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The Impact of International Factors on U.S. Inflation: An Empirical Test of the Currency Substitution Hypothesis

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Preliminary: Please do not quote with authors permission. Comment welcome.

1. INTRODUCTION

A common argument for flexible exchange rates is that they insulate the domestic economy from foreign monetary shocks. Consequently, the domestic rate of inflation and income growth are related directly to the behavior of the domestic money supply. Over the past few years, the insular properties of a flexible exchange rate system have been challenged by the proponents of the theory of currency substitution. In particular, advocates of currency substitution argue that the domestic demand for money is a function of the relative opportunity costs between domestic and foreign holdings of monetary assets. Failing to recognize these international forces yields a domestic money demand function which appears to be highly unstable.[1/] Consequently, depending on the particular set of international influences on the domestic demand for money, any given rate of domestic money growth can lead to a variety of rates of domestic inflation.

In a world with currency substitution, the demand for "world" money cannot be influenced by the changing relative compositions of financial asset portfolios. It is this stability of world money demand vis-a-vis domestic demand that leads McKinnon (1982) to argue that "in general, growth in world money supply is a better predictor of American price inflation than is U.S. money growth." (p. 324).

Our purpose in this paper is to test this hypothesis. To do so, we investigate the issue by using quarterly data, as opposed to the popular reliance on annual observations, and we explicitly test for restrictions imposed by the estimated model. This methodological departure from previous work provides a reliable, systematic test of the currency substitution hypothesis. The format of the paper is as follows. Section 2 summarizes previous studies investigating the currency substitution hypothesis. The evolution of empirically testing the hypothesis, represented in papers by McKinnon and others, also is discussed. The model and empirical results are offered in section 3. In testing the hypothesis, we note that a crucial point of argument concerns which measure of domestic inflation is the most appropriate. Moreover, we discuss the different procedures to measure world money. The empirical tests reported explore each of these points. A summary of our findings and some concluding remarks close the paper in section 4.

2. ANTECEDENT STUDIES

Because the statistical support initially offered by McKinnon (1982) amounted only to tabular comparisons of domestic U.S. inflation, domestic money (M1) growth and a measure of world money growth, several researchers have made more rigorous efforts to support or to refute the currency substitution hypothesis. The way was led by Ross (1983) who performed a simple correlation analysis between inflation and the different money growth measures for the period 1960-1980.

Ross found that the correlation between U.S. money growth and U.S. inflation was 0.72. When the world money supply growth was used, the correlation fell to 0.29.[2/] The evidence presented by Ross was summarily rejected in a reply by McKinnon and Tan (1983). They argued that Ross' results were not a valid test of the currency substitution hypothesis, because he failed to recognize the differential effects stemming from the fixed and floating regimes used in his sample. A more appropriate test, they argue, would focus solely on the flexible exchange rate period after 1970. McKinnon and Tan also argue that a more proper test can be performed using regression analysis. Based on regressions of annual observations of U.S. wholesale price inflation on U.S. and world money growth for the period 1970-81, McKinnon and Tan found that the $\bar{R}^2$ for the equation using only U.S. money growth to explain inflation was 0.53. When only world money growth was used, the $\bar{R}^2$ increased to 0.70. This finding led McKinnon and Tan to conclude that "the doctrine of domestic monetarism--where American authorities consider only American monetary aggregates--has become obsolete."[3/]

Spinelli (1983) found that the empirical results of McKinnon and Tan and more recent evidence reported by McKinnon (1984) were not very robust, particularly because the performance of McKinnon's estimated equations with annual data depended critically on one observation. Spinelli, therefore, conducted an analysis over the I/1973 to IV/1980 period using

quarterly data. Using a different method for constructing the world money supply than McKinnon, Spinelli found that domestic money growth outperforms world money growth alone in explaining U.S. inflation measured by either the GNP deflator or the wholesale price index.[4/] Furthermore, the addition of rest-of-world money growth (that is, world money growth omitting the U.S.) to domestic money growth only marginally improved the explanatory power of the equation. Unfortunately, Spinelli's testing methodology was simply to compare $\bar{R}^2$s across equations. Because he also corrected for first-order autocorrelation, the $\bar{R}^2$s across equations are incomparable. Consequently, Spinelli's results are unreliable at best.

Goldstein and Haynes (1984) also performed a quarterly analysis for the United States over the period II/1973 to II/1982 using McKinnon's method to construct the world money supply. Their analysis focuses on the GNP deflator as the measure of inflation. In lieu of a distributed lag model, Goldstein and Haynes employ 12-quarter moving averages of domestic money growth, world money growth and rest-of-world money growth. This approach smooths the data considerably and imposes constraints on the estimated coefficients that are not tested.[5/] Although they find that rest-of-world money growth does not add to the explanation of U.S. inflation once U.S. money growth is accounted for, it is not clear how sensitive their results are to the constraints imposed and the data smoothing caused by the use of moving averages.

Following an approach similar to Goldstein and Haynes, Wallace (1984) argues that the validity of the currency substitution hypothesis depends critically on the measure of inflation employed. Using annual data, he finds that world money growth is not a better predictor of U.S. inflation than U.S. money growth when inflation is measured by the CPI or GNP deflator. Only when the wholesale price index is used (as does McKinnon) does world money growth outperform U.S. money growth. Wallace's estimated equations contain less than 10 degrees of freedom, however, and consequently are subject to the same small sample problems that plague McKinnon's previous empirical analysis.

Finally, McKinnon (1984) and Ambler and McKinnon (forthcoming) redirect the focus of McKinnon's and others previous attempts at empirically capturing the effects of currency substitution on U.S. inflation. In his original article, McKinnon explicitly states that, since the demand for world money is more stable than the demand for U.S. money, world money growth is a better predictor of U.S. inflation. In these more recent studies, however, it is argued that the exchange rate, not rest-of-world money growth, is a better indicator of externally-motivated shifts in the domestic demand for U.S. money. As Ambler and McKinnon state, "with significant lags in the collection of both American and foreign monetary data, the dollar exchange rate is the more immediately relevant monetary indicator." (p.3)

In summary, the evolution of the debate concerning the currency substitution hypothesis has left three important issues unresolved: First, is annual data appropriate given the relatively short sample period? Second, should inflation be measured using the wholesale price index, as McKinnon does, or should it be measured using a broader measure, such as the GNP deflator? Finally, and most recently, what is the best measure to capture the effects of currency substitution on domestic inflation? In the next section, we address each of these issues.

3. THE MODEL AND EMPIRICAL RESULTS

It is obvious from the preceding discussion that there has not been a thorough, systematic test of the currency substitution hypothesis as formulated by McKinnon. Each of the studies mentioned has its own idiosyncracies that may affect the relative quality and comparability of empirical results. We propose a general testing framework which avoids the problems associated with the previous work and, consequently, provides an unequivocal test of the hypothesis.

3.A. THE MODEL

We employ a distributed lag model on quarterly data (as opposed to the moving averages or the annual data used by most others) over the floating exchange rate period, 1972-1982. Thus, the following equation of U.S. inflation is estimated:

$$(1)\quad \dot{P}_t = a + \sum_{i=0}^{12} b_i \dot{MUS}_{t-i} + \sum_{i=0}^{K} c_i \dot{FVAR}_{t-i}$$

where $\dot{P}$ is the quarter-to-quarter rate of U.S. inflation measured by (a) the GNP deflator and (b) the producer price index (PPI), $\dot{MUS}$ is the quarter-to-quarter rate of U.S. M1 growth and $\dot{FVAR}$ is either the quarter-to-quarter rate of rest-of-world M1 growth or the quarter-to-quarter rate of change of the effective exchange rate. The value of K is 12 for the rest-of-world money growth and 8 for changes in the effective exchange rate. To conserve degrees of freedom, the coefficients of each distributed lag were constrained to lie on a fourth degree polynomial.[6/]

The usefulness of this approach is that it allows us to explicitly test the marginal contribution of rest-of-world money growth and changes in the effective exchange rate as predictors of U.S. inflation <u>after</u> the influence of U.S. money growth has been included.[7/] If the currency substitution hypothesis is correct, rest-of-world money (MROW) growth and/or changes in the effective exchange rate (EFER) should add significantly to the explanation of U.S. inflation.

3.B. MEASUREMENT ISSUES

Before presenting the results, there are two points that should be discussed: the measurement of inflation and the method for constructing the money supply for the rest of the world. On the first point, use of the GNP deflator as the measure of inflation with which to test the currency

substitution hypothesis has been rejected by advocates of the theory. Specifically, it is argued that the GNP deflator "contains large nontradeable components which are less sensitive to foreign influences" (Ambler and McKinnon, 1984). Alternatively, "wholesale [price] indices come closer . . . to providing a common denominator of tradeable goods" (McKinnon, 1982).

The issue here is just what type of inflation is to be measured? If inflation is considered to be a general increase in all prices motivated by excess aggregate demand, then a measure such as the PPI is not appropriate, because movements in it reflect changes in prices of only a subset of the goods produced in the U.S. (in particular, tradeable goods). Furthermore, increases in the prices of tradeable goods (captured by the PPI) that are offset by decreases in the the prices of nontradeables cannot be considered inflation. The GNP deflator, in contrast, includes all goods and services, tradeable and nontradeable, produced in the U.S. Consequently, movements in the deflator generally are a more accurate indication of inflation as usually defined than are movements of the PPI. Although these reservations reduce the usefulness of employing the PPI inflation measure, we perform our analyses using both the PPI and GNP deflator inflation rates to make our results comparable to those of previous studies.

The second point of concern is the computation of the rest-of-world money supply, which requires some aggregation assumptions. McKinnon's method involves calculating money

growth rates for each of the countries in his sample and then calculating a weighted average growth rate, where the individual weights are determined using each country's share of world nominal GNP (in U.S. dollars) in some base year.[8] This "fixed-weight" approach is adopted to avoid any complication that may evolve due to continually changing exchange rates. McKinnon claims that his empirical results are insensitive to the weights chosen; we have chosen not to address this issue here and have simply employed McKinnon's weights.[9]

Another procedure, one adopted by Spinelli, is to convert all foreign money supplies to U.S. dollars using current exchange rates, aggregate to form a rest-of-world money supply, and then calculate the growth rate of this series. In contrast to McKinnon's fixed-weight technique, Spinelli's approach allows the relative weights to vary overtime. During the 1972-82 period investigated, the mean growth rates of the two MROW measures are approximately the same: 9.1 percent for variable-weight measure and 9.6 percent for the fixed-weight. The variable-weight measure, however, is almost four times more variable than is the fixed-weight measure: the standard deviation of the former is 16.5 where that for the latter is 4.3. Because neither measure is preferable over the other, a priori, both are employed in our analysis to gauge the robustness of the results to the money measure used.

3.C. ESTIMATION

Equation 1 was estimated first with a distributed lag U.S. money growth on the right-hand-side as the only variable explaining the rate of growth of the GNP deflator and the rate of growth of the PPI. To evaluate the currency substitution hypothesis, the two measures of rest-of-world money growth and changes in the effective exchange then are added individually and their marginal explanatory power is tested. To test whether rest-of-world money growth and the effective exchange rate combined add to the explanatory power of U.S. money growth, both measures are included together in an estimation of equation 1.[10/] The summary regression results are reported in table 1.

The top panel of table 1, equations 1.1 through 1.6, reports the summary statistics when the GNP deflator is used to calculate the U.S. inflation rate. Equation 1.1 represents a simple "domestic monetarist" model, one that includes only a distributed lag of U.S. money growth. As reported, the sum coefficient is significant at the 5 percent level of confidence. Moreover, the sum coefficient (1.404), although somewhat large, does not differ from unity at any conventional level of significance (t=0.78). During the sample period examined, the model "explains" about 40 percent of the variance in inflation.[11/]

Equations 1.2 and 1.3 augment equation 1.1 with measures of rest-of-world money growth. Equation 1.2 reports the result using McKinnon's fixed-weight calculation. The sum coefficient

on MROW1 is not significant at the 5 percent level. The MUS term, however, remains statistically significant. Equation 1.3 adds rest-of-world money growth measured with the variable weight procedure. It, too, has no statistically significant, long-term impact on U.S. inflation measured with the deflator. Domestic money growth continues to exert a lasting, significant effect on inflation. In both instances, the calculated sum coefficients on U.S. money growth do not differ from unity at any reliable level of confidence.[12/]

The remaining equations in the upper panel of table 1 report the results of adding the effective exchange rate to equation 1.1. Equation 1.4 again shows that only domestic money growth has a significant cumulative effect on domestic inflation: the sum coefficient on the exchange rate variable is not statistically different from zero. When the exchange rate information is combined with the domestic money growth and rest-of-world money growth, the results are mixed. For example, when the MROW1 measure is used, none of the sum coefficients achieve statistical significance. Moreover, MROW1 takes on theoretically perverse negative sign. When MROW2 is used, ΣMUS is not significant, the sum effect of the exchange rate now achieves significance, and MROW2, although close to significance at the 5 percent level, is incorrectly signed. Such counter-intuitive results as 1.5 and 1.6 leads one to question their informational content.

The estimation results using the PPI inflation rate are reported in the lower panel of table 1. Equation 1.7 is the basic equation using only domestic money growth as the explanatory variable. The sum coefficient is significantly different from zero at the 5 percent level. Moreover, the sum coefficient's large standard error does not allow us to reject the hypothesis that the long-run impact is unity (t=1.55).

In contrast to the results based on the GNP deflator, the outcome of adding MROW1, MROW2 or EFER to U.S. money growth indicates that each measure exerts a statistically significant, lasting impact on U.S. wholesale price growth. In the instance of incorporating MROW2, this addition reduces MUS to insignificance. Similar to the GNP deflator results, including both a rest-of-world money measure and the exchange rate yields unsatisfactory results: see equations 1.11 and 1.12.

The analysis to this point does not adequately address the crucial issue at hand. That is, one cannot infer from a test of a sum of coefficients that a particular right-hand-side variable does or does not add to the explanatory power of an equation.[13] Moreover, because some of the equations have been corrected for first-order autocorrelation, a simple comparison of relative $\bar{R}^{-2}$ magnitudes is equally at fault.[14] The appropriate analysis, therefore, is to test whether the entire distributed lag of each foreign variable significantly increases the explanatory power of the equation that contains only U.S. money growth. Consequently, to determine the statistical importance of the non-U.S. variables in determining the U.S. inflation rate, a conventional F-test is employed.

The calculated F-statistics used to test the hypothesis that the addition of the distributed lag of rest-of-world money growth or changes in the effective exchange rate (or both) enhances the explanatory power of the equation using only U.S. money growth are reported in table 2. The F-statistics indicate that the addition of any of the international variables does not significantly improve the explanatory power of the basic equation when the GNP deflator is used to measure inflation. In other words, neither measure of rest-of-world money nor the exchange rate improves upon the explanation of movements in the U.S. GNP deflator once the impact of U.S. M1 growth is accounted for.

When U.S. price movements are measured by the PPI, however, both measures of rest-of-world money significantly increase the explanatory power of the basic equation. The most interesting result using the PPI concerns the finding that the F-statistic for adding the effective exchange rate is <u>not</u> significant at the 5 percent level. This result is somewhat confusing given that the summed coefficient on EFER in table 1 (equation 1.10) is significant at the 5 percent level and the $\bar{R}^2$ for the equation (0.38) appears much larger than the equation that uses only U.S. money growth (0.25). Thus, if the exchange rate is taken to be the most reliable proxy for "news" that reflects money demand shifts caused by active currency substitution, the position taken recently by McKinnon (1984) and Ambler and McKinnon (1984), the results of our F-test

indicate that foreign influences on either measure of domestic inflation are not statistically significant during the floating exchange rate period.[15/]

One final point is to examine the argument that there are two well-defined periods (1973-74 and 1979-80) during which domestic money growth is expected to be a particularly poor predictor of U.S. inflation.[16/] To investigate this assertion we generated the residuals from the GNP deflator version of equation 1 estimated with U.S. money and McKinnon's measure of rest-of-world money and U.S. money and the effective exchange rate.[17/] These residuals, along with those from the estimation using U.S. money only, are presented in charts 1 and 2, respectively.

It is clear from the residual plots that none of the expanded specifications dominate the U.S. money only model in explaining U.S. inflation during these two periods. Comparing mean absolute errors for these periods across the three specifications confirms this observation. In particular, for the period I/1973 to IV/1974, the mean absolute error (MAE) for the specification containing only U.S. money is 1.16 percent, for the U.S. money and McKinnon's rest-of-world money specification the MAE is 1.20 percent, and for the equation using U.S. money and the effective exchange rate, the MAE is 1.18 percent. For the period I/1979 to IV/1980, the mean absolute errors for the three specifications are 0.88, 0.89 and 0.91, respectively. Consequently, the inclusion of neither

rest-of-world money nor the effective exchange rate improves on the ability of U.S. money in explaining domestic inflation during these two periods.

4. SUMMARY AND CONCLUSIONS

It has been asserted that the domestic demand for U.S. money is unstable due to the impact of foreign influences that generate restructuring of financial portfolios. Consequently, it is hypothesized that U.S. inflation during the floating exchange rate period cannot be explained adequately by U.S. money growth alone, but more appropriately by U.S. money growth plus a measure of rest-of-world money growth or changes in the effective exchange rate.

Our analysis, based on quarterly data, demonstrates that when inflation is measured by the PPI rest-of-world money growth does add to the explanation of inflation over that of U.S. money alone. That foreign money growth affects the PPI should not be surprising since the goods whose prices comprise the PPI are primarily tradeable goods. When a more comprehensive measure of domestic inflation is used, the GNP deflator, neither measure of rest-of-world money growth adds to the explanatory power of domestic M1 growth alone.

McKinnon recently has argued, however, that the proper measure to gauge the impact of foreign influences on domestic inflation is through changes in the effective dollar exchange rate. When this indicator is included in the U.S. inflation equation, however, it adds no significant explanatory power regardless of the measure of inflation used.

The outcome of our analysis indicates that the role of currency substitution in the explanation of the rate of domestic inflation during the floating exchange rate period is not supported by the data. While our results obviously do not rule out the possibility that such international factors may influence domestic inflation, they clearly demonstrate that rest-of world money growth measures and exchange rate changes do not reliably capture these possible influences.

FOOTNOTES

1/ Evidence supporting the existence of currency substitution in the U.S. is presented in McKinnon (1982) and Miles (1978, 1981). Other studies investigating the existence of currency substitution through the estimation domestic money demand functions include Bordo and Choudri (1982), Cuddington (1983), Spinelli (1983), and Batten and Hafer (1984). The evidence presented in these studies generally do not support the currency substitution hypothesis.

2/ These correlations are based on annual data, using a one-year lag of money growth relative to inflation. The inflation rate is calculated using the wholesale price index.

3/ McKinnon and Tan (1983), p. 476. It should be noted that, although the sample period is reported to be 1970-81, the footnote to Table 3, p. 475, indicates that the sample period for the dependent variable actually is 1972-81, a total of only 10 observations. Given the number of regressors used, this leaves a scant 7 degrees of freedom.

4/ The procedure used by Spinelli (1983) to construct a world money growth series is discussed below.

5/ The use of moving averages implicitly constrains the effects of money growth to have equal impacts in each quarter of the lagged distribution. The evidence presented in Carlson (1980), for example, refutes this approach.

6/ We tested the restriction imposed by the fourth degree polynomial and could not reject it in any equation. It also should be mentioned that no endpoint constraints are employed, based on the findings reported in Thornton and Batten (1984).

7/ The IMF's effective exchange rate is a weighted average of 17 bilateral rates with the weights derived from the IMF's multilateral exchange rate model.

8/ The countries used to form the rest-of-world money supply consist of ten industrial countries: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Switzerland and the United Kingdom.

9/ See McKinnon (1984), pp. 38-9. The change in the weights from 1970 (McKinnon (1982)) to 1977 (McKinnon (1984)) has the effect of changing the world money growth rate by an absolute average of 1.3 percentage points per year for the period 1971-80. An interesting feature of the weighting procedure is that it fixes the weight at a single point in time. Thus, exchange rate changes across the sample period are obscured.

10/ To our knowledge, this is the first reporting of quarterly results using the effective change rate as the proxy for changes in international demands for the dollar. McKinnon (1984) reports results based on annual data.

11/ The level of explanatory power, although low, is not unexpected. Macroeconomists, monetarist and non-monetarist alike, have recognized the fact that money growth alone does not explain all movements in quarterly inflation. Exogenous factors, such as the imposition of price controls and the relative oil price shocks of 1973-74 and 1979-80, push the observed inflation rate temporarily from its monetary rate,

lowering the sole explanatory power of money growth. Thus, describing a model such as 1.1 as a monetarist model or one that exemplifies "domestic monetarism" disregards much recent work in monetary economics. See, for example, Rasche and Tatom (1981).

12/ The relevant t-statistics are 0.24 for equation 1.2 and 0.69 for equation 1.3. The null hypothesis tested is that $\Sigma b_i = 1.0$.

13/ Such a conclusion is drawn, incorrectly, in Goldstein and Haynes (1984).

14/ This comparison has been made by Spinelli (1983).

15/ To be specific, McKinnon (1984) argues that "under floating exchange rates, international investors continually move from financial assets denominated in one currency to those denominated in another. Although remaining very important, the effects of money supply changes by themselves could then be obscured." He goes on to argue for "amending our basic regression equation to include the dollar exchange rate as an additional explanatory variable incorporating "news" that reflects these demand shifts . . .(permitting) supply side and demand side fluctuations to be distinguished from one another." (p. 43)

16/ McKinnon (1984) argues that during the period 1971-73, foreign central banks attempted to shore up the dollar in the face of the devaluation following the breakdown of the Bretton Woods agreement. This action is revealed by the

increase in foreign holdings of dollars in 1971-72 which led to the sharp increase in rest-of-world money growth (ROW) during the 1971-73 period (see his table 4.1, pp. 38-39). The data also reveal that ROW remained in double-digit ranges, on average, until 1979. Thus, although the increase in ROW during the early 1970s does precede the increase in U.S. inflation during 1973-74, an increase most attribute to the OPEC oil embargo, the continuation of rapid ROW growth after 1974 does not predict the observed decline in U.S. inflation between 1975 and 1978.

17/ We focus on the GNP deflator, because the policy discussions surrounding these two periods were not concerned with the behavior of relative price changes, captured by the PPI, but with the behavior of the general level of prices.

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Table 1
Summary Results of Estimating Equation 1: 1972/II-1982/IV

Equation	ΣMUS	ΣMROW1	ΣMROW2 GNP Deflator	ΣEFER	$\bar{R}^2$	SE	DW	$\hat{\rho}$
1.1	1.404* (2.71)				0.394	1.67	1.99	0.40
1.2	0.904* (2.26)	0.191 (1.67)			0.554	1.56	1.92	
1.3	1.348* (2.66)		0.114 (1.81)		0.418	1.71	1.96	0.28
1.4	1.263* (2.55)			-0.084 (1.11)	0.427	1.69	2.00	0.29
1.5	0.310 (0.49)	-0.200 (0.62)		-0.169 (1.12)	0.550	1.54	2.07	-0.19
1.6	0.741 (1.50)		-0.910 (2.00)	-1.383* (2.19)	0.529	1.60	2.01	
			PPI					
1.7	2.738* (2.44)				0.249	3.80	1.99	0.35
1.8	2.299* (2.78)	0.801* (3.37)			0.525	3.22	2.07	
1.9	1.502 (1.91)		0.328* (3.10)		0.445	3.48	1.80	
1.10	1.678* (2.06)			-0.377* (2.82)	0.378	3.69	1.74	
1.11	2.875 (1.96)	1.394 (1.87)		0.359 (1.03)	0.525	3.22	2.10	
1.12	1.564 (1.36)		0.458 (0.43)	0.221 (0.15)	0.372	3.70	1.93	

OTES: Absolute value of t-statistics appear in parentheses. MROW1 represents the growth in rest-of-world money calculated using McKinnon's fixed weight procedure; MROW2 uses the variable weight approach. MUS is U.S. money growth and EFER is the percentage change in the effective exchange rate.

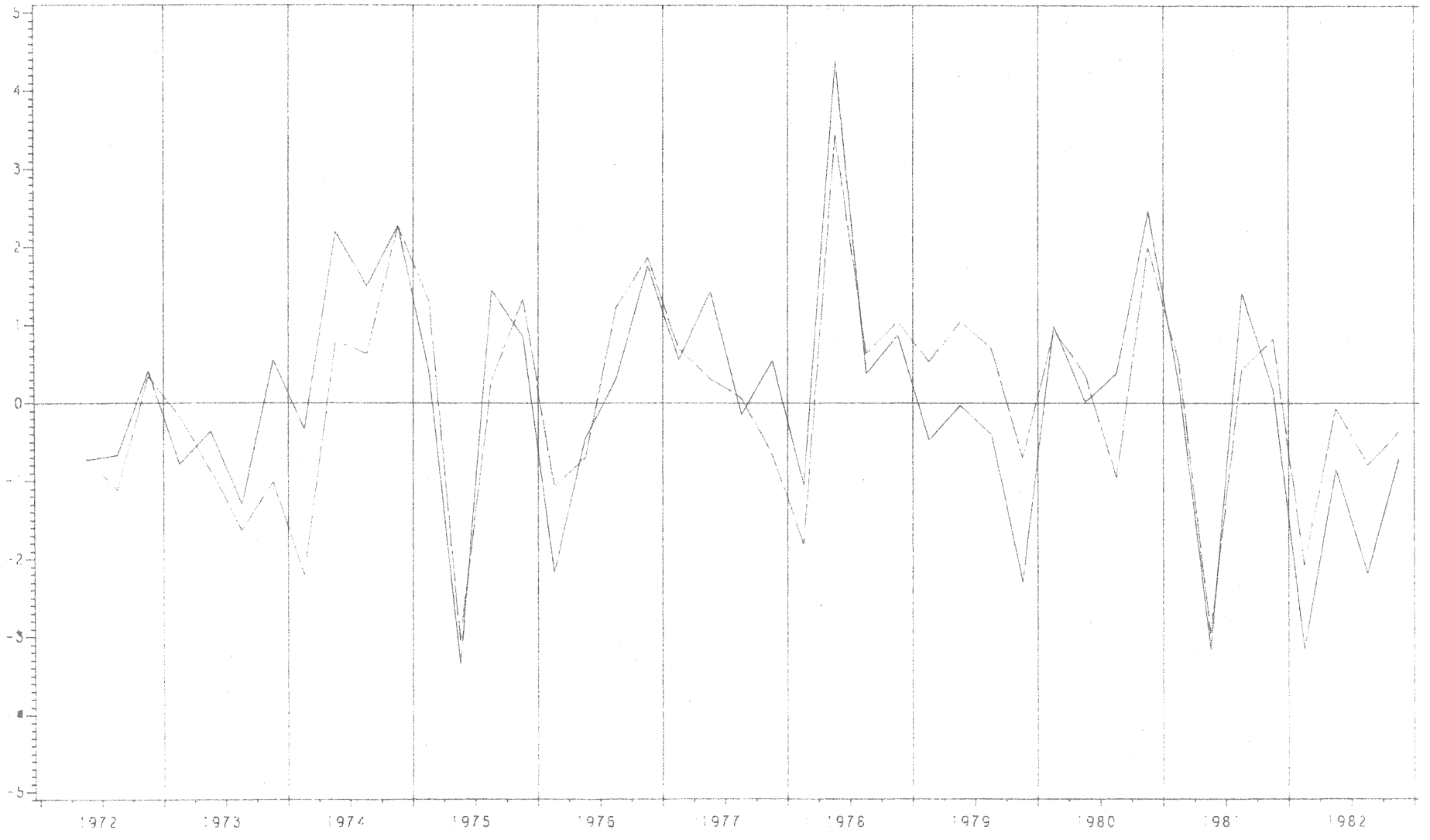
Table 2
Tests of the Marginal Impact of Rest-of-World Money and the Exchange Rate

Independent Variables: MUS plus	F-statistics	
	GNP Deflator	PPI
MROW1	2.15	3.93*
MROW2	0.71	2.52*
EFER	0.83	1.62
MROW1, EFER	1.68	2.48*
MROW2, EFER	1.35	1.20

*Statistically significant at the 5 percent level.

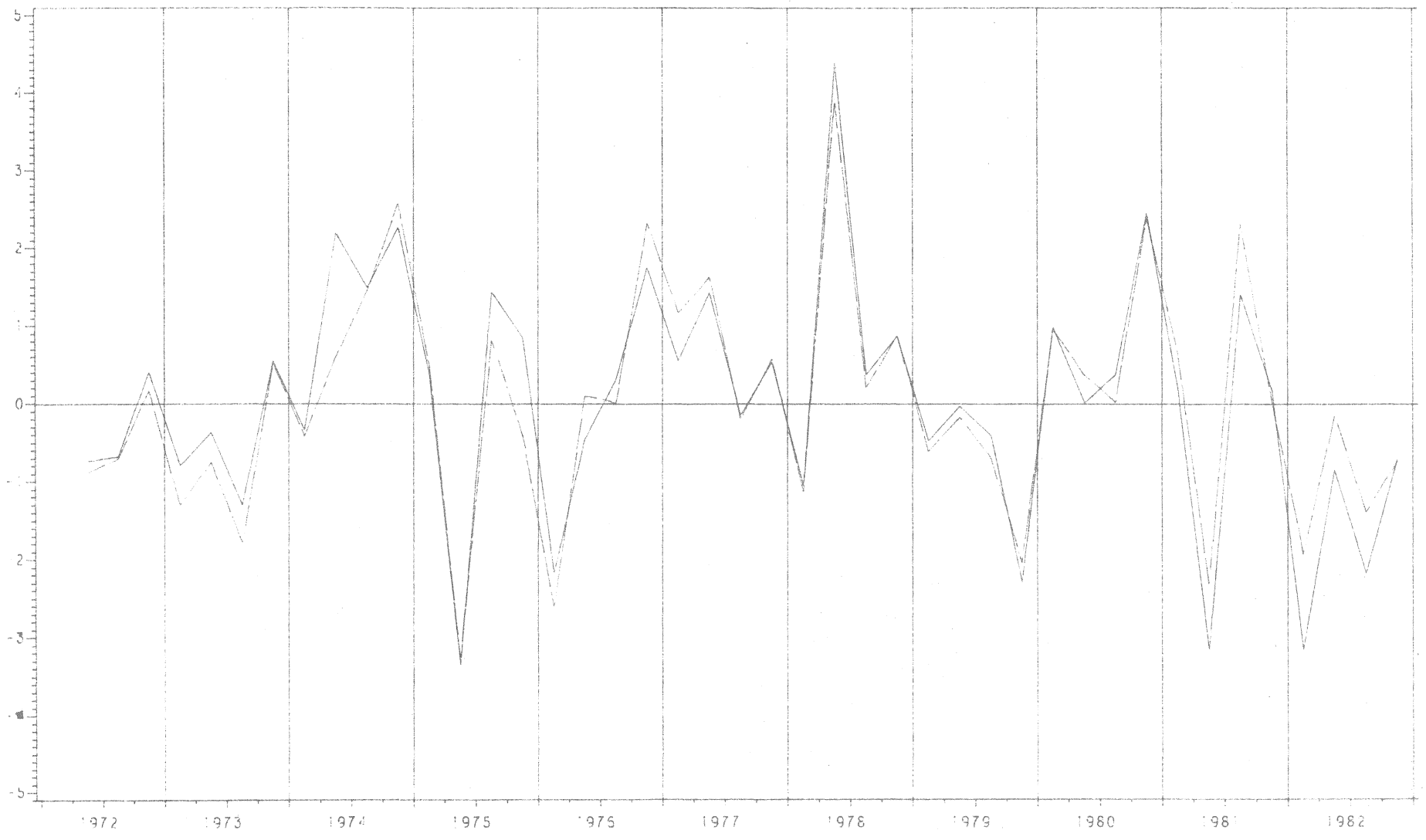
MROW1 = rest-of-world money growth, fixed weight version
MROW2 = rest-of-world money growth, flexible weight version
EFER = rate of change of the effective exchange rate

FIGURE 1



Residuals from:
U.S. Money Only ———
U.S. Money/MROW1 - - -

FIGURE 2



Residuals from:
U.S. Money Only ———
U.S. Money/EFER - - -