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**THE MONETARY APPROACH TO THE BALANCE OF
PAYMENTS: A REVIEW ARTICLE**

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The monetary approach to the balance of payments (MABP) has spawned a literature rivaling -- in pages per year -- that in the early days of the neoclassical growth model or the search models of unemployment. No one specializing in macroeconomics or finance who has a due regard for the division of labor or value of time would possibly attempt to keep abreast of this burgeoning stream.¹ And yet the questions nag: What are the essential elements of the approach and to what extent must they be incorporated in our models. The recent publication by Jacob Frenkel and the late Harry Johnson [5] of a proposed locus classicus for the MABP provides the occasion to consider these questions in some depth.

Strong parallels can be drawn with the history of neoclassical growth theory: Both literatures began with the discovery or rediscovery of a simple but important error in standard theory. The literature using this point then exploded and the point got lost in considering nearly all possible combinations of subsidiary assumptions. The theory ran far beyond its empirical base and publishability seemed to be judged on aesthetic grounds rather than on informativeness about the real world.² For the MABP, the matrix of possible combinations is nearly complete and continued production of sterile exercises must be near an end. Unfortunately, this will probably be followed by some years of disrepute for the MABP until younger economists can begin unselfconsciously to use its essence where appropriate.

This unfortunate state of affairs may be laid to the methodology of the MABP's founding fathers Harry Johnson and Robert Mundell. Both have displayed a distaste if not hateur for "getting one's hands dirty with empirical work" and this has been transmitted to their students. The remarkable fact is that all

of the essays in the Frenkel and Johnson volume are by economists associated with the Workshop in International Economics at the University of Chicago. While other economists have raised the MABP torch, the core group consists of Johnson, Mundell, and their students and present or former colleagues.

Before turning to substantive issues, the potential reader of the Frenkel and Johnson volume should be warned that it is impossible to read within a short span of time. This is not because of the difficulty of the material, but because of its tedious repetitiveness. The essential ideas are to be found in Chapters 1, 2, 6, 10, 13, and 16.³ The rest can be skimmed or left for reference for specific points.

Four central themes of the MABP are discussed in section I: (1) the balance of payments is an essentially monetary phenomenon best analyzed in terms of the supply of and demand for money, (2) the law of one price or international commodity arbitrage, (3) the balance of payments is a stock adjustment process not a flow equilibrium, and (4) the money supply is endogenous under fixed exchange rates and monetary policy is limited to determining the balance of payments. The system equilibrium is explored in section II with particular emphasis on the role of the reserve-currency monetary authority in providing a system constraint. In section III, I return to the theme of what insights from this literature can be used by the specialist in macroeconomics or finance.

I. Central Themes

A number of fine integrative expositions of the monetary approach to the balance of payments already exist. Notable among these are two articles by advocates of the MABP contained in the Frenkel and Johnson volume. The introductory essay by Frenkel and Johnson stresses the place of the MABP in the broader literature while Johnson's "The Monetary Approach to Balance-of-Payments Theory"⁴ is the classic exposition. Marina Whitman [17] provided a remarkably evenhanded general survey. The empirical studies have been considered by Stephen Magee [9]. These expositions need not be replicated here; they can be referred to should the analytical details of the themes discussed here be desired.

The core idea of the MABP "can be summarized in the proposition that the balance of payments is essentially a monetary phenomenon."⁵ This statement is easily misinterpreted -- and it has been by both the critics and the advocates of the MABP.⁶ Properly the proposition involves questions of policy relevance, theory, and empirical judgement.

It is conceivable that we could explain the balance of trade in pins with an elegant theory and an R^2 (adjusted) of .999, but no one would really care. The balance of payments reflects changes in the monetary authority's holdings of foreign reserve assets and is a channel by which the domestic excess demand for money can affect the supply of money.⁷ So the balance of payments is indeed an interesting variable for national policy.

The theoretical point is that the balance of payments is the prime means for the private sector of an open economy to adjust money supply to money demand. So we can explain the excess demand for money and hence the balance of payments by the determinants of the supply of and demand for money. By Walras' Law, one might instead examine the excess demands of the items above the line (goods and securities) but as is asserted by advocates of the MABP that it is analytically

simpler and less error-prone to concentrate on the monetary sector.

The assertion that the monetary account is a superior engine of analysis rests on an empirical judgement that the demand for money is a stable function of variables either not affected or affected in a predictable way by the changes of concern. This implies that other factors which dominate the balance of trade cause offsetting movements in the capital account and so do not affect the monetary account. Instead factors such as price levels and money supply which are relatively trivial in terms of determining variations in individual above-the-line accounts are important for their total and hence the balance of payments. Whether that is true depends in part on the stability of the money demand function. But it also depends on what are empirically interesting problems.

With three markets it is not obvious that the general equilibrium values of the money-demand determinants (real income, price level, and interest rate) will behave in easily predictable ways. An important subsidiary theme -- the "law of one price" -- arose to eliminate this uncertainty. There are more and less extreme versions, but the dominant assumption in the Frenkel and Johnson volume is that the price of tradable goods is determined even in the short-run as the product of the exchange rate and foreign price of tradable goods. The presence of transportation costs, tariffs, and the like is admitted but treated as a constant factor of proportionality which can be abstracted from. In full equilibrium relative prices are not affected by monetary shocks such as a devaluation, change in foreign prices, or change in domestic credit;⁸ so the general price level is determined by the law of one price.

The law of one price has received severe empirical criticism despite some early attempts⁹ to show that variations in inflation rates among countries on fixed exchange rates are no greater than among cities within a country. These results would appear to depend on the higher sampling error in city than national

price levels and have not been generally convincing. Branding of goods and changes in transportation costs and trade restrictions all seem to provide significant slippage between the growth rates of the domestic price and the exchange rate times the foreign price.

More recently the law of one price has been abandoned by such major writers in the monetary approach as Dornbusch ([4], p. 260). While purchasing power parity is assumed to hold in the long-run, short-run adjustments are assumed in the recent MABP literature to depend on interest arbitrage in the asset markets. The assumption is made "that on a covered basis domestic and foreign assets are perfect substitutes."¹⁰ On this assumption, the domestic and world interest rates, say r and r^* , are related by the expected depreciation implicit in the forward exchange rate for the corresponding period:

$$(1) \quad r = r^* + \frac{\hat{e} - e}{e},$$

where e is the spot rate in units of domestic currency per unit of foreign currency and \hat{e} is the forward rate. It is usually assumed that r^* is fixed, so that the analysis turns on moving r , e , and \hat{e} .

While the asset arbitrage assumption is superior to the law of one price, it too faces an incipient attack as to whether the market in fact treats covered foreign and domestic assets as perfect substitutes. Further the whole question of expectations formation is opened here which pretty thoroughly eliminates any easily predictable effects on the determinants of money demand. So while the MABP writers have been correct in stressing the value of a general equilibrium analysis, it is not clear that they have successfully developed an empirically useful one themselves.

A third theme is to view the balance of payments as reflecting a stock adjustment process. Since the balance of payments is the rate of change in the

monetary authority's stock of foreign reserves, it reflects changes in the equilibrium stock of reserves. These changes may be of two types: (1) balanced growth and (2) disturbance to equilibrium.

A country which has growing income, trade, and demand for money will want to hold a fraction¹¹ of the increase in high-powered money as foreign reserves. It can do so by providing only the remainder of equilibrium high-powered money by domestic credit creation so that the desired amount of reserves flows in automatically as a balance of payments surplus. This stock adjustment will proceed normally over time and requires no disequilibrium in money demand and supply or relative price levels to accomplish. This then provides a normal level of balance of payments surplus for demanders of international reserves and a normal balance of payments deficit for suppliers of international reserves.

Disturbances to a balanced growth equilibrium can arise from numerous causes. Devaluations, tariffs, and autonomous changes in domestic credit have been popular cases in the literature. Each disturbance implies a certain cumulative balance of payments relative to normal to return to balanced growth equilibrium. For example, if a small country increases its high-powered money by an abnormal \$10 million-worth domestic credit increase, this will not affect the (long-run) real demand for money or price level or money multiplier, so \$10 million worth of reserves must flow out of the country to reestablish equilibrium. If it takes two years, this means the balance of payments surplus would average \$5 million per year less than normal during the adjustment period.

Since the effects of most international shocks on the goods market can be adequately predicted in the long-run (often as nil), the MABP does provide or remind one of the long-run determinants of the balance of payments and cumulative effects which must be met by any short-run adjustment process to shocks. This can be combined with models of capital flows in the neoclassical growth of an

open economy,¹² to obtain the breakdown of the above-the-line capital and trade accounts with the trade account the residual. The short-run transmission mechanism and adjustment process remains an unsettled issue among MABP writers.

A fourth and final major theme concerns the role and possibilities of monetary policy, particularly under fixed exchange rates. Early writers in the monetary approach generally assumed that the monetary authority neither could nor did sterilize the effects of the balance of payments on the nation's money supply.¹³ The idea is that if the money supply exceeds money demand, any attempt to offset the fall in money supply resulting from balance of payments deficits will lead to a greater balance of payments deficit. So it is either impossible or improper to sterilize the effects of the balance of payments on the money supply. Thus the only possible role for monetary policy in a small open economy is to choose domestic credit growth so as to obtain the desired balance of payments. This quite different path yields precisely Robert Mundell's [12] old result: Use monetary policy for external balance and fiscal policy for internal balance.

While all the MABP long-run results follow so long as sterilization is incomplete, it does make a big difference for the short-run which macroeconomist customarily consider whether the money supply of even fairly small countries is controllable and influenced by domestic factors in the short-run.¹⁴ If the money supply is controllable in the short-run, it is possible to select the trend growth path of the money supply to correspond to that required to maintain purchasing power parity and to vary the money supply around this growth path for contracyclical or other purposes.

Swoboda¹⁵ is aware that this possibility arises for large countries and for countries with sizable nontraded sectors and imperfect capital mobility. He tends to dismiss this possibility because it is inappropriate to Meade's dilemma cases of balance of payments deficit and high unemployment and vice versa.

However the dilemmas arise because an inappropriate trend growth path of the money supply is selected. So this hardly seems a damning problem.

A serious objection is that most of the interesting results of the MABP depend on the fixed exchange rate assumption. Johnson and Frenkel contend that this change is a red herring because (1) most countries still maintain parities with one of the major currencies and (2) under floating exchange rates the MABP becomes the monetary approach to exchange rate determination.¹⁶ The first defense depends on the weighting which one puts on different countries and is rather besides the point. The second defense is formally correct but does not demonstrate that any interesting new results are found.

Perhaps the problem is that the received literature on flexible rates is of higher average quality than that dealing with fixed exchange rates -- although there were the "elasticity pessimists" -- but the monetary approach literature has not added much value there. Milton Friedman's (1953) argument for flexible exchange rates in order to give the monetary authority control over the money supply was well known. That each country's money supply then determines its price level and purchasing power parity the exchange rate hardly rates as a new or radical idea. In fact the kernel of the MABP is just the other side of Friedman's coin although citations to Friedman are scanty indeed throughout the MABP literature.¹⁷ Perhaps the main contribution of the monetary approach to the exchange rate is reemphasizing that the exchange rate is an endogenous variable jointly determined with the price level and that changes in the floating exchange rate are not therefore a separate cause of inflation.

A more basic problem is the failure to distinguish between fixed exchange rates and pegged exchange rates.¹⁸ It is frequently argued that a devaluation provides no lasting remedy for a balance of payments deficit unless the growth rate of domestic credit is cut. The reason is that a devaluation creates a

temporary excess demand for money which is met by an inflow of reserves. But once the excess demand is satisfied, the balance of payments will return to its normal value determined by the growth of domestic credit relative to the growth of demand for high-powered money. But a policy of periodic devaluations in which reserves are built up just after one devaluation to be drawn down before the next is a viable if not universal approach among countries which maintain parities. It is an alternative to floating exchange rates which makes it possible for the monetary authority to have complete control over the money supply in both the short-run and long-run via sterilization. The advantages of having pegged rates almost all the time must be weighed against the costs of induced speculative attacks and unfortunate shifts in the prices of tradable good relative to nontradable goods. But the availability of the option to repeatedly change pegged rates implies that the limitations on monetary policy under fixed exchange rates derived from the MABP are strictly applicable only to such monetary authorities as the Hong Kong Currency Board or the Federal Reserve Bank of Dallas.

II. The World System and the System Constraint

For macroeconomists, the implications of the MABP for reserve currency countries are of principal importance. These received scant attention in the Frenkel and Johnson volume.¹⁹ This section will attempt to draw out those implications.

A reserve currency is one which other countries use to peg their exchange rates. Thus country 1 sets an exchange rate \bar{E}_1 in terms of the number of units of its currency which it will exchange for a unit of the reserve currency. The reserve-currency country does not offer to exchange its currency at an announced rate for that of any other currency. Consider first a fiat currency which can be exchanged at an announced rate only for fresh bills of the same currency. For our purposes let the "world" consist of a currency bloc of n countries, the n th of which is the reserve currency. Floating exchange rates insulate this world from other worlds built around other reserve currencies; so they can be ignored for now. Each of the first $n - 1$ countries holds reserves R_1 in the form of bonds issued by country n . We will consider only the long-run equilibrium for which purchasing power parity holds and real income \bar{y}_1 is fixed at any instant of time by supply conditions.

The model contains $n - 1$ purchasing power parity conditions:

$$(2) \quad P_i = \bar{E}_1 P_n, \quad i = 1, \dots, n-1.$$

Money demand is determined according to the Cambridge equation with constant long-run fluidity values $\bar{\phi}_i$:²⁰

$$(3) \quad M_i^D = \bar{\phi}_i \bar{y}_i P_i, \quad i = 1, \dots, n$$

Money market equilibrium holds in the long-run:

$$(4) \quad M_i^D = M_i^S, \quad i = 1, \dots, n$$

Money supply in each country is assumed a constant multiple $\bar{\mu}_1$ of high-powered money. High-powered money is the sum of domestic credit \bar{D}_1 fixed by the local monetary authority and reserves R_1 :

$$(5) \quad M_1^S = \bar{\mu}_1 (\bar{D}_1 + R_1), \quad i = 1, \dots, n.$$

Equation counting yields $4n-1$ equations to solve for the $4n$ endogenous variables (the P_1 's, M_1^D 's, M_1^S 's, and R_1 's). The missing equation is obtained by noting that a fiat reserve currency producer has no need for reserves since it only exchanges one unit of its money for another. So its reserves can be fixed as zero:²¹

$$(6) \quad R_n = 0$$

The world money supply and demand approach determines the world money price level by computing world monetary aggregates. The world money supply is the sum of the national money supplies converted by the exchange rates ($\bar{E}_n \equiv 1$) into their reserve currency value:

$$(7) \quad M_w^S = \sum_{i=1}^n M_i^S \bar{E}_i$$

Since real income is measured in a constant base unit of real output,²² real world money demand m_w^D is the sum of the individual real money demands:

$$(8) \quad m_w^D = \sum_{i=1}^n \bar{\phi}_i \bar{y}_i$$

The world price level in units of the reserve currency per unit of output is determined as

$$(9) \quad P_n = \frac{M_w^S}{m_w^D} .$$

Define the world high-powered money stock H_w as the sum of the national high-powered money stocks converted by the exchange rates:

$$(10) \quad H_w = \sum_{i=1}^n (\bar{D}_i + R_i) \bar{E}_i$$

The world money multiplier μ_w in principle depends on the distribution of high powered money among countries since

$$(11) \quad \mu_w = \frac{M_w^S}{H_w} = \frac{\sum_{i=1}^n \bar{\mu}_i (D_i + R_i) \bar{E}_i}{\sum_{i=1}^n (\bar{D}_i + R_i) \bar{E}_i}$$

$$\mu_w = \sum_{i=1}^n \bar{\mu}_i w_i,$$

where the weights w_i vary with the country's share in the world high-powered money supply. These weights are determined by the model in the long-run and μ_w has generally been found stable even in the short-run.

The world money supply and demand approach substitutes $\mu_w H_w$ for M_w^S in equation (9) to determine the world price level as

$$(12) \quad P_n = \frac{\mu_w}{m_w^D} H_w.$$

Taking μ_w and m_w^D as stable and independent of H_w in the long-run, the world price level is therefore proportional to the world high-powered money stock.

This approach -- it seems to me -- obfuscates rather than clarifies the determination of the world price level. Returning to equations (2) through (6), we can extract the reserve country equations:

$$(13) \quad M_n^D = \bar{\phi}_n \bar{y}_n P_n$$

$$(14) \quad M_n^D = M_n^S$$

$$(15) \quad M_n^S = \bar{\mu}_n \bar{D}_n$$

Solving for the price level, we obtain

$$(16) \quad P_n = \frac{\bar{\mu}_n}{\bar{\phi}_n \bar{y}_n} \bar{D}_n$$

Thus the reserve-currency nation's and world's price level is determined independently of any international considerations in long-run equilibrium. While equation (12) is correct, it doesn't determine the world price level. Individual country price levels are determined by equations (16) and (2) and their money supplies and reserves will adjust passively as dictated by equations (3) through (5).

This analysis indicates that the long-run effects on the world price level of domestic credit creation are strictly proportionate for the reserve-currency country and nil otherwise. This is contrary to the results of such authors as Swoboda²³ who treat world reserves as given so that the effects of open market operations depend on the weights w_1 .

The world money supply approach does have the apparent advantage of easy inclusion of Eurocurrencies -- bank deposits denominated in a foreign currency which are not normally included in any domestic money supply. But Eurocurrencies are not very important empirically²⁴ and have a tenuous role in theory. The world price level is affected only insofar as the reserve-currency country's real demand for domestic money is changed by the issuance of reserve-currency denominated deposits by foreign banks. These deposits are unlikely to be perfect substitutes and would thus be appropriately included as a determinant of the reserve-currency money demand function.

We have so far assumed that the reserve currency was a fiat currency. Instead it may be that the reserve currency is linked to a commodity such as gold. In that case it would be appropriate to suppose that the reserve-currency nation maintains some long-run desired ratio $\bar{\delta}$ of the commodity reserve to domestic credit. Thus equations (5) should be replaced with

$$(5') \quad M_i^S = \bar{\mu}_i (\bar{D}_i + R_i), \quad i = 1, \dots, n$$

$$M_n^S = \bar{\mu}_n \left(1 + \frac{1}{\bar{\delta}}\right) R_n$$

Commodity reserves now vary with the amounts bought or sold at the mint ratio. The excess private stock supply of the commodity will depend on the (world and) national price level P_n and other variables relating to nonmonetary supply and demand conditions. So we replace equation (6) with this excess supply function:

$$(6') \quad R_n = S(P_n, \dots), \quad \frac{dS}{dP_n} < 0$$

Again the world price level is determined entirely within the reserve currency nation except that the reserve ratio $\bar{\delta}$ might be affected by its reserve-currency status. If more than one country maintained reserves of the same commodity, we would have multiple reserve currencies and the world price level would be determined similarly by those countries alone.

So an examination of the system implications of the MABP for a reserve-currency country shows that there are no long-run international complications or constraints that need to be taken into account in examining that economy. Any international effects will be of the nature of a transitory shock. The constraints on the nation's monetary policy are those which it imposes on itself.

III. General Applications

The monetary approach to the balance of payments has much less relevance to specialists in macroeconomics and finance than would be supposed from reading the sweeping conclusions at the end of the typical MABP article. Still the claims have been so great that what remains is considerable.

The strongest results obtain for a nonreserve-currency country under fixed exchange rates. In the long-run, that country's price level will be determined by the price level of the reserve currency country and the exchange rate. The nominal money supply will be demand determined at whatever level is consistent with that price level. The monetary authorities must not (completely) sterilize the effects of the balance of payments on the money supply if the fixed exchange rate is to be maintained. The only long-run effect of domestic high-powered money creation via open market operations or discounting is on the amount created by exchange-rate-support operations (that is, the balance of payments).

Despite these long-run implications, even a fairly small country can exercise short-run control over its money supply for stabilization or other purposes so long as the trend money supply growth rate is consistent with long-run requirements. Significant nontradable sectors and barriers to international capital mobility provide a possible range for short-run monetary policy. In analyzing the short-run policy options of the government of such a nation, the MABP would suggest an amendment to the standard government budget identity.

Macroeconomists have found the consolidated government budget identity useful for assuring that proposed policies are feasible. The standard version is

$$(17) \quad \Delta H = G - T + rB - \Delta B$$

where H is the stock of high-powered money, G is government spending net of transfers other than government interest payments, B is the stock of government bonds, and

r is the (variable) interest rate paid on government bonds. The MABP reminds us that the monetary authority exchanges government bonds for foreign bonds and earns interest on them. Denoting the stock of foreign bonds as R (reserves) and assuming that they yield an average rate r^* , the revised consolidated government budget identity is

$$(18) \quad \Delta H = G - T + rB - r^*R - \Delta B + \Delta R.$$

In the long-run ΔH is demand determined and ΔR is the residual determined by the government's domestic credit creation ($G - T + rB - r^*R - \Delta B$) and commitment to a fixed exchange rate. In the short-run balance of payment effects (ΔR) can be sterilized by an equal change in government (gross) borrowing (ΔB).²⁵

The long-run loss of control over high-powered money and price level can be avoided by a nonreserve country either by adopting floating exchange rates or a strategy of repeated re- or devaluations. That is, abandonment of the fixed exchange rate goal allows the trend growth of the money supply to be chosen to achieve a price level goal.

A fiat-reserve-currency country, on the other hand, can choose its money supply to be whatever is desired whether in the short-run or the long. No international limitations are imposed by the MABP as extended in section II above. This is because among n countries there are only $n - 1$ exchange rates against the reserve currency and these are determined by the actions of the nonreserve central banks. Thus the reserve country's central bank is free to determine its own -- and hence the other countries' -- money supply and price level. However the reserve currency country cannot control its real balance of payments deficit defined on the official settlements basis.²⁶ This is determined by the decisions of the nonreserve countries as to how much of the real growth in their high-powered money stocks they wish to add to reserves. A measure of indirect control may be exercised if the nonreserve countries' decisions are affected by the rate of

inflation chosen by the reserve country. Since this rate of inflation will be reflected in the nominal interest rate paid on reserves, this is not a simple tax on money argument.²⁷

The recent emphasis on covered asset arbitrage opens up a new range of relations which have only just begun to be exploited for those with interests extraneous to the MABP literature. Roll and Solnik [16] have presented an analysis relating interest rate parity, purchasing power parity, and the Irving Fisher relation. John Makin [10] used the covered interest equation (1) in a theoretical examination of the Darby [2] effect of taxes on inflationary interest premiums. Makin's argument and the standard interest arbitrage equation itself are tainted to the extent that individuals face different "effective" tax rates on domestic interest, foreign interest, and exchange rate gains. This issue and that of exchange control risk must be resolved analytically and empirically before covered "arbitrage" can serve as a standard part of our models.

Finally, although the law of one price (level) has been rejected as an empirically useful short-run proposition, it is not without relevance for the prices of traded goods. The MABP has served to demonstrate a role for foreign price and exchange rate changes in the aggregate supply curve. The short-run importance of this channel relative to Hume's classic balance-of-payments/money-supply/price-level channel has yet to be resolved and may well vary depending on the circumstances of each country.

In conclusion, the monetary approach to the balance of payments has not added so much of importance to our knowledge, but has been instrumental in pointing out just how much we knew that ain't so. If this contribution is small in proportion to the claims made and pages published, that is not unusual for economics.

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FOOTNOTES

¹The author has managed to collect two full file drawers of articles, books, and working papers on the MABP -- and this without unusual diligence to the task!

²After all, the real world is only a very special case of the more general model!

³Chapter 1 by Frenkel and Johnson gives the central ideas and purports to show that the MABP has been historically dominant in economic thought. Chapter 2 is a brief 1958 generalization of Meade's absorption approach by Harry Johnson; the kernel of the MABP is present and the analysis is thoughtful. Chapter 6, also by Johnson, goes through the arithmetic of the monetary approach with completeness and clarity; growth is explicitly considered contrary to most of the chapters. Chapter 10 by Alexander K. Swoboda has some sensible discussion of the short-run adjustment process with due regard to the relative size of the country, its relative openness to capital flows, and the relative size of the nontradable goods sector. A. Hans Genberg's Chapter 13 is instructive as one of the best empirical studies; here the application is to Sweden. Donald N. McCloskey and J. Richard Zecher give a provocative view of the workings of the gold standard (1880-1913) in Chapter 16.

⁴[5], Chap. 6.

⁵[5], Chap. 1, p. 21.

⁶One is reminded of the frequent misinterpretations of Milton Friedman's famous dictum that inflation is essentially a monetary phenomenon.

⁷The "monetary authority" is to be construed here as inclusive of the government's financing and exchange stabilization operations whether actually carried out by the central bank or treasury. Further the implicit definition of the balance of payments would correspond to the official settlements basis only for a small country none of whose liabilities are held by foreign monetary authorities. This latter issue will be raised below.

⁸In MABP jargon, high powered or base money is the sum of the foreign reserves and domestic credit of the monetary authority.

⁹Notably [5], Chaps. 13 and 16.

¹⁰[4], p. 261.

¹¹Not necessarily a constant fraction, however.

¹²See for example, [13], pp. 257-82, and [1], Chap. 5.

¹³For example: "The new approach assumes -- in some cases, asserts -- that these monetary inflows or outflows associated with surpluses or deficits are not sterilised -- or cannot be, within a period relevant to policy analysis -- but instead influence the domestic money supply." H. G. Johnson, [5], pp. 152-53.

¹⁴The issue of short-run controllability of the money supply of a small open economy is still unsettled. One group -- associated with Laffer and Mundell -- argued that it was impossible. Others following Friedman argue that it can be done although it is inconsistent with long-run stability. Evidence that the money supply of even such a small country as the Netherlands is controllable is presented in [8].

¹⁵[5], Chap. 10.

¹⁶[5], Chap. 1, p. 29. Examples of the monetary approach applied to exchange rate determination are found in the proceedings volume on Flexible Exchange Rates and Stabilization Policy, Scandinavian Journal of Economics, 1976, vol. 78, no. 2.

¹⁷The author index in [5] lists only six page references for Friedman and only one of these refers to his work on exchange rates.

¹⁸See [3], pp. 221-30.

¹⁹Some discussions of the determinants of the world money supply have appeared in the literature (see for example papers in [11], [14], and [15]). These papers generally demonstrate the existence of stable world money multiplier and world real money demand. So the world price level is determined by the world high-powered money. While formally correct, this result is rather round about in the case of a fiat reserve currency as discussed below. The author is currently working at the National Bureau of Economic Research with Anna Schwartz, Benjamin Klein, and Jim Lothian on a project aimed at detailing the nature of and changes in the system constraint in the postwar era.

²⁰Fluidity (the inverse of income velocity) is of course a function of interest rates and real income as well as payments practices and institutions. As these long-run values are unaffected, we can assume fluidity constant without loss of generality.

²¹Or any other constant.

²²Easier said here than accomplished in actual computations!

²³[5], Chap. 10.

²⁴[15], pp. 24-47.

²⁵Of course even in the short-run sterilization is likely to amplify the variation of ΔR from normal.

²⁶Since the fiat-reserve-currency country has no or fixed reserves, this deficit is the sum of the increase in foreign monetary authorities' holdings of the government's bonds. The reserve country might marginally influence this total by lending to a foreign country so that it might have in effect negative net reserves.

²⁷The decisions of the nonreserve countries include both the desired holdings of reserves and the more basic choice of to which currency bloc to belong. Benjamin Klein [7] has considered competing moneys previously and is continuing this research as part of the NBER project on the international transmission of inflation.