Comment on H. Robert Heller's "Exchange Rate Flexibility and Currency Areas"

By Jacob A. Frenkel*

Robert Heller's paper "Exchange Rate Flexibility and Currency Areas" is extremely useful in highlighting the formal analogy between factors that are relevant for the choice among alternative exchange rate systems and those that are relevant for the determination of optimal currency areas. More importantly, *Heller* faces up to the difficult challenge of devising an empirical framework that is useful for evaluation of countries' actual choice among alternative exchange rate systems. My remarks are divided into three parts. The first elaborates on some theoretical considerations concerning the determinants of optimal currency areas. The second deals with the empirical framework and the third provides a sketch of an alternative approach to the analysis of the optimal degree of exchange rate flexibility.

I. Optimal Currency Areas: Theoretical Considerations

The Second Amendment to the Articles of Agreement of the International Monetary Fund practically permits each country to choose an exchange rate system that is most appropriate for its needs. *Heller* recognizes, and this is his major theoretical insight, that the existing literature on the determinants of optimal currency areas may be relevant for analyzing the determinants of countries' choice among alternative exchange rate systems. This insight is then followed by a useful survey of the major factors that have been mentioned in the literature on optimal currency areas. These factors are: (i) the degree of openness, (ii) the size of the economy, (iii) the degree of commodity diversification, (iv) the degree of capital market integration, and (v) the degree of similarity of inflation rates. *Heller* then describes the empirical proxies for these factors which are then used in his empirical study. In what follows I will elaborate on these measures and outline some of their limitations. It should be emphasized at the outset that these limitations should not be viewed as a criticism of *Heller*'s con-

* Department of Economics. University of Chicago, 1126 East 59th Street, Chicago, Illinois 60637, USA.

tribution. *Heller,* who is undoubtedly aware of these limitations, has chosen to provide a faithful survey of the existing literature. Accordingly, my comments should be viewed in the broader context of the literature on optimal currency areas.

1. The Degree of Openness

According to the "openness" criterion economies with a large foreign trade sector should prefer fixed exchange rates, while relatively "closed" economies, with a small foreign trade sector, should prefer flexible exchange rates. The argument relies on the Keynesian framework in which prices are fixed and in which the adjustment mechanism is analyzed in terms of the foreign trade multiplier that is inversely related to the propensity to import. This framework has also been used in studies of the demand for international reserves with the prediction that relatively closed economies need more international reserves than economies that are relatively open. The major characteristics of the fixed-price model is that all external imbalances are eliminated by adjustments of national income via the foreign trade multiplier which is inversely related to the import propensity. It can be shown, however, that when external imbalances are eliminated by changes in the price level and in relative prices, the effect of openness is not clear-cut and in fact, under certain conditions, it might lead to conclusions that are opposite to those of the simple priceless model.[1]

It is also argued that in relatively open economies changes in the exchange rate induce large changes in the price level which may not be desirable. Therefore, it is argued, that more open economies would prefer fixed rates. In this context two points are noteworthy. First, it is important to recognize that a given shock has to be absorbed in one form or another. Therefore, in order to provide for a meaningful comparison of the implications of alternative exchange rate systems, one should specify how shocks are absorbed when the exchange rate is fixed. Second, in order to be able to assess the appropriateness of alternative exchange rate systems one should specify the cause of exchange rate fluctuations. In particular one should indicate whether the shocks are "real" or monetary, as well as whether the shocks originate from domestic or from foreign disturbances. I will return to these distinctions in Section III below.

2. The Size of the Economy

According to the size criterion, small economies will prefer fixed exchange rates and, therefore, will find it useful to join a monetary

[1] For an outline of the implications of the price adjustment model see *Frenkel* (1974).

union. The basic argument underlying this proposition relies on the concept of optimal scale, according to which the size of small countries is likely to be sub-optimal and therefore, providing an incentive to enlarge the effective economic size by forming a union. It is pertinent to note, however, that this criterion does not provide a guide to the fundamental question of "to whom to peg". Moreover, it might be useful to specify in greater detail what are the "fixed factors" which give rise to diminishing returns and thereby imply the concept of optimal size.

From the viewpoint of the empirical implementation it might be noted that since size is likely to be negatively correlated with openness (after all, the largest unit — the world — is a closed economy), it might be difficult to separate the effect of size from the effect of openness.

3. The Degree of Commodity Diversification

According to the diversification criterion, countries with a high degree of commodity diversification will prefer fixed rates and will therefore join a monetary union. The argument here is that highly diversified economies are likely to have a diversified export sector which, in turn, is less likely to be subjected to large shocks since the various shocks will tend to offset each other. It is important to emphasize, however, that the relevant variables are the degree of diversification of exports as well as the degree of diversification of imports. As an empirical matter, countries' imports tend to be more diversified than exports. Furthermore, the extent to which diversification provides a cushion against shocks depends critically on whether the various sectoral shocks are independent, or whether they are positively or negatively correlated.

4. The Degree of Capital Mobility

Mundell's original contribution to the literature on optimal currency areas emphasized the role of capital mobility. According to the mobility criterion countries between which there is a high degree of factor market integration (e. g., a high degree of capital mobility) will prefer to have a fixed exchange rate by joining a monetary union.

In the absence of a good measure of the degree of capital mobility, *Heller* chose to measure it in terms of the ratio of commercial banks' foreign assets as a percentage of the money supply according to which a high percentage indicates a high degree of capital mobility. Since *Mundell*'s concept emphasizes the mobility of capital as a factor of production (i. e., mobility of *physical* capital), one wonders how well it is represented by measures of the mobility of *financial* capital.[2] Fur-

thermore, for measuring the degree of financial integration I would prefer to use a concept of "price integration" rather than that of "quantity integration". Thus, the degree of equality of rates of return might be a better proxy for integration than measures which relate to the distribution of ownership of world assets. Needless to say, devising a measure of the degree of capital mobility is an extremely difficult task, and *Heller* should be complimented for attempting to provide such a quantifiable index.

5. The Degree of Similarity of Inflation Rates[3]

One of the most important criteria emphasized by *Heller* is the degree of similarity of inflation rates according to which countries with similar inflation rates will tend to prefer greater fixity of exchange rates. Since a monetary union results in an automatic transmission of inflation throughout the integrated domain, it seems reasonable to argue that prospective members of the union should posses similar tastes concerning the course of inflation. Indeed, only when inflationary preferences are similar might one expect sovereign states to relinquish monetary independence for the benefits of a monetary union. From the empirical viewpoint, however, one faces the difficult task of distinguishing between cause and effect. Do member countries have similar rates of inflation because they have joined the union or have they joined the union because of their similar tastes? It is useful therefore to examine in somewhat greater detail the factors which determine countries' preference for inflation.

These preferences are determined by a wide spectrum of considerations which include socio-psychological elements as well as considerations relating to the efficiency of fiscal management.

To illustrate the former, it is quite clear that current taste differences between Britain and Germany reflect to some extent the impact of different experiences in the past. Germany's attitude towards inflation is probably influenced by Germany's past experience with the hyperinflation of the 1920's, while Britain's attitude towards unemployment is probably influenced by the British experience with unemployment during the 1920's. From this viewpoint these two countries do not seem to be potential candidates for a successful union.

---

[2] In principle, the effects of mobility of physical capital could be linked to the mobility of financial capital through equality of the rates of return since, in equilibrium, the rate of interest should equal the ratio of the rental on capital to its price.

[3] The arguments in the following two sections are adopted from *Frenkel* (1975).

Since monetary policies within the union must be harmonized and coordinated, governments joining the union should have similar views concerning the optimal use of the inflation tax as a means for collecting revenue. The optimal use of an inflation tax depends upon the nature of the demand for money, the rate of growth of income, and most important, on the use and efficacy of other forms of fiscal taxation and the progressivity of the tax bracket schedules. This suggests that candidates for a monetary union should be similar in those respects, and that the degree of fiscal harmonization would also figure as one of the relevant criteria.

6. The Degree of Other Forms of Integration

One of the criteria that is not analyzed by *Heller* is the effect of existing forms of economic integration (e. g., a common market) on the incentives to extend these forms so as to include also a monetary integration. For example, much has been written concerning the prospects for a European monetary integration as a sequel to the European common market. It is useful, therefore, to analyze the wisdom of promoting an international system which rests on the requirement that governments harmonize policies over a broad range of economic issues.

Consider for example the relationship between custom unions and monetary integration. The criteria for joining a custom union differs from those relevant for joining a monetary union. It is conceivable that in cases where joining a custom union proves to be beneficial (according to the trade creation-trade diversion criterion), the criteria for the beneficial formation of a monetary union may not necessarily be fulfilled. In fact, since exogenous disturbances cannot be presumed to be perfectly correlated among the various countries, it might be reasonable to reduce potential frictions arising from conflicts of interests by leaving each member state with a degree of freedom to independently use some policy instruments in pursuing discretionary policies. Thus, a country joining a monetary union might wish to preserve some independence in commercial policy while a country joining a custom union might wish to retain some independence in monetary policy.

The above analysis also implies that monetary unions might be beneficial for economies among which there exists a positive correlation of exogenous disturbances, so that expansionary and contractionary policies would be mutually consistent with the needs of all partners.

II. The Empirical Framework

Heller's empirical framework is both original and imaginative. He employs a discriminant analysis in order to classify countries into

certain groups. He is thus able to identify and quantify the importance of the various characteristics (size, openness, etc.) common to the group of countries which have chosen to peg their exchange rate and those common to countries which have chosen to let their exchange rate float. Basically, this approach divides countries into groups (peggers and floaters) such that the combined variance of the various characteristics (size, inflation, etc.) within the group is minimized, while the combined variance between the groups is maximized.

Implicitly, it is assumed that the various characteristics are independent of the choice of the exchange rate system, and thus, that they may indeed be viewed as characteristics of the country in question. For some of the characteristics (like size and openness) this assumption seems valid. For others, one may wonder to what extent are the characteristics themselves influenced by the choice of the exchange rate system. For example, to what extent are the rates of inflation or the degree of capital market integration affected by the exchange rate system?

As for the choice of characteristics, my previous discussion has already indicated the desirability of extending the list so as to include a variable that characterizes the fiscal structure of the countries in question.

Heller's contribution in the empirical section is in uncovering some important empirical regularities. He thus faces up to the difficult challenge of confronting the various insights of theory against empirical facts. I view the study as a contribution to positive analysis. Caution should be exercised in using the conclusions for normative prescriptions. *Heller* was able to provide us with a list of characteristics that are common to the majority of countries that have chosen to peg their exchange rate as well as a list of characteristics that are common to the majority of countries which chose to have greater flexibility of exchange rates. As for the normative question, it seems that more research is needed to determine what exchange rate system is *appropriate* for each country.

III. A Sketch of an Alternative Approach[4]

Heller's observation that the International Monetary Fund permits countries to choose among a relatively broad spectrum of exchange rate systems is important. According to revised Article IV, countries may choose among various degrees and forms of fixity of exchange rates. In practice, countries indeed have chosen to manage their exchange rates

[4] I am indebted to *Michael Bazdarich* for research assistance and suggestions concerning the material in this section.

in one form or another. In what follows I will sketch a simple analytical framework that highlights some of the determinants of the optimal degree of exchange rate flexibility. The analysis will emphasize the role of the stochastic structure of the various shocks which affect the economy, and its purpose is to suggest an additional set of characteristics which might be included in *Heller*'s discriminant analysis.

Consider a small economy that is subject to two types of repetitive and serially uncorrolated shocks. These shocks, which are specified below, are referred to as real and monetary shocks.

Denote the supply of output by Y_t and let

$$Y_t = ye^{\mu} \; ; \quad \mu \sim N(-\sigma_{\mu}^2/2, \; \sigma_{\mu}^2) \tag{1}$$

where μ is a stochastic shock (the "real" shock) with a constant variance σ_{μ}^2. The mean of the distribution of the real shock is chosen to be $-\sigma_{\mu}^2/2$ so as to assure that the expected value of output equals y (permanent income).

The second shock arises from the monetary sector. Let the demand for nominal cash balances L_t be

$$L_t = kP_t Y_t e^{\varepsilon} \; ; \quad \varepsilon \sim N(-\sigma_{\varepsilon}^2/2, \; \sigma_{\varepsilon}^2) \tag{2}$$

where k denotes the desired money-income ratio, P denotes the domestic price level and ε denotes the stochastic shock to the demand for money (the "monetary" shock).

The domestic price level is linked to the foreign price through the purchasing power parity relationship. Thus

$$P_t = S_t P^* \tag{3}$$

where P_t^* denotes the foreign price level and S_t denotes the exchange rate (the price of foreign currency in terms of domestic currency). To simplify the analysis it is assumed that foreign prices are fixed (and thus will be denoted henceforth as P^*), that purchasing power parity holds deterministically and that μ and ε are independent.[5]

Assume that the flow demand for money ΔM^d corresponds to a stock adjustment process such that

$$\Delta M^d = \alpha (L_t - \overline{M}_t) \tag{4}$$

where $\overline{M}_t$ denotes the money stock at the beginning of the period.

[5] The implications of relaxing some of these assumptions are analyzed in *Frenkel* (1976).

Using equations (1) and (3) we may express the demand for money (2) as

$$L_t = kS_t P^* y e^{\mu+\varepsilon} . \tag{5}$$

When the exchange rate is flexible, it will adjust so as to eliminate any stock disequilibrium in the money market, thus ensuring that $L_t - \bar{M}_t = 0$. Using (5) it follows that when the exchange rate is flexible,

$$kS_t P^* y e^{\mu+\varepsilon} - \bar{M}_t = 0 . \tag{6}$$

The equilibrium exchange rate can be written as

$$S_t = (\bar{M}_t/kP^* y)\, e^{-(\mu+\varepsilon)} \tag{7}$$

and the percentage change thereof is

$$\ln S_t - \ln S_{t-1} = \ln (\bar{M}_t/kS_{t-1} P^* y) - (\mu + \varepsilon) . \tag{8}$$

The other extreme system is the fixed exchange rate system for which

$$\ln S_t - \ln S_{t-1} = 0 . \tag{9}$$

Using (8) and (9) we may define an index γ such that $0 \leq \gamma \leq 1$:

$$\gamma = (\ln S_t - \ln S_{t-1})/[\ln (\bar{M}_t/kS_{t-1} P^* y) - (\mu + \varepsilon)] . \tag{10}$$

The coefficient γ characterizes the whole spectrum of exchange rate regimes. When $\gamma = 0$, the system is that of a fixed exchange rate, and when $\gamma = 1$ the system is that of a freely flexible exchange rate. An intermediate value of γ indicates an intermediate degree of exchange rate flexibility. We will refer to the coefficient γ as the coefficient of managed float, or the intervention index. From the policy perspective, the basic question is to determine the optimal value of γ, that is, to determine the optimal degree of exchange rate flexibility.

In principle, if shocks were identifiable, the optimal policy would be to allow the exchange rate to correct monetary disturbances but not real disturbances.[6] We will assume, however, that information is incomplete and that during a given period only the joint outcome of the shocks $\mu + \varepsilon$ is known but not the separate values of μ and ε. It is this lack of complete information which necessitates a second-best policy.[7]

---

[6] For an analysis of this proposition see *Fischer* (1977).

[7] The assumption of the lack of complete information has been used by *Gray* (1976) to analyze partial wage indexation.

Assume that the objective is to minimize the losses due to imperfect information and that the policymaker wishes to minimize the quadratic loss function H:

$$\text{Minimize } H = E\,[(c_t - E\,(Y_t)]^2 \tag{11}$$

where c_t denotes the rate of consumption which, from the budget constraint, equals the rate of income minus the real value of additions to real cash balances

$$c_t = Y_t - \frac{\Delta M}{P_t} \,. \tag{12}$$

The previous relationships imply that

$$[c_t - E\,(Y_t)] = y\,(e^{\mu} - 1) - \alpha\, ky\,[e^{\mu+\varepsilon} - (\bar{M}_t/kS_{t-1}\,P^*\,y)^{1-\gamma}\, e^{\gamma\,(\mu+\varepsilon)}] \,, \tag{13}$$

and using (13) in (11) yields the loss function which is to be minimized with respect to γ.

The above analysis has not specified the value of $\bar{M}_t$. It is assumed, following *Fischer* (1977), that at the beginning of each period the monetary authority changes the money supply so as to compensate for past disturbances according to

$$\bar{M}_t = kS_{t-1}\,P^*\,y \,. \tag{14}$$

Substituting (14) in (13) and minimizing the loss function (13) with respect to γ yields the following implications concerning the choice of the optimal degree of exchange rate flexibility:

(i) In general, the optimal value of γ will be within the range (0, 1), so that the optimal exchange rate regime will correspond to neither of the extremes of a completely fixed or of a completely flexible rate regime.

(ii) The intermediate solution is more likely the higher is $\alpha\, k$ — the propensity to save out of transitory income.

(iii) When the only shocks to the system are real ($\sigma_\varepsilon = 0$), the optimal solution is that of fixed rates ($\gamma = 0$); and conversely, when the only source of shocks is monetary ($\sigma_\mu = 0$), the optimal solution is that of freely floating rates ($\gamma = 1$).

(iv) The higher the variance of the monetary shock, the larger will be the optimal value of γ while the higher is the variance of the real shock the lower will be the optimal value of γ. That is, high variance of real shocks, ceteris paribus, tends to raise the desirability of greater fixity of exchange rates and conversely for high variance of monetary shocks.

Table 1 contains the results of illustrative computations of the optimal degree of the intervention index γ for alternative assumptions concerning the magnitudes of the various shocks. The computations are made under the assumption that αk, the propensity to save out of transitory income, is unity. These results illustrate the above propositions.

Table 1

Optimal Exchange Rate Flexibility for Alternative Values of Real and Monetary Shocks

$\sigma_\varepsilon \longrightarrow$ / $\sigma_\mu \downarrow$	.01	.03	.05	.07	.09
.01	.50	.90	.96	.98	.99
.03	.10	.50	.74	.85	.90
.05	.04	.27	.50	.67	.77
.07	.02	.16	.34	.50	.63
.09	.01	.10	.24	.38	.51

The analysis in this section provides an analytical framework for determining the optimal degree of exchange rate flexibility. It highlights the unique role of the stochastic structure of the economy and suggests, therefore, a set of additional characteristics that might potentially be included in *Heller*'s discriminant analysis.

References

Fischer, Stanley (1977), Stability and Exchange Rate Systems in a Monetarist Model of the Balance of Payments, in: R. Z. Aliber (ed.), The Political Economy of Monetary Reform. New Jersey: Allanheld, Osmum and Co. p. 59 - 73.

Frenkel, Jacob A. (1974), Openness and the Demand for International Reserves, in: R. Z. Aliber (ed.), National Monetary Policies and the International Financial System. Chicago, Ill.: University of Chicago Press, p. 289 - 298.

— (1975), Reflections on European Monetary Integration, Weltwirtschaftliches Archiv, Bd. III, Heft 2, p. 216 - 221.

— (1976), An Analysis of the Conditions Necessary for a Return to Greater Fixity of Exchange Rates, unpublished manuscript, University of Chicago.

Gray, Joanna (1976), Wage Indexation: A Macroeconomic Approach, Journal of Monetary Economics 2, No. 2 (April), p. 231 - 246.