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International Money and International Inflation: 1958-1973

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Inflation on an international scale was negligible or modest into the early 1960's. Then it accelerated, slowly through 1965, progressively faster to the explosive climax of 1973-74. The eclipse of price-level stability has been explained in a variety of ways. One explanation blames traumatic phenomena of commodity supply, including crop failures and aggressive policies of the petroleum oligopoly. Another points to social conflict. Factors such as these did generate blips or bubbles in price levels, but they do not account for the prolonged surge of inflation.

The inflation was a monetary phenomenon. Money was supplied in excessive quantities everywhere, and its value or purchasing power decayed. Prime responsibility for excess money lies with the fiscal-monetary policies of the United States. Fiscal deficits of the American government generated an increasing stock of Treasury debt. Market prices bid for the debt by the Federal Reserve and other national monetary authorities drew virtually all of the debt into the authorities' portfolios, and "high powered" or "reserve" money increased correspondingly. The linkage of monetary systems by the arrangements of Bretton Wood guaranteed the subservience of "small" monetary systems to policies of the American Treasury and central bank. Every monetary system expanded its national money supply on the basis of accumulating reserves. Then holders of money responded as they always do to excess money supplies, by speeding up their turnover rate or velocity of money expenditure. The pace of growth in these expenditures was progressively faster than the pace of growth in real outputs of goods and services. Accelerating inflation and the collapse of Bretton Woods were the only possible outcomes.

The first section below develops a model that formalizes the fiscal-monetary explanation of world inflation in a context of fixed foreign-exchange rates. There is a center country that imposes inflationary shocks, and there are small countries that contribute their shares to the upward sweep of price levels. The model is adapted to the regime of Bretton Woods. The second section explores briefly the experience of the United States as center and of eight other countries as satellites during 1958-65. In those years, by good luck or sound judgment, growth of nominal money hewed quite closely to growth in real money demanded by private sectors, and the result was stability in markets for goods, securities, and foreign exchange. The third section has to do with the years 1966-73 that terminated in the collapse of Bretton Woods. The fourth section explores briefly potentials for inflation in the center country after foreign-exchange rates have been floated.

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I. Elements of the Inflationary Process

The equilibrium growth path of the world's price level depends on the relative growth paths of nominal money supplied and real money demanded.

$$(1) \qquad p^w = m_s^w - \bar{m}_d^w$$

p^w = rate of change in the world price level in terms of the center numeraire

m_s^w = rate of change in the world nominal money supply in terms of the center numeraire

$\bar{m}_d^w$ = rate of change in real money demanded in the world economy.

A relative rise in the growth rate of nominal money increases the rate of inflation though, in the short run, some of the adjustment occurs in growth rates of output and of real money demanded.

Equation (2) elaborates upon (1), distinguishing the growth paths of the center or large country (u) and the satellite or small countries (o). Equilibrium is assumed for every member of the bloc; foreign-exchange rates are normalized at unity; and all goods are classified as tradeables.

$$(2) \quad p^w = \left[s_u\left(m_s^u\right) + s_o\left(m_s^o\right)\right] - \left[s_u\left(\bar{m}_d^u\right) + s_o\left(\bar{m}_d^o\right)\right]$$

s_u and s_o = country weights, summing to unity.[1]

Equation (3) elaborates upon (2), presenting the determinants of growth in nominal money.*

$$(3) \quad s_u\left(m_s^u\right) + s_o\left(m_s^o\right) = s_u\left(t^u + \frac{d(r^u)}{1+r^u}\right) + s_o\left(t^o + \frac{d(r^o)}{1+r^o}\right)$$

*The term d ( ) in the following equations is the differential of the function ( ).

t^u = growth rate of international monetary reserves held by the monetary authority of the center country.

t^o = growth rate of international monetary reserves held by the monetary authorities of the satellites.

r^u = actual and desired ratio of domestic non-reserve assets to reserves in the monetary system of the center country.

r^o = actual and desired ratio of domestic non-reserve assets to reserves in the monetary systems of the satellite countries.

It is assumed that monetary systems, in acquiring reserve and non-reserve assets, issue only money—or that issues of money are in constant proportion to issues of, say, time and savings deposits and certificates of deposit. International reserves may include physical stocks of gold, priced in the center's numeraire, and SDR's as well. However, the analysis below takes it for granted, in general, that these reserve components do not grow. The component that will concern us most is (T), interest-bearing debt of the center's government at nominal value. This is a policy variable, its growth rate (t) depending on growth in the center government's real deficit and the rate of inflation.

$$(4) \quad t = e + p^w$$

e = growth rate of the real debt of the center government.

The ratios (r) of domestic credit to reserves are also a policy variable. The assumption will be that (r^u) is constant but that (r^o) may be changed by monetary authorities in small countries. Their decisions may be explained in this fashion:

(5) $r^o = r^o(\overset{+}{y^o}, \overset{-}{v^o}, \overset{+}{p^w})$

y^o = growth rate of permanent income in the satellite countries.

v^o = growth rate of real imports into the satellite countries.

Equation (5) suggests that portfolio preference on the part of small monetary systems shifts away from reserve assets to domestic credit accordingly as the negative yield (p^w) on the former increases and as positive yields on the latter are generated by speedier growth of output (y^o). It suggests also that demand for reserve assets, relative to domestic credit, tends to increase with growth of international trade (v).

Equations (6) and (7) complete specifications for the supply component of equation (2).

$$(6) \quad t^o = m_s^o - \frac{d(r^o)}{1+r^o}$$

$$(7) \quad t^u = \frac{t}{s_w} - \frac{s_o(t^o)}{s_w}$$

These equations allocate growth in monetary reserves between satellite and center monetary systems. Equation (6) indicates that satellite monetary authorities may accommodate as little or as much as they wish of the center government's deficit finance. They may resist importation of reserves, displacing reserves with domestic credit and raising (r^o) in the manner, say, of Japan. They may welcome reserve inflows and economize on domestic credit, at low values of (r^o), in the style of The Netherlands. Equation (7) indicates that the monetary authority of the center country is the residual buyer of its government's debt issues. It establishes and defends a rate of interest for government securities that is low enough, relative to other rates of interest, to repel demand for (T) by the nonmonetary sector of the world economic system.

Equation (8) elaborates upon the demand element of equation (2).

$$(8) \quad s_u(\bar{m}_d^u) + s_o(\bar{m}_d^o) = s_u(\eta_y^u y^u - \eta_{pw}^u p^w) + s_o(\eta_y^o y^o - \eta_{pw}^o p^w)$$

η_y y = response of growth in real money demanded to growth in permanent income.

$\eta_{p^w}{}^{p^w}$ = response of growth in real money demanded to inflation.

The (η_y) in this equation is the income elasticity of demand for money, and (η_{pw}) is the inflation elasticity. We suppose that real rates of interest are constant and that expected inflation is equal to actual inflation. Nominal rates of interest, suppressed in this model, vary with (p^w). If one were to trace a temporal path defined partly by (8), he would observe a redistribution of the world's real money balances, a larger share accruing in countries with high growth rates of real income, and with low sensitivity, on the part of the money-holders, to inflation.

We have now a very small model to guide analysis of inflation in 1958-73. There are three equations. One is equation (2), expanded by (3), (4), (5) and (8). The others are (6) and (7). The three endogenous variables, determined by the model, are (p^w), (t^o), and (t^u). Instruments of policy are the fiscal-monetary instrument of the center country (t) and the portfolio-choice instrument of the satellites (r^o). Other instruments will be introduced informally, including the foreign-exchange rate between center and satellites and the issuance of SDR's.

Compression of the model to only three equations has its analytical costs. For example, one does not observe explicitly that the nominal money stock and its growth rate in the center country are not determined exclusively by the monetary authority of the center. Given (t) and the international pattern of demand for real money, (m_s^w) is determined partly by the portfolio choices of foreign monetary authorities. High values of (r^o) imply relatively large stocks of money in the center, low values of (r^o) relatively small stocks in the center. The world's nominal money supply and the supply in each country are at the mercy of decisions by all monetary authorities.

In an harmonious monetary world, with constant foreign-exchange rates, monetary authorities would wield their control instruments in a mutually satisfactory way. The center would manage (t) and (r^u); the satellites would man-

age (r^o); and everyone would be satisfied with paths taken by nominal money and the price level. The rate of inflation everywhere is at the mercy of monetary expansion anywhere, but a consensus about the optimal inflation rate can hold the monetary community together.[2]

There is some risk of excessive instability in the integrated monetary world when the monetary authority of the center watches over (r^u) only and neglects changes in the constellation of reserve and domestic-credit ratios in small countries. If its conception of its role is myopic, fixed only upon domestic monetary developments, the possibility is not negligible that concerted changes abroad in desired portfolio ratios of small monetary systems will induce important changes in world growth rates of money and prices. When foreign-exchange rates are fixed, the center ignores monetary policies in small countries at some peril to world stability.[3]

The source of instability that concerns us most originates with the center, mainly through an increase in (t) but potentially as well through an increase of (r^u). One recalls that (t) is the growth rate for primary debt (T) of the center's fiscal authority, the variable reserve asset of the world's monetary system.[4] The initial disturbance on the markets for reserves and money caused by an increase in (t) may be absorbed smoothly by the world's monetary system. Perhaps as the result of coincidental increases in world trade flows (v), there may be reductions in desired domestic-credit ratios of small countries that limit the multiplicative impact on money supplies. Again, concurrent growth of permanent incomes (y) may draw increments of nominal money into real money balances at an essentially stable rate of price inflation. That is to say, declines in (r^o) and increases in $(\bar{m}^o_d)$ may neutralize acceleration of (t).

Sustained and accelerated growth in (T), combined with unfortunate but not improbable monetary policies in the center and its satellites, however, has ominous potentialities for the world monetary system.[5] Growth in the nominal value of international reserves has been described in equation (4), repeated here:

$$(9) \quad t = e + p^w$$

With (p^w) initially at zero, the center government may be driven by political considerations, perhaps by a war, into acceleration in growth of its real debt (e) and correspondingly in (t). The center monetary authority, trying to inhibit an upward sweep of domestic rates of interest, can be expected to increase open-market purchases and (t^u). Inevitably international balances of payment would transmit some of the growth in (t) to small monetary systems. The effect can be to reduce their domestic-credit ratios below desired levels and so to accelerate their monetization of domestic credit. Some increase in the rate of inflation must occur, and then (t) must increase again. Nominal rates of interest, responding to growth in (p^w), must rise and induce faster monetization of deficits in the center, given the illusion of the center monetary authority that there is no difference between real and nominal rates of interest. The likelihood of dramatic growth in the world's money supply and price level is not small for any large increase in (e). Needless to say, an initial reduction of (e) could precipitate cumulative deflation. The real fiscal objectives of the center and its monetary policies, together with portfolio preferences of small monetary systems, have a common and interacting bias toward monetary instability.

This scenario of fiscal and monetary instability is still incomplete. Growth of (e), (t), (m^w_s), and (p^w) must be expected, on the basis of equation (8), to induce some decline in the world growth rate of real money demanded and some increase in the growth rate of money's velocity. Moneyholders respond to the inflation tax by the obvious strategem of demanding slower growth in real money balances. Any decline in ($\bar{m}^w_d$) must push inflation along still faster, according to equation (1), and contribute to the quickening growth of nominal fiscal deficits, nominal reserves, and nominal money supplies. Money-holders, too, have a role in the explosive sequence.

The stage now is set for the collapse of international monetary arrangements. Monetary systems of small countries cannot give vent to their

portfolio preference for domestic over international assets by accelerating domestic credit expansion, because the inflationary outcome would be intolerable. Specific interventions on capital markets, goods markets, and the foreign exchanges are too costly in investment and trade distortions. The only acceptable way of preserving relative price-level stability and desired portfolio balance is simultaneously to depreciate the center country's currency at some rate (f) and to raise (r^o). We may introduce the new instrument of monetary control (f) into our model:

$$(10) \quad p^o = p^w - \dot{f}$$

$$(11) \quad p^o = m^o_s - \bar{m}^o_d$$

$$(12) \quad m^o_s = t^o - \dot{f} + \frac{d(r^o)}{1+r^o}$$

$\dot{f}$ = rate of change in price of the center money in terms of the numeraire of the small economy.

The moves for independence of the small economy reduce accumulation of reserves there and increase (t^u), the rate of growth of high-powered money in the center. The consequence for the center, given budgetary policy, is necessarily still more rapid inflation. Presumably the time must come when, out of despair over its own inflationary experience, the center reduces the growth rate of its real budget deficit. Fixed foreign-exchange rates provide an opportunity for the center country to induce world-wide inflation. Floating exchange rates permit small countries to choose their own price-level paths and may induce the erstwhile center country not to heap inflationary abuse upon its own monetary system.

It may be helpful to reiterate the real aspects of inflation and monetary crisis. The crisis we have synthesized is initiated by a fiscal decision in the center country for a real budget deficit, financed by seignorage and inflation-tax revenues. Excess real money balances induce substitutions by private sectors against money in favor of wealth in other forms and perhaps of consumption. Unbalanced portfolios induce substitutions by small monetary systems against international reserves in favor of claims on domestic wealth, and they may induce changes in the relative price of the center currency. The crisis is a real phenomenon. However, it could not happen except for one capitulation to money-illusion, the "low" interest-rate policy of the center's monetary authority. That policy prevents the diversion of (T) away from monetary systems and the monetary base.

II. Bretton Woods in Bloom: 1958–65

In this section, we undertake an informal analysis of international monetary experience, applying the model of the preceding section. The analysis relates to just the United States and eight "small" countries. It covers the period when monetary experience was serene, 1958-65, and when only a few factors were in sight that might disturb that serenity. Table I provides a few insights into the real and monetary contours of the period.

Growth in real incomes and in trading during these years induced growth in real money demanded: the velocity data suggest that the growth rate of real money balances exceeded the growth rate of real income in most cases. This meant, of course, that the international monetary system was realizing efficiency gains from money-deepening. Stability of nominal rates of interest suggests that demand for real money was not damped by accelerating inflationary expectations. Such expectations were missing, of course, because monetary authorities, including the United States as center and others as satellites, constrained growth of nominal money to modest levels. Demand - pull by money - holders for monetary expansion was being accommodated by monetary authorities at essentially stable price levels.

Patterns of change in portfolio preference among monetary systems, between international reserves and domestic credit, are suggested in Table II.

Table I
Growth Experience in Nine Countries: 1958-1965[1]

	United States	Belgium	Canada	France	Germany	Italy	Japan	Nether-lands	Switzer-land
					Growth Rates of Nominal Money				
1958-61	1.7	3.5	5.8	10.8	11.1	12.2	16.1	6.8	8.7
1962-65	3.3	7.6	9.0	13.1	8.9	13.6	19.4	8.7	8.4
					Growth Rates of Real GNP				
1958-61	2.4	2.9	3.0	5.2	7.7	6.5	11.0	4.0	4.6
1962-65	5.6	5.2	6.3	6.0	5.0	4.5	8.8	5.4	4.8
					Growth Rates of GNP Deflator				
1958-61	1.8	1.0	1.3	6.1	2.9	1.7	3.3	2.2	2.9
1962-65	1.5	3.4	2.2	4.3	3.9	6.1	4.5	5.5	4.7
					Change in Money's Velocity				
1958-61	+	+	−	+	−	−	−	−	−
1962-65	+	+	−	−	0	−	−	+	+
					Growth Rates of Imports				
1958-61	2.3	5.2	0.1	2.0	9.8	9.2	7.9	5.5	8.4
1962-65	10.3	11.4	8.8	11.7	12.4	9.0	8.9	10.1	8.1
					Government Bond Rates of Interest (end of year)				
1957	3.5	6.0	4.2	5.9	7.5	6.8	8.4	4.6	3.6
1961	3.9	5.9	5.1	5.1	6.0	5.2	7.3	3.9	3.0
1965	4.2	6.4	5.2	5.3	6.7	6.7	5.5	5.2	4.0

[1]Federal Reserve Bank of St. Louis, *Rates of Change in Economic Data for Ten Industrial Countries*; International Monetary Fund, *International Financial Statistics*.

Table II[1]
Ratios of Foreign Assets to Domestic Credit in the Monetary Systems of Nine Countries: 1958-1961 and 1962-1965

	1958-1961	1962-1965	1958-1965
United States	9.2%	5.6%	
Belgium	37.3	29.8	
Canada	17.2	20.3	
France	8.6	17.8	
Germany	21.3	16.1	
Italy	16.3	10.8	
Japan	4.0	1.6	
Netherlands	85.0	64.6	
Switzerland	25.6	23.1	
Average excluding United States	26.9	23.0	25.0%

Source: *International Financial Statistics*. The percentages are four-year averages of end-of-year data.

Monetary systems of the small countries supplied growth domestically in nominal money by acquiring both foreign assets, primarily gold and U.S. dollars, and domestic assets. Evidently there were substantial differences among countries in their relative tastes for reserves, on the one hand, and claims against domestic wealth, on the other. At the extreme, Japan may have economized on reserves because its growth rate of output and, correspondingly, rates of return on domestic wealth were high, while The Netherlands, facing lower opportunity costs of holding reserves and having a higher proportion of imports to national output, preferred a lower (r^o). Between 1958-61 and 1962-65, there was a small shift, on the average, away from reserves. However, since the only significant adjustment in a foreign-exchange price of U.S. dollars during the second interval was positive (Canada), appreciating the U.S. dollar, one does not sense a growing aversion to reserves.

The role of the United States, as center of the

international monetary system, is indicated in Table III.

Growth in permanent income, imports, and real money balances induced demand by small countries for international reserves, and the United States responded by export of $15.6 billion, 60 percent of it in gold and the remainder in liquid external liabilities. Catering to demand abroad for reserves, the United States permitted its own reserve base of gold to erode. The vehicle for international reserve transfers was, of course, the international balance of payments. Net demands by small monetary systems upon the United States for reserves were associated, during 1958-65, with net demands upon the United States for goods and services. Economic growth abroad and military objectives as well required not only an input of high-powered money but an input too of goods and services for consumption and investment. Inevitably these net demands for reserves, goods, and services were associated with net supplies, through "bond" markets, of securities to the United States. Demand for these securities in the center country is explained by the relative attractiveness of investment opportunities abroad that one can sense in the relatively high growth rates of output and income there and in the relatively high rates of interest on government bonds. Growing demands for real money, reserves, and goods abroad were financed by growing supplies of securities to the center.

Deficits and debt-issues of the American federal government supplied to the Federal Reserve, through its open-market operations, the assets that it demanded in replacement of gold lost to abroad ($9.4 billion) and the assets that it demanded for creation of domestic currency and reserves of commercial banks in this country ($9.5 billion). They supplied, too, growth of $6.2 billion in reserves of small monetary systems. Some $25 billion of debt were floated by the Treasury of the United States to domestic and foreign monetary authorities, $15 billion to other lenders: interest-rate policies of the Federal Reserve did not preempt, for the portfolios of monetary authorities, the entire issue of Treasury debt. One notes that there was no upward drift of fiscal deficits during 1958-65. Demands for money, gold, and debt of the United States government were stimulated by growth of the world's economy, and the demands were satisfied at relatively stable prices for goods, securities, and foreign exchange.

The smooth accommodation of world monetary expansion to economic growth yielded a variety of gains in economic efficiency. For one, stable expectations regarding price levels and foreign-exchange rates encouraged the use of dollars as a vehicle for settlements in world

Table III[1]
International and Fiscal Position of the United States: 1958-1961 and 1962-1965
($ billions)

	1958-1961	1962-1965	Total
International			
Change in international reserves	−6.1	−3.3	−9.4
Change in external liquid liabilities to monetary authorities and governments	2.7	3.5	6.2
Total export of reserves	8.8	6.8	15.6
Fiscal			
Deficits of the federal government	18.3	19.4	37.7
Increase in debt of the federal government	25.0	14.2	39.2
Monetary			
Federal Reserve purchases of federal debt	6.0	12.9	18.9

[1]*International Financial Statistics.*

Table IV[1]
Growth Experience in Nine Countries: 1966-1973

	United States	Belgium	Canada	France	Germany	Italy	Japan	Nether-lands	Switzer-land
				Growth Rates of Nominal Money					
1966-69	5.4	5.5	9.7	6.4	6.4	14.2	15.7	8.2	7.4
1970-73	6.3	10.2	14.3	9.0	9.5	21.3	23.0	12.8	10.2
				Growth Rates of Real GNP					
1966-69	4.1	4.3	5.4	5.7	4.4	6.2	12.5	4.2	3.6
1970-73	3.7	5.2	5.2	5.8	4.1	3.8	9.1	5.8	4.7
				Growth Rates of GNP Deflator					
1966-69	3.7	3.7	4.0	4.3	2.6	2.7	4.2	4.8	4.0
1970-73	4.7	6.0	5.1	5.9	6.8	7.4	7.1	8.0	7.8
				Change in Money's Velocity					
1966-69	+	+	−	+	+	−	+	+	+
1970-73	+	+	−	+	+	−	−	0	+
				Growth Rate of Imports					
1966-69	13.6	11.4	12.7	13.9	9.3	14.0	16.4	10.3	9.4
1970-73	18.2	21.7	15.5	21.2	21.6	22.2	26.4	22.4	21.7
				Government Bond Rates of Interest (end of year)					
1965	4.2	6.4	5.2	5.3	6.7	6.9	5.5	5.2	4.0
1969	6.1	7.2	7.6	7.6	6.8	6.9	6.3	7.5	4.9
1973	6.3	7.4	7.6	8.3	9.3	7.4	9.0	7.8	5.6

[1]Federal Reserve Bank of St. Louis, *Rates of Change in Economic Data for Ten Industrial Countries*; International Monetary Fund, *International Financial Statistics*.

trade: economies of a common currency were realized. Again, growth in international capital flows at stable price levels and exchange rates induced substantial reform in the capital markets of small countries, presumably with greater efficiency of allocation for savings in the monetary area. Third, a market developed among savers in small countries for non-monetary claims against American financial institutions. This country performed as a financial intermediary, buying foreign investments at risk and absorbing foreign savings in its own issues of assets that appeared to be safer, at stable foreign-exchange rates. Fourth, stable monetary growth, investment opportunities in small countries, and imperfections of capital markets there opened the Eurodollar route to better savings allocations. Some dollar payments to abroad did not accumulate in reserve bases of monetary systems. Instead, private holders deposited them with commercial banks, where they provided the reserve base for Eurodollar loans and a superstructure of term deposit accounts.

There were a few clouds in the generally clear skies of 1958-65. Each represented a problem of portfolio distortion. There was potentiality of excess demand for gold in monetary portfolios, but steps were taken to satisfy this demand by isssuance of SDR's. There was concern in some small countries that the flow of their securities to the United States, in payment for goods as well as for monetary reserves, would compromise too much national ownership of

national wealth. It worried the United States that capital outflow would impede domestic capital accumulation and impose unacceptable losses of gold. It is not clear that American authorities understood the role of fiscal deficits and of capital outflows in satisfying external demands for money and for monetary reserves.

III. Bretton Woods Plowed Under: 1966–73

In this second interval, the United States sharply increased (e), the growth rate of its real fiscal debt, and (t), its supply of government debt to monetary reserves. Moreover, it adopted a number of inefficient interventions in flows of international trade and payments. The only possible outcome was collapse of the international monetary system.

Table IV, an extension of Table I, reports a few aspects of 1966-73.

There is no mistaking the acceleration of growth, from 1958-65 to 1966-73, in nominal money for all countries, save Germany, represented in Table IV. At the same time, growth rates of real GNP were giving little or no lift to growth in real money demanded, and paths of interest rates indicate that inflationary expectations were damping demand for real money. On balance, money's velocity rose. The only possible outcome, of course, was higher rates of growth in GNP deflators. During 1966-73, demand-pull upon growth of nominal money at stable prices was diminishing. Supply-push took over, with faster inflation the result.

Faster growth in nominal money emanated from both satellite countries and the center. For the former, as Table V suggests, there was a notable shift of portfolio preference away from reserves to domestic credit: desired and actual (r°) increased. It is useful to compare Tables V and II.

Data for money's velocity tell us that private sectors in small countries were economizing on real money balances, shifting to other forms of wealth. The data of Table V tell us that monetary systems in small countries were trying to economize on international reserves—and succeeding. Both low-powered and high-powered money were in disfavor: the growth rate of ($\overline{m}_d^{\circ}$) declined and the growth rates of desired and actual domestic-credit ratios increased. The latter cannot be explained by the paths of permanent income and imports. The explanation must be expectations of decay in the dollar's foreign-exchange value and resistance against the flow of seignorage and inflation-tax revenues to the United States.

Distaste for international reserves, on the part of small countries, is attested by declines in the

Table V[1]
Ratios of Foreign Assets to Domestic Credit in the Monetary Systems of Nine Countries: 1958-1973
(percent)

	1966-1969	1970-1973	1966-1973	1958-1965
United States	3.7	2.3	3.0	7.4
Belgium	21.3	19.8	20.5	33.6
Canada	18.2	17.6	17.9	18.6
France	11.1	5.9	8.5	13.2
Germany	13.8	13.9	13.8	18.7
Italy	10.5	5.7	7.1	13.5
Japan	1.8	4.4	3.1	2.8
Netherlands	30.6	26.7	28.7	74.8
Switzerland	20.4	20.8	20.6	24.4
Average excluding United States (unweighted)	16.0	14.3	15.1	25.0

[1]*International Financial Statistics*. The percentages are averages of end-of-year data.

ratios of foreign assets to domestic credit. It is attested also by extensive adjustments in foreign-exchange rates for the dollar during 1966-73. Each of the eight countries in Table V reduced the price of the dollar in terms of the domestic numeraire. Germany was the first, in 1969. Canada and The Netherland followed in 1970. The others revalued repetitively in 1971-73. The portfolio shift against dollars became a flight. It will be recalled that, during 1958-65, changes in the prices of dollars were few and all but one were positive. In the earlier years, (r^o) and (f) were stable, while in the later years (r^o) rose and (f) fell.

Table VI, an extension of Table III, bears on the role of the United States in the inflation of 1966-73. It explains in broad terms the growth of (t) that small countries attempted to resist.

Deficits and debt of the American federal government increased by roughly the same order of magnitude during 1966-69 as during the eight years 1958-65, but these increases were modest in comparison with those of 1970-73 when growth of both (e) and (p^w) accelerated. All of the growth in federal debt found its way into portfolios of monetary authorities during 1966-73, with the Federal Reserve absorbing $43 billion and foreign authorities $51 billion. Private sectors wanted none of it at the monetary authorities' support prices. Aside from its exports of federal debt, the United States shipped to its satellites close to $3 billions in gold and SDR's. Additional increments to high-powered money abroad as well as in this country included growth in balances of SDR's, from initial allocations, and capital gains on gold stocks as official prices of gold increased. "Avalanche" is rather too mild as a description of growth that occurred in reserves of the world's monetary system.

One criterion of efficient monetary policy in a center country is moderation in the average growth of reserves that it supplies. The United States satisfied this criterion in 1958-65 and violated it in 1966-73. A second criterion is stability in the growth rate of reserves. The United States satisfied this criterion in 1958-65 and violated it in 1966-73. During the two intervals of eight years each, average annual increases of America's external liquid liabilities to monetary authorities and governments were, successively, $8 billion and $16 billion. The average annual deviations from mean growth of external liquid liabilities were, successively, 40 percent and 68 percent. Stop-go policies in the United States during the later interval produced

Table VI[1]
International and Fiscal Position of the United States: 1958-1965 and 1966-1973
($ billions)

	1966-1969	1970-1973	Total 1966-1973	Total 1958-1965
International				
Change in international reserves	−1.5	−2.6	−4.1	−9.4
Change in external liquid liabilities to monetary authorities and governments	0.6	50.8	51.4	6.2
Total export of reserves	2.1	53.4	55.5	15.6
Fiscal				
Deficits of the federal government	34.4	63.5	97.9	37.7
Increase in debt of the federal government	23.0	65.5	88.5	39.2
Monetary				
Federal Reserve purchases of federal debt	16.1	26.6	42.7	18.9

Source: *International Financial Statistics.*

an erratic pattern of growth in international reserves, money supplies, and actual relative to desired levels of (r^o). It may be a fair presumption that the collapse of Bretton Woods reflected, in part, an attempt by small countries to escape not just the escalation of monetary reserves but instability in growth of reserves and in the impact of monetary pressures on growth in price levels and output as well.

It is a third criterion of efficient monetary policy that the monetary authorities abstain from specific interventions in various markets as ways of preventing or undoing damage done by policies affecting money. This criterion was violated with increasing frequency by both the United States and the small countries during 1966-73, and awkward results of the specific interventions appear to have been one more reason for the demise of the Bretton Woods. The intervention that comes first to mind is the imposition of price controls, through successive "phases," over goods and labor in the United States from 1971. Its monetary effects are patent in equations (13) and (14), written for this country only:

$$(13)\quad m_s^u - p^{uc} = \bar{m}_d^u + \bar{m}_d^{ui}$$

$$(14)\quad p^{uc} = p^u - p^{ur}$$

m_s^u = rate of growth in nominal money.

$\bar{m}_d^u$ = rate of growth in real money demanded.

$\bar{m}_d^{ui}$ = rate of growth in excess real money balances.

p^u = rate of inflation without price controls.

p^{uc} = rate of inflation with price controls.

p^{ur} = repressed inflation.

Fiscal and monetary policy, without price ceilings, would have produced a rate of inflation (p^u). Interventions reduced the rate of inflation temporarily to (p^{uc}), and repressed inflation was (p^{ur}). At ceiling prices, real money balances demanded increased at the rate of ($\bar{m}_d^u$). Because real money balances supplied increased even faster, involuntary holdings increased at the rate ($\bar{m}_d^{ui}$). Repressed inflation and excess real money are twin aspects of the same distortion. Of course, growth in real money demanded was reduced by price controls accordingly as they inhibited growth in real income.

Inevitably, given the pace of growth in nominal money, the interventions in goods and labor markets failed. When they were withdrawn, step by step, money-holders set about to eliminate undesired real balances by spending them. Then, of course, inflation repressed became inflation realized. This burst of growth in the price level must have done its bit to diminish growth in real money demanded, so that inflation realized overcompensated for repression. The mean rate of inflation has been higher since 1970 than it would have been in the absence of price and wage controls.

Federal Reserve administration of Regulation Q was another destabilizing intervention. When rapid growth in monetary reserves and domestic-credit ratios generated inflation, expectations of inflation, and rising open-market rates of interest, ceilings upon deposit rates in the United States generated substantial flows of short-term capital, private and governmental, to small monetary systems and the Eurodollar markets. The accumulations of dollar claims abroad were sensitive not only to interest-rate differentials but also to anticipations regarding change in foreign-exchange prices of dollars. They shifted between countries and, within any one country, between central bank and commercial banks. Administration of Regulation Q aggravated instability in the Bretton Woods regime.

Other interventions were applied on markets for goods, capital and foreign exchange by both the center and its satellites. There were "voluntary" credit restraints on capital exports, interest equalization taxes, discriminatory taxes and deposit-rate regulations on capital imports, two-tier foreign-exchange markets for current and capital transactions, and other specific measures

to cope with the general malaise of monetary instability. Authorities of small monetary systems speculated overtly on the foreign exchanges. The result, of course, was to sacrifice gains in efficiency that had emerged from monetary unification under Bretton Woods. As these gains were sacrificed, the social benefit of staying with stable exchange rates and tolerating unstable inflationary pressures evaporated.

As one reviews the sorry tale of Bretton Woods, he may wonder why the small countries stayed with the regime as long as they did. One answer might be a stubborn faith of monetary authorities in some small countries that the balance-of-payments constraint, imposed by a fixed foreign-exchange price for the dollar, would inhibit virulent domestic pressures toward inflation. These authorities may have chosen the lesser of two evils, imported inflation rather than indigenous inflation. Another answer might be that export sectors in small countries were opposed to revaluations of domestic currencies against the dollar. If some small countries did have selfish interests in staying with Bretton Woods, why should the burden of guilt for world inflation be put upon the United States? The appropriate rejoinder seems to be, "Why is credit due to the United States for exploiting the gullibility and vulnerability of its trading partners?"

IV. A Sequel to Bretton Woods

A dour pessimist might generate a bleak forecast of inflation for the United States, using an adaptation of the model in Section I. With no change in its fiscal-monetary policies, the United States could release within its own boundaries the inflationary pressures that were absorbed, under Bretton Woods, by growth in demand for dollar reserves worldwide. The result would be inflation here at rates faster than the rates of 1970-73.

In the new world of floating foreign-exchange rates the singular inflation paths, we may suppose, (t^o) falls to zero and each small country selects some domestic asset, with growth rate (x), as the monetary base. Then price levels for the United States and any small country, (p^u) and (p^o), behave as follows:

$$(14)\quad p^u = \left(\frac{t + d(r^u)}{1+r^u}\right) - \bar{m}^u_d$$

$$(15)\quad p^o = \left(\frac{x + d(r^o)}{1+r^o}\right) - \bar{m}^o_d$$

Growth of the foreign-exchange rate is the link between "local" inflation rates:

$$(16)\quad \dot{f} = p^u - p^o$$

The growth rate of (t) depends on the real expenditure objectives of government in the United States and on the rate selected for the inflation tax (p^u). If (t) is no less in the new regime than in the old, the level of (p^u) can be notably higher. No longer is there growth demand abroad for some part of (t^o) of (t). No longer is growth abroad in real money demanded a "leakage" for (t). The full force of fiscal-monetary indiscretion hits the American monetary system, its price level, and the price of dollars on the foreign exchanges.

FOOTNOTES

1. Country weights may change over time if real growth rates differ between countries. If the satellite is Japan and the United States is the center, (s^o) rises and (s^u) declines. Then a larger share of growth in nominal and real money accrues to the satellite. The formal analysis here neglects the role of international balances of payments in changing allocations of growth in nominal money.

2. A "small" disturbance may be initiated by a satellite. Its portfolio preference may shift from reserves to domestic credit: it prefers to direct more of national savings to domestic wealth and less to reserve accumulation and so to finance of the center's fiscal deficit. The effect is to repel reserves from the satellite to other parts of the monetary community, to raise the average level of (r^o) of domestic credit ratios, and to increase the world growth rate of nominal money. Assuming a constant growth rate of reserves (t), one can indicate the expansionary impact in this adaptation of equation (3):

$$d(m_s^w) = \frac{d(r^o)}{1+r^o}$$

An increase in any (r^o) would be damped, one imagines, by a subsequent increase in imports (v^o) that would shift portfolio preference in the small country back toward reserves. In the context of stable monetary policies by the center country and other satellites, the one small economy is unlikely to change its desired domestic credit ratio substantially.

It is imaginable that a "large" disturbance of the world's money supply could be touched off by simultaneous impulses in a number of small countries. Their monetary authorities would set targets for (r^o) above actual levels, inducing domestic excess supplies of reserves and excess demands for goods and securities. Their excess supplies of reserves would spill into the monetary systems of other small countries and of the center country. Then actual levels of (r^o) would rise to the target levels. In time, the disturbance would be absorbed in higher growth rates of the world's money supply and price level. Of course, the disturbance might have a deflationary tilt, with desired domestic-credit ratios falling relative to existing ratios. Then reserves would be drawn to the economies that express demand for reserves and, unless other economies simultaneously increased their desired domestic-credit ratios or unless the center increases the growth rate of reserves, growth rates of the world money supply and price level would decline.

3. A "large" disturbance could also originate on the market for money rather than on markets for reserves and domestic credit. For whatever reason, perhaps an increase in the growth rates of real income, accelerated growth in real money demanded could impose excess demand for money. The result would be a decline in the inflation rate, accompanied by more or less prolonged instability in output and employment, unless monetary authorities responded to the public's "demand-pull" with faster growth of the money supply. For stability of the inflation rate, the appropriate response, of course, is an increase in (t) or (r^o) that adjusts (m_s^w) to ($\overline{m}_d^w$). If monetary systems in small countries prefer not to increase domestic-credit ratios, perhaps because of concurrent growth in international trading, the center authority should acknowledge its critical role by raising (t) or (r^u) or both. Either instrument of world monetary control can clear excess demands for money and reserves, provided that no special obstacles are put in the way of adaptative adjustments in international balances of payments.

A "large" disturbance can originate in markets for goods as we know from the petroleum episode of 1973-74. One effect is to reduce the growth rate of income (y) and of real money balances demanded ($\overline{m}^d$) in petroleum-importing countries and, as a result, to generate excess supply of money with potentialities for accelerated inflation. In principle, growth in real money demanded by petroleum exporters could sustain monetary equilibrium on the initial price-level path, but that would be an improbable coincidence. OPEC might prefer monetary reserves so that, given (r^o), the world would be threatened with a deflationary episode. One solution would involve an increase in (t) by the center monetary authority. Since OPEC demand for reserves could be unstable, the preferred solution may be to supply OPEC or any comparable oligopolist with a non-monetary financial asset. Then the outcome would be some increase in the world's inflation rate and some transfer of the world's non-monetary wealth.

4. The primary debt of the center's fiscal authority (T) is an obvious source of fiscal revenues. Disposal of (T) into portfolios of the world's monetary system yields seignorage to the center's fiscal authority. If the monetary expansion exceeds growth in real money demanded, there are revenues from an inflation tax. These revenues are a temptation to fiscal-monetary indiscretion in the center country when government expenditures have risen along a steep incline and when there is resistance to increases of conventional tax bases and tax rates as well as to increases in interest rates paid on (T). They flow not from domestic money-holders alone but also from money-holders in small countries whose monetary systems accumulate (T) through international balances of payments with the center.

Collection of seignorage and the inflation tax by the center need not be deliberately exploitative. Fiscal deficits may be financed initially on the security markets of the center. The increments of (T) may flow to the center monetary authority when interest rates are driven above its target levels. Then monetary expansion in the center induces the disequilibria in markets for goods and securities which drive abroad the share of growth in (T) that small monetary systems desire on the higher expansion path of the world's money supply. The fiscal authority of the center issues debt and the center monetary authority, abiding by a policy guideline without exploitative intent, collects domestically and abroad the revenues of seignorage and the inflation tax.

5. If growth in (T) is sustained and accelerated, resistances develop. Monetary authorities in small countries may express preference for transfers of gold from the center in substitution for transfers of (T). One expects the center monetary authority to respond by closing its "gold window." Small countries may demand higher interest compensation from the center for their portfolios of (T) so that the center receives smaller flows of seignorage and inflation-tax revenues. Authorities, both in small countries and the center, may impose micro-interventions that tend to inhibit growth in real incomes. These can include specific controls over trade in goods, securities, and foreign exchange. Their net monetary effects, through reductions in ($\overline{m}_d^w$) are inflationary.