MONEY SUPPLY TRANSMISSION BETWEEN MAJOR TRADING PARTNER COUNTRIES IN A SIMPLE TEST OF MONETARY AUTONOMY

by

David Alan Stallings

Thesis submitted to the Faculty of the

Virginia Polytechnic Institute and State University

in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

in

Economics

APPROVED:

D. I. Meiselman, Chairman

B. A. Kemp

H. J. Cassidy

June, 1982

Falls Church, Virginia

TABLE OF CONTENTS

I. INTRODUCTION 1

II. RESULTS FROM THE LITERATURE 9

III. THE MODEL TO BE TESTED 17

IV. DATA AND METHOD 20

V. RESULTS 25

VI. CONCLUSIONS AND SUGGESTIONS FOR FURTHER STUDY 49

REFERENCES 52

VITA 55

I. INTRODUCTION

Most economists would agree that unanticipated changes in monetary policy have measurable and significant impacts upon output and employment in the short run, with resulting effects on the level of prices after a somewhat longer period. As has been pointed out on many occasions, control over monetary aggregates can have a productive as well as a destructive potential. Although commentary has been frequent and incisive on the importance of money to a capitalist economy, it is doubtful that it has been stated any better than by Milton Friedman, in saying monetary policy serves best in that it can:

1) Prevent money itself from being a major source of economic disturbance.

2) Provide a stable background for the economy.

3) Contribute to offsetting major disturbances in the economic system arising from other sources[1].

The ability of a central bank, or other similar body so designated, to effectively exercise its duties is seen generally as

---

[1]Milton Friedman, "The Role of Monetary Policy," American Economic Review 58 (March 1968): 12-13.

greatly contributory to the stability and efficiency of any economy[2]. Whether one views this function as one of a "fixed rule" or a countercyclical tool, the role of money is, now, not to be discounted in economic management.

However, since at least the time of David Hume, the recognition has been that a small country, its economy to a large degree dependent on trade with the rest of the world, cannot, for long periods of time, exercise complete control of its own monetary aggregates if its desires are strongly at variance with those of the world at large. This, of course, is the case when the ratio of the value of its currency is fixed and is anticipated to remain the same in the near term (so far as can be discounted). The following discussion[3] illustrates why this is so:

Let the "world" be taken as one large country L and one small

---

[2]ibid, p. 12: "Every other major contraction [other refers to other than the Great Depression but the context also is including the Great Depression] in this country has been either produced by monetary disorder or greatly exacerbated by monetary disorder."

[3]Based upon Richard E. Caves and Ronald W. Jones, World Trade and Payments: An Introduction (Boston: Little, Brown and Company, 1973), p. 325; Thomas M. Humphrey, "Adam Smith and the Monetary Approach to the Balance of Payments", Federal Reserve Bank of Richmond Economic Review 67 (November/December 1981): 3-6; and Harry G. Johnson, "The Monetary Approach to the Balance of Payments", in Further Essays in Monetary Economics (Cambridge: Harvard University Press, 1973), pp. 233-36.

country S. Assume a sharp increase in the rate of growth of the money supply in L, given a stable demand for money and initial full-employment equilibrium. As individuals attempt to dispose of excess money balances, demand for all goods and services, domestic and imported, will increase. The rise in total expenditure without a corresponding increase in total output leads ineluctibly to a higher level of general prices.

Exporters in S, which is also in full-employment equilibrium, may obtain increases in the prices of traded goods sold in L through the workings of the fixed exchange rate, or may simply see a greater number of orders placed for their goods. As more goods from S are sold in L, general prices in S will also be bid higher. The shortage of goods relative to currency causes an excess demand for money, and consumption in S falls for all goods, domestic and imported, as individuals try to maintain individual currency balances.

As expected, the combination of circumstances above leads to an international account surplus with an excess supply of foreign exchange as the hard evidence. Such monies may not, however, be spent domestically (unless at a premium)[4]; exporters will receive a temporary "windfall" as they convert the low-valued L currency to

---

[4]This is implicitly assumed in the section "The model to be tested".

higher-valued S currency at the fixed rate.

The government of country S may instruct its monetary authorities to "sterilize" the inflow by reducing the domestic money supply in exactly the same amount as the balance-of-payments surplus. This will not, however, solve the external disequilibrium; the surplus will remain. At some point, domestic currency must be sold to allow the balance-of-payments equilibrium to be consistent with the fixed rate (not, of course, considering the easier alternative of allowing S currency to appreciate). However, after all domestic adjustments to the money injection in L, real production and purchases of goods and services will return to their previous equilibrium, but at higher nominal prices[5].

Purchases from S will continue, and the higher prices for S exports will cause a shift in resource allocation from nontraded to traded goods. Doing so implies a slower rate of growth of real income in the continuous case:

If the quantity equation, in growth terms, is given by

$$g_P + g_Y = g_M + g_V$$

where:

---

[5]Michael R. Darby, Macroeconomics (New York: McGraw-Hill Book Company, 1976), pp. 153-168; Caves and Jones, pp. 326-27.

g_P = continuous rate of growth of world prices

g_Y = continuous rate of growth of real income

g_M = continuous rate of growth of money

g_V = continuous rate of growth of velocity.

It is clear, given the law of one price and the assumed short-run stability of the velocity of money ($g_V = 0$), that any increase in the rate of price increase in the world at large, passed untouched through the fixed rate of exchange to a small country, must result in a decline in the rate of growth of real income unless the money supply growth rate is increased. This is clearly noted by William Day (1979), in stating "The conclusions [are that] . . . the supply of money should be allowed to adjust to the demand for money through the nonsterilization of the monetary impact of international reserve changes. . . ."[6]

But why, then, would governments allow themselves to be partially controlled by "policies - deliberate or accidental - of other monetary authorities"[7]? Although not stated explicitly, the

---

[6]William H. L. Day, "Domestic Credit and Money Ceilings Under Alternative Exchange Rate Regimes", International Monetary Fund Staff Papers 26 (September, 1979): 503.

[7]Friedman, p. 13.

answer may be given by Arthur Laffer[8] when he notes that disturbances in the domestic economy caused by some indescretion in local monetary arrangements may be less painful or costly to offset through the workings of a fixed exchange rate[9]. Governmental "mistakes" that result in inflationary or deflationary pressures are transmitted to the international economy[10]. In fact, when one-time money stock errors are made, they may be less embarrassing by being made less obvious than the very public and fanfare-laden atmosphere of currency devaluation[11].

---

[8]Arthur B. Laffer, "Two Arguments for Fixed Rates", in The Economics of Common Currencies, eds. Harry G. Johnson and Alexander K. Swoboda (London: George Allen & Unwin Ltd., 1973), pp. 28-31.

[9]Leslie Lipshitz, in "Exchange Rate Policies for Developing Countries: Some Simple Arguments for Intervention", International Monetary Fund Staff Papers 25 (December 1978): 650-75, argues strongly against this view. A more simple, and appealing, yet no less elegant approach is taken by Milton Friedman, in "The Case for Flexible Exchange Rates", in Readings in International Economics, eds. Richard E. Caves and Harry G. Johnson (Homewood, Illinois: Richard D. Irwin, 1968), pp. 413-37, stating that exchange rates are more flexible than prices, therefore easier to adjust.

[10]Discussed at length in Robert Mundell, International Economics (New York: Macmillan Publishing Co., 1968), pp. 114-121, 157-159, 160-162; and Caves and Jones, pp. 324-25, 329-33. For an empirical study of the lags involved, see Mohsin S. Khan and Malcolm Knight, "Stabilization Programs in Developing Countries: A Formal Framework," International Monetary Fund Staff Papers 28 (March 1981): 1-53. See pp. 27-31 for the effects of a monetary shock and pp. 33-38 for the result of a drop in domestic credit.

[11]Thomas Willett, Floating Exchange Rates and International Monetary Reform (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1977), p. 13.

On the more optimistic side, however, it may simply be that a very small country with a timid government may choose to accept the relative stability of a large partner country. Most of the S and L countries represented herein fall into the category of a small developing economy that is "dependent", in a trade sense, on a large developed (assume also relatively stable) economy. In examining monetary dependence, it may therefore be noted that such may be passive, meaning the central authorities make no attempts to sterilize inflows or outflows of foreign currencies (that is, maintain surpluses or deficits in the balance-of-payments accounts) but will allow the domestic money supply to adjust.

On the other hand, the tendency for central bankers in such an environment to attempt to exercise their autonomy in the small country can be noted. Because errors are, in a sense, self-correcting, if the local currency may be bought or sold in international markets (that is, sellers or buyers may be found), <u>any</u> monetary policy may be followed. Adjustments through the balance-of-payments via the fixed exchange rate mean equilibrium will eventually be restored in the international accounts and the domestic money market. (This does assume that errors are not always in the same direction, to a degree that would inhibit the buying and selling of foreign exchange or put undue pressure on the

international value of the currency.)

The question, or more precisely, one question that may be readily resolved herein is "What countries allow (passively, perhaps), domestic monetary policy to be determined from outside by that of their major trading partner?" Gottfried Haberler noted this phenomenon for the U.S. and its partners in stating ". . . it can be shown that quite a few countries that pegged their currencies to the dollar and therefore had to share in the U.S. inflation did so voluntarily or even happily and would have gotten into trouble if the United States had had less inflation than it actually had."[12]

---

[12]"Inflation as a Worldwide Phenomenon - An Overview", in The Phenomenon of Worldwide Inflation, eds. David I. Meiselman and Arthur B. Laffer (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1975), p. 16.

II. RESULTS FROM THE LITERATURE

Some definitions are in order before proceeding further. Generally, the money stock, in total, is considered as the sum of domestic credit (C), under the control of the monetary authorities, and international reserves (R), which are not:

$$M = C + R.$$

For our purposes, then, the money stock is domestic credit plus domestic currency (or bank deposits) created from the sale of foreign assets (at par) to the central bank. The studies cited here all make this assumption as to the composition of the money stock.

In an examination of the effects of money supply growth in the United States on that of Canada, Girton and Roper (1977) use an ingenious model that applies to both the fixed and floating rate period for the Canadian dollar[13]. The growth of the international reserve portion of M, in the fixed rate period[14], is estimated as:

$$g_R = -.96\, g_C + 1.74\, g_{USM1} + 2.54\, g_{YC} - 2.51\, g_{YUS}$$

---

[13]The Canadian dollar was freely floating from 1952-62 and after June, 1970.

[14]The left-hand variable also included the rate of appreciation of the Canadian dollar for the floating rate period, of course equal to zero for the fixed rate period.

where:

g_R = continuous rate of growth of international reserves in Canada.
g_C = continuous rate of growth of domestic credit in Canada.
g_{USM1} = continuous rate of growth in M1 in the United States.
g_{YC} = continuous rate of growth of income in Canada.
g_{YUS} = continuous rate of growth of income in the United States.

All coefficients were significant at the 1% level, with no problems of first-order autocorrelation (the Durbin-Watson statistic is 2.11, with 23 observations and 16 degrees of freedom). A constant term was also included, but proved insignificant (-0.03, with a standard error of 1.38).

First, and most important for the purposes of this study, there is a direct and positive relationship between U.S. money and that portion of the Canadian money supply consisting of Canadian dollars "created against the purchase of foreign assets"[15], and therefore available for use by the banking system in Canada. Second, the coefficient of -.96 on the growth of domestic credit states, as is no surprise, that one dollar of reserves, as defined above, is exchangeable for one dollar of domestic credit. Third, the virtually identical value attained for the two coefficients of the income

---

[15]Lance Girton and Don Roper, "A Monetary Model of Exchange Market Pressure Applied to the Postwar Canadian Experience,", American Economic Review 67 (September 1977): 538.

growth rates indicates that if the two economies grow at about the same rate, there will be no net income effect on the growth of reserves. The growth of "international reserves", as defined here, then would depend on either the growth of money external to the economy or the exchange of a domestic asset for a foreign one. Girton and Roper also note that if C and R were combined on the left-hand side (i.e. the growth rates were exchanged for the growth rate of the total of C and R), the coefficients on the right-hand side would be unaffected.

Mike Farrell (1980) extended Girton and Roper's model to the case of the U.S. and Mexico. The results proved strikingly similar, with the income coefficients, again, very close and opposite in sign. The same tradeoff as noted in Canada was observed between domestic credit and reserves, and the relationship between money growth in the U.S. and in Mexico was strongly positive. Connolly and Taylor (1976) provide tacit support for the findings of both the Girton and Roper and Farrell studies in stating, for developing countries in general, that they find a simultaneous loss of domestic credit when the balance of payments deficit decreases (reserves increase).

In a somewhat different vein, Mario Blejer (1977) examined the short-run responses to external price changes and domestic monetary equilibrium in Mexico. First, he found a strong relationship between

external inflation (in this case, again, represented by the United States) and domestic prices. Second, he found that local monetary disequilibrium was eliminated, as expected, through the balance of payments. This would tend to add some force to the arguments for the law of one price and the accomodation necessary in the international accounts (reducing excess foreign assets when in deficit, for example) to restore internal and external equilibrium.

Farrell (1980) in comparing the approaches of Blejer with respect to that of Girton and Roper, found the results of the latter far more powerful, noting "Mexico's policymakers can be advised to keep an eye on the course of the U.S. money supply rather than U.S. prices when attempting to assess the impact of their own money supply on the balance-of-payments."[16]

Richard Selden (1981), in a study examining the intracountry relationship between monetary growth and inflation in fourteen developed countries, also tested (as an aside) the transmission between money growth in the United States and price changes in those same fourteen countries. Although the period covered, 1958-77, was not one entirely devoted to the fixed rate period under the

---

[16]Mike Farrell, "International Impact of U.S. Money Supply: The Case of Mexico," American Economic Review 70 (June 1980): 442.

Bretton-Woods agreement, a significant relationship was found in eight of the fourteen cases. Although far from a positive affirmation of the theory placed forward here, the fact that twenty-five of the thirty years covered the fixed exchange rate period should be grounds for further examination. Selden also tentatively argues for these results as providing some support for the mechanism of adjustment presented in the introduction, above.

The key element in what is known as the monetary approach lies in the "willingness" of the central bank to buy and sell foreign assets to return the balance of payments to equilibrium, maintaining the fixed rate of exchange. The late 1960's and early 1970's witnessed a large, apparently "autonomous" increase in total international reserves. According to David Meiselman (1975) primary responsibility was laid to the creation of the International Monetary Fund and its ability to add "directly to the world's supply of international reserves and to the world's monetary base". In addition, he also notes there was a perceived willingness on the part of the IMF to "bail out deficit countries."[17] These, combined

---

[17]"Worldwide Inflation, A Monetarist View", in The Phenomenon of Worldwide Inflation, eds. David I. Meiselman and Arthur B. Laffer (Washington. D.C.: American Enterprise Institute for Public Policy Research, 1975), pp. 72-73.

with the desire to hold fewer dollars[18] (as the major source of international reserves) worldwide resulted in a general decline in the demand for reserves.

According to the monetary approach, as fewer reserves, that is, stocks of foreign assets (currency, in the simplest case) are demanded, the excess must make its way into domestic money markets. The most visible result would be inflation on a global scale and increased external disequilibrium measured as changes in the level of international reserves. Strongly confirming this position are studies by H. Robert Heller (1976), Mohsin Khan (1979), and a follow-up study by Heller (1981).

In his first study, Heller found a one-year lag between changes in international reserves and corresponding changes in money from 1951-74, considered for the world as a whole. The relationship proved strongly positive, as expected. He also tested the relationship of prices to changes in reserves, with a similar outcome after a five-year lag. The subsequent 1981 study extended the results further into the 1970's (and further into the floating

---

[18]H. Robert Heller, "International Reserves and Worldwide Inflation", International Monetary Fund Staff Papers 23 (March 1976): 65-71.

rate period), where the results were more strongly supportive.

Mohsin Khan (1979) used the Granger-Sims test of causality in examining the same relationship for three groupings: the World, the developed world, and the developing world. His results also support those of Heller: A strong one-way relationship exists from reserves to prices, and not the reverse, for the World and the developed world. However, for the developing world, the result is described as "contemporaneous". This should not be surprising; for developing countries as a whole, reserve stocks may be (1) wildly erratic, (2) transformations into local currency may be virtually instantaneous, (3) as noted by Meiselman, the presence of international lending agencies may encourage the use of reserves for other than the stabilization of the balance of payments, and/or (4) at any one point in time, the ability to maintain a cushion of reserves against loss is far less than in the developed world.

The most directly relevant test to the question of monetary autonomy was that of Dwight and Kusinitz (1977) in examining the experience of six developed countries from 1962-71. The results indicated that for the three countries operating under fixed exchange rates with no controls on the international movement of capital (West Germany, the Netherlands, and Switzerland), domestic monetary policies were deemed ineffective. In Belgium, however, the

maintenance of a "dual" floating foreign exchange value for the franc (there was an official fixed value; the floating franc was denoted as the "financial" Belgian franc) was enough to allow it almost complete monetary autonomy.

In sum, it has been argued (by many) that domestic monetary shocks cause changes in the domestic rate of growth of real income and nominal prices, that external price increases will cause a small country under a fixed exchange rate to experience a balance of payments surplus; i.e. an increase in international reserves. Worldwide, increases in reserves lead to increases in money. What remains is now to examine country-to-country cases, where changes in the money stock of a large country L are postulated as strongly affecting the money supply in a small country S, through the implied medium of balance of payments adjustment.

III. THE MODEL TO BE TESTED

The following, drawn heavily from Swoboda (1973) formed the basis for the test performed:

Let the total money supply equal the sum of the money supplies of the country in question (S) and the major trading partner country (L):

$$M_T = M_S + M_L$$

where:

M = Money defined as M1 in all cases.

The quantity theory equations are given by:

$$P_L Y_L = M_L V_L$$

$$P_S Y_S = M_S V_S$$

where:

P = nominal prices

Y = real income

V = velocity of money

The exchange rate between the two countries' currencies is constant, so the ratio of the price levels is also constant:

$$P_L / P_S = C.$$

Then:

$$P_S = \frac{M_S V_S}{Y_S}$$

$$P_L = \frac{M_L V_L}{Y_L}$$

$$C = \frac{M_L V_L Y_S}{M_S V_S Y_L}$$

Expressed as logarithms:

$$\ln C = \ln(M_L) + \ln(V_L) + \ln(Y_S) - \ln(M_S) - \ln(V_S) - \ln(Y_L)$$

Then, as percentage rates of change:

$$0 = d\ln(M_L) + d\ln(V_L) + d\ln(Y_S) - d\ln(M_S) - d\ln(V_S) - d\ln(Y_L)$$

If velocities are constant[19], the equation reduces to:

$$d\ln(M_S) = d\ln(M_L) + [d\ln(Y_S) - d\ln(Y_L)].$$

If the real rates of growth in the two economies are similar, then the determining factor in short-run changes in money supply growth may be partially the result of a corresponding change in the monetary aggregate of the large trading partner country. Simply stated, a change in the rate of change in the money supply of country L leads to the same percentage change in S.

The ramifications are clear: In order for the relationship

$$d\ln(M_S) = f[d\ln(M_L)]$$

---

[19]Also assumed by Heller (1976), p. 64.

to hold, (1) the demands for money in the two countries, generally considered a function of real income and the cost of holding domestic money, and as implied in the equations above, must be reasonably constant, (2) there must be a strong correlation between money supply changes in L and nominal income in S, and (3) short-run changes in velocity are minimal. Violation of any of these conditions will most likely lead to the lack of a significant one-way relationship being found, or, possibly a perverse result.

IV. DATA AND METHOD

First, in order to determine major trading partners, the most consistent source of total trade statistics was sought. For the years covered, the best seemed to be the Direction of Trade Annuals published by the International Monetary Fund. A sample of years was chosen for both the country S and its partner L during the fixed exchange period (all data is published in current dollars).

In choosing L for each partner country S, the case for each of the country pairs subsumed herein was generally clear: One and only one L country, from visual inspection, dominated the trade of each S. There was only a single exception, that of the S country Malaysia, with L partners Japan and the United States.

Once the major trading partner was established, as well as its percentage of the total trade of S, the next step was to determine the potential effect of L on the gross national or gross domestic product (GNP or GDP) of S. This second criterion for inclusion was the relative dependence of the economy of S on trade with L. An arbitrary limit was set herein with the exports of S to L comprising at least five percent of the smaller country's GNP or GDP. The implicit assumption is that the larger the share of S's income that

is determined by trade with L, the greater the likelihood of a significant relationship being found between the money supply growth rates of the two countries for two reasons: First, the ratio of traded to nontraded goods (as a proportion of GNP) would mean the "speed of adjustment"[20] should be greater. Second, and related to the first, the ability to "sterilize" any inflows would be diminished. The first five relevant tables in the results section are arranged in decreasing order of the importance of partner trade with country S. All GNP or GDP data was obtained from International Financial Statistics of the International Monetary Fund, and converted to dollars.

The fixed exchange rate period between each S and its partner was determined in a two-step process. First, the dollar exchange value of each currency was obtained from the International Financial Statistics, line rf. Then, the ratio of the two values was taken. Where this ratio remained constant, the two units of currency were fixed in value relative to each other. The time periods reflected in the tables in the results section indicate those "fixed" exchange

---

[20]Alexander K. Swoboda, "Monetary Policy under Fixed Exchange Rates: Effectiveness, the Speed of Adjustment, and Proper Use," Economica 40 (May 1973): 148-49.

rate dates, between which the official ratio of currency values remained inviolable.

Money supply data was also obtained from the International Financial Statistics, and was defined as M1, seasonally unadjusted (line 34), for all countries. For most, quarterly values were available back to 1957, where relevant.

From the discussion below, it seems likely that a lagged relationship should form the basis for an appropriate model measuring the relationship between the money supplies of partner country L and country S. It would also be most reasonable to assume that any effect on S would occur at least after, and possibly at the same time, as the short-run changes in L associated with changes in the rate of growth of the money supply in L.

The most comprehensive set of evidence as to the short-run effects, and the time delay involved, relates changes in money supply growth to changes in nominal income and prices in the post-World War II United States. The first "induced" effect would be that noted by Sims (1972) from changes in the rate of growth of money to changes in nominal income, being strongest at a lag of some three to four quarters. The second is that of a change in the rate of growth in prices, placed at around twenty-three months after a

change in the rate of growth of money by Weintraub, Lord, and Mintz (1976)[21].

Therefore, in the case of those countries S whose dominant trading partner is the United States, major effects would take at least eight quarters to be fully realized in that partner L, with an additional period of adjustment probable in the home country S. The time period of the lags should then account for (1) changes in the volume of contracts as a result of nominal income changes, then (2) altered demand for the products of country S as a result of any "temporary" price differential. Because many of the series had sufficient observations to support long degrees of lags, the total effect was arbitrarily measured with the limit set at fourteen quarters. Variations in import timing, payment schedules, recognition, etc., make a priori judgements on the most likely-to-be significant past quarters difficult; none was attempted. The long-term effect would be measured by the sum of the lagged coefficients; a positive value would indicate support for the postulated relationship.

Observations for inclusion in the regression model were then computed in the following manner: All money supply data was

---

[21]U.S. Congress, House, Subcommittee on Domestic Monetary Policy of the Committee on Banking, Currency, and Housing, The Impact of the Federal Reserve System's Monetary Policies on the Nation's Economy, Committee Print (Washington, D.C.: Government Printing Office, 1976), pp. 8-12.

converted to its natural logarithm and first-differenced. Then, the current first-differenced value for S was regressed on the current and fourteen past values for L. Estimations were then made for the thirty-six country pairs in which L's dollar value of trade with S exceeded five percent of S's GNP.

In addition, no ex post attempt was made to respecify each model to include only those lags seen to be significant on the first "pass". As noted by Maddala (1977) "when we . . . let the data decide which model is reasonable, it is not clear what probabilities to attach to the confidence interval statements and tests made on the model finally arrived at."[22]

Because of potential difficulties caused by deviations in the real rates of growth between the two economies in each model, a simple computation was used in noting any such differences. Again, with all data from the International Financial Statistics, the two end GDP observations for each country (where available) were divided by the corresponding values for the consumer price index. The resultant figures were then converted to logs, the differences taken, and the answer divided by the intervening number of years to determine the growth rate.

---

[22]G. S. Maddala, Econometrics (New York: McGraw-Hill Book Company, 1977), p. 127.

V. RESULTS

Using the F-statistic significance as the test for the entire equation, 24 of the 36 cases showed a statistically identifiable relationship. Before examining the happy twenty-four, attention will focus on those twelve instances showing no relationship.

First, of the twelve country pairs in which money supply changes appear unrelated, seven were estimated with less than ten degrees of freedom remaining. Some inference may be drawn that the monetary authorities in these S's may have attempted to exercise their autonomy, resulting in continual balance-of-payments problems and leading to revaluation after a relatively short period. Only three: Malaysia-U.S., Gabon-France, and Togo-France, had more than twenty degrees of freedom. The first key to understanding the reason behind the lack of a relationship between these three country pairs would be to examine the relative rates of growth in the two countries involved.

The set of tables on the following two pages summarizes the regression results (Table 1) and differences in the real rates of growth (Table 2) in the two economies, covering only those country pairs showing no relationship between money supply growth rates.

Table 1. Summary of Regression Results for Those Trading Partners with no Relationship Between Money Supply Growth Rates

Country/ Partner	Periods Covered	R-Squared Corrected	F-statistic	Degrees of Freedom	Percent of GNP Accounted for by trade with Partner Country
Gabon France	1962-1 1980-1	.019	1.08	(15,45)	18.6
Surinam U.S.	1972-1 1980-4	-.45	.59	(15,5)	18.4
Trinidad & Tobago U.S.	1957-1 1966-4	-.73	.33	(15,9)	16.6
Libya Germany	1961-2 1969-3	-.95	.42	(15,3)	14.5
Ecuador U.S.	1971-1 1980-4	.376	1.96	(15,9)	10.4
Mauritania France	1962-3 1973-4	.0327	1.0676	(15,15)	7.7
Malaysia U.S.	1957-1 1970-4	.1379	1.43	(15,25)	7.2
Sri Lanka United Kingdom	1957-1 1966-4	-.474	.485	(15,9)	7.2
Togo France	1962-3 1979-4	.0074	1.0267	(15,39)	6.6
Morocco France	1960-1 1969-2	.329	1.719	(15,7)	6.6
Nigeria United Kingdom	1959-3 1967-3	.6768	3.3728	(15,2)	5.6
Denmark United Kingdom	1957-1 1967-3	.2758	1.6856	(15,12)	5.5

Table 2. Comparison of Growth Rates of Real GNP and GDP for Small Country S and Trading Partner L Showing No Relation Between Money Supply Growth Rates

Country	Partner	Years	Country Real GNP or GDP Growth Rate	Partner Real GNP or GDP Growth Rate	Absolute Difference
Gabon	France	1962 1979	8.6433	4.6667	3.9766
Suriname	U.S.	1972 1979	4.5537	2.2723	2.2813
Trinidad & Tobago	U.S.	1957 1966	6.1998	4.3136	1.8862
Libya	Germany	1964 1969	17.594	4.6189	12.975
Ecuador	U.S.	1971 1980	9.4031	1.998	7.4051
Mauri-tania	France	1962 1973	2.9272	5.6313	2.7041
Malaysia	U.S.	1957 1970	6.2349	3.7196	2.5153
Sri Lanka	United Kingdom	1957 1966	3.5245	3.3608	.16375
Togo	France	1963 1979	5.6579	4.545	1.1129
Morocco	France	1959 1967	5.1381	5.7683	.63024
Nigeria	United Kingdom	1959 1967	2.1355	3.4166	1.2811
Denmark	United Kingdom	1957 1967	5.2054	3.3018	1.9039

As noted previously, a "large" difference in the real rates of growth of GNP between the two countries could be one important reason in noting the lack of correspondence in the rates of growth in the money supplies of L and S. The table above seems to give general support to that observation.

The story is quite clear for the extreme cases. For example, the Libya - Germany real growth differential of some 13%, even over the period of six years, would indicate that monetary authorities in Libya would almost certainly be induced to autonomously alter their monetary aggregates, regardless of external influence. In only two of the twelve NS cases was the differential less than 1%, and in both of these, Morocco-France and Sri Lanka-Great Britain, the degrees of freedom are 7 and 9, respectively. For two of the three country pairs with an insignificant money supply transmission regression and a large number of observations, the verdict is also clear: In the Malaysia-United States pair, the growth differential is a relatively large 2.5% (25 d.o.f.); the Gabon-France differential is close to 4% (45 d.o.f); but the Togo - France difference is only 1.1% (39 d.o.f.). What else can the income figures tell us?

The following table summarizes variability in the real rate

of growth of GDP in each of the NS countries. A simple time trend was fitted to the logs of real GDP in each country, with variance defined as the sum of squared residuals from the fitted line. Because the "slope" of the regression is the continuously compounded growth rate, deviations from the line represent growth greater or less than the "trend". The ratio of the two is then tested using the one-tailed F test (noting that in computing the ratio of the "variances", the division by the number of observations less one cancels out; the ratio of the two sums of squares remains the same because the number of observations is the same in each country-partner pair).

The Togo-France mystery then has a satisfactory solution in terms of the assumptions made in the model. Not only is the variability of the rate of growth of real income in Togo much higher than in France, but the ratio of the variances is also the third highest in that entire table. The same may be said of the Morocco-France and Sri Lanka-Great Britain cases; the variation in the rate of growth of income is significantly greater for the two S countries.

Second, as pointed out on page 7, if buyers and sellers for a currency can always be found, then <u>any</u> monetary policy may be

Table 3. Examination of the "Variances" of the Rate of Growth of Real GDP for those Country Pairs Exhibiting No Relationship Between Money Supply Growth Rates

Country	Partner	Years	Country GDP Growth Rate Variance	Partner GDP Growth Rate Variance	Ratio of Variances
Gabon	France	1962 1979	1.14344	.01629	70.29*
Suriname	U.S.	1972 1979	.01903	.00453	4.2**
Trinidad & Tobago	U.S.	1957 1966	.00392	.00457	.858***
Libya	Germany	1964 1969	.01865	.00334	5.584**
Ecuador	U.S.	1971 1980	.021	.00811	2.59***
Malaysia	U.S.	1957 1970	.0387	.00767	5.05*
Sri Lanka	United Kingdom	1957 1966	.00366	.00103	3.55**
Togo	France	1963 1979	.2692	.0133	20.24*
Morocco	France	1959 1967	.00839	.000684	12.27*
Nigeria	United Kingdom	1959 1967	.0659	.000822	80.17*
Denmark	United Kingdom	1957 1967	.00544	.00113	4.81**

* Significantly different at the 1% level.
** Significantly different at the 5% level.
*** No significant differences in the variances.

followed. Both Togo and Gabon[23] are members of the "Operations Account countries" arrangement between France and fourteen African countries. The local currency for each of these countries is the CFA franc, fixed in value and equalling one-fiftieth of a French franc. Since CFA francs could be created/destroyed freely in all of these countries, then converted with no cost and no restriction into French francs, it seems plausible to postulate that Togo and Gabon could act unconstrained, for a long period of time, by balance of payments problems induced by domestic monetary disequilibrium.

In sum, for those countries in which no significant "transmission" of money was found, there were three basic reasons for such a result: (1) The lack of a long period of fixed exchange association implies underlying problems in the balance-of-payments of S that required revaluation of its currency, (2) large differences in the real income growth rates of the two economies, violating the functional assumption, or (3) the great variability in real growth from year-to-year. This latter circumstance almost certainly indicates some instability in the demand for money, especially given the undeveloped financial markets in many of the S countries. It could also, if not affecting the demand for money, provide impetus for short-term fluctuations in the velocity of

---

[23]International Monetary Fund, 21st Report on Exchange Restrictions (Washington, D.C.: International Monetary Fund, 1970), pp. 168-69, 181-85, 478-83.

circulation[24], which may reinforce the effects of the divergence of income growth rates on the change in the money supply. A fourth, but for the moment more speculative hypothesis, is the apparently almost costless convertibility of the CFA franc between France and its "Operations Account countries".

The discussion below and accompanying four pages of tables summarize the expected results for those country pairs for which a significant value of F was obtained, indicating an association exists between past changes in the rate of growth of the money supply in L and its current rate of growth in S. The exposition also sets forth conditions to be observed if the relationship is indeed the one postulated.

The first five columns of Table 5, for each country pair, list those "standard" statistics used in evaluating the performance of the equation as a whole. The remainder are, however, far more important in the analysis of the magnitude and sign of the monetary transmission between L and S.

First, in order to show an overall long-run positive association between money in L and money in S, the sum of the coefficients of the lagged rates of change is listed. As implied in

---

[24]See Meiselman, pp. 90-91, for examples of long-term secular changes for the world and for the U.S. Annual rates of change seem to be fairly small, but could, of course, be much larger for developing countries.

the section titled "The Model Tested", a strictly linear relationship would result in the total being very close to one. Deviations from unity would seem to indicate a more complex lag structure, of, perhaps a large polynomial degree. The fact that a sum proves positive should, however, give clear acknowledgement that the theorized relationship is a valid one.

Second, the number of overall positive coefficients should tell whether the group of country pairs, as a whole, exhibit the expected corresponding relationship. If each pair may be taken as a binomial test of fourteen independent events, then the test of the group mean number of positive coefficients can be performed using a standard t; repeated and large numbers of trials for the same number of events produces a normal distribution of "successes".

If one looks at each individual regression separately, however, the number of positive signs of the lagged coefficients may also be analyzed using the binomial distribution if independence between the lags is assumed. Each positive sign could be termed a "success", with a 50% chance assigned to each such occurrence if no relationship existed. In this case the probability function, with fourteen observations

per trial, appears as:

$$\frac{14!}{x!(14-x)!}(p)^x(1-p)^{14-x}$$

where x is the number of positive coefficients and p is the expected success rate. The test would, then, be one measuring whether the parameter p, for a given equation, is or is not greater than 0.5.

In order to do so, a one-tailed test should be performed to examine whether, say, eight, nine, or ten positive coefficients are adequate to state that the parameter p is significantly different than 0.5. Table 4, below, after computing the confidence interval as suggested by Hogg and Craig[25], shows that such a firm statement may be infrequent; at least ten positive coefficients are required to demonstrate an individual result that there were more than could be expected statistically if we assume no relationship. If the implied coefficient less the computed confidence interval is less than 0.5, the null hypothesis that p = .5 cannot be rejected. Only when x = 10 (p = .714) or more can the alternative be accepted.

Table 5 summarizes the regression results for those country pairs that demonstrated a significant relationship between money supply growth in L and that of S.

---

[25]Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics, Third edition (New York: Macmillan Publishing Co., Inc., 1970), p. 197-198.

Table 4. Confidence Interval and probability that a given p is significantly different than 0.5 for the binomial distribution at the 10% level, over fourteen trials

Successes	Implied p	10% confidence interval value	Critical Lower Limit	Is implied p significantly greater than 0.5 ?
8	.571	.1696	.4104	no
9	.643	.1642	.4788	no
10	.714	.1548	.5592	yes

Table 5. Summary of Regression Results for those Trading Partners with a Significant Relationship between Money Supply Growth Rates.

Country/ Partner	Periods Covered	R-Squared Corrected	F-statistic	Significance (d.o.f.)	Durbin-Watson	Number of Positive Lagged Coefficients	Sum of Lagged Coefficients	Percent of GNP Subsumed in Trade with Partner
Mauritius United Kingdom	1960-1 1973-4	.4422	3.1138	1% (15,25)	2.0587	10 of 14	5.12	27.7
Ireland United Kingdom	1957-1 1978-4	.4734	5.3146	1% (15,57)	2.4913	9 of 14	.646	18.8
Sierra Leone United Kingdom	1961-4 1978-3	.3345	2.743	1% (15,37)	2.244	9 of 14	2.11	16.5
Honduras U.S.	1962-1 1980-1	.567	5.98	1% (15,42)	2.01	8 of 14	2.65	13.6
Senegal France	1962-3 1979-4	.262	2.28	5% (15,39)	1.936	8 of 14	2.244	13.25
Dominican Republic U.S.	1957-1 1979-4	.574	7.82	1% (15,61)	2.427	9 of 14	1.954	13.0

Table 5. Summary of Regression Results for those Trading Partners with a Significant Relationship between Money Supply Growth Rates - Continued

Country/ Partner	Periods Covered	R-Squared Corrected	F-statistic	Significance (d.o.f.)	Durbin-Watson	Number of Positive Lagged Coefficients	Sum of Lagged Coefficients	Percent of GNP Subsumed in Trade with Partner
Ivory Coast France	1962-3 1980-3	.374	3.271	1% (15,42)	1.868	8 of 14	1.41	10.3
Costa Rica U.S.	1962-1 1970-4	.815	6.87	1% (15,5)	.740	5 of 14	-4.41	10.2
Netherlands Germany	1957-1 1969-3	.7647	8.5843	1% (15,20)	2.5274	6 of 14	-.258	10.0
Guyana U.S.	1957-1 1966-4	.5469	2.9315	10% (15,9)	3.2227	7 of 14	-3.67	9.5
Jamaica United Kingdom	1961-2 1971-4	.6763	4.7612	1% (15,12)	2.397	6 of 14	-2.04	9.1
Haiti U.S.	1957-1 1979-1	.638	9.5757	1% (15,58)	1.6447	9 of 14	2.83	9.0

Table 5. Summary of Regression Results for those Trading Partners with a Significant Relationship between Money Supply Growth Rates - Continued

Country/ Partner	Periods Covered	R-Squared Corrected	F-statistic	Significance (d.o.f.)	Durbin-Watson	Number of Positive Lagged Coefficients	Sum of Lagged Coefficients	Percent of GNP Subsumed in Trade with Partner
Malaysia Japan	1957-1 1970-4	.3176	2.2409	5% (15,25)	2.2559	6 of 14	-1.45	9.0
El Salvador U.S.	1957-1 1980-4	.7091	14.003	1% (15,65)	2.0397	6 of 14	2.66	8.7
Belgium Netherlands	1961-2 1971-1	.7524	5.8613	1% (15,12)	2.2471	10 of 14	5.2	8.4
Bolivia U.S.	1959-1 1971-4	.6874	6.2787	1% (15,21)	2.4712	5 of 14	-2.95	7.3
Cameroon France	1962-1 1980-4	.4804	4.698	1% (15,45)	1.962	8 of 14	1.85	7.0
Nicaragua U.S.	1957-1 1970-4	.8909	22.774	1% (15,25)	2.3415	6 of 14	-1.13	7.0

Table 5. Summary of Regression Results for those Trading Partners with a Significant Relationship between Money Supply Growth Rates - Continued

Country/ Partner	Periods Covered	R-Squared Corrected	F-statistic	Significance (d.o.f.)	Durbin-Watson	Number of Positive Lagged Coefficients	Sum of Lagged Coefficients	Percent of GNP Subsumed in Trade with Partner
Panama	1957-1 1980-4	.3499	3.871	1% (15,65)	2.3699	7 of 14	1.55	6.8
Iraq Italy	1960-2 1971-2	.3945	2.2596	10% (15,14)	1.4372	6 of 14	-1.05	6.4
Madagascar France	1963-1 1979-4	.5054	4.5419	1% (15,37)	1.8894	10 of 14	.792	5.7
Malta United Kingdom	1957-1 1970-4	.2924	2.102	5% (15,25)	1.9644	10 of 14	1.05	5.5
Iran Japan	1957-4 1972-4	.3521	2.4128	5% (15,26)	2.619	8 of 14	.922	5.4
Guatemala U.S.	1957-1 1980-3	.6861	12.514	1% (15,64)	1.904	8 of 14	2.07	5.4

In general, it may be noted that the strongest results, of those pairs showing a positive relationship, are those with the greatest number of observations, i.e. the longest periods in which S is "willing" to accept policy rules executed in L. Of the six "pairs" of countries with 50 or more degrees of freedom (50 quarters plus 14 lags plus 15 coefficients plus one degree of differencing means a time period of some twenty years of a fixed exchange rate period), all of the regressions were significant at the 1% level. The tendency would be to gather that the host country S, after so long a period, is content to benignly accept the monetary policy of its larger "protector", either the relative stability of the United States, or, in the case of Ireland, that of the United Kingdom. In addition, all had coefficients on the lagged values of the rate of growth of money in L that summed to a positive value.

A somewhat more formal approach can be had by noting the number of positive lagged coefficients. For the 24 significant regressions, the average number of positive lagged coefficients is 7.67, with a standard error about the mean of .333. If we expected a 50% chance of a coefficient being positive, then the fact that the mean is significantly greater than seven implies, on the average, that a positive relationship exists; an <u>increase</u> in the rate of growth of the money supply of L is followed by an <u>increase</u> in the rate of

growth of the money supply of S.

The binomial test on individual equations, however, did not fare so well. Only four country pairs demonstrated a number of lagged coefficients significantly greater than the expected result of seven. One, however, was Mauritius and its partner, the United Kingdom, the pair having the greatest L trade effect on S GNP.

Eight country pairs had negative coefficient totals on the lagged independent values. However, all were estimated with twenty-five or fewer degrees of freedom, implying somewhat greater autonomy than may be expected, especially if a known revaluation were forthcoming. Another potential source of difficulty could be in the disparity in rates of growth of the two economies.

In fact, in only two cases in which the regression proved significant was the difference in real growth rates greater than three percentage points. However, one of those cases, that of Malaysia and its partner Japan, had a total lagged coefficient value of less than zero. The table on the next two pages summarizes the real rates of growth and the differences in those between the two economies.

Table 6. Real rates of Growth of GDP and Intercountry Differences For Those Trading Partners Showing a Significant Relationship in the Rates of Growth of Money

Country	Partner	Years	Country Real GNP or GDP Growth Rate	Partner Real GNP or GDP Growth Rate	Absolute Difference
Mauritius	United Kingdom	1963 1973	2.467	3.3377	.87071
Ireland	United Kingdom	1957 1978	4.2702	2.7895	1.4807
Sierra Leone	United Kingdom	1964 1978	2.6608	2.3934	.26738
Honduras	U.S.	1962 1980	4.87	2.968	1.9024
Senegal	France	1967 1979	.48728	4.2217	3.7344
Dominican Republic	U.S.	1957 1979	4.77	3.389	1.3811
Ivory Coast	France	1962 1978	7.5225	4.7511	2.7714
Costa Rica	U.S.	1962 1970	6.7575	3.9308	2.8267
Nether-lands	Germany	1957 1969	5.4491	6.2489	.79982
Guyana	U.S.	1957 1966	3.1543	4.3136	1.1593
Jamaica	United Kingdom	1961 1971	5.346	2.935	2.4105
Haiti	U.S.	1966 1979	1.9133	2.7493	.83604

Table 6. Real rates of Growth of GDP and Intercountry Differences For Those Trading Partners Showing a Significant Relationship in the Rates of Growth of Money - Continued

Country	Partner	Years	Country Real GNP or GDP Growth Rate	Partner Real GNP or GDP Growth Rate	Absolute Difference
Malaysia	Japan	1957 1970	6.2349	9.8909	3.6561
El Salvador	U.S.	1957 1979	3.7978	3.3893	.40858
Belgium	Netherlands	1961 1971	5.9038	5.1626	.74114
Bolivia	U.S.	1959 1971	4.8062	3.8743	.93194
Cameroon	France	1968 1979	n.a.	.	.
Nicaragua	U.S.	1972 1979	n.a.	.	.
Panama	U.S.	1957 1980	6.0143	3.058	2.9563
Iraq	Italy	1960 1971	5.5948	5.9032	.30836
Madagascar	France	1964 1974	3.5702	4.88	1.3097
Malta	United Kingdom	1957 1970	4.7905	3.1776	1.9036
Iran	Japan	1959 1972	10.046	9.7548	.29172
Guatemala	U.S.	1957 1980	4.93	3.058	1.872

The last table, Table 7, encapsulates the argument noted for all thirty-six country pairs, associating the "success" of the estimated equation and the remaining degrees of freedom. The results are striking:

Of the fifteen country pairs with twenty-six or more degrees of freedom, thirteen of the equations were significant and all of these had a positive sum of the lagged coefficients. The two "dissident" pairs, Gabon-France and Togo-France, were part of the "Operations Account" group discussed above. Those countries maintaining a fixed exchange rate with the currency of their partners for fourteen years or longer apparently allow passive adjustment to the monetary policy of their larger "friend".

The implications are no less striking than that for the "bottom" sixteen, estimated with twenty-one or fewer degrees of freedom. Of those, only one showed a significant and positive relationship. Thus, it seems, a period of twelve and one-half, or fewer years is not enough to establish a monetarily meaningful relationship.

The "indifference" point seems to be at a period just short of fourteen years, or in the table, those equations estimated with twenty-five degrees of freedom. Two out of the five were very significant and positive, with positive sums of coefficients and the number of positive coefficients significantly greater than seven

Table 7. Summary of Regression Results, All Country Pairs, Ranked by Remaining Degrees of Freedom

Country/ Partner	Degrees of Freedom	Regression Significance	Sum of Lagged Coefficients	Number of Positive Lagged Coefficients
El Salvador U.S.	65	1%	2.66	6
Panama U.S.	65	1%	1.55	7
Guatemala U.S.	64	1%	2.07	8
Dominican Repub. U.S.	61	1%	1.954	9
Haiti U.S.	58	1%	2.83	9
Ireland U.K.	57	1%	.646	9
Cameroon France	45	1%	1.85	8
Gabon France	45	NS	—	8
Ivory Coast France	42	1%	1.41	8
Honduras U.S.	42	1%	2.65	8
Togo France	39	NS	—	9
Senegal France	39	1%	2.24	8

Table 7. Summary of Regression Results, All Country Pairs, Ranked by Remaining Degrees of Freedom - Continued

Country/ Partner	Degrees of Freedom	Regression Significance	Sum of Lagged Coefficients	Number of Positive Lagged Coefficients
Sierra Leone U.K.	37	1%	2.11	9
Madagascar France	37	1%	.792	10
Iran Japan	26	5%	.922	8
Mauritius U.K.	25	1%	5.12	10
Malaysia U.S.	25	NS	--	7
Malaysia Japan	25	5%	-1.45	6
Nicaragua U.S.	25	1%	-1.13	6
Malta U.K.	25	5%	1.05	10
Bolivia U.S.	21	1%	-2.95	5
Netherlands Germany	20	1%	-.258	6
Mauritania France	15	NS	--	9
Iraq Italy	14	10%	-1.05	6

Table 7. Summary of Regression Results, All Country Pairs, Ranked by Remaining Degrees of Freedom - Continued

Country/ Partner	Degrees of Freedom	Regression Significance	Sum of Lagged Coefficients	Number of Positive Lagged Coefficients
Belgium Netherlands	12	1%	5.2	10
Jamaica U.K.	12	1%	-2.04	6
Denmark U.K.	12	NS	--	7
Trinidad & Tobago U.S.	9	NS	--	9
Ecuador U.S.	9	NS	--	3
Sri Lanka U.K.	9	NS	--	0
Guyana U.S.	9	10%	-3.67	7
Morocco France	7	NS	--	6
Surinam U.S.	5	NS	--	7
Costa Rica U.S.	5	1%	-4.41	5
Libya Germany	3	NS	--	10
Nigeria U.K.	2	NS	--	12

(two out of the four "successful" cases doing so).

This "indifference point, incidentally, includes the only "S" country with two L partners: Malaysia and its "friends" Japan and the United States. Interestingly, its real income growth rate fell almost exactly between the two (6.2%, as opposed to 3.7% for the U.S. and 9.9% for Japan, per year when compounded continuously). The test relating changes in the corresponding money aggregates proved insignificant when considering the U.S. money supply and negative when regressed against the rate of growth of the Japanese money supply. The inference is that Malaysia demonstrated an inability to respond passively to the monetary policy of either of the L's when taken separately (perhaps considering the two as one larger L), or a willingness to exercise or attempt some small measure of autonomy.

VI. CONCLUSIONS AND SUGGESTIONS FOR FURTHER STUDY

Although the results above are very suggestive, it is quite easy to add that many more questions have been raised than have been answered.

First, it seems reasonable to assert that if a fixed rate of exchange is maintained over a long enough period, the domestic money supply of a small country is strongly influenced by that of a dominating trading partner. For those countries maintaining a fixed currency value vis-a-vis the currency of its larger partner for a period of at least fourteen years, the results were almost universally positive and conformable to the monetary approach to the balance-of-payments. Indeed, the uniformity of outcome over the variety of countries involved argues strongly that for those small countries, monetary autonomy must be considered as almost beyond possibility. The undemonstrated portion (perhaps untestable), but certainly implied, is that acceptance of this arrangement is "passive". Otherwise, it is not shown that the results are due to reserve flows or external price changes.

Second, some degree of "independence" from partner dominance in

monetary affairs is shown for the majority of country pairs. However, this conclusion was obtained from estimations using far fewer observations than those in the "positive" group. Several explanations are appropriate, but the one fitting most closely with the assumptions of the monetary model concerns the sterilization of inflows. In attempting to offset (or augment) changes in the balance of payments through active domestic intervention, disequilibrium in the international accounts is maintained or exacerbated, forcing revaluation of the currency. This would tend to explain the shorter time period involved for those country pairs showing either no relationship or a negative one between its own money supply growth rate and that of its partner. It would be of some interest to note how many of these periods involved an appreciation or depreciation of the domestic currency.

Interesting as follow-up studies would be those for the country pairs subsumed herein after the fixed-rate period, to examine the relationship between money supply growth rates. In theory, under a floating exchange rate regime, domestic monetary adjustment is reflected externally by a change in the rate of exchange of domestic currency[26], and not necessarily by the change in the balance of payments. Thus, it would be expected that all external shocks would

---

[26]Harry G. Johnson, "The Case for Flexible Exchange Rates, 1969", in Further Essays in Monetary Economics (Cambridge: Harvard University Press, 1973), p. 208-09.

be discharged through changes in the exchange rate, and no relationship would be shown between the changes in the money stock of L and S.

Other interesting tests which may be done in the context of the fixed exchange rate model concern the direction of movement, for individual countries, from reserves to money and prices to money. Most especially, the latter should be of great concern, for the anticipated result, as implied in the introduction[27], would be changes in international prices strongly leading to changes in money. This would lend greater credence to the hypothesis of lack of monetary autonomy under fixed rates.

---

[27]Humphrey, p. 4.

REFERENCES

Caves, Richard E. and Jones, Ronald W. World Trade and Payments: An Introduction. Boston: Little, Brown and Company, 1973.

Connolly, Michael, and Taylor, Dean. "Testing the Monetary Approach to Devaluation in Developing Countries." Journal of Political Economy 84 (July 1976): 849-59.

Darby, Michael R. Macroeconomics. New York: McGraw-Hill Book Company, 1976.

Day, William H.L. "Domestic Credit and Money Ceilings under Alternative Exchange Rate Regimes." International Monetary Fund Staff Papers 26 (September 1979): 490-512.

Farrell, Mike. "International Impact of U.S. Money Supply: The Case of Mexico." American Economic Review 70 (June 1980): 433-43.

Friedman, Milton. "The Case for Flexible Exchange Rates." In Readings in International Economics, pp. 413-437. Edited by Richard E. Caves and Harry G. Johnson. Homewood, Illinois: Richard D. Irwin, 1968.

_____. "The Role of Monetary Policy." American Economic Review 58 (March 1968): 1-17.

Girton, Lance, and Roper, Don. "A Monetary Model of Exchange Market Pressure Applied to the Postwar Canadian Experience." American Economic Review 67 (September 1977): 537-48.

Haberler, Gottfried. "Inflation as a Worldwide Phenomenon, an Overview." In The Phenomenon of Worldwide Inflation, pp. 13-26. Edited by David I. Meiselman and Arthur B. Laffer. Washington, D.C.: American Enterprise Institute for Public Policy Research, 1975.

Heller, H. Robert. "International Reserves and World-wide Inflation". International Monetary Fund Staff Papers 23 (March 1976): 61-87.

REFERENCES (cont.)

_____. "International Reserves and World-wide Inflation: Further Analysis." International Monetary Fund Staff Papers 28 (March 1981): 230-33.

Hogg, Robert V., and Craig, Allen T. Introduction to Mathematical Statistics. Third edition. New York: Macmillan Publishing Co., Inc., 1970.

Humphrey, Thomas M. "Adam Smith and the Monetary Approach to the Balance of Payments." Federal Reserve Bank of Richmond Economic Review 67 (November/December 1981): 3-10.

International Monetary Fund. Direction of Trade Annual. Washington, D.C.: International Monetary Fund, various issues 1962-1976.

_____. International Financial Statistics. Subscription tape. Washington, D.C.: International Monetary Fund, August, 1981.

_____. 21st Annual Report on Exchange Restrictions, Washington, D.C.: International Monetary Fund, 1970.

Johnson, Harry G. "The Case for Flexible Exchange Rates, 1969." In Further Essays in Monetary Economics, pp. 198-222. Cambridge: Harvard University Press, 1973.

_____. "The Monetary Approach to Balance-of-Payments Theory." In Further Essays in Monetary Economics, pp. 229-249. Cambridge: Harvard University Press, 1973.

Khan, Mohsin S. "Inflation and International Reserves: A Time-Series Analysis." International Monetary Fund Staff Papers 26 (December 1979): 699-724.

_____ and Knight, Malcolm. "Stabilization Programs in Developing Countries: A Formal Framework." International Monetary Fund Staff Papers 28 (March 1981): 1-53.

Laffer, Arthur B. "Two Arguments for Fixed Rates." In The Economics of Common Currencies, Foreword by Robert A. Mundell, pp. 25-34. Edited by Harry G. Johnson and Alexander K. Swoboda. London: George Allen & Unwin Ltd., 1973.

REFERENCES (cont.)

Lipschitz, Leslie. "Exchange Rate Policies for Developing Countries: Some Simple Arguments for Intervention." International Monetary Fund Staff Papers 25 (December 1978): 650-75.

Maddala, G.S. Econometrics. New York: McGraw-Hill Book Company, 1977.

Meiselman, David I. "Worldwide Inflation, A Monetarist View." In The Phenomenon of Worldwide Inflation, pp. 69-112. Edited by David I. Meiselman and Arthur B. Laffer. Washington, D.C.: American Enterprise Institute for Public Policy Research, 1975.

Mundell, Robert A. International Economics. New York: Macmillan Publishing Co., Inc., 1968.

Phaup, E Dwight and Kusinitz, Alan. "Monetary Control under Fixed Exchange Rates". Journal of Money, Credit, and Banking 9 (November 1977): 552-61.

Selden, Richard T. "Inflation and Monetary Growth: Experience in Fourteen Countries of Europe and North America since 1958." Federal Reserve Bank of Richmond Economic Review 67 (November/December 1981): 19-31.

Sims, Christopher A. "Money, Income, and Causality." American Economic Review 62 (September 1972): 540-52.

Swoboda, Alexander K. "Monetary Policy under Fixed Exchange Rates: Effectiveness, the Speed of Adjustment, and Proper Use." Economica 40 (May 1973): 136-54.

U.S. Congress, House. Subcommittee on Domestic Monetary Policy of the Committee on Banking, Currency and Housing. The Impact of the Federal Reserve System's Monetary Policies on the Nation's Economy, by Robert Weintraub, Linda Lord, and Carl Mintz. Committee Print. Washington, D.C.: Government Printing Office, 1976.

Willett, Thomas D. Floating Exchange Rates and International Monetary Reform. Washington, D.C.: American Enterprise Institute for Public Policy Research, 1977.

The vita has been removed from the scanned document

MONEY SUPPLY TRANSMISSION BETWEEN MAJOR TRADING PARTNER COUNTRIES IN A SIMPLE TEST OF MONETARY AUTONOMY

by

David Alan Stallings

(ABSTRACT)

One of the most important conclusions derived from the monetary approach to the balance of payments concerns the inability of a country operating under a fixed exchange rate regime to maintain an autonomous internal monetary policy at variance with that of the rest of the world.

In the approach taken here, the domination of a small country by the monetary policy of a large trading partner (representing the world, i.e. with an economy likely to be unaffected by any action of its small partner yet strongly influencing that country's income) is examined for thirty-six country pairs. Transmission was measured by evaluating a linear autoregressive ordinary least squares model which identified the relationship, if any, of current changes in the rate of growth of money in the small country to past changes in money growth rates in the larger country. The monetary approach is strongly confirmed in the fifteen country pairs showing the longest periods of fixed currency values between the two. In addition, for those instances in which the monetary policy of the small country showed no relationship to that of the larger country, conditions that would potentially validate the monetary model were identified.