were slightly more volatile during the classical gold standard and especially more volatile during the Bretton Woods preconvertibility period. Thus, official statistics indicate that the convertibility period, when the Bretton Woods System was in full operation, offered a degree of exchange rate stability superior to that offered by other international monetary regimes.

However, a recent study by Reinhart and Rogoff (2002) challenges the use of official statistics for assessing the stability of exchange rate regimes. The authors collect monthly exchange rate data for 153 countries between 1946 and 1998. Their study distinguishes between *official* exchange rate classifications, as designated by the IMF, and *"natural"* exchange rate classifications, which are determined by market conditions.[24] After World War Two, these differences widened because most countries relied on capital controls and/or dual exchange rate markets. If the exchange rate depreciates in the parallel market, but the official classification remains fixed, the underlying monetary policy is deflationary and the effects on the official exchange rate are masked. Historically, this scenario has led to an eventual depreciation of the official exchange rate. Econometric analysis demonstrates that the market-determined exchange rate is a far better predictor of a country's monetary policy stance than is the official exchange rate. Reinhart and Rogoff's new dataset challenges the commonly accepted knowledge of historical exchange rate policy. The authors

[24] Official classifications are given in the IMF's annual *Exchange Arrangements and Restrictions*.

emphasize that dual or multiple exchange rates were the norm for industrialized countries in the 1940s and 1950s, and lasted much later in some cases. Therefore, past studies that rely on official exchange rates to examine the effects of volatility on trade may produce misleading results. Simple correlation between market exchange rate volatility and trade suggests that volatility may have exerted a more pronounced negative impact than is commonly believed.

The new classification based on market exchange rates reveals that the Bretton Woods System was much more volatile than previously understood. In 1950, the IMF's classification as either *pegged* or *other* listed 65 percent of all countries as pegs. However, Reinhart and Rogoff's classification reveals that less than 40 percent of all regimes were actually pegs. This difference resulted from the widespread existence of parallel markets after World War Two, especially in Western Europe. Chart 8 plots the parallel market premium since 1946. The evidence for Europe is startling; as the authors describe: "From 1946 until the arrival of the 1960s, Europe was *de facto* floating under the guise of pegged official exchange rates. Each time the official rates were realigned, the story had already unfolded in the parallel market."[25] This tendency was even more pronounced for the developing world, where the volatility of the parallel rate was similar to the volatility of today's managed floats. For industrial economies, these premia persisted until the 1960s, suggesting that the true duration of the fixed-rate Bretton Woods System was much shorter than many textbooks proclaim. For the developing world, pre and post-1973 market-determined exchange rate volatility looks remarkably similar.

This new database challenges the notion that Bretton Woods was a fixed-exchange rate regime comparable to the classical gold standard or a currency union. At the very least, it highlights the need to divide the system into preconvertibility and convertibility periods. In addition, the statistics demonstrate that the experience of the core industrial economies was much different from that of the developing world. Official and natural exchange rates

[25] Reinhart and Rogoff (2002), p. 25.

illustrate that the Bretton Woods System performed far better in the 1960s, even if for a short period of time. For the convertibility period, official statistics show that exchange rates under the Bretton Woods System were more stable than during the classical gold standard. Through this stability, the Bretton Woods System may have supported international trade in the 1960s. However, perhaps the most important measure of its contribution to trade was the extent to which the markets trusted the system. The following section will attempt to determine this.

Was the Bretton Woods System Credible?

Regardless of how actual exchange rate stability is defined, the perception of stability and credibility in the markets is extremely important. Decisions to import or export goods ultimately affect the total volume of international trade, and these decisions are partly based upon expectations of future stability. The classical gold standard benefited from the confidence of the markets that monetary authorities would defend their gold parities at all cost. As a result of this confidence, capital flowed in a stabilizing direction. Similarly, currency unions represent a perfect commitment to exchange rate stability and convertibility. Therefore, if the markets perceived Bretton Woods as being a credible system, then it may have had a positive impact on international trade. This section begins with a general analysis of the system's credibility and then evaluates the empirical evidence.

The design of Bretton Woods made it dynamically unstable in the long run, undermining the system's credibility. The key problem for the Bretton Woods System in the 1960s was the lack of confidence in the U.S. dollar. At the beginning of the decade, Robert Triffin (1960) recognized that the growth of the world monetary gold stock would not be sufficient to finance the growth of world output and trade, which would lead to the U.S. monetary gold stock declining relative to U.S. liabilities. As pressure on the U.S. monetary gold stock

increased, the world would substitute dollars for gold, triggering a confidence crisis that would destroy the system.[26] This dilemma was already evident early in the system's operation, given that U.S. foreign monetary liabilities first exceeded U.S. gold reserves in 1960.[27] Recognition of the liquidity problem led to the creation of an artificial reserve asset, called Special Drawing Rights (SDR). However, by the time SDR were allocated in 1970, the liquidity problem had been solved through persistent U.S. payments deficits, which inflated the volume of international reserves. The necessity of persistent U.S. balance of payments deficits highlighted another problem of the Bretton Wood System: the absence of an effective adjustment mechanism. If the United States attempted adjustment by increasing the price of gold –effectively a dollar devaluation– it would undermine confidence in the entire system.

Destabilizing capital flows illustrated the market's distrust of the system. The Kennedy and Johnson administrations believed that capital exports aggravated the balance of payments deficit. Therefore, measures such as the U.S. Interest Equalization Tax discouraged residents from investing abroad. However, the restoration of current account convertibility made capital controls more difficult to enforce. Firms could over- and under- invoice trade, thereby covertly transferring funds abroad. The growth of multinationals and Euro-currency markets also made enforcement increasingly difficult (Eichengreen 1996). The increase in capital flows further weakened the adjustment mechanism by making a single parity change less sustainable.

Ultimately, destabilizing capital flows were a symbol of the underlying weaknesses of the system –mainly, its lack of an available adjustment mechanism. When a country experienced an external deficit under the classical gold standard, the price-specie flow mechanism and restrictive monetary policy assured adjustment. Thus, capital flowed in a stabilizing direction. However, the post-war political environment, created by the social contract with labour, made

[26] Kenen (1960) and Gilbert (1968) advance similar arguments.
[27] Eichengreen (1996), p. 116.

it almost impossible to raise interest rates or apply restrictive fiscal policy to achieve external balance. By the late 1960s, the United States refused to subordinate other economic and political objectives to defend the dollar price of gold.[28] Morover, foreign support for the dollar became increasingly more costly as the U.S. began exporting inflation. By the turn of the decade, failure of the system seemed inevitable (Cooper 1993). For these reasons, a qualitative examination suggests that the Bretton Woods System lacked the credibility enjoyed by the classical gold standard.

Several authors have attempted to quantify the credibility of the Bretton Woods System using data on interest rate differentials and exchange rate risk premia. Giovannini (1993) uses market data to compare the credibility of the Bretton Woods System with that of the classical gold standard. The rules of the gold standard and Bretton Woods System implied a band within which exchange rates were allowed to fluctuate. Giovannini uses data on interest rates and forward exchange rates for the dollar, the Reichsmark and the franc to estimate expected exchange rate changes. The author attempts to determine whether expectations were consistent with these officially designated fluctuation bands. Evidence on the credibility of the gold standard using interest differentials is contradictory and somewhat inconclusive. The author's examination of Bretton Woods emphasizes forward exchange rates as the best indicator of credibility. For Bretton Woods, the fluctuation bands do not appear to produce stable expectations during the system's entire operation. However, Chart 9 illustrates that expectations were reasonably stable in the early 1960s, after the establishment of convertibility. The lack of credibility again becomes evident toward the end of the 1960s, when markets expected exchange rate realignments.

Obstfeld (1993) performs similar exercises to assess the impact of capital controls during the Bretton Woods period from 1960 to 1971. Obstfeld argues that imperfect capital mobility during the Bretton Woods era exacerbated the

[28] These objectives were part of Lyndon Johnson's "Great Society" and the escalation of the Vietnam conflict (Krugman and Obstfeld 2000).

liquidity constraints faced by deficit countries. Also, exchange rate and political risk destabilized capital flows, which further undermined credibility in a circular process. The author tests these models of Bretton Woods using financial market data. To measure the effectiveness of capital controls, Obstfeld computes the covered interest differentials for the United Kingdom and Germany in the 1960s. The evidence suggests that capital mobility was imperfect. Furthermore, the effect of capital controls was distinct from the effect of expected exchange rate changes. Obstfeld divides his data into sub-periods for the early and late-1960s. Exchange rate risk premia were negligible in the period from 1960 to 1965, but existed negatively or positively during the late-1960s. Obstfeld's tests demonstrate that controls did have a significant impact on capital flows, although their effectiveness decreased across time. His tests also demonstrate the system's relative credibility in the early 1960s.

Obstfeld's findings are confirmed by Marston (1993), who conducts an analysis using tests of Euro-currency interest rates. Comparing Euro-currency interest rates, rather than national rates, allows one to distinguishing between the effects of capital controls and country risk (because Euro-currency interest rates are free of capital controls). For Britain, Germany and the United States, Marston finds that capital controls led to large covered interest differentials. In contrast, Marston finds little evidence of exchange rate risk premiums, although these may have been time-varying for shorter periods. Thus, he attributes interest rate differentials under Bretton Woods to the existence of capital controls and not to the exchange rate risk premium.

By the end of the 1960s, the underlying weaknesses of the Bretton Woods System became increasingly clear. Empirical evidence demonstrates that capital controls had a strong impact on interest rate differentials, although their effect diminished with time. However, as Eichengreen (1996, p. 121) elucidates: "[Capital controls] did not remove the underlying problem that had prompted the tendency for capital to flow out in the first place... They provided some temporary autonomy for domestic policy but did not provide an effective

adjustment mechanism." And this lack of a viable adjustment mechanism ultimately undermined the credibility of the system. In contrast, the adjustment mechanism of the classical gold standard allowed capital flows to help to stabilize the system. Despite this fundamental flaw of Bretton Woods, the system delivered an impressive degree of credibility in the early 1960s, which is demonstrated by the studies above. But by the late-1960s, the market increasingly anticipated parity changes. Therefore, if the Bretton Woods System bolstered international trade through its credibility, it probably did so only in the early 1960s, while the system operated effectively.

Was Bretton Woods an Effective Monetary Union?

In conclusion, the main lesson from the analysis of current account convertibility, exchange rate volatility and overall credibility is that the Bretton Woods System functioned very differently in the 1950s and 1960s. In the 1950s, the struggle to achieve current account convertibility among Western European countries led to exchange rate volatility and a general lack of credibility. Ultimately, the institutions that removed the obstacles to convertibility were not part of the Bretton Woods System. Therefore, Bretton Woods deserves little credit for facilitating the rise of international trade in the early 1950s. However, the greatest expansion of bilateral trade occurred in the 1960s, when the system functioned as intended. During this decade, the Bretton Woods System provided an environment of exchange rate stability superior to that provided by the classical gold standard. In the early 1960s, this exchange rate stability likely aided the overall credibility of the system. But by the late 1960s, when capital controls were rendered ineffective, the underlying problems of the system became increasingly apparent. In the United States, political and economic circumstances increasingly conflicted with the maintenance of the dollar gold price. Therefore, much like the gold standard, external factors may be partly to blame for the demise of Bretton Woods. The system functioned as it was

designed for only a short period, approximately during the decade after 1958. Indeed, the system did provide a high degree of exchange rate stability and credibility in this period. Thus, the Bretton Woods System may have facilitated the post-war rise of international trade by acting as an effective common currency, but only during its golden era in the early 1960s. The remainder of the paper attempts to isolate this effect using econometric analysis.

V. The Model and Dataset

This section tests the following general hypothesis: **Participation in the Bretton Woods System exerted a positive influence on bilateral trade, holding other factors constant**. This hypothesis implies that two countries which were jointly participating in the Bretton Woods System traded more with each other than with comparable countries that were using alternative monetary regimes, *ceteris paribus*. To test this hypothesis, I employ an augmented gravity model similar to that used in previous studies of the effect of contemporary currency unions and the gold standard on bilateral trade. This section begins with a brief discussion of the theoretical foundations and application of the gravity model in previous studies. I then provide a detailed specification of the model used in this analysis, including a justification of each variable and a discussion of expectations for the coefficients.

The Gravity Model of Trade

In its simplest form, the gravity model posits that trade between two countries (*i* and *j*) is a positive function of their economic size (GDP) and a negative function of distance (d) between them—a functional form that resembles the law of gravity in physics:

Volume of $\text{trade}_{i,j} = Z\frac{(Y_iY_j)^x}{d^y}$, where x, y> 0 and Z depends on preferences, transaction costs and other factors.

The model establishes a "normal" level of trade between country *i* and *j* based on their economic and geographic characteristics. From this fundamental model, the equation can be augmented by adding other variables to analyze the impact of trade protectionism, exchange rate volatility or common currency effects.

Given its simplicity, how well does this model predict the level of trade between two countries? Remarkably well. Past authors have derived the gravity equation using diverse theories of trade and have obtained strikingly similar results. For example, Anderson (1979) and Bergstrand (1985) derive the gravity equation using assumptions of product differentiation and monopolistic competition. Leamer and Stern (1970) derive the gravity equation from a probability model of transactions. And Deardorff (1998) justifies the gravity model using two extreme cases of Hechscher-Ohlin: frictionless trade and impeded trade for all goods. Deardorff concludes that it is relatively easy to provide theoretical justification for the gravity equation using almost any standard theory of international trade. Furthermore, the fact the gravity equation does not depend on a specific model of international trade makes its results even stronger. Empirical tests demonstrate that the gravity equation yields "some of the clearest and most robust empirical findings in economics" (Leamer and Levinsohn 1995, p. 1384).

The gravity equation is well established in the empirical literature of international trade to measure the impact of size, distance and levels of protection on bilateral trade.[29] More recently, authors have used the gravity model to

[29] Tinbergen (1962) and Poyhonen (1963) were the first to use the gravity equation to study trade flows.

analyse the role of currencies in determining levels of trade between countries. As discussed in Section III, Frankel and Wei (1995) apply gravity equations to a cross-section of countries and find that exchange rate volatility has had negative impacts on trade since the 1960s. Their argument is based on a standard gravity equation, augmented with a variable measuring the volatility of the bilateral exchange rate between country i and j. They interpret the negative coefficient on this variable as evidence that exchange rate volatility reduces bilateral trade. I will employ similar methodology in my econometric analysis to assess the impact of exchange rate volatility during the Bretton Woods period.

In more recent and controversial literature, Rose (2000) uses an augmented gravity model to demonstrate that joint participation in a currency union may increase bilateral trade by a factor of three. This strong relationship is based on a single dummy variable that equals 1 if country i and j were in a monetary union. Using almost identical methodology for the gold standard period, Estevadeordal, Frantz and Taylor (2001) and Lopez-Cordova and Meissner (2000) confirm the positive, if somewhat smaller, impact of joining an effective monetary union. These large and significant coefficients suggest the need for further research on the currency union effect. In this section, I will provide such research by performing a similar exercise using bilateral trade data from the Bretton Woods era.

The Dataset and Model

The augmented gravity equation that I employ in this paper closely resembles the models used by these previous studies of effective currency unions from different periods. In order to account for as many factors as possible, I augment the standard gravity model with several control variables and then add variables that are specific to the Bretton Woods System. Therefore, my model takes the following functional form:

$$\ln(\text{Trade}_{ijt}) = \beta_0 + \beta_D \ln(\text{Distance})_{ijt} + \beta_Y \ln(Y_i Y_j)_t + \beta_{Y/N} \ln(Y_i Y_j / N_i N_j)_t$$
$$+ \beta_A \text{Adjacent}_{ij} + \beta_L \text{Locked}_{ij} + \beta_V \text{Volatility}_{ijt} + \beta_{PEG} \text{MarketPeg}_{ijt}$$
$$+ \beta_c \text{Convert}_{ijt} + \beta_{IMF} \text{IMF}_{ijt} + \varepsilon_{ijt}$$

where *i* and *j* denote country partners; *t* denotes observation year (1954, 1964 or 1975); $\beta' = [\beta_0,\ldots, \beta_{10}]$ is a vector of coefficients; and ε_{ij} is an error term assumed to satisfy the necessary properties. And the variables are defined as follows:

Trade_{ijt} denotes the total volume of bilateral trade between country i and j in year t. Specifically, trade between the partners is measured by $(M_{ij} + M_{ji})$, the sum of bilateral imports, and is reported in nominal U.S. dollars. The data for this variable was obtained from a larger dataset compiled by Irwin and Tervio (2000), which the authors use to study the effects of trade on income across the entire twentieth century.[30] Irwin and Tervio compiled their dataset from the International Monetary Fund's Direction of Trade Statistics, which previous authors have used to study bilateral trade for a similar period.[31] Table A1 provides summary statistics. The mean value of bilateral trade rose from $60.7 million in 1954 to $463.9 million in 1975, illustrating the massive increase in world trade during the period examined.

Distance_{ijt} is the distance, in miles, between the capital cities of country i and j. This variable was also taken from the dataset compiled by Irwin and Tervio (2000). In this study and previous studies, distance is treated as a proxy for transportation costs –an essential determinant of bilateral trade that would otherwise be very difficult to incorporate into a cross-sectional analysis. β_D is hypothesized to be negative because greater distance is associated with higher transaction costs. Graph A1 illustrates the simple negative correlation between distance and trade.

Y_i and **Y_j** denote country i and j's Gross Domestic Product (GDP) measured in current international prices. This variable also comes from the

[30] I am grateful to Douglas Irwin and Marko Tervio for generously providing this data.
[31] For example, see Frankel and Romer (1999), who also examine the effects of trade on income.

dataset compiled by Irwin and Tervio (2000), who obtained the figures from the Penn World Tables.[32] The gravity model predicts that bilateral trade between countries will increase with their economic size. Therefore, β_Y should be positive and significant. Graph A2 illustrates the simple positive correlation between GDP and trade. Most gravity model studies also hypothesize that trade will increase with population, which is typically included as per capita income. I constructed this variable by dividing $\mathbf{Y_i}$ and $\mathbf{Y_j}$ by populations, $\mathbf{N_i}$ and $\mathbf{N_j}$. Population data also comes from the Penn World Tables. $\beta_{Y/N}$ is hypothesized to be positive and significant, a result consistently confirmed by previous studies.

$\mathbf{Adjacent_{ij}}$ is a dummy variable equal to 1 if country i and j share a border. And $\mathbf{Locked_{ij}}$ is a dummy variable that is equal to 1 if either i or j is landlocked. Both variables were taken from the Irwin and Tervio dataset. Typically, authors augment the standard gravity equation with these important determinants of trade. Countries that are adjacent enjoy the benefits of lower transaction costs of trade. Therefore, β_A is hypothesized to be positive. In contrast, landlocked countries typically face higher transaction costs because they lack major ports or waterways that are necessary for ocean freight. Thus, the regressions should yield a negative estimate of β_L.

The remaining variables are relevant to the functioning of the Bretton Woods System. In previous gravity model studies of the gold standard and modern currency unions, Rose (2000) and EFT (2001) base their arguments on a single dummy variable that equals 1 if both country i and j were on the gold standard or in currency union. This method has the advantage of producing one straightforward coefficient that the authors use to argue for the positive effects of the gold standard or currency union membership on trade. Unfortunately, given the complex operation of the Bretton Woods System, it is impossible to define "participation" using only one variable. In the *Articles of Agreement,* the designers of Bretton Woods only loosely define the system's function and give

[32] See Summers and Heston (1991) for a description of the data. Irwin and Tervio used the Mark 5.6 version.

no strict definition of participation. Therefore, it is necessary to create several variables that indicate the extent to which a country was participating. The disadvantage of this approach is that it makes the effect of the Bretton Woods System on trade difficult to directly interpret. However, this method does allow one separately to analyse the impact of various aspects of participation and to determine the extent to which countries were actually participating.

Perhaps the most important definition of participation involved maintaining a stable exchange rate. The system's architects wanted to avoid excessive exchange rate volatility, which they associated with the economic turmoil of the interwar period. Therefore, they designed as system of pegged exchange rates, which were only adjustable in the event of a "fundamental disequilibrium". Given its central role in the system, the pegged exchange rate is the main channel through which Bretton Woods may have facilitated bilateral trade by acting as an effective common currency. Indeed, a country was "participating" in Bretton Woods if it pegged its exchange rate to the dollar (either directly or indirectly). Therefore, lower exchange rate volatility is hypothesized to be positively related to bilateral trade. I include the following two measures of exchange rate stability in my regressions.

Volatility$_{ij}$ is the sum of the volatility of the official nominal exchange rate for country i and j. Following the methodology of Rose (2000) and Frankel and Wei (1995), exchange rate volatility is defined as the standard deviation of the first-difference of the monthly logarithmic nominal exchange rate in the five years preceding period *t*. The nominal exchange rate is measured by the country's currency per Special Drawing Right (SDR). I obtained this exchange rate data from the IMF's *International Financial Statistics* CD-ROM. For the five years preceding 1954, monthly exchange rate data is not available, and therefore yearly data is substituted. The summary statistics from Table A1 confirm that official exchange rates were most volatile in the 1950s, but quite stable by the early 1960s. Official volatility again increased in the early 1970s, after the breakdown of Bretton Woods. A negative β_V would provide new

evidence on the adverse effect of exchange rate volatility on bilateral trade. It would also indicate that countries that were *not* participating in Bretton Woods (i.e. countries that allowed their exchange rate to fluctuate excessively) traded less with each other. Therefore, a negative β_V is consistent with the hypothesis stated above.

However, a country's official exchange rate often differed significantly from its market-determined exchange rate. As discussed in Section IV, Reinhart and Rogoff (2002) provide a new database with information on parallel market exchange rates. Reinhart and Rogoff draw data from various issues of the *Picks Currency Yearbook*, *Picks Blackmarket Yearbook*, and *Picks World Currency Report*. Their database reveals a large gap between a country's official classification of its exchange rate and the behaviour of its parallel market exchange rate. The authors argue that the market-determined exchange rate is a better indicator of a country's underlying exchange rate policy. Furthermore, the parallel market premium reveals the level of credibility that the market has in the country's pegged exchange rate. Therefore, the market-determined exchange rate provides the most accurate indicator of whether a country was actually participating in the Bretton Woods System.

To test whether a country was participating by this measure, I use market-determined exchange rate data from Reinhart and Rogoff's new dataset. $\mathbf{MarketPeg_{ij}}$ is a dummy variable equal to 1 if both country i and j pre-announced an exchange rate peg *and* maintained that peg in the parallel market. The authors classify a country's exchange rate using a code that ranges from 1 to 14, for which lower numbers indicate a more stable exchange rate. In order for the **MarketPeg** dummy to equal 1, a country must earn a Reinhart-Rogoff classification of 1, 2 or 3, indicating that the country either used no separate legal tender, a currency board, or maintained its market-determined exchange rate within a narrow pegged band of +/- 2 percent. This dummy variable indicates whether the country intended to peg its exchange rate (i.e. it pre-announced

participation in Bretton Woods) and whether it actually did so, as indicated by parallel market data.

Appendix A shows which countries were pegging their exchange rates in each year. In 1954, 46 percent of county-pairs in my dataset pegged their exchange rate in the parallel market. This figure rose to 52 percent by 1964 and fell to 28 percent by 1975, after the breakdown of Bretton Woods. Because the pegged exchange rate was so fundamental to the operation of the Bretton Woods System, in my analysis I will emphasize β_{PEG} as the primary coefficient indicating the impact of Bretton Woods participation on bilateral trade. Therefore, a positive value of β_{PEG} would provide the strongest evidence for the hypothesis that Bretton Woods participation exerted a positive impact on bilateral trade, *ceteris paribus*.

The next essential element of participation was current account convertibility. $\mathbf{Convert_{ij}}$ is a dummy variable equal to 1 if both country i and j maintained current account convertibility in year *t* under Article VIII, section 2, 3, and 4 of the IMF *Articles of Agreement.* I obtained data for this variable from the IMF's *Exchange Controls and Exchange Restrictions* from the 1954, 1964 and 1975 editions. Appendix B lists the countries that made their currencies convertible by year. As discussed in Section IV, current account convertibility is one characteristic of an effective monetary union that almost certainly increases trade. Therefore, convertibility is another channel through which Bretton Woods participation may have increased trade. It also represents an important control variable necessary to isolate the impact of the exchange rate peg. Countries trading with convertible currencies enjoy much lower transaction costs, and therefore β_c should be positive. For reasons outlined in Section IV, most countries struggled to achieve convertibility in the 1950s, with only 9 countries making their currencies convertible in 1954. And in 1964, only 23 countries had achieved convertibility under Article VIII. Therefore, by this definition participation in the Bretton Woods System was very limited.

The most straightforward element of participation was membership in the International Monetary Fund (IMF), the governing organization of the Bretton Woods System. $\mathbf{IMF_{ij}}$ is a dummy variable equal to 1 if country i and j were both IMF members in year *t*. The variable was constructed using information on the date of membership, which was obtained from Gold (1974). Appendix C lists IMF membership by year. In 1954, only 38 percent of countries in the dataset were IMF members. But by 1964, membership had risen to almost 63 percent of the 152 countries and had expanded to include a wide variety of developing nations. Aside from the benefits of stabilization associated with IMF membership, membership likely increased trade by demonstrating commitment to trade-led economic growth. As Scammell (1975) states: "[To] provisions for the re-establishment of multilateral trade the Americans attached great importance, believing such re-establishment to be the main *raison d'etre* of the [International Monetary] Fund, equal in importance to its stabilization function."[33] Therefore, two countries that were IMF members were more likely to be committed to the expansion of trade, which suggests that β_{IMF} should be positive.

VI. Econometric Results

A cursory examination of the data suggests that the Bretton Woods System may have exerted a positive influence on bilateral trade. Table A2 provides correlations and conditional means for the Bretton Woods variables. In 1954 and 1964, the simple correlations between the natural logarithm of trade and **MarketPeg, Convert** and **IMF** are all positive, but small. For all three years, there is a consistent negative relationship between official volatility and trade, suggesting that excessively volatile exchange rates *may* have reduced bilateral trade. And in 1954 and 1964, countries that maintained a pegged exchange rate in the parallel market, as defined by **MarketPeg**, averaged

[33] Quote taken from Eichengreen (1996).

significantly higher bilateral with each other. Graph A3 illustrates this relationship.

However, it is impossible to argue causation based on these simple correlations because there may be other competing forces driving the relationships. Therefore, it is necessary to use multiple regressions to isolate the impact of Bretton Woods participation on bilateral trade. In this section, I present my baseline estimates of the gravity equation specified in Section V. These results provide strong evidence for the hypothesis that Bretton Woods participation exerted a positive influence on bilateral trade, other factors held constant. According to my estimates, pegged exchange rates and current account convertibility were the most important aspects of participation.

Table 1 presents my baseline year-by-year and pooled Ordinary Least Squares estimates of the gravity model specified above. I ran separate regressions for each year (1954, 1964, 1975) and then combined the observations from these years to obtain pooled results. The data from 1975 is problematic because it represents the post-Bretton Woods period. Most scholars mark the collapse of the Bretton Woods System at August 1971, when the United States finally closed the gold window.[34] Although the "Bretton Woods" variables (pegged exchange rates, convertibility, IMF membership) from 1975 may equal 1, they cannot accurately reflect the merits of the system as it was designed. Therefore, statements made about the system must be based on coefficients from the years 1954 and 1964. Accordingly, I ran separate pooled regressions with data only from 1954 and 1964, which I refer to as the "pooled Bretton Woods" regressions. Any statements based on the regressions that include 1975 data are used only for comparative purposes and for general statements about exchange rate volatility.

I will emphasize the pooled Bretton Woods results as my preferred estimates because they exploit more effectively the substantial variation in the data across time. Exploiting this time variation is particularly important in this

[34] For example, see Bordo (1993, p. 74).

type of study because it allows one more effectively to analyse across time the trade impact of policy decisions, such as choosing to participate in the Bretton Woods System.[35] Thus, the pooled sample includes data both from the early stages of the Bretton Woods System (1954), when few were participating, and from the period when the system was thriving (1964). My methodology of isolating several distinct aspects of Bretton Woods participation allows me to exploit the 1954 data, even if the system was not yet fully operational in this year. I experiment with year dummies to control for other potential changes across these periods that are not accounted for by the regressors. The dummies indicate that in 1954 trade was substantially higher than is accounted for by the explanatory variables alone. As discussed, in the early 1950s Western Europe struggled to re-establish export industries, which had been decimated by the war. The strong positive coefficient for 1954 may reflect the resurgence of European trade resulting from the rapid reconstruction of export industries, which was facilitated by Marshall Plan aid of the previous years.

The estimates in Table 1 were produced using Ordinary Least Squares (OLS) with the dependent variable entered as $\ln(Trade_{ijt})$. This method presents a problem because the estimates are based on truncated samples that exclude observations for which trade between country i and j is zero.[36] For example, the 1964 data contains more than 1,300 observations for which $\ln(Trade_{ij})$ equals zero. It is important to include these observations because they provide potentially important information on trade patterns. Their exclusion could significantly bias the estimated coefficients. Following EFT (2001) and Eichengreen and Irwin (1998), a better method is to use Tobit estimates on censored data by constructing a new dependent variable $\ln(1+ Trade_{ijt})$. This method substantially increases the number of observations and eliminates potential bias in the coefficients. However, Tobit estimates are also more

[35] Rose (2000) and EFT (2001) also emphasize pooled estimates for similar reasons.
[36] The dataset was constructed such that countries with extremely low trade values were entered as zero.

difficult to interpret than OLS and consequently I use them only for comparative purposes. Table 2 presents the Tobit estimates.

The equations exhibit a high degree of explanatory power compared to similar gravity model studies. The OLS estimates for 1954 explain more than 70 percent of bilateral trade, an impressive result for any cross-sectional analysis. The regressions from 1964 and 1975 and pooled estimates produce R-squared values in the range of 0.65 to 0.7. In comparison, EFT (2001) obtain R-squared values from 0.5 to 0.6 for the gold standard. However, because they study the pre-1913 period, they must use data reconstructed from multiple sources and therefore their econometric results are not directly comparable. In a study of a more recent period, Rose (2000) obtains R-squared values similar to those produced by my regressions.

Gravity Model Variables

For both the OLS and Tobit estimations, the standard gravity model variables, distance, GDP and GDP per capita are always highly significant in the hypothesized direction. Both higher GDP and higher GDP per capita increased bilateral trade, *ceteris paribus*. And greater distance between countries decreased trade between country pairs. Furthermore, the magnitudes of these coefficients are intuitively reasonable and consistent with the gravity model studies conducted by EFT (2001), Rose (2000) and others. The adjacency and landlocked dummy variables appear less important. When statistically significant, the coefficients on these variables confirm the hypothesis that adjacency increases trade and being landlocked decreases trade. However, the adjacency variable is rarely significant and appears to have a relatively small effect. Both variables are insignificant in 1954, perhaps reflecting the difficulty that Western Europe experienced in re-establishing unrestricted bilateral trade in the early 1950s as a consequence of wartime destruction. I experimented with

alternative specifications that exclude these variables, but their exclusion made little difference to the baseline estimates.

Exchange Rate Variables

The exchange rate variables deliver the strongest evidence for the hypothesis that the Bretton Woods System exerted a positive influence on bilateral trade. In both the year-by-year and pooled regressions, official exchange rate volatility decreased bilateral trade, *ceteris paribus*. The coefficients are always highly significant, exceeding the 99 percent confidence level in every regression. Following EFT (2001) and Rose (2000), I make sample calculations for the magnitude of the volatility effect. For the pooled Bretton Woods (1954 and 1964) estimates, the coefficient on official volatility (β_V) suggests that completely eliminating exchange rate variability between a given country pair (i.e. pegging their exchange rates) would have resulted in a 2.5 percent increase in trade.[37] The magnitude of this effect was larger in the early 1960s, when reducing exchange rate volatility to zero would have led to an increase of almost 9 percent in bilateral trade. This large effect for the early 1960s is revealing because it represents the trade benefit that countries would have gained from participating in Bretton Woods when it acted as an effective monetary union. And the size of the coefficients is even greater using Tobit estimates, which include zero-trade observations. Cumulatively, these coefficients provide strong evidence that limiting the volatility of the official nominal exchange rate—a key aspect of participation in the Bretton Woods System—increased bilateral trade, *ceteris paribus*.

However, the most important element of Bretton Woods participation was maintaining a pegged exchange rate in the parallel market. My baseline OLS

[37] The mean value of exchange rate volatility from the period was 0.06. Therefore, reducing volatility from 0.06 to zero involved a 2.5% increase in trade, since (-.42)(-.06) = 0.025 and exp(0.025)-1 = 2.5%.

estimate of β_{PEG} suggests that two countries which pegged their exchange rate in the parallel market traded almost 20 percent more (since exp(.17)-1 ≈ .19) with each other than with comparable countries that allowed their market-determined exchange rates to fluctuate. Furthermore, this coefficient is significant at the 99 percent level and is based on data from two distinct periods of the Bretton Woods System, thus exploiting the time variation effect. The impact of Bretton Woods participation also becomes much larger when using Tobit estimates that include zero-trade observations (suggesting that countries which traded little or none were more likely to allow their exchange rates to fluctuate in the parallel market). The exact magnitudes of these estimates should not be interpreted too literally, however they do provide strong evidence of the positive influence of pegged exchange rates on bilateral trade. Since maintaining pegged exchange rates in the parallel market was the most fundamental element of Bretton Woods participation, these coefficients also provide the strongest evidence for the positive influence of Bretton Woods participation on trade—a result that supports the hypothesis stated above.

It is important to note some interesting features of the results. Both the OLS and Tobit estimates of β_{PEG} are positive and significant for the 1954 dataset and are similar in magnitude to the pooled results. But when OLS estimates are made using the 1964 data, the pegged exchange rate coefficient is insignificant at standard confidence levels. However, when I include zero-trade observations using Tobit estimates, the β_{PEG} variable becomes positive and significant and is comparable to the pooled result. The 1964 dataset has more than 1,300 observations for which trade between country-pairs equals zero (compared with only about 200 for the other years). These observations provide potentially important information about bilateral trade patterns and therefore their exclusion could seriously bias the estimates. Thus, it is important to emphasize the Tobit results as the most relevant estimates for 1964, and these estimates lend further support to the stated hypothesis. β_{PEG} turns significantly negative in the 1975 regression—an unsurprising result given that only smaller, less developed

economies continued to peg their exchange rates after the breakdown of Bretton Woods. This negative β_{PEG} for 1975 may also suggest that the exchange rate peg of the 1950s and 1960s, which was managed under Bretton Woods, exerted an econometrically distinguishable positive influence on bilateral trade.

Convertibility and IMF Membership

Both the year-by-year and pooled estimates confirm the hypothesis that countries which made their current accounts convertible traded more with each other than with comparable countries that restricted current account payments. The pooled Bretton Woods baseline estimate suggests that joint current account convertibility was associated with a 43 percent (since $\exp(.363)-1 \approx .43$) increase in bilateral trade, *ceteris paribus*. This coefficient is significant at the 99 percent confidence level. The large magnitude of this effect is expected, given the significant obstacle posed by trading with inconvertible currencies. The estimated coefficient for 1954 implies a considerably larger convertibility impact, although it is significant at only the 90 percent level. However, this result is driven by very few observations, since only nine countries in the dataset made their currencies convertible in 1954, and the main countries to do so were Canada and the United States, who enjoyed disproportionate trade while Europe completed reconstruction of its export industries. Even in 1964, during the golden era of the Bretton Woods System, only 16 percent of countries in the dataset made their currencies convertible, as acknowledged by the IMF. Therefore, the large magnitude of the effect is not surprising. The coefficient loses significance with the Tobit estimates, which incorporate censored data. This contradiction makes the convertibility result weaker than the results for the impact of exchange rate stability. Nonetheless, the OLS estimates suggest that convertibility, the most restrictive definition of Bretton Woods participation, exerted a positive influence on bilateral trade, other factors held constant.

Surprisingly, IMF membership does not appear to have exerted a positive influence on bilateral trade. Although the positive impact is quite strong in 1954, the coefficients turn negative and lose significance for the subsequent years. The pooled results suggest that joint IMF membership actually *decreased* trade.[38] The effect of IMF membership is perhaps the most difficult variable to justify theoretically. I expected membership to influence trade through credibility and commitment, which makes the weak or negative influence of IMF membership puzzling. In 1954, nearly 40 percent of countries in the dataset were IMF members. This 40 percent included many developing nations that only participated in Bretton Woods through IMF membership and did not maintain pegged exchange rates or convertible currencies. The estimates of β_{IMF} suggest that in order for countries to enjoy the full benefits of Bretton Woods membership, they needed to do more than simply join the IMF. Instead, the biggest benefits of participation came through current account convertibility and exchange rate stability. Therefore, the IMF result highlights the importance of examining several aspects of Bretton Woods participation rather than focusing on a single aspect.

Potential Weaknesses

The above estimates have several potential shortcomings, which I must note here as a *caveat*. The most obvious weakness is the omission of tariff data. Historical cross-sectional analysis is particularly challenging because of the massive data requirements associated with analysing country-pair observations. This requirement makes it very difficult to incorporate tariff data into a gravity model study. EFT (2001) make an explicit attempt to estimate the impact of tariffs on bilateral trade during the gold standard era. The authors exploit a new 40-country cross-sectional dataset complied by Clemens and Williamson (2001), which measures historical tariffs between country-pairs. Despite considerable

[38] The Tobit estimates yielded a similar negative result.

effort, I was unable to obtain this unreleased dataset from the authors. In EFT's baseline pooled estimates, the coefficient on tariffs is insignificant at standard confidence levels and has relatively little effect on the other coefficients, while including the tariff data cuts the sample size in half. Rose (2000) does not explicitly account for the impact of tariffs, however he does include control dummies for regional trade agreements. In these studies, tariff rates are not found to have a dominant influence on bilateral trade in either period.

Furthermore, Irwin (1995) argues that tariff reductions were not the main cause of the post-war recovery of international trade. GATT failed to achieve major tariff reductions in the 1950s and early 1960s. Only after 1964, with the Kennedy Round negotiations (1964-67), did countries begin substantially to reduce tariffs. By the time these reductions took effect in the late 1960s, the Bretton Woods System had already begun to break down. Thus, exclusion of tariff data does not seriously compromise my estimates of the impact of Bretton Woods on bilateral trade in the 1950s and early 1960s.

Another potential shortcoming of my analysis is simultaneity. Several authors have noted the possibility that countries may decide to join a monetary union based on their existing trade relationships. Similarly, countries may have decided to participate in Bretton Woods because their main trading partners were participating, which would introduce reverse causation. To confront this possibility, authors often employ instrumental variable estimation. This method requires a variable that is strongly related to monetary union membership but unaffected by trade considerations. Unfortunately, an appropriate instrumental variable has proved elusive in historical studies. For the classical gold standard, EFT (2001) and Lopez-Cordova (2000) address this problem by using the product of the logarithm of each partner country's average distance from all countries on gold. However, estimation by this method has little effect on the gold standard coefficient. In a more contemporary study, Rose (2000) de-

emphasizes trade as the major criteria in the decision to join a monetary union.[39] Like these other studies, his incorporation of instrumental variables has little effect on his underlying results.

In summary, although the issues of tariff data and endogeneity may affect my estimates, similar studies find little impact on the baseline coefficients. GATT did not achieve substantial tariff reductions until the late 1960s, when Bretton Woods was already failing, and other gravity model studies dismiss the significance of simultaneity.

VII. The Broader Implications

My analysis of exchange rate stability and current account convertibility provides strong evidence for the hypothesis that the Bretton Woods System, acting as an effective common currency, increased bilateral trade among its participants, other factors held constant. The greatest challenge of this analysis was to define "participation" in the system. Pegged exchange rates act as the foundation of any effective monetary union. Since Bretton Woods was fundamentally a system of pegged exchange rates, any analysis of the system's contribution to bilateral trade must focus on this criterion. Furthermore, exchange rate data from the parallel market provide the best indication of a country's underlying monetary policy, and therefore the best evidence of whether a country was actually participating. Using this criteria, β_{PEG} provides my baseline estimate, which suggests that Bretton Woods increased bilateral trade amongst its participants by about 20 percent, *ceteris paribus*.

[39] Rose draws on the example of the EMU, arguing that inflation was a bigger consideration than trade.

Putting the Results in Context

My baseline estimate provides further evidence of the strong positive influence of effective monetary union participation on bilateral trade. The 20 percent estimate from this study is smaller than the result obtained by EFT (2002), who suggest a 92 percent trade increase from effective monetary union membership based on the classical gold standard. My coefficient is also smaller than estimates by Lopez-Cordova and Meissner (2000), who determine a 60 per cent trade increase from gold standard participation and by Rose (2000) for contemporary currency unions, which implies a 235 percent increase in trade. The smaller effect in this study is not surprising, given that countries participating in Bretton Woods still traded in separate currencies. Although the system acted as an effective monetary union in the early 1960s, use of separate currencies inevitably meant smaller commitment, less credibility and more frictions than a system using only one legal tender.

However, Rose's study has also received considerable criticism because of the implausible magnitude of the currency union effect. The 20 percent effect obtained in my study, although significantly smaller, may represent a more reasonable estimate of the positive impact of monetary union participation on bilateral trade. In addition, I obtain my results using a diverse dataset that contains monetary union observations from both highly-developed European economies and less-developed periphery economies. Rose bases his estimates almost exclusively on small, underdeveloped economies that participated in a currency union –a methodology that makes his estimates less applicable to the EMU. In contrast, the diversity of my Bretton Woods dataset makes my results more generally relevant for statements about both the EMU and LDC monetary unions.

Like Rose (2000), my estimated impact of monetary union participation is an order of magnitude larger than hypothetically reducing official exchange rate volatility to zero. My calculations suggest that reducing official exchange rate

volatility to zero would have delivered an 8 percent increase in bilateral trade (at most), versus a 20 percent increase from my preferred definition of monetary union participation. Previous research on currency unions equates monetary union membership to eliminating exchange rate volatility completely. The results obtained in this study and Rose (2000) contradict this theory, suggesting that monetary union membership delivers a trade benefit that is greater than simply eliminating volatility. As discussed, the exact mechanisms through which currency unions deliver this benefit are not well understood. Most arguments focus on the impact of the more credible commitment represented by monetary union membership. However, previous studies provide little evidence of this effect.

My analysis differs from past studies because my preferred definition of participation involves pegging the exchange rate in the parallel market. My estimates suggest that it was more important to peg the market-determined exchange rate than to stabilize the official exchange rate. This result supports the theory that effective monetary unions increase trade through credibility, since maintaining a pegged exchange rate in the parallel market implies a high degree of market confidence in that peg. Market credibility probably increases trade by lowering the transaction costs associated with uncertainty. Simply maintaining an official exchange rate peg was not enough to reap the full benefits of Bretton Woods participation. Similarly, IMF membership alone was insufficient for countries to derive the full trade benefits of Bretton Woods. To my knowledge, this paper uses the first gravity model that incorporates Reinhart and Rogoff's new dataset on market-determined exchange rates. The incorporation of this data provides the best available evidence that Bretton Woods participation increased trade through market credibility.

Some Lessons about Bretton Woods

Did Bretton Woods act as an effective monetary union? First, like a monetary union, Bretton Woods increased bilateral trade through current account convertibility. I have shown that this effect is large and econometrically significant. Country pairs that made their currencies fully convertible traded about 40 percent more than pairs in which at least one country restricted current account payments. Furthermore, this result is based on data from both the limited 1950s Bretton Woods System and the more successful 1960s system. Second, like a monetary union, Bretton Woods increased bilateral trade by reducing exchange rate volatility. By comparison with the classical gold standard and post- 1971 era, Bretton Woods delivered a high degree of exchange rate stability. I have shown that official exchange rate stability under Bretton Woods exerted a positive, though relatively small, impact on trade. The effect was greatest in the 1960s, during the system's heyday. Third, like a monetary union, Bretton Woods increased bilateral trade through its credibility. Countries which maintained pegged exchange rates in the parallel market enjoyed the significant benefits of this credibility in the form of greater trade—a benefit on the order of 20 percent. Therefore, my econometric analysis of convertibility, volatility and credibility suggests that Bretton Woods increased bilateral trade amongst its participants by acting as an effective common currency. This result confirms my conclusions from Section IV and lends further support to my arguments about the positive impact of monetary union participation on trade.

But my analysis also reveals that *full* participation in the Bretton Woods System was very limited, much more so than textbook accounts acknowledge. My analysis relies on three basic definitions of participation: exchange rate stability, current account convertibility and IMF membership. Textbooks generally acknowledge that few countries were participating in the 1950s, and my data confirm this assessment. In 1954, less than 4 percent of countries in the dataset simultaneously fulfilled all three criteria of Bretton Woods participation.

More surprisingly, participation by these definitions was still quite limited in the 1960s, during the system's golden era. In 1964, less than 12 percent of countries fulfilled all three participation requirements. And this group excluded several major economies, such as France and Japan, which failed to peg their exchange rates in the parallel market. Therefore, even at the height of the system's effectiveness, few countries reaped the significant benefits of full Bretton Woods participation. My baseline estimates imply that if Bretton Woods had achieved greater levels of participation in the 1950s and 1960s, the world may have benefited from a significant increase in international trade.

Based on the results, what new statements can I make about the welfare contribution of the Bretton Woods System in the 1950s and 1960s? A full welfare analysis of the system is well beyond the scope of this paper. However, my results do provide significant evidence that Bretton Woods participation increased bilateral trade, and this increased trade likely led to greater gains from trade. Several recent studies use econometric analysis to show the significant income benefits from trade. For example, Frankel and Romer (1999) demonstrate that a one percent increase in the trade ratio raises GDP per capita by between 0.5 and 2 percent, *ceteris paribus*. This result is corroborated by a recent study by Irwin and Tervio (2000) on different time periods. Therefore, the Bretton Woods System may have contributed to the rapid growth of per capita income that occurred during its operation.

Lessons about Exchange Rate Regimes

The results obtained from this analysis also provide new evidence that exchange rate volatility exerts a negative influence on international trade. Previous research using time-series studies has been unable to reach a consensus on this effect. As discussed, cross-sectional studies have produced the best evidence that exchange rate volatility adversely affects trade, although the effect is relatively small. My estimates on official volatility support this negative

effect. Furthermore, the negative impact of exchange rate volatility was not only significant for the Bretton Woods period. The estimates from 1975 suggest that eliminating exchange rate volatility altogether would have resulted in a 19 percent increase in bilateral trade—a coefficient that is similar in magnitude to the effect of Bretton Woods participation. Therefore, the greater exchange rate volatility of the post-Bretton Woods era probably decreased international trade. Perhaps if countries had been able to implement a system of fixed exchange rates in the 1970s, they would have enjoyed significant benefits of increased international trade. However, any econometric results from the 1970s must be viewed with caution because of the oil shocks and general economic instability of that decade.

This paper provides strong historical evidence for the positive impact of maintaining pegged exchange rates in the parallel market. Maintaining these pegs requires that the market ascribe credibility to the government's policies. Consequently, market pegs are considerably more difficult to uphold than official pegs. They require credible institutions to assure their legitimacy, which an effective monetary union can provide. Since the collapse of Bretton Woods, countries have experienced considerable difficulty in maintaining pegged exchange rates in the parallel market. Previous studies of pegged exchange rate regimes have likely underestimated their benefit by focusing only on official exchange rate data. The findings of this paper suggest the need for more research on the positive impact of pegged exchange rates using Reinhart and Rogoff's (2002) new parallel market dataset. Exploitation of this data may yield some surprising results that contradict previous studies on official volatility.

VIII. Conclusion

In this paper, I have assessed the contribution of the Bretton Woods System to the rapid rise of international trade during the 1950s and 1960s. I have argued that the Bretton Woods System acted as an effective common currency, if

only for a short period in the early 1960s, by facilitating current account convertibility, exchange rate stability and providing credibility for these policies. Based on these criteria, I hypothesized that participation in the system increased bilateral trade. I then quantified this effect using an augmented gravity equation, and found that joint Bretton Woods participation increased trade between countries by about 20 percent, *ceteris paribus*.

My results confirm the findings of previous studies that suggest a strong positive impact of monetary union membership on bilateral trade. The estimates also provide new evidence on the adverse effects of exchange rate volatility. However, this paper's greatest innovation is the exploitation of a new dataset on parallel market exchange rates. Use of these data allowed me to assess the impact of *credible* exchange rate pegs on bilateral trade by distinguishing between countries that claimed to be participating in Bretton Woods and those that were actually participating. Based on my historical analysis of Bretton Woods, I concluded that effective monetary unions probably increase international trade through their credibility.

These results are especially relevant for present-day policymakers attempting to select the appropriate monetary regime for their country. My estimates are particularly robust because they were obtained using data from both highly developed economies and smaller LDCs. Therefore, the estimates suggest the significant trade benefits of monetary union participation for both EMU candidates and developing economies. However, any effective monetary union must operate under institutions that assure its credibility in the parallel market. By creating such monetary unions, countries can reap the significant economic benefits of greater international trade.

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Tables and Charts

Table 1. OLS Baseline Estimates

Dependent Variable: ln(trade)

	1954	1964	1975	Pooled	Pooled Bretton Woods
Distance	-0.674556	-0.71156	-0.874362	-0.781868	-0.720302
	(-15.00)	(-20.31)	(-19.97)	(-32.73)	(-25.60)
GDP	0.817145	0.659568	0.674386	0.694013	0.697374
	(32.76)	(45.24)	(31.68)	(62.70)	(54.67)
GDP/N	0.400205	0.548541	0.590403	0.555965	0.498432
	(11.48)	(22.15)	(18.48)	(32.82)	(24.71)
Locked	-0.123038	-0.550465	-0.343531	-0.263713	-0.270684
	(-1.12)	(-6.35)	(-2.68)	(-4.39)	(-3.98)
Adjacent	0.164926	0.277639	0.026791	0.091788	0.157238
	(0.80)	(1.82)	(0.13)	(0.84)	(1.26)
Volatility	-0.464712	-2.891784	-2.969119	-0.438166	-0.419975
	(-9.10)	(-6.48)	(5.57)	(-7.13)	(-7.69)
Market Peg	0.374681	0.040358	-0.635733	0.082556	0.170572
	(4.42)	(0.71)	(-2.92)	(1.77)	(3.66)
Convertibility	0.820815	0.328094	0.446923	0.436681	0.362884
	(1.16)	(3.86)	(4.22)	(6.98)	(4.52)
IMF	0.366453	-0.652078	-0.556406	-0.234945	-0.152916
	(4.18)	(-6.93)	(-2.71)	(-3.69)	(-2.31)
Constant	-16.7758	-12.98422	-13.74948	-15.23232	-14.09802
	(-19.71)	(-23.83)	(-16.39)	(26.67)	(-30.29)
Year = 1954	---	---	---	1.835952	0.728369
				(19.64)	(13.70)
Year =1964	---	---	---	1.096178	---
				(36.33)	
Observations	1024	2550	1866	5440	3574
Adjusted R^2	0.7106	0.6458	0.702	0.6928	0.6502
Root MSE	1.1735	1.3262	1.4581	1.3723	1.3101

Note: t-stats indicated in parentheses.

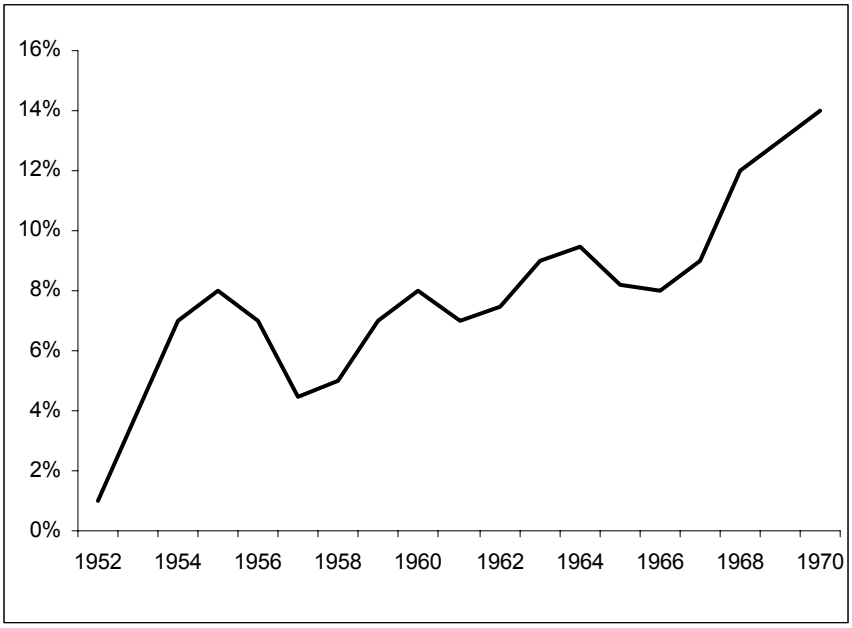
Table 2. Tobit Estimates

Dependent Variable: ln(1+trade)

	1954	1964	1975	Pooled	Pooled Bretton Woods
Distance	-0.94995	-1.812615	-1.022043	-1.443923	-1.601324
	(-11.35)	(-19.80)	(-14.5)	(-27.73)	(-23.17)
GDP	1.031104	1.415393	0.74394	1.166841	1.337795
	(22.47)	(39.64)	(21.76)	(51.06)	(45.68)
GDP/N	0.965355	1.39041	0.809046	1.057159	1.232599
	(15.78)	(22.70)	(16.04)	(29.92)	(25.84)
Locked	–0.195355	-1.34226	-0.518496	-0.651929	-0.842082
	(-0.99)	(-6.59)	(-2.58)	(-5.36)	(-5.47)
Adjacent	-0.742012	-0.769834	-0.006288	-0.786479	-1.048615
	(-1.97)	(-1.85)	(-0.02)	(-3.23)	(-3.34)
Volatility	-0.700313	-7.713528	-1.896951	-0.737798	-0.731169
	(-7.8)	(-7.13)	(-2.23)	(-6.07)	(-5.48)
Market Peg	0.534988	0.370902	-1.322949	0.705093	0.641284
	(3.44)	(2.54)	(-4.01)	(7.27)	(5.74)
Convertibility	0.613628	-0.346312	0.31978	-0.159183	0.100041
	(0.63)	(-1.48)	(1.87)	(-1.14)	(0.50)
IMF	0.552118	-1.224466	-0.789835	-0.269625	-0.623191
	(3.45)	(-5.52)	(-2.38)	(-2.07)	(-4.04)
Constant	-29.28803	–40.72323	-18.46815	-33.96003	-38.92871
	(-19.29)	(-29.30)	(-13.82)	(25.51)	(20.36)
Year =1954	---	---	---	3.853865	2.686101
				(10.07)	(-35.39)
Year =1964	---	---	---	1.221714	---
				(-38.34)	
Observations	1140	3696	1962	6798	4836
Pseudo R^2	0.1902	0.1633	0.1508	0.1726	0.1662

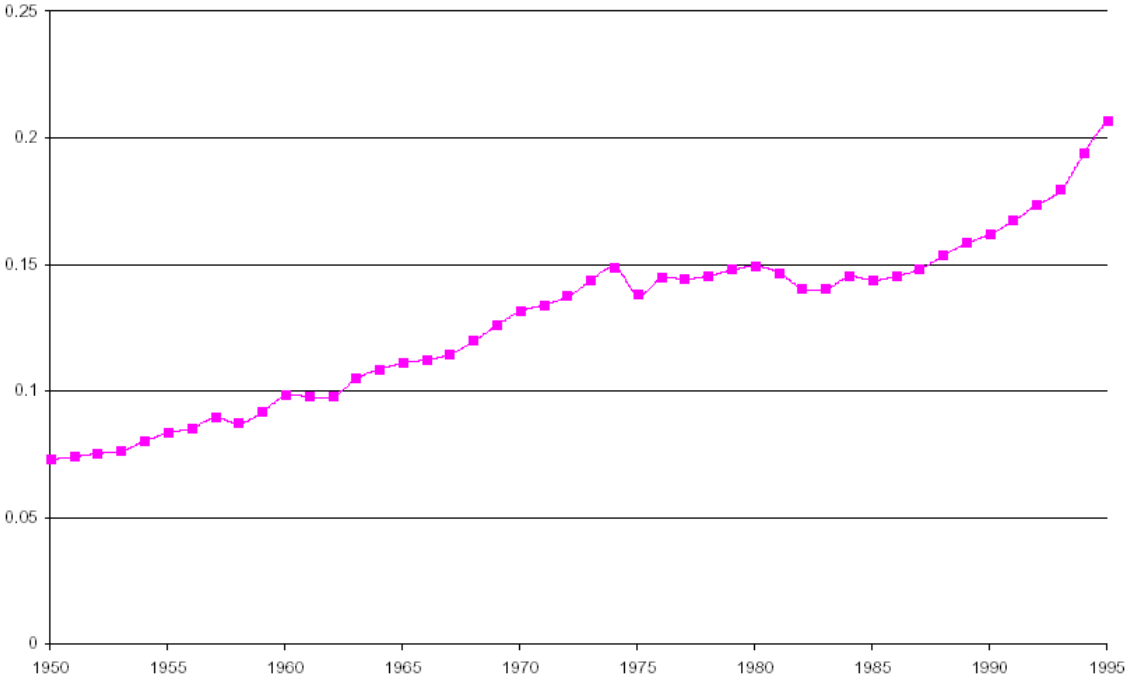
Note: t-stats indicated in parentheses.

Chart 1. Total Merchandise Export Growth, % Change
(3-Year Moving Average)



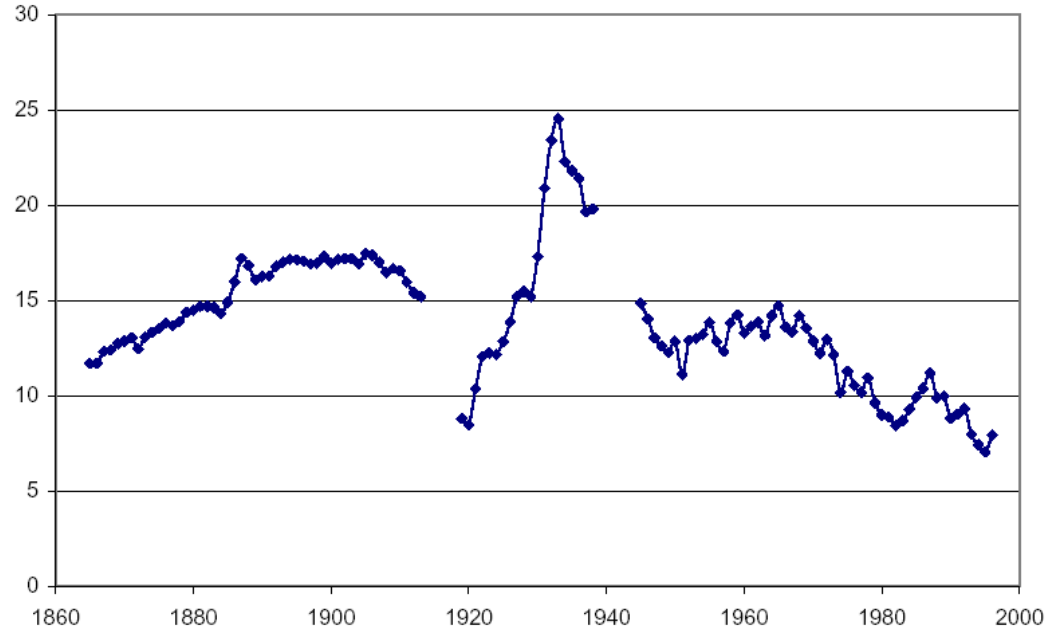
Source: World Trade Organization

Chart 2. World Trade/ Output Growth 1950-1995



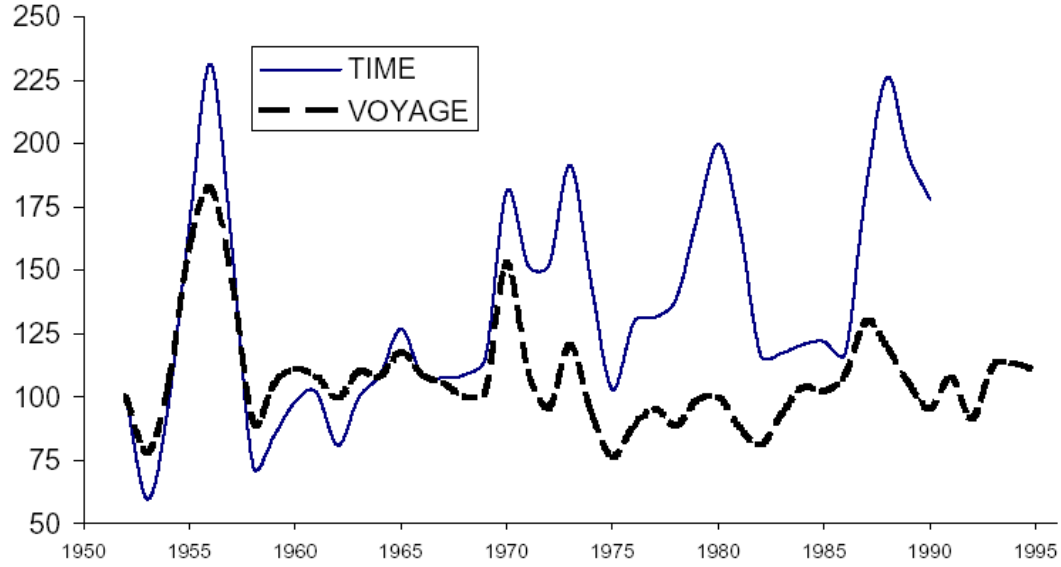
Source: Hummels (1999)

Chart 3. Unweighted World Average Own Trade, 35 Countries
(percentages)



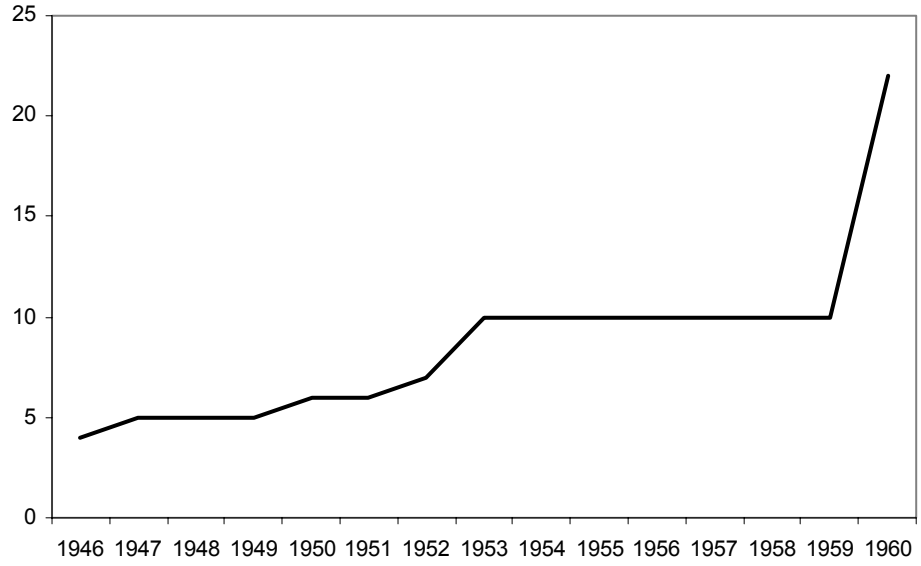
Source: Clemens and Williamson (2001)

Chart 4. Tramp Shipping Rates- Commodity Price Deflator



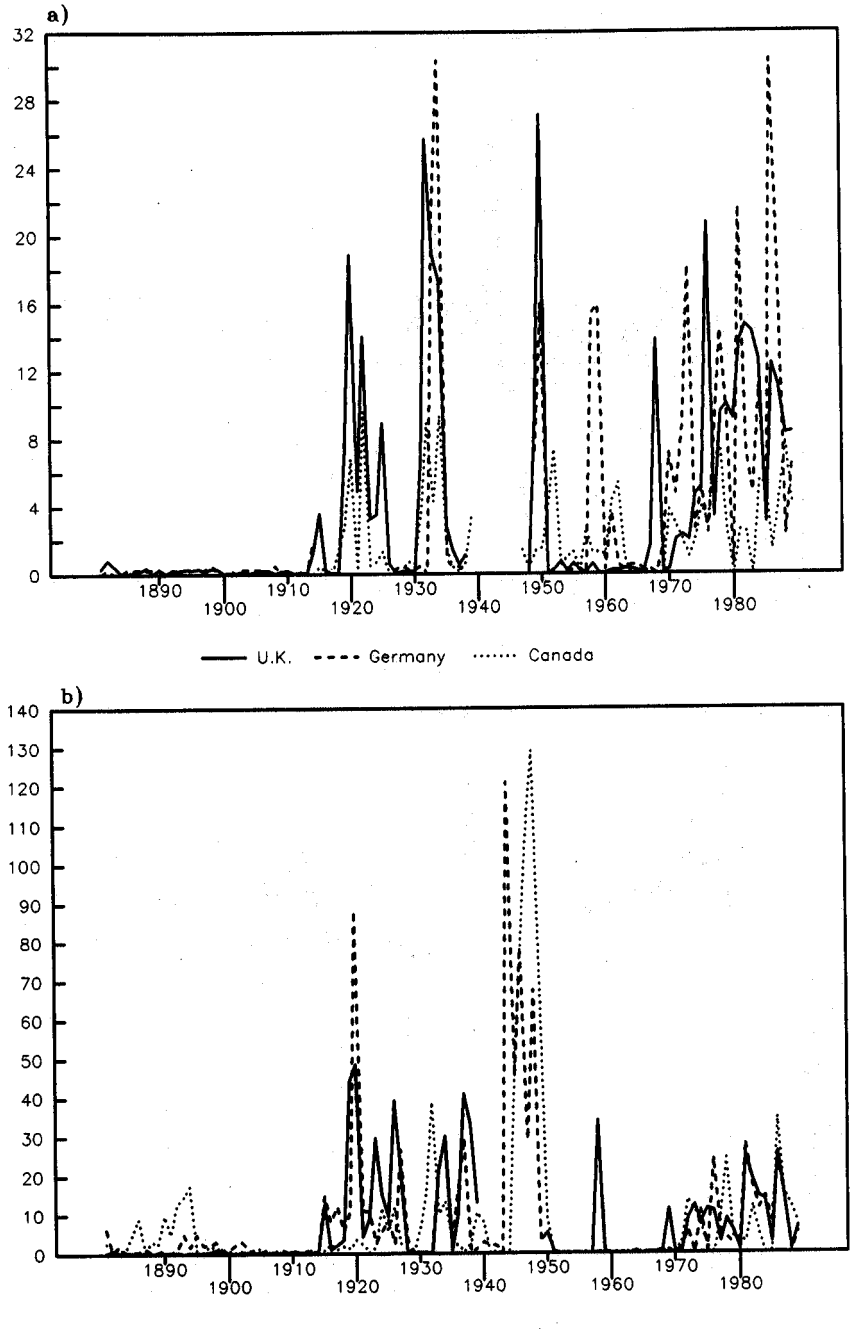
Source: Hummels (1999)

Chart 5. Current Account Convertibility- Number of IMF Members That Had Accepted Article VIII



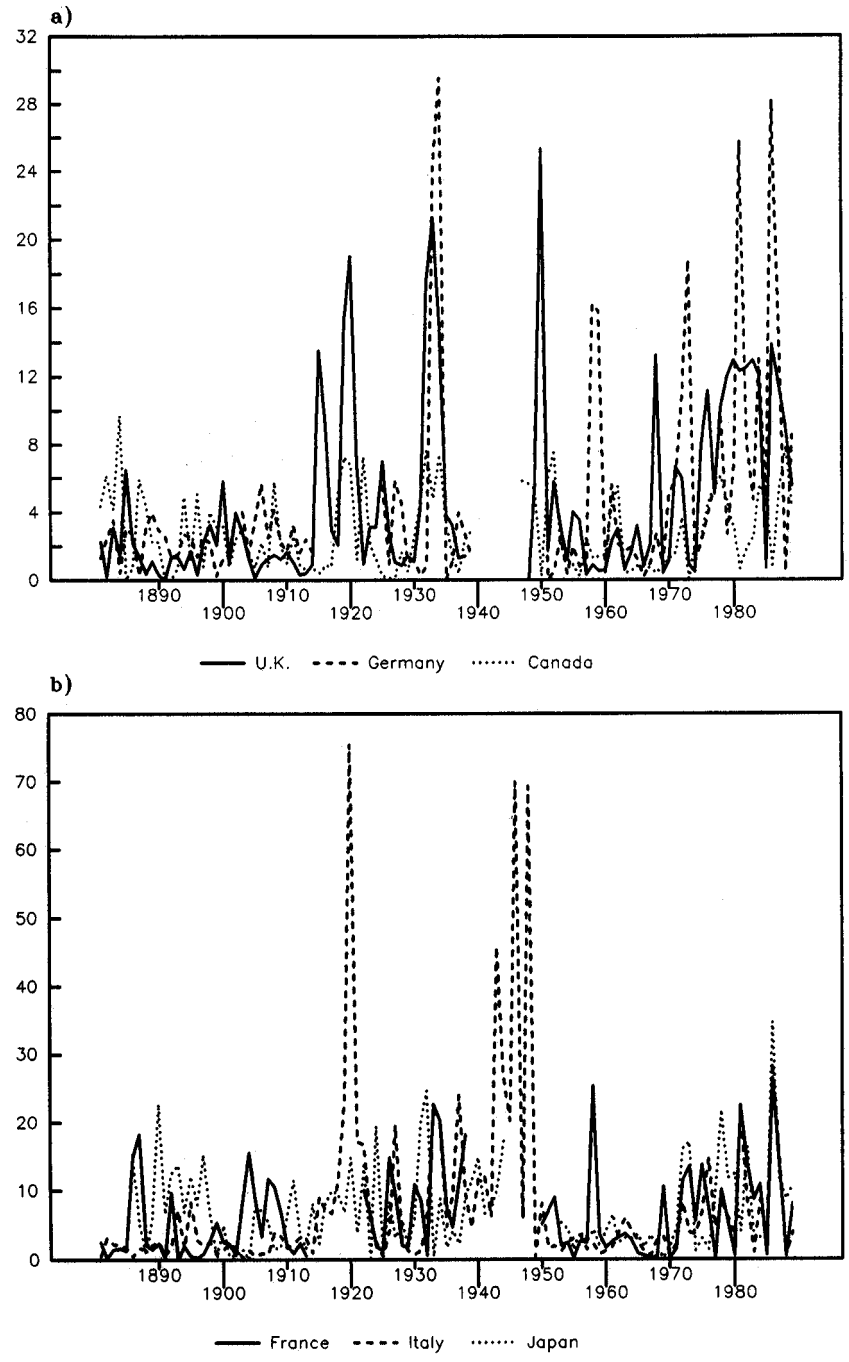
Source: Eichengreen (1996). Original data taken from International Monetary Fund's *Annual Report on Exchange Controls and Exchange Restrictions* (various years).

Chart 6. Absolute Change in Nominal Exchange Rates, 1880-1989



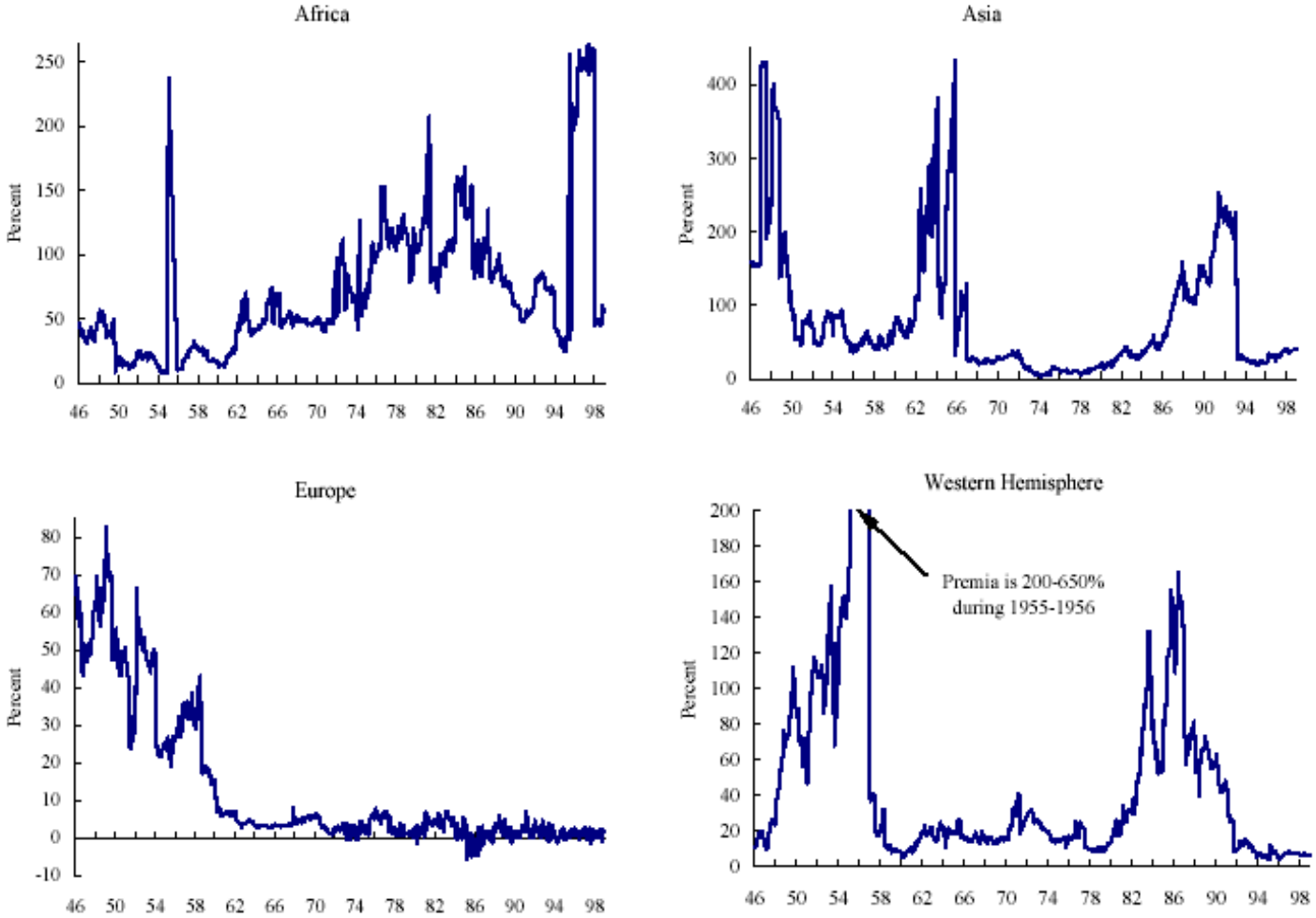
Source: Bordo (1993)

Chart 7. Absolute Change in Real Exchange Rates, 1880-1989



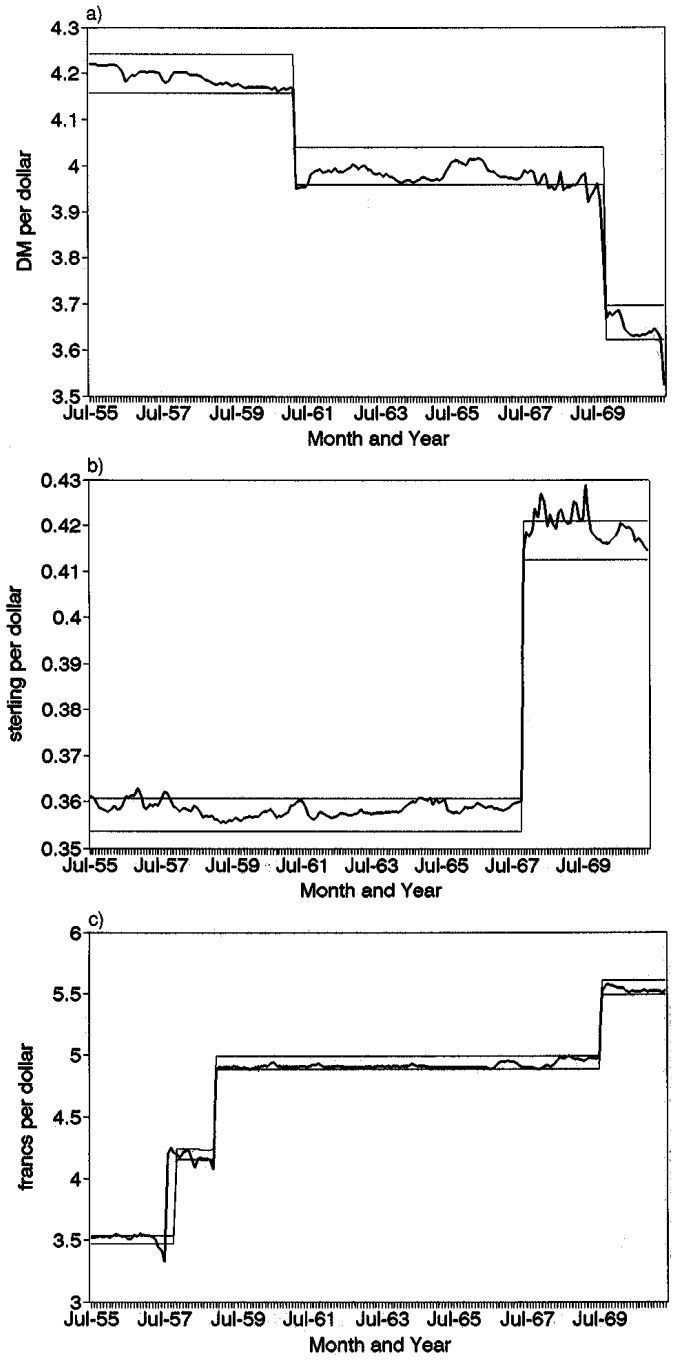
Source: Bordo (1993)

Chart 8
Average Monthly Parallel Market Premium: 1946-1998



Source: Reinhart and Rogoff (2002), IMF

Chart 9. Three-Month Forward Rate and Parity Bounds
a) Deutsche Mark/ dollar b) Sterling/ dollar c) Franc/ dollar



Source: Giovannini (1993)

Table A1

Summary Statistics (Pooled BW)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade	5,397	62,091	309,111	0	9,691,699
Distance	44,742	8,006	4,442	70	19,948
GDP	21,416	2.68E+14	2.56E+15	4.79E+08	1.21E+17
GDP/N	21,416	527,899	863,177	3,534	10,700,000
Landlocked	46,530	0.29684	0.45687	0.00000	1.00000
Adjacent	44,742	0.01998	0.13994	0.00000	1.00000
Volatility	31,006	0.06002	0.30583	0.00000	3.95847
IMF	46,530	0.27051	0.44423	0.00000	1.00000
Convertibility	46,530	0.01384	0.11683	0.00000	1.00000
Market Peg	46,530	0.24010	0.42715	0.00000	1.00000

Summary Statistics (1954)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade	1,572	60,752	261,954	0	5,936,300
Distance	22,371	8,006	4,441,737	70	19,948
GDP	5,051	1.63E+14	1.12E+15	1.49E+10	2.7E+16
GDP/N	5,051	413,764	535,214	3,534	4,219,518
Locked	23,265	0.29684	0.45688	0.00000	1.00000
Adjacent	22,371	0.01998	0.13994	0.00000	1.00000
Volatility	13,418	0.10241	0.45594	0.00000	3.95847
IMF	23,265	0.14249	0.34956	0.00000	1.00000
Convert	23,265	0.00327	0.05706	0.00000	1.00000
Market Peg	23,265	0.21332	0.40966	0.00000	1.00000

Summary Statistics (1964)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade	4,325	62,586	324,662	0	9,891,699
Distance	22,371	8,006	4,442	70	1,994,844
GDP	16,365	3.00E+14	2.86E+15	4.79E+08	1.21E+17
GDP/N	16,365	563,126	938,824	9,047	10,100,000
Locked	23,265	0.29684	0.45688	0.00000	1.00000
Adjacent	22,371	0.01998	0.13994	0.00000	1.00000
Volatility	17,588	0.02769	0.06230	0.00000	0.47000
IMF	23,265	0.39854	0.48960	0.00000	1.00000
Convert	23,265	0.02441	0.15434	0.00000	1.00000
Market Peg	23,265	0.26688	0.44234	0.00000	1.00000

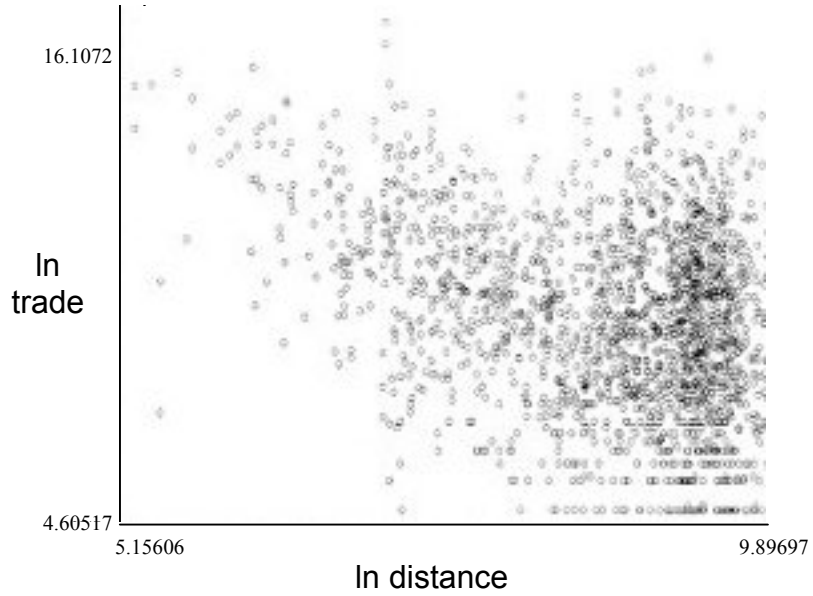
Summary Statistics (1975)

Variable	Obs	Mean	Std. Dev.	Min	Max
Trade	2,626	4,639,548	2,024,237	0	48,100,000
Distance	22,371	800,049	4,442	70	19,948
GDP	18,437	2.52 E+15	2.2E+16	2.7E+9	1.08E+18
GDP/N	18,437	3,806,904	5,960,891	30,318	50,500,000
Locked	23,265	0.29684	0.45688	0.00000	1.00000
Adjacent	22,371	0.01998	0.13994	0.00000	1.00000
Volatility	16,232	0.05640	0.04383	0.01497	0.41649
IMF	23,265	0.71330	0.45223	0.00000	1.00000
Convert	23,265	0.08902	0.28478	0.00000	1.00000
Market Peg	23,265	0.07952	0.27055	0.00000	1.00000

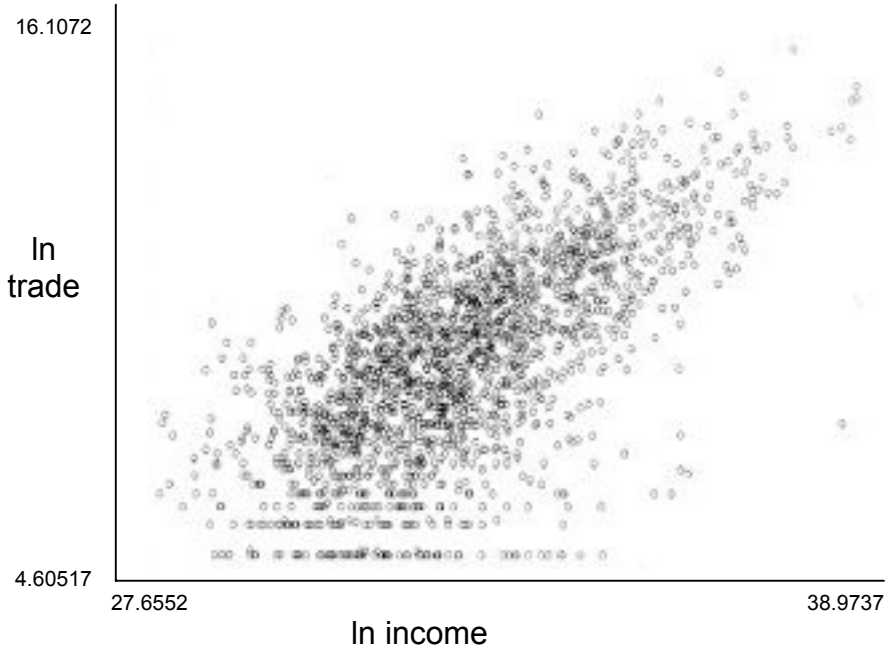
Table A2
Simple Correlations

	Trade	Distance	GDP	GDP/N	Locked	Adjacent	Volatility	IMF	Convert	Market Peg
Trade	1									
Distance	-0.2821	1								
GDP	0.6741	0.0767	1							
GDP/N	0.5009	-0.0758	0.3591	1						
Locked	-0.0884	-0.0173	-0.1561	0.0452	1					
Adjacent	0.1730	-0.4124	0.0522	0.0412	0.0648	1				
Volatility	-0.0103	0.0880	0.0286	-0.0495	-0.0371	0.0055	1			
IMF	0.1311	0.1058	0.2377	0.2109	-0.4256	-0.0018	0.0348	1		
Convert	0.2392	-0.0754	0.1835	0.2848	-0.0515	0.0613	-0.0402	0.1586	1	
Market Peg	0.0966	0.0175	0.0296	0.2133	0.0515	-0.0718	-0.0253	-0.0317	0.1743	1

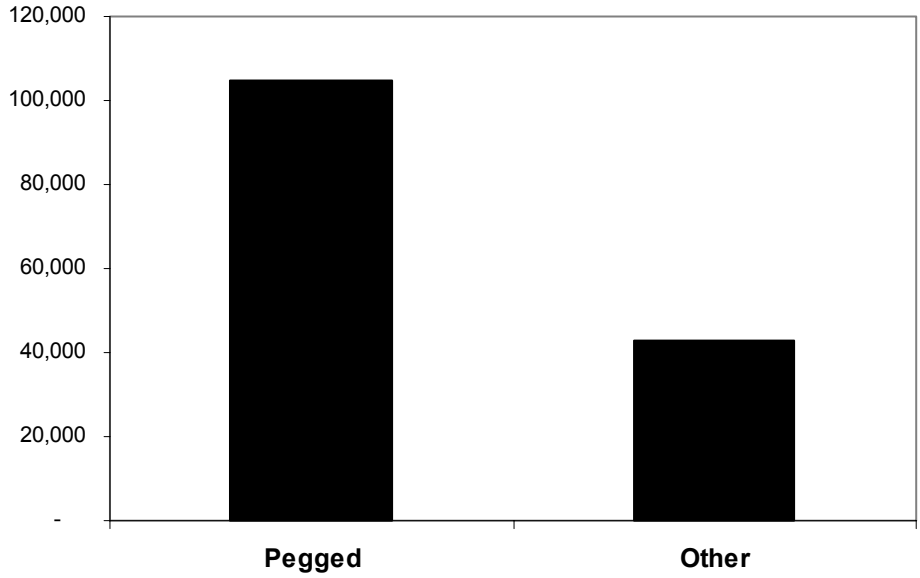
Graph A1



Graph A2



Graph A3. Average Trade: Pegged vs. Floating



Source: Based on Pooled Data from 1954 & 1964.

Appendix A. Market Pegs

Pegged in 1954	Pegged in 1964		Pegged in 1975
AUSTRALIA	ARGENTINA	TANZANIA	BENIN
AUSTRIA	AUSTRALIA	THAILAND	BOTSWANA
BELGIUM	AUSTRIA	TOGO	BURKINA_FASO
BENIN	BENIN	TUNISIA	BURUNDI
BOTSWANA	BOTSWANA	UGANDA	CAMEROON
BURKINA_FASO	BURKINA_FASO	UK	CAR
BURUNDI	BURUNDI	USA	CHAD
CAMEROON	CAMEROON	VENEZUELA	COSTA_RICA
CAR	CANADA	WEST_GERMANY	DOMINICA
CHAD	CAR	ZAMBIA	ECUADOR
CYPRUS	CHAD		GABON
DENMARK	CYPRUS		GAMBIA
DOMINICA	DENMARK		GRENADA
EL_SALVADOR	DOMINICA		GUATEMALA
GABON	GABON		GUINEA-BISSAU
GAMBIA	GAMBIA		GUYANA
GHANA	GHANA		HAITI
GRENADA	GREECE		HONDURAS
GUATEMALA	GRENADA		INDIA
GUINEA	GUATEMALA		IRAQ
GUINEA-BISSAU	GUINEA		IRELAND
GUYANA	GUINEA-BISSAU		JAMAICA
HAITI	GUYANA		JORDAN
HONDURAS	HAITI		KENYA
HUNGARY	HONDURAS		LESOTHO
INDIA	HONG_KONG		LIBERIA
IRAQ	INDIA		MADAGASCAR
IRELAND	IRAN		MALAYSIA
JAMAICA	IRELAND		MALI
JORDAN	ISRAEL		MEXICO
KENYA	ITALY		NEPAL
LAOS	JAMAICA		NICARAGUA
LESOTHO	JORDAN		NIGER
LIBERIA	KENYA		PAKISTAN
LUXEMBOURG	LESOTHO		PANAMA
MADAGASCAR	LIBERIA		SENEGAL
MALAWI	MADAGASCAR		SOUTH_KOREA
MALAYSIA	MALAWI		ST.LUCIA
MALI	MALAYSIA		ST.VINCENT&GRENADINES
MALTA	MALI		SWAZILAND
MAURITANIA	MALTA		THAILAND
MAURITIUS	MAURITANIA		TOGO
MEXICO	MAURITIUS		VENEZUELA
MOROCCO	MEXICO		
MYANMAR	MOROCCO		
NETHERLANDS	MYANMAR		
NEW_ZEALAND	NEPAL		
NIGER	NETHERLANDS		
NIGERIA	NEW_ZEALAND		
PAKISTAN	NICARAGUA		
PANAMA	NIGER		
PORTUGAL	NIGERIA		
SAUDI_ARABIA	NORWAY		
SENEGAL	PANAMA		
SINGAPORE	PERU		
SOUTH_AFRICA	PORTUGAL		
SRI_LANKA	SAUDI_ARABIA		
ST.LUCIA	SENEGAL		
ST.VINCENT&GRENADINES	SINGAPORE		
SURINAME	SOUTH_AFRICA		
SWAZILAND	SPAIN		
SWITZERLAND	SRI_LANKA		
TANZANIA	ST.LUCIA		
TOGO	ST.VINCENT&GRENA		
UGANDA	DINES		
UK	SURINAME		
USA	SWAZILAND		
VENEZUELA	SWEDEN		
ZAMBIA	SWITZERLAND		

Appendix B. Convertibility

Convertible in 1954	Convertible in 1964	Convertible in 1975
CANADA	AUSTRIA	ARGENTINA
DOMINICAN REP.	BELGIUM	AUSTRALIA
EL_SALVADOR	CANADA	AUSTRIA
GUATEMALA	DOMINICAN REP.	BAHAMAS
HONDURAS	EL_SALVADOR	BAHRAIN
HONG_KONG	FRANCE	BELGIUM
MEXICO	GUATEMALA	BOLIVIA
PANAMA	HONDURAS	CANADA
USA	HONG_KONG	COSTA_RICA
	IRELAND	DENMARK
	ITALY	DOMINICA
	JAMAICA	DOMINICAN REP.
	JAPAN	ECUADOR
	KUWAIT	EL_SALVADOR
	MEXICO	FIJI
	NETHERLANDS	FRANCE
	PANAMA	GUATEMALA
	PERU	GUYANA
	SAUDI_ARABIA	HAITI
	SWEDEN	HONDURAS
	UK	HONG_KONG
	USA	IRELAND
	WEST_GERMANY	ITALY
		JAMAICA
		JAPAN
		KUWAIT
		MALAYSIA
		MEXICO
		NETHERLANDS
		NICARAGUA
		NORWAY
		OMAN
		PANAMA
		PERU
		QATAR
		SAUDI_ARABIA
		SINGAPORE
		SOUTH_AFRICA
		SURINAME
		SWEDEN
		UK
		UNITED_ARAB_EMIRATES
		USA
		WEST_GERMANY

Appendix C. IMF Members

IMF Members in 1954	IMF Members in 1964		IMF Members in 1975	
ARGENTINA	ARGENTINA	PORTUGAL	ARGENTINA	MALAYSIA
AUSTRALIA	AUSTRALIA	RWANDA	AUSTRALIA	MALI
AUSTRIA	AUSTRIA	SAUDI_ARABIA	AUSTRIA	MALTA
BELGIUM	BELGIUM	SENEGAL	BAHAMAS	MAURITANIA
BOLIVIA	BOLIVIA	SIERRA_LEONE	BAHRAIN	MAURITIUS
BRAZIL	BRAZIL	SOMALIA	BANGLADESH	MEXICO
CANADA	BURUNDI	SOUTH_AFRICA	BARBADOS	MOROCCO
CHILE	CAMEROON	SOUTH_KOREA	BELGIUM	NEPAL
CHINA	CANADA	SPAIN	BENIN	NETHERLANDS
COLOMBIA	CAR	SRI_LANKA	BOLIVIA	NEW_ZEALAND
COSTA_RICA	CHAD	SUDAN	BOTSWANA	NICARAGUA
CZECHOSLOVAKIA	CHILE	SWEDEN	BRAZIL	NIGER
DENMARK	CHINA	SYRIA	BURKINA_FASO	NIGERIA
DOMINICAN REP.	COLOMBIA	TANZANIA	BURUNDI	NORWAY
ECUADOR	CONGO	THAILAND	CAMEROON	OMAN
EGYPT	COSTA_RICA	TOGO	CANADA	PAKISTAN
EL_SALVADOR	CYPRUS	TRINIDAD&TOBA	CAR	PANAMA
ETHIOPIA	CZECHOSLOVAKIA	GO	CHAD	PARAGUAY
FINLAND	DENMARK	TUNISIA	CHILE	PERU
FRANCE	DOMINICAN REP.	TURKEY	CHINA	PHILIPPINES
GREECE	ECUADOR	UK	COLOMBIA	POLAND
GUATEMALA	EGYPT	URUGUAY	COMOROS	PORTUGAL
HAITI	EL_SALVADOR	USA	CONGO	PUERTO_RICO
HONDURAS	ETHIOPIA	VENEZUELA	COSTA_RICA	QATAR
HONG_KONG	FINLAND	WEST_GERMANY	CYPRUS	ROMANIA
ICELAND	FRANCE	YUGOSLAVIA	CZECHOSLOVAKIA	RWANDA
INDIA	GABON	ZAIRE	DENMARK	SAUDI_ARABIA
IRAN	GHANA		DOMINICA	IMF Members in
IRAQ	GREECE		DOMINICAN REP.	1975
ITALY	GUATEMALA		ECUADOR	SENEGAL
JAPAN	HAITI		EGYPT	SIERRA_LEONE
JORDAN	HONDURAS		EL_SALVADOR	SINGAPORE
LUXEMBOURG	HONG_KONG		ETHIOPIA	SOLOMON_IS
MEXICO	ICELAND		FIJI	SOMALIA
NETHERLANDS	INDIA		FINLAND	SOUTH_AFRICA
NEW_ZEALAND	IRAN		FRANCE	SOUTH_KOREA
NICARAGUA	IRAQ		GABON	SPAIN
NORWAY	IRELAND		GAMBIA	SRI_LANKA
PAKISTAN	ISRAEL		GHANA	SUDAN
PANAMA	ITALY		GREECE	SURINAME
PARAGUAY	IVORY_COAST		GUATEMALA	SWAZILAND
PERU	JAMAICA		GUINEA	SWEDEN
PHILIPPINES	JAPAN		GUYANA	SYRIA
POLAND	JORDAN		HAITI	TAIWAN
SOUTH_AFRICA	KUWAIT		HONDURAS	TANZANIA
SRI_LANKA	LAOS		IMF Members in 1975	THAILAND
SWEDEN	LIBERIA		HONG_KONG	TOGO
SYRIA	LUXEMBOURG		ICELAND	TONGA
THAILAND	MADAGASCAR		INDIA	TRINIDAD&TOB
TURKEY	MALAYSIA		INDONESIA	AGO
UK	MALI		IRAN	TUNISIA
URUGUAY	MAURITANIA		IRAQ	TURKEY
USA	MEXICO		IRELAND	UGANDA
VENEZUELA	MOROCCO		ISRAEL	UK
WEST_GERMANY	NEPAL		ITALY	UNITED_ARAB_
YUGOSLAVIA	NETHERLANDS		IVORY_COAST	EMIRATES
	NEW_ZEALAND		JAMAICA	URUGUAY
	NICARAGUA		JAPAN	USA
	NIGER		JORDAN	VENEZUELA
	NIGERIA		KENYA	WEST_GERMAN
	NORWAY		KUWAIT	Y
	PAKISTAN		LAOS	YEMEN
	PANAMA		LESOTHO	YUGOSLAVIA
	PARAGUAY		LIBERIA	ZAIRE
	PERU		LUXEMBOURG	ZAMBIA
	PHILIPPINES		MADAGASCAR	
	POLAND		MALAWI	

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