Comment on Ronald I. McKinnon's "Optimum Currency Areas and Natural Variability in Exchange Rates"

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The paper has two targets. Firstly, it tries to explain the high variability in the exchange rates since the generalized floating from the early 1970's onwards. Secondly, it aims to explain why certain exchange rates have been less variable than others, a phenomenon which is called "natural" variability or the "natural" degree of exchange rate fluctuation.

1. Determination of the Variability in Exchange Rates

In the long-run, the exchange rate is determined by purchasing power parity. In the short-run, it deviates from the purchasing power parity and it is dominated by capital flows where the latter are influenced by the differential in interest rates and by views on the future exchange rate. The functional relationship between the interest rate differential and the change in the exchange rate is given by the interest rate parity which is supposed to hold at each moment:

$$\frac{R_s}{R_f} - 1 = i_n - i$$

For a given foreign interest rate (i_n), changes in the spot rate (R_s) are determined by the behavior of the domestic interest rate (i) and the expectations with respect to the forward rate (R_f).

For the very short-run, the determination of the interest rate can be justified by a partial equilibrium analysis where the interest rate is determined in the market for money within the traditional Keynesian framework of the money-bonds-markets according to which the money market is the inverse image of the bond market; consequently it is sufficient to analyze only one market, for convenience the money market (even though *Ronald McKinnon* analyzes both markets). Given real income and other determinants of the demand for real cash bal-

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ances (L), the equilibrium interest rate is a function of the real quantity of money (M/P). Consequently, the interest rate parity can be reformulated as:

$$\frac{R_s}{R_f} - 1 = i_n - i\left(\frac{M}{P}, \ldots\right)$$

By differentiating the above equation for given values of i_n and P, we obtain:

$$\frac{dR_s}{R_s} = \frac{dR_f}{R_f} + \frac{1}{\sigma}\,\frac{dM}{M}$$

where $\sigma = -(L_i/L)$ is the interest responsiveness of the demand of real cash balances ($L_i = \partial L/\partial i$). This formula states the short-run impact of monetary policy (dM/M) on the exchange rate (dR_s/R_s) under the traditional assumptions of a stationary economy, the absence of any inflation or deflation, immediate flow-stock adjustment of the demand for money, and no immediate impact of a ΔM on P in the very short-run. For instance, a given expansionary monetary policy will sharply depreciate the exchange rate if the interest responsiveness of the money demand (σ) is very low and/or if there are expectations of a high future depreciation of the currency (dR_f/R_f). The formula is that of *Dornbusch* (1976 a, pp. 260 - 62) and it is only implicitly contained in *Ronald McKinnon's* paper. However, *McKinnon's* main occupation is (a) the analysis of the interest-rate elasticity of the demand for money in an open economy under floating exchange rates, and (b) finding an appropriate hypothesis about the expectation formation with respect to the exchange rate. In what follows I shall comment successively on these two problems. The first one has not been analyzed in the literature until now, while the second one should be elaborated in a much more sophisticated way than we know it from the recent literature on the formation of (inflationary) expectations.

a) *The Interest Responsiveness of the Money Demand in an Open Economy under Floating Exchange Rates.* For a closed economy, we have the traditional demand curve for money as depicted by the schedule DWH in Fig. 1. The opportunity cost of holding money is the interest rate on domestic bonds (i). The opening of the economy does not modify the demand curve for money held by domestic wealth holders (DWH) to the extent that domestic and foreign bonds are perfect substitutes which is assured by the interest rate parity according to which $i = i_n + 1 - R_s/R_f$. The (pure) domestic wealth holders hold domestic currency and (domestic and foreign) bonds. The other type of agents, the (pure) foreign exchange dealers, hold only domestic and foreign currencies, either on an open or hedged basis. According to *McKinnon*, their demand curve for money is the schedule FED in Fig. 1

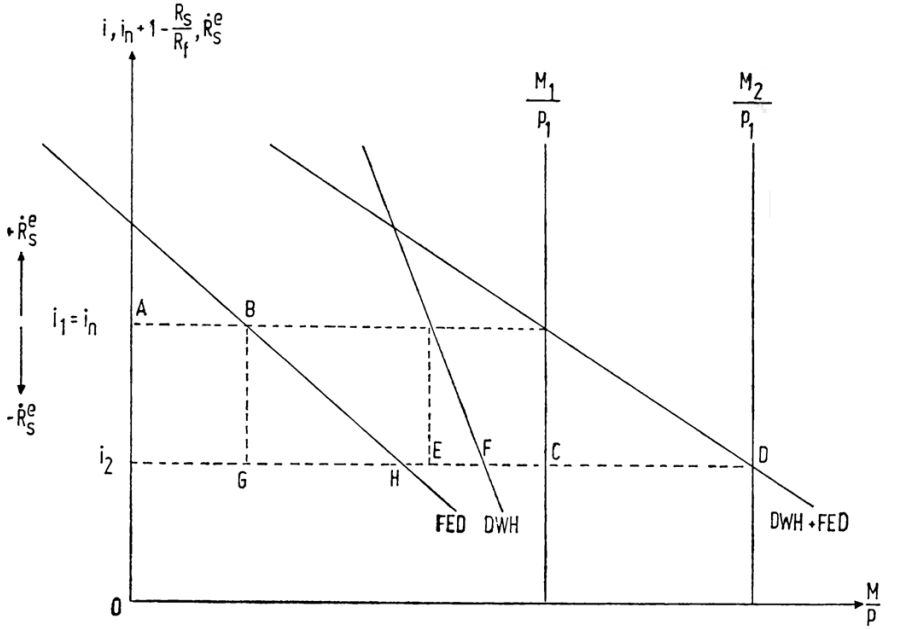

Fig. 1

such that the total demand curve for money in the economy is DWH + FED.

McKinnon's principal contribution is the derivation of the demand function for money held by the foreign exchange dealers. The argument for the FED-schedule in Fig. 1 runs as follows. Suppose equilibrium in the money market, for a given money supply M_1, at the interest rate i_1. i_1 is supposed to be equal to the foreign interest rate. Consequently, $R_s = R_f$, i. e. the current exchange rate equals the expected exchange rate. There is no expected change in the exchange rate ($\dot{R}_s^e$ which is equivalent to $1 - R_s/R_f$), i. e. $\dot{R}_s^e = 0$. The foreign exchange dealers hold AB of domestic currency. We are not told why they hold the specific amount of AB. Their decision margin is not the interest rate (as it is the case with the domestic wealth holders) because they do not hold bonds. Instead their decision margin is the expected change in the exchange rate that is zero at the interest rate i_1.

Suppose now an open market operation which increases the nominal quantity of money by *CD* to M_2. Correspondingly, the domestic bond holdings of domestic wealth holders have decreased by *CD*. The domestic interest rate has fallen to i_2. Domestic wealth holders hold more

cash balances (EF) and more foreign bonds (GH) such that $CD = EF + GH$; the domestic interest rate i_2 is equal to the foreign interest rate i_n minus the expected depreciation of the foreign currency. Foreign exchange dealers hold more domestic currency (GH) that they acquire from the domestic wealth holders who purchase foreign bonds. The dealers decrease their foreign currency holdings and hold the extra amount of domestic currency because of the expected appreciation $-\dot{R}_s^e = i_2 - i_1$.

Why is the slope of the FED schedule smaller than the slope of the DWH-curve as it is implied implicitly in *Ronald McKinnon's* Fig. 1? A priori, either of both could be smaller or steeper. However, the real issue is that *individuals* hold domestic and foreign bonds, and hold domestic *and* foreign currencies. The merit of *McKinnon's* analysis is that he has taken into account the other alternative to the holdings of domestic cash balances which is foreign currency holdings (besides domestic and foreign bond holdings). As in all attempts to formalice a new problem, the first analytical construction is extremely simplified. *McKinnon's* critical simplification concerns the assumption that there are two *separate* cash balances: the cash balances held by domestic wealth holders whose decision margin is the interest rate (or the foreign interest rate corrected by the expected change in the exchange rate according to the interest rate parity), and the cash balances held by foreign exchange dealers whose decision margin is the expected appreciation or depreciation. As we know from the traditional analysis of the demand for money, there is no division between different types of cash balances (transactions, precautionary and speculative balances). Each money unit serves all motives of money holdings. Consequently, the demand function for money — in an open economy under floating exchange rates — has to be derived on the *simultaneous* decision margins of the interest rate (à la domestic wealth holders) *and* of the expected change in the exchange rate (à la foreign exchange dealers). This reformulation of the demand function for money in an open economy under floating exchange rates may give us a still better understanding of the interest responsiveness of the money demand which is the main analytical issue of *McKinnon's* paper.

It is this interest responsiveness of the money demand which determines *inter alia* the variability of the exchange rate as a consequence of a changing monetary policy and, in the case of *McKinnon's* paper, as a consequence of an expansionary monetary policy via open-market operations. Let us come back to the above monetary experiment and its impact on the exchange rate. The domestic interest rate falls and the fall in the interest rate will be very sharp if the interest respon-

siveness of the money demand is low. The interest rate differential in favour of the foreign bonds induces a capital export with the consequence of a depreciation of the exchange rate which corresponds to the interest differential (for a given unchanged expected exchange rate which will be discussed below). Consequently, in order to explain the high variability in the exchange rate — or at the moment its high increase —, one has to show that the interest responsiveness of the money demand is relatively low. But relatively low in comparison to which other situation?

b) *The Hypothesis of Expectations Formation with Respect to the Exchange Rate. McKinnon*'s expectations hypothesis is based on the "long-run" validity of the purchasing power parity where the long-run begins after 90 days if one takes *McKinnon*'s numerical example seriously. In a world of full information and taking into account two periods, the expectation behavior is:

$$\frac{dR_f}{R_f} = \frac{dM_t}{M_t} + \frac{dM_{t+1}}{M_{t+1}}$$

and where the quantity theory is realized after one period (90 days):

$$\frac{dM_t}{M_t} = \frac{dP_{t+1}}{P_{t+1}}$$

In a world of uncertain expectations one has to foresee whether a monetary expansion is of temporary or permanent nature so that

$$\frac{dR_f}{R_f} = \left(\frac{dM_t}{M_t}\right)^e + \left(\frac{dM_{t+1}}{M_{t+1}}\right)^e$$

by maintaining the assumption of the quantity theory:

$$\left(\frac{dM_t}{M_t}\right)^e = \left(\frac{dP_{t+1}}{P_{t+1}}\right)^e$$

This formation of "rational" expectations is certainly one among many other conceivable ones. However, if one wants to explain the high variability of exchange rates and for a shorter period than 90 days, an alternative formula may work better which is that proposed by *Dornbusch* (1976 a, p. 262) and which is of the type of adaptive expectations:

$$R = \pi R_s + (1 - \pi) R_{s-1}$$

such that

$$\frac{dR_f}{R_f} = \pi \frac{dR_s}{R_s}$$

The differentiated formula of the interest rate parity:

$$\frac{dR_s}{R_s} = \frac{dR_f}{R_f} + \frac{1}{\sigma} \frac{dM}{M}$$

would become then:

$$\frac{dR_s}{R_s} = \frac{1}{(1 - \pi)\,\sigma} \frac{dM}{M}$$

For a given monetary policy (dM/M), the lower is σ and/or the closer π is to unity, the larger will be the variability of the exchange rate (dR_s/R_s).

2. Natural Variability and Currency Areas

The term "natural" has become very fashionable. From *Wicksell* we know that a "natural" economic variable is explained in terms of the so-called real forces. By analogy, *Ronald McKinnon* assigns to those countries who are (natural) candidates to form an optimum currency area according to the criterion of the openness of their economies, a lower "natural" variability in their exchange rate. There are two specific reasons for that.

The first reason is that the volume of international trade in very open economies is extremely high. Consequently, foreign exchange dealers have to hold relatively more cash balances — domestic and/or foreign ones — in order to clear international payments; relatively more cash balances means here more in comparison to rather closed economies. To the extent that the interest responsiveness of their money demand is very high (and in combination with their high endowment of cash balances), the interest responsiveness of the total money demand (σ) will be very high so that an expansionary monetary policy has a small interest-rate effect and, by this, a small impact on the exchange rate. However, as we have already noticed, the rationale of a higher interest responsiveness of the money demand by foreign exchange dealers is not explicitly (or not at all) demonstrated in *McKinnon's* paper.

The second reason for a lower variability in the exchange rates of optimum-currency-area-countries refers to the rapid transmission of a change in the exchange rate on the internal price level due to the fact of the high share of tradable goods among the GNP. Consequently, an expansionary monetary policy will have a rather *simultaneous* effect on the exchange rate and the internal price level. To the extent that the internal price level is nearly immediately influenced, the interest

rate will decrease by far less (because of the increased demand for money) such that the impact of the monetary policy on the exchange rate is lower. In terms of our differentiated formula of the interest rate parity for which the price level is now allowed to vary, it becomes:

$$\frac{dR_s}{R_s} = \frac{dR_f}{R_f} + \frac{1}{\sigma}\left(\frac{dM}{M} - \frac{dP}{P}\right)$$

Consequently, the second right-hand expression becomes lower. However, from an analytical point of view, one could suggest an essential improvement of *McKinnon*'s model. If the price level is allowed to vary even in the short-run, a *total* macroeconomic model (for instance, à la *Dornbusch* 1976 b) would do better. One would not have to wait for the price-level effect of a change in the exchange rate. The expansionary monetary policy would have an immediate effect on the price level which would dampen the fall in the interest rate and, by this, in the exchange rate. The main reason for the depreciation of the exchange rate would be the expectations represented by dR_f/R_f which in their turn are dominated by the behaviour of the internal price level.

A final comment is necessary with respect to *McKinnon*'s term "natural" variability. We know, for instance, *Wicksell*'s natural rate of interest or *Friedman*'s natural rate of unemployment. Both rates are determined by real forces and the actual rate can be above or below the natural rate because of "short-run monetary forces". This latter case is not applicable in *Ronald McKinnon*'s model of the natural variability of the exchange rate because the natural exchange rate and its variability are (and should be) a nominal phenomenon.

References

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