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10 Collective Pegging to a Single Currency: The West African Monetary Union

Jorge Braga de Macedo

10.1 Introduction

Under the present international monetary system, a large number of countries peg their exchange rates in some way, and a fair number of small countries peg to a single currency. Few countries, however, are members of exchange rate unions in which the rates are collectively pegged to a single currency or basket of currencies.

Even fewer countries establish a full monetary union, with a union-wide central bank. In fact, until the transformation of the East Caribbean Currency Authority into a central bank in October 1983, the closest examples were the monetary institutions of the Franc Zone. In particular, the West African Monetary Union (known by its French abbreviation UMOA) consists of former French colonies in West Africa that have maintained a fixed bilateral exchange rate against the French franc since October 1948. That they have done so is all the more remarkable in light of the repeated changes in the parity of the French franc relative to the dollar and to other major European currencies.

Actual monetary unions may be few, but nonetheless a considerable analytic literature on the subject exists. It emerged during the 1960s in connection with the celebrated controversy over the desirability of fixed versus flexible exchange rates, and it was revived with the creation of the European Monetary System (EMS) in 1979.[1]

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There is a general agreement that the key factors on which the impact of a monetary union depends are, first, the sources and types of economic disturbances giving rise to exchange rate fluctuations; second, the trade patterns of the country joining the union; and third, wage and price behavior at home and abroad. As Marston (1984a) stated, the conditions under which a fixed exchange rate regime is superior to a rate that floats according to some social welfare criterion involve a complicated weighting of these key factors, making any generalizations about the unions difficult.

The model of a monetary union presented in this paper is designed to illuminate monetary and exchange rate policy in the West African Monetary Union. The discussion centers on the interaction of UMOA members with one another, through the common central bank, and on their interaction with France and the rest of the world. As a consequence, the structure of the national economies is highly stylized. Indeed, country size is the major structural characteristic in the model.

The relative size of the partners is of course reflected in the sources and types of disturbances, as well as in the trade pattern. Although the model can also account for real and nominal wage rigidities, the focus is on the two key factors just mentioned. In the model, therefore, large countries (such as France) are not affected by disturbances originating in small countries, but small countries (such as the members of UMOA) are affected by domestic disturbances in the large countries. The collective nature of the pegging is important because the small countries are assumed to be of equal size.

The paper is divided into two parts. Section 10.2 presents a four-country macroeconomic model in which one of two large countries establishes what Corden (1972) would call a pseudo–exchange rate union with two small countries, which together form a full monetary union with their own central bank. The effect of the arrangement on monetary and real disturbances originating inside and outside the union is analyzed.

The pseudo–exchange rate union with the large partner is shown to have no effect on the real exchange rates of the small countries but to affect their price levels, whereas a full monetary union requires in principle a transfer whose allocation between the two small countries may have real effects. This transfer is provided by the large country, as guarantor of the fixed exchange rate arrangement. Because of size differences, the converse is not true. When both small countries are in surplus, there is a reverse transfer to the large country, with no monetary consequences.

The characterization of the UMOA in section 10.3 begins with an overview of African monetary history, contrasting the experience of the Franc Zone with that of the former British colonies along lines suggested by Mundell's (1972) classic contribution to the subject. Using

rough indicators of financial development to compare several African countries, the analysis shows that in the 1970s the countries of the Franc Zone increased their propensity to hold near-money at a faster rate than the countries of the Sterling Zone of Africa. This finding is consistent with the emphasis of the model on the requirement of a transfer from France to guarantee the fixed exchange rate agreement. Evidence on the composition of the money stock in the UMOA confirms the importance of the French transfer.

A comparison of nominal and real effective exchange rates in several African countries yields mixed results, but as mentioned in the conclusion, the pattern of relative price adjustment among members of the UMOA does seem to reflect the emphasis on monetary allocations. In effect, surplus countries such as Ivory Coast experienced real appreciations, whereas deficit countries such as Senegal experienced real depreciations.

Finally, it should be kept in mind that although the model is designed to illuminate the workings of the West African Monetary Union, the two parts of the paper are largely self-contained. In particular, the possible real effects of the union cannot be ascertained by the evidence provided in section 10.3.

10.2 A Model of Collective Pegging to a Single Currency

10.2.1 A Two-Tier, Four Country Model

The model consists of standard aggregate demand and aggregate supply relationships, with trade and capital movements linking national economies.[2] Account is taken of the unequal size of the potential partners by modeling two pairs of identical economies, one large and one small. In the two identical large economies the bilateral exchange rate floats freely. In the two identical small economies the authorities decide whether to float their exchange rate or fix it with one of the large countries; in so doing, they also allow the unionwide central bank to decide on monetary allocations.

Because of the difference in size between the partners in the union, only the distribution of money between the two small countries is endogenously determined, but even there it can be modified by the allocation of a monetary transfer from the large partner. There is a pseudo–exchange rate union between one of the large countries and the two small countries but full monetary integration between the two small countries.

Each national economy is highly stylized, and the model focuses on the interaction of the members of the monetary union—the two small countries, labeled country 1 (Senegal) and country 2 (Ivory Coast)—which take as given the member of the pseudo–exchange rate union,

labeled country* (France) and the country outside the union, labeled country** (the United States). The model is therefore recursive.

Because of the devaluations of the French franc mentioned earlier, a more accurate procedure would be to specify a three-tier, rather than a two-tier, structure. If the two large countries are the United States and Germany (as a proxy for the EMS) and France is treated as a small country, the recursiveness of the model is preserved. The structure of the monetary union between two (very) small countries would allow them to trade with France and the two large countries, or at least one of them (the United States), but not with each other. This would again preserve the recursiveness of the model, but there would be two exogenous exchange rates: the franc-dollar rate and the franc-Ecu rate shocking the (very) small economies. To illustrate the interaction between France and the UMOA, though, a three-tier structure would be too cumbersome.

The four national economies are described by conventional aggregate relationships. Demand for domestic output (the IS curve) is a function of foreign outputs, relative prices or the real exchange rate, and the real interest rate. It can be changed by an exogenous demand disturbance, which can also be interpreted as the result of fiscal policy. Demand for real balances (the LM curve) is a function of domestic output and the nominal interest rate as a measure of the return differential. Eliminating the nominal interest rate yields an aggregate demand curve that relates domestic output to the real exchange rate, to foreign output, and to the exogenous demand and monetary disturbances. A real depreciation increases the demand for domestic output along conventional foreign trade multiplier lines.

The supply of domestic output is derived from labor market equilibrium, in which the supply of labor by workers responds to the wage deflated by a consumer price index, and the demand for labor by firms responds to the wage deflated by the price of the domestic good. Eliminating the nominal wage yields an aggregate supply curve relating domestic output to the real exchange rate and to an exogenous supply disturbance that can be interpreted as a change in productivity. A real depreciation lowers the supply of domestic output because it raises the product wage. Prices change as a proportion of the difference between demand and supply, so that a Phillips curve allowing for real wage rigidity is featured.

The model is closed by the assumption that domestic and foreign assets are perfect substitutes, so that interest rates are equalized in the stationary state. This recursively determines the real exchange rate and the price of domestic output in terms of the exogenous real and monetary disturbances, respectively. Under flexible exchange rates, the nominal exchange rate is then given by monetary disturbances,

whereas under fixed rates, the nominal money stock is determined endogenously.

Size does not affect the interest-rate elasticities of money demand and aggregate demand, which are common to all four countries. It may affect the other parameters, which are, however, identical in each pair of large and small countries. In particular, the steady-state money stocks in the two small countries are the same. These assumptions could be somewhat relaxed, but an analytical solution does require some symmetry between economic structures.[3]

The assumptions of labor market equilibrium and of perfect substitutability between domestic and foreign assets are particularly strong. Nevertheless, the case of an infinitely elastic supply of labor has often been used in the context of developing countries. The exchange rate union, on the other hand, rules out some special risks attached to the assets of small countries, making the perfect substitutability assumption slightly more palatable but the comparison with a perfectly flexible exchange rate regime less appropriate. Indeed, imperfect asset substitutability, as recognized by Marston (1985), would seem to call for the three-tier structure discussed earlier.

The model is used below to assess the effect of fixing the bilateral exchange rates of the two small countries with one of the large countries. Under price flexibility the exchange rate regime has no effect on the real exchange rate, since the effect on the nominal exchange rate and the price level offset each other. Nevertheless, a monetary union between one of the large countries and the two small countries may require a transfer from the large partner to offset internal and external disturbances. To that extent the union allows the central bank of the small countries to enforce an asymmetric monetary allocation rule. Prices then will not be adjusted to the nominal exchange rate, and the real exchange rate will also have to change as a consequence of the price rigidity.

10.2.2 Flexible Exchange Rates

The Two Large Economies

I present the model here in logarithmic deviations from the stationary state and denote rates of change by dots. Assuming perfect foresight about prices and exchange rates, the model of the two large economies consists of the following set of equations:

$$\left.\begin{aligned} (1)\quad & y^{*} = \upsilon y^{**} + a\theta^{*} - b(i^{*} - \dot{p}_{C}^{*}) + u_{A}^{*} \\ (2)\quad & y^{**} = \upsilon y^{*} - a\theta^{*} - b(i^{**} - \dot{p}_{C}^{**} + u_{A}^{**} \end{aligned}\right\} \text{IS equations}$$

$$(3)\quad \theta^{*} = e + p^{**} - p^{*} \qquad \text{the real exchange rate}$$

(4) $p_c^* = p^* + \beta\theta^*$

(5) $p_c^{**} = p^{**} - \beta\theta^*$

} consumer price indexes

(6) $u_m^* - p^* = y^* - ci^*$

(7) $u_m^{**} - p^{**} = y^{**} - ci^{**}$

} LM equations

(8) $\dot{p}^* = \gamma(y^* + k\beta\theta^* - u_\pi^*)$

(9) $\dot{p}^{**} = \gamma(y^{**} - k\beta\theta^* - u_\pi^{**})$

} price adjustment rules

(10) $i^* = i^{**} + \dot{e}$, interest parity

where y^j is the real output of country j (j = *,**);
p^j is the price of the output of country j;
e is the price of the double-starred currency in units of the starred currency;
i^j is the nominal interest rate in country j;
u_A^j is a demand disturbance in country j;
u_η^j is a supply disturbance in country j;
u_m^j is a monetary disturbance in country j;
v is the (common) foreign output multiplier;
a is a (common) term involving trade elasticities divided by the multiplier;
b is the (common) real interest semielasticity of aggregate demand;
c is the (common) interest semielasticity of money demand;
β is the (common) share of foreign goods in the consumer price indexes;
γ is the (common) speed of adjustment of domestic prices; and
k is the (common) real exchange rate elasticity of aggregate supply.

I will concentrate here on the stationary-state solution of the model.[4] The real exchange rate is obtained from the difference in the cyclical positions of the two countries, whereas the interest rate is obtained by their sum. In other words, relative disturbances are channeled through the exchange rate; and global disturbances, through the interest rate, such that:

(11) $$\theta^* = -\frac{u_*^d}{H_*}$$

(12) $$i^* = i^{**} = \frac{u_*^s}{b},$$

where $H_* = a + k\beta(1 + v)$;

$u_*^d = {}^*u_A^d - (1 + v)^*u_\pi^d$ is a composite relative real disturbance;

$u^s = {}^*u_A^s - (1 - \upsilon){}^*u_\pi^s$ is a composite global real disturbance;

$${}^*u_i^d = \frac{u_i^* - u_i^{**}}{2}, \quad i = A, \pi; \text{ and}$$

$${}^*u_i^s = \frac{u_i^* + u_i^{**}}{2}.$$

The size of the multiplier H_* is smaller, the larger the demand and supply elasticities a and k. Now, given θ^*, we can obtain y^* and y^{**} by equating to zero the right-hand sides of equations (8) and (9), and we can obtain the price of domestic output from equations (6) and (7).

Thus, in country**:

$$(13) \quad p^{**} = -k\beta\theta^* - u_\pi^{**} + ci^{**} + u_m^{**}$$
$$= \frac{1}{H_*}(k\beta{}^*u_A^d + a{}^*u_\pi^d) + \frac{1}{\phi}[{}^*u_A^s - (1 + \phi - \upsilon){}^*u_\pi^s] + u_m^{**},$$

where $\phi = b/c$. The first term on the right-hand side of the equation is a modified real exchange rate effect; the second term, a modified interest rate effect; and the third term, an own monetary effect. Note that the first term enters negatively in p^*.

Given prices and the real exchange rate, the nominal exchange rate is determined by equation (3). The interest rate effect drops out, so that again only relative disturbances matter, such that:

$$(14) \quad e = (1 + 2k\beta)\theta^* + 2{}^*u_m^d - 2{}^*u_\pi^d$$
$$= \theta^* + 2{}^*u_m^d - \frac{2}{H_*}(k\beta{}^*u_A^d + a{}^*u_\pi^d),$$

where ${}^*u_m^d = \dfrac{u_m^* - u_m^{**}}{2}$.

Let us now consider the effect of each of the disturbances in turn. Monetary disturbances have no effect on the real exchange rate and offsetting one-to-one effects on the nominal exchange rate and on the own price level. An increase in the demand for the good of country*, $u_A^* > 0$, appreciates the real exchange rate by $\frac{1}{2}H_*$.

According to the first equation in (13), the effect of a change in the real exchange rate on the nominal exchange rate is augmented by $2k\beta$ because of the effect of aggregate demand expansion in country* in raising prices in country**. The real appreciation of the domestic currency is always less than the nominal appreciation.

Demand expansion in country** increases the price level there by one half of $([1/\phi] - [k\beta/H_*])$ so that the nominal exchange rate depreciates by more, with the factor given by the effect of the real on the nominal exchange rate change, $1 + 2k\beta$. The effect of supply or pro-

ductivity disturbances is also stronger on the nominal exchange rate, the difference being proportional to the trade elasticities.

Equally distributed demand, supply, or monetary disturbances (such that $^*u_i^d = 0$ and $^*u_i^s = {}^*u_i$, $i = A, \pi, m$) leave the exchange rates unchanged ($\theta^* = e = 0$). The size of the effect of a supply shock on the price level differs from the size of that of a demand shock by the factor $1 + \phi - \upsilon$, shown in the second term on the right-hand side of (13). Negatively correlated real disturbances (such that $^*u_i^s = 0$ and $^*u_i^d = u_i^*$) leave interest rates unchanged ($i^* = i^{**} = 0$). Their effect on the price level is given by the first term in equation (13). That effect vanishes when there are no supply effects ($k = u_\pi^i = 0$).

The structure of the large economies can thus be simplified by ruling out supply effects. If, in addition, their monetary policies are perfectly correlated ($^*u_m^d = 0$) and there are only relative demand disturbances ($^*u_A^s = 0$), the nominal and real exchange rates are the same, and they will be the only channel of external disturbances to the small countries.

The Two Small Economies

The model of the small economies consists of the same relationships as in the model of the large economies. Care is taken, though, to distinguish between trade with each of the two foreign countries, one of which, country*, is a partner in the exchange rate union. I will present the model of what I will call the domestic economy in log-linear form, expressed again as a deviation from steady state. It will be easy to modify the model to consider the other (identical) small country, which will be the partner in the monetary union.

The following set of equations describes the domestic economy:

(15) $y = (a^* + a^{**})\theta - a^*\theta^* + \upsilon^* y^* + \upsilon^{**} y^{**} - b(i - \dot{p}_c) + u_A$ — IS equation

(16) $\theta = e^{**} + p^{**} - p$ — real exchange rate

(17) $p_c = p + (1 - \alpha)\theta - \alpha_*\theta^*$ — consumer price index

(18) $u_m - p = y - ci$ — LM equation

(19) $\dot{p} = \gamma[y - h\alpha_*\theta^* + h(1 - \alpha)\theta - u_\pi]$ — price adjustment rule

(20) $i = i^* + \dot{e}^*$ — interest parity

(21) $e^* = e^{**} - e$, — triangular arbitrage,

where $e^*(e^{**})$ is the price of the starred (double starred) currency in units of the domestic currency;
$a^*(a^{**})$ is a term involving trade elasticities with country* (country**) divided by the multiplier;

$\alpha_*(\alpha_{**})$ is the share of goods from country* (country**) in the consumer price index, $\alpha_* + \alpha_{**} + \alpha = 1$;
$\upsilon^*(\upsilon^{**})$ is the multiplier for trade with country* (country**); and
h is the real exchange rate elasticity of aggregate supply.

Concentrating again on a particular solution to the model (with $\dot{p}_c = \dot{p} = \dot{e}^* = 0$), we can solve for the real exchange rate, θ, as a function of the foreign real exchange rate, θ^*, and the common interest rate, i^*; supply disturbances in the two large countries; and domestic disturbances, such that:

$$(22) \quad H\theta = [\tilde{a}^* + (\upsilon^* - \upsilon^{**})k\beta]\theta^* + bi^* - \upsilon^* u_\pi^* - \upsilon^{**} u_\pi^{**} - u_A + u_\pi,$$

where $\tilde{a}^j = a^j + h\alpha_j$, $j = *, **$; and $H = \tilde{a}^* + \tilde{a}^{**}$.

The role of trade patterns is apparent. Indeed, when trade multipliers are the same ($\upsilon^* = \upsilon^{**} = \upsilon/2$), equation (22) simplifies to:

$$(23) \quad H\theta = \tilde{a}^*\theta^* + {}^*u_A^s - {}^*u_\pi^s - u_A + u_\pi.$$

Even in this special case, global disturbances abroad affect the real exchange rate of the small countries unless they are the same as domestic disturbances ($u_i = {}^*u_i^s$, $i = A, \pi$).

Substituting the right-hand side of (19) into (18) yields an expression for the price of domestic output in the same form as (13) above:

$$(24) \quad p = h[(1 - \alpha)\theta - \alpha_*\theta^*] + \frac{u^s}{\phi} - u_\pi + u_m.$$

Substituting for θ yields in the strongly symmetric case of equation (23):

$$(25) \quad p = \chi A^* \theta^* + \frac{u^s}{\phi} + \chi({}^*u_A^s - {}^*u_\pi^s) - \chi u_A - (1 - \chi)\, u_\pi + u_m,$$

where $A^* = (a^*\alpha_{**} - a^{**}\alpha_*)/(1 - \alpha)$ and $\chi = h(1 - \alpha)/H$

If there is no difference between the relative shares of foreign output in the domestic price index and the relative trade elasticities, then $A^* = 0$. This is the case, emphasized by Marston (1984a), of "balanced" sensitivities. With equal real disturbances at home and abroad, the effect of a supply shock therefore differs from the effect of a demand shock by the same factor, $1 + \phi - \upsilon$, as in equation (13) above.

When foreign real disturbances are perfectly negatively correlated and $A^* = 0$, the price of domestic output is a χ-weighted average of demand and supply disturbances plus the monetary disturbance. From equation (18), then, output is given by:

$$(26) \quad y = \chi u_A + (1 - \chi)\, u_\pi.$$

Similarly, the real exchange rate can be written as:

$$\theta = \zeta\theta^* - \frac{1}{H}(u_A - u_\pi), \tag{27}$$

where $\zeta = \bar{a}^*/H = \alpha_*/(1 - \alpha)$ when $A^* = 0$.

To solve for the nominal exchange rate of the small country with the numeraire currency, use the definition of the real exchange rate, which is obtained by adding θ and p in equations (25) and (27) and subtracting p^{**} in (13). In the absence of supply and interest-rate effects in the large countries, we find:

$$e^{**} = \zeta e - U + u_m - u_m^{**}, \tag{28}$$

where $U = \xi u_A + (1 - \xi) u_\pi$ and $\xi = [1 + h(1 - \alpha)]/H$.

To sum up the results under flexible exchange rates, monetary disturbances have no effect on the real exchange rate, and only domestic monetary disturbances (u_m) have an effect on the price of domestic output (the effect is one-to-one, as before). An increase in the demand for domestic output ($u_A > 0$) appreciates the real exchange rate, and an increase in productivity ($u_\pi > 0$) depreciates it by the same amount, $1/H$.

In the two-country model the effect is not symmetric because account has to be taken of the output repercussion in the foreign country, which is zero for the small, open economy. Thus, in equation (11) the depreciation caused by a supply shock is larger than the appreciation caused by a demand shock by $v/2H_*$.

Another difference is the unambiguously negative effect of demand expansion on the domestic price level. Since the fall in prices induces a real depreciation, the nominal exchange rate has to appreciate by more than the real rate. The effect of the supply shock on prices is also unambiguously negative, but the nominal exchange rate will depreciate only if the trade elasticities are small ($a^* + a^{**} < 1$, or equivalently $\xi > 1$), because in that case the fall in prices is less than the real depreciation.

10.2.3 Fixed Exchange Rates

It is useful to define the effective exchange rate of the domestic economy, a weighted average of the exchange rates of the two partners, by the weights given by the respective shares in the foreign component of the consumer price index, that is, by ζ, such that:

$$E_e = \zeta e^* + (1 - \zeta) e^{**} = e^{**} - \zeta e. \tag{29}$$

The second equation is obtained by triangular arbitrage. Taking it into account, we can see from equation (28) that in this simplified setting

the effective exchange rate is a function only of domestic disturbances. If the home country fixes its exchange rate with country*, then $e^* = 0$ and $e^{**} = e$. We thus have the effective exchange rate under the union, denoted by a tilde, such that:

$$^{E}\tilde{e} = (1 - \zeta)\, e. \tag{30}$$

The effective exchange rate under the union appears in the expression for the exchange rate with the potential partner, obtained from (28) by triangular arbitrage, such that:

$$e^* = -(1 - \zeta)e - U + u_m - u_m^*. \tag{31}$$

Under the union, equation (31) becomes an equation for the endogenous money stock of the home country, denoted by m, such that:

$$m = u_m^* + {}^{E}\tilde{e} + U. \tag{32}$$

Because of the difference in size between the two partners, however, the money stock of country* continues to be policy determined, and there is no problem of monetary allocation between the two partners. Thus, u_m^* can be interpreted as an exogenous increase in the unionwide money stock. If ${}^*u_m^d = 0$, foreign monetary expansion increases the domestic money stock one-to-one, since there is no induced depreciation of the exchange rate of country*.

Associated with the money stock under the union is a price of domestic output, denoted by a tilde. From equation (25), in the absence of global real disturbances and when sensitivities are balanced, we find:

$$\tilde{p} = -y + m. \tag{33}$$

Since according to (26) and (27) y and θ are given by real domestic disturbances, the difference between the fixed and flexible exchange rate solutions is matched by the difference in money stocks and prices, such that:

$$e - e^{**} = \tilde{p} - p = m - u_m. \tag{34}$$

Equation (34) shows that if the fixed exchange rate is lower than the one prevailing before the agreement, the money stock and the price of domestic output will decrease by the same amount. The decrease in the money stock is brought about by a capital outflow that would increase in magnitude if the government attempted to increase the supply of domestic assets to the public. As long as real output does not change, the real money stock remains fixed, and the fall in money balances is transmitted to prices. Only by increasing demand for real output could the government enforce a different nominal income. Alternatively, as we will see, the loss in reserves could be offset by a transfer from abroad.

In general, the price of domestic output has to be different from its equilibrium level for the real exchange rate to be different under the union. For example, domestic prices may be downwardly rigid.

Consider, thus, a price level p_T associated with a real exchange rate θ, which under the union gives a real exchange rate θ^T. The difference in real exchange rates then equals the difference in nominal rates, so that, from equation (34):

$$\theta^T - \theta = \tilde{p} - p_T. \tag{35}$$

The difference between the price prevailing in the neutral situation of equation (33) and that prevailing in the rigid situation can be decomposed further into the difference in real outputs and in money stocks. The latter, in turn, can derive from an increase in the foreign money stock. Assuming that ${}^*u_m^d = 0$, denoting the common increase by $\bar{u}_m$, and that $\theta = 0$ under the "neutral" union (that is, $u_A = u_\pi = 0$), we find:

$$\begin{aligned} \tilde{p} - p_T &= m - m_T - y + y_T \\ &= -\frac{1}{H} u_A^T - \bar{u}_m, \end{aligned} \tag{36}$$

where m_T is given by equation (32) with $U = \xi u_A^T$ and $u_m^* = \bar{u}_m$. A demand expansion, u_A^T, perhaps in the form of a fiscal expansion, appreciates the real exchange rate by $1/H$, whereas a monetary transfer from abroad has a one-to-one effect.

When account is taken of the induced real appreciation, the demand expansion increases output by $\chi < 1$. Given monetary policy, this expansion would reduce prices by the same amount by which it expands output, so that the nominal appreciation would be given by $\chi + 1/H = \xi$. Ruling out the exchange rate change and the fall in prices requires an increase in the money stock by the same factor ξ, which will be less than one if the trade elasticities are high enough. The real appreciation is accompanied by a rise in prices in the amount $1/H$. To keep the nominal exchange rate constant, demand expansion must therefore be consistent with the increase in the money stock, or $u_A = \bar{u}_m/\xi$. Of the equivalent rise in nominal income, a proportion, χ/ξ, goes to real output expansion, and the remainder, $(1 - \chi)/\xi$, goes to the rise in prices and fall in the real exchange rate.

In sum, the effects of a fixed exchange rate regime are confined to nominal variables unless there is a price rigidity, an induced demand for domestic output as a consequence of fiscal expansion, or a transfer from abroad. The last possibility is particularly relevant when there is a monetary union involving the two small countries, henceforth indexed 1 and 2.

10.2.4 Two-Tier Monetary Unions

A Monetary Union of Two Small Countries

If country 1 fixes its exchange rate with country 2, e_1^* will equal e_2^* in equation (31). Unlike in the previous case, we must keep track of the monetary allocation. In fact, any exogenous increase in the unionwide money stock, denoted by t, will be allocated between the two partners in proportion to their steady-state shares (assumed to be equal). Setting $\bar{u}_m = 0$ for simplicity, we find:

$$m_1 = t + U^d \tag{37}$$

$$m_2 = t - U^d \tag{38}$$

$$e^* = t - (1 - \zeta)e - U^s, \tag{39}$$

where t is the increase in the unionwide money stock; $U^d = (U^1 - U^2)/2$; and $U^s = (U^1 + U^2)/2$.

Given the unchanged real exchange rates, equations (37) through (39) are the solution of the exchange rate union between two small countries. If $t = 0$, the money stocks are unchanged when demand and supply disturbances are perfectly correlated ($U^d = 0$). In that case, the exchange rate with country* appreciates by $U^s = U^1$.

A Three-Country Monetary Union

In general, fixing the exchange rate with country* requires an increase in the unionwide money stock given by making $e^* = 0$ in equation (39). If real disturbances are exogenous, the transfer must adjust. Denoting this endogenous monetary transfer from abroad by a tilde, we find:

$$\tilde{t} = E_{\tilde{e}} + U^s. \tag{40}$$

According to equation (40), a depreciation of the franc against the dollar requires an increase in $\tilde{t}$ that is larger, the higher the consumption share of goods from country** relative to goods from country* (the lower the ζ). On the other hand, a unionwide demand expansion requires an increase in $\tilde{t}$ that is larger, the larger the consumption share of nonunion relative to union goods (the lower the α).

The endogenous increase in the unionwide money stock ($\tilde{t} > 0$) can be interpreted as a transfer from the large partner that guarantees the fixed exchange rate agreement. Although t could be zero in equations (37) through (39), $\tilde{t}$ will generally be nonzero in (40).

Conversely, the transfer may remain exogenous if expenditure is adjusted by fiscal policy in both countries, such that (with $u_\pi^i = 0$):

$$\tilde{u}_A^s = (t - {}^E\tilde{e})/\xi. \tag{41}$$

I continue to assume that the transfer has no effect on the money stock of country* because of the size difference. It is, nevertheless, required by the union and would be zero only if there were no unionwide demand or supply disturbances and no external real disturbances either, so that $U^i = e = 0$.

I will analyze next how the allocation of the transfer can have real effects.

A Monetary Allocation Rule

If the unionwide central bank allocates the transfer in equation (40) according to (37) and (38), the full monetary union will have no real effects. This is easy to verify by eliminating $t = \tilde{t}$.

Consider now a monetary allocation rule whereby money increases in each country, denoted as u_T^i, are based on a share ω of the sum of the equilibrium money stock increases. The percentage change in each money stock is given by $2\omega\tilde{t}$ when the two small countries are identical in steady state, so that:

$$u_T^1 = 2\omega\tilde{t} \tag{42}$$

$$u_T^2 = 2(1 - \omega)\tilde{t}. \tag{43}$$

Using equations (40), and (42), and (43) in (35), we find:

$$\theta_1^T = \theta_1 + (1 - 2\omega)\,{}^E\tilde{e} + (1 - \omega)U^1 - \omega U^2 \tag{44}$$

$$\theta_2^T = \theta_2 - (1 - 2\omega)\,{}^E\tilde{e} - (1 - \omega)U^1 + \omega U^2. \tag{45}$$

The effects of various disturbances on θ_1^T are displayed in table 10.1. Since the exchange rate gaps are of the same magnitude and of opposite sign (if $\theta_1^T > \theta_1$, then $\theta_2^T < \theta_2$), the results for country 2 are easy to obtain. Thus the first column, first row shows that the effect of a depreciation of the franc-dollar rate is ambiguous when $\omega > \frac{1}{2}$. The effect will be a real depreciation in the small countries if trade is sufficiently biased toward France. When $\omega = \frac{1}{2}$, the effect is the same as under flexible exchange rates.

The first column, second row shows that demand expansion in country 1 has an ambiguous effect on the real exchange rate, unless the whole transfer goes to country 2 ($\omega = 0$), in which case the effect will be positive. The condition for a negative effect will be weaker than $\omega > \frac{1}{2}$ if the supply elasticity is high enough, that is, if $h(1 - \alpha) > 1$. When the entire transfer goes to the expanding country ($\omega = 1$), the effect is the same as in equation (27) above.

The effect of demand expansion in country 2 is a real appreciation in country 1, and the same is true of a productivity improvement if trade elasticities are high enough ($\xi < 1$). As shown in the third row, both effects are dampened by ω, so that they vanish when the entire

Table 10.1 **The Effect of Disturbances on the Real Exchange Rate of Country 1 (θ_1^T)**

	Disturbance		
	Demand ($j = A$)	Supply ($j = \pi$)	Both
1. Foreign (e)	$\frac{\alpha_* + \alpha_{**}(1 - 2\omega)}{1 - \alpha}$	n.a.	n.a.
2. Domestic (u_j^1)	$\chi - \omega\xi$	$1 - \chi - \omega(1 - \xi)$	$1 - \omega$
3. Partner (u_j^2)	$-\omega\xi$	$-\omega(1 - \xi)$	$-\omega$
4. Unionwide			
4.1 Global ($u_j^1 = u_j^2$)	$\chi - 2\omega\xi$	$1 - \chi - 2\omega(1 - \xi)$	$1 - 2\omega$
4.2 Distribution ($u_j^1 = u_j^2$)	χ	$1 - \chi$	1

transfer goes to country 2 ($\omega = 0$). The effect of a domestic productivity improvement is an unambiguous real depreciation, so that a harvest failure ($u_\pi^1 < 0$), for example, causes the real exchange rate to fall. When the entire transfer goes to country 1 ($\omega = 1$), the effect is again the same as in equation (27).

As shown in the fourth rows, the effects of unionwide global disturbances are the same as in (27) when $\omega = \frac{1}{2}$. On the contrary, inversely correlated disturbances are independent of ω and always have an effect given by χ. In general, the real exchange rate gap can be avoided by the choice of a suitable ω. For example, if $U^1 > U^2$, then $\omega > \frac{1}{2}$ for $\theta_i^T = \theta_i$.

The model described above shows how a monetary allocation rule induces a change in the real exchange rates of the members of a monetary union. This description implies that there is also a pseudo–exchange rate union that includes, aside from the members of the monetary union, a large country ready to ensure the fixed exchange rate agreement by transferring real resources to the union.

Because of the size difference between the partners, an increase in the large partner's money stock could also imply a change in the real exchange rate of the small partner, to the extent that the price level was different from the one to which the exchange rate was pegged. Similarly, the real effects of demand expansion could be interpreted in terms of a fiscal expansion induced by the union, as long as the large partner is willing to transfer real resources and therefore increase real money balances.

Nevertheless, the focus of the analysis was on the allocation of a given transfer between the two small countries, because this is an

important feature in the recent experience of the West African Monetary Union. The major implication of the model was therefore that changes in the real exchange rate of the small partners are to be expected when the allocation of a given transfer is different from the one implied by the assumed equality of the steady-state monetary shares of the two small countries.

10.3 The West African Monetary Union

10.3.1 The Franc Zone

Established in the mid-1940s between France and its colonies, the Franc Zone survived the independence of the colonies in the early 1960s and the move to generalized floating exchange rates in the early 1970s.

Summing up the African monetary experience of the Bretton Woods era, Mundell (1972, 93) wrote:

> The French and the English economic traditions in monetary theory and history are different. At the risk of gross oversimplification . . . the French tradition has stressed the passive nature of monetary policy and the importance of exchange stability with convertibility (within the franc area); stability was achieved at the expense of institutional development and monetary experience. The British countries by opting for monetary independence have sacrificed stability, but gained experience and better developed monetary institutions. The simplest test of this is the extent of development of money substitutes.

Mundell went on to present indicators of financial intermediation for eleven "rich countries" and 33 African countries, classified into "Franc Africa," "Sterling Africa," "North Africa," and "Central East Africa." His figures showed that in 1968 the median propensity to hold cash was 21 percent in OECD countries, 33 percent in Sterling Africa, 47 percent in Franc Africa, and 45 percent in the other two regions of Africa.

Table 10.2 provides evidence along the same lines for the United States and France, as rich countries; Kenya, a Sterling Africa country; several countries of Franc Africa; Barbados, a member of the East Caribbean Currency Area; and Sudan.[5] The figures for 1962 and 1972 confirm the lower development of money substitutes in Franc Africa.

The Franc Zone has changed considerably over the last 40 years. Upon independence, it was adapted through the creation of common central banks for the former French colonies of West, Central, and East Africa. In particular, Benin, Ivory Coast, Mauritania, Niger, Senegal, Togo, and Upper Volta created UMOA, managed by the Central

Table 10.2 **Indicators of Financial Intermediation in Various Countries, in Percentages**

Country	Propensity to Hold Near-Money			Propensity to Hold Cash		
	1962	1972	1982	1962	1972	1982
Rich Countries						
United States	60	71	80	8	6	6
France	36	60	70	25	11	6
Sterling Africa						
Kenya	29[a]	30	37	21[a]	21	18
Franc Africa						
Cameroon	7	18	36	52	38	27
Ivory Coast	8	17	30	56	42	33
Senegal	3	9	28	51	39	32
Mauritania	3	8	26	49	40	31
Madagascar	2	19	21[b]	55	39	31[b]
Mali	3	3	6	61	59	62
Other						
Barbados	57[a]	71	70	13[a]	10	13
Sudan	6	13	18	50	45	32

Source: International Monetary Fund, *International Financial Statistics* (IFS)

(1) Line 35
(2) Line 14a
} divided by lines 34 plus 35 (M2) unless otherwise noted

France (1) Lines 35 plus 65a
(2) Line 14a.
} divided by lines 54 plus 56a (M3)

U.S.

(1) Lines 59mcb minus 59 mab
(2) Line 14a.
} divided by line 59 mcb (M3)

[a]1966.

[b]1979.

Bank of the West African States (known by its French abbreviation BCEAO), whereas Cameroon, Central Africa, Chad, Congo, and Gabon established the union of the members of the Bank of Central African States. The members of those two monetary unions signed an agreement of monetary cooperation with France whereby the exchange rate between the French franc and the franc of African Financial Cooperation (CFA) was fixed, foreign exchange reserves were pooled, and exchange controls were common to the whole zone. Most importantly, an "operations account" at the French Treasury guaranteed the convertibility of the CFA and provided a channel for monetary transfers between France and UMOA.

Although Mali participated in the UMOA negotiations, it refused to sign the agreement and left the Franc Zone in 1962. Its justification was consistent with Mundell's view of the British tradition: Monetary

sovereignty, Mali argued, was an essential instrument of development. Monetary stability ws a less pressing consideration.

Mali's criticism of the Franc Zone as a neocolonial obstacle to "self-centered" development is only one example of a fairly widespread view that the arrangement has served to benefit France.[6] Since the repeated devaluation of the French franc after 1981 and the implementation of tighter areawide exchange controls, the desirable trend toward trade diversification away from France seems to have been reversed. As a consequence, the British tradition might now provide an argument for leaving the Franc Zone: There will be no monetary stability in the UMOA if there is none in France.

This controversy about the costs and benefits of the Franc Zone arrangements merely illustrates how the volatility of major exchange rates over the last ten years has changed the terms of the Mundellian trade-off between monetary stability and development. Stability relative to one currency means instability relative to other floating currencies, so that fixing "the" exchange rate is no longer an option. The figures for 1982 reported in table 10.2 also suggest a blurring of the difference between the French and the English monetary traditions. Certainly, the propensity to hold cash remains higher in the former French colonies than in Kenya, but except for Madagascar, the propensity to hold near-money increased much faster in the countries of Franc Africa than it did in Kenya or Sudan.

To the extent that both groups were subject to the global shocks of the 1970s, the acceleration of financial development casts the agreements of monetary cooperation with France in a new light. The originality of their design has been emphasized in the work of the Guillaumonts (1984). Rather than being a historic relic, the Franc Zone represents in their view a conscious choice of monetary and exchange rate policy by sovereign states. Similarly, for Vinay (1980, 3), it is a "unique organization in which the traditional legalism of French institutions was replaced by a fertile pragmatism." The fact that some former French colonies, such as Madagascar and Mauritania, left the union in 1972 is, of course, consistent with the idea of choice.[7]

Pragmatism can also be found in the posture of Mali. Three years after choosing monetary sovereignty, Mali began negotiations for a return to the Franc Zone, and a special arrangement was agreed upon in 1967 whereby the Malian franc was devalued by 50 percent relative to the CFA. In addition, France was to lobby for the accession of Mali to the UMOA. The agreement involved two preliminary phases. A one-year fiscal adjustment-cum-liberalization was followed by bilateral cooperation with France along BCEAO lines. The duration of this phase was not specified, since full membership for Mali might not in the end be welcome by the other members. This is not surprising in light of

the country's singular monetary underdevelopment, apparent from table 10.2, and its persistently negative operations account with France. Political considerations also played a role, as emphasized by Crum (1984).

Nevertheless, Malian membership in the UMOA was agreed upon in Niamey, Niger in October 1983. The third phase was thus completed in 1984. Because of the increasing transfer of resources from France to the UMOA, the reversal of Mali's position might be explained by a desire to receive the transfer through the UMOA rather than directly from France.

If fixing is impossible in a world of floating rates and a pure float is not a viable—let alone desirable—option for a developing country, an alternative to the institutions of the Franc Zone would be for the UMOA collectively to peg to a basket of currencies. This was proposed by Nascimento (1984) on the basis of his econometric analysis of the costs and benefits of various exchange rate regimes for the union as a whole. He measured the trade-off between monetary sovereignty and the "liquidity" by, respectively, the loss in reserves associated with an excess supply of money (the offset coefficient) and the variances of departures from purchasing power parity. According to this operationalization of the Mundellian trade-off, offset coefficients and real exchange rate variability in the UMOA are smallest under a basket peg and largest under a crawling peg relative to the French franc.

Both the neglect of the French transfer—which allows the continued sterilization of the loss in reserves—and the assumption of purchasing power parity cast doubt on the applicability of Nascimento's analysis to the UMOA, let alone to its members with persistent deficits, such as Senegal. All the same, for a given transfer, pegging to a basket allows for the choice of optimal weights. Since it is unlikely for the optimal weight of a particular currency to be one, such a regime would dominate the present arrangement. Similarly, it is unlikely that the rate of crawl would be zero, so that a regime by which indicators are optimally chosen will also dominate the basket peg.[8] This arrangement would make the UMOA look like the EMS rather than part of the Franc Zone. The problem for a deficit country in the UMOA would then be how to ensure a continued transfer from its surplus partners, if there are any.

10.3.2 Monetary Allocations in the UMOA

During its first decade the UMOA followed the prudent course cited earlier as being characteristic of the French monetary tradition. From its Paris headquarters, BCEAO managed to keep the composition of the union's money stock (M2) virtually constant. The net foreign assets of the banking system grew almost without interruption and remained at about one third of the money stock, so that domestic assets ac-

counted for the other two thirds, as shown in table 10.3, column 3. The propensity to hold near-money increased from 4 percent in 1962 to 13 percent ten years later (column 4). Finally, as a share of the French money stock, the UMOA's money showed a slight increase over that period (column 5).

The situation changed in the 1970s, but the reversal was obscured by the drastic increases in the reserves of Ivory Coast in 1974 and 1977, largely as the result of higher world prices for coffee (19 percent and 20 percent, respectively) and cocoa (56 percent and 69 percent, respectively). The reserves of Togo also jumped in 1974 as the result of a rise in the price of phosphates (by 483 percent); and as a share of the union money stock they went from 14 percent to 27 percent. At the same time the institutional reforms allowed the BCEAO greater freedom to conduct monetary policy from its newly established African headquarters.[9]

Table 10.3 **The Composition of Money Stock in the UMOA, 1962–82**

	Net Foreign Assets (CFAF billion)	Money (M2) (CFAF billion)	Ratio (1)/(2)	Ratio Time Deposits/(2) (%)	Share of France
Year	(1)	(2)	(3)	(4)	(5)
1962	31.0	88.3	35	4.3	1.2
1963	31.0	90.2	34	4.1	1.1
1964	32.2	103.1	31	10.0	1.1
1965	43.5	103.6	40	7.8	1.0
1966	43.5	108.0	40	8.2	1.0
1967	38.8	112.1	35	10.3	.9
1968	43.8	133.6	33	12.7	.9
1969	53.7	159.6	34	16.9	1.1
1970	79.5	185.7	43	16.1	1.1
1971	81.3	204.1	40	16.4	1.0
1972	63.7	217.0	29	13.3	.9
1973	52.9	261.0	20	18.3	.9
1974	81.0	387.2	21	21.1	1.2
1975	30.2	437.4	7	20.9	1.2
1976	37.1	596.0	6	21.8	1.4
1977	62.8	811.7	8	23.5	1.7
1978	38.5	941.2	4	25.4	1.7
1979	−73.0	945.1	−8	22.4	1.5
1980	−282.0	1,024.7	−28	23.5	1.5
1981	−431.1	1,186.2	−36	25.1	1.6
1982	−547.5	1,273.9	−43	27.0	1.5

Sources: (1) *IFS* line 31n summed over country pages; it excludes long-term borrowing (line 36cl) and SDR allocations (included in other items, line 37r).
(2) *IFS* lines 34 and 35 summed over country pages.
(4) *IFS* line 35 divided by (2).
(5) (2) plus (3) divided by *IFS* lines 34 plus 35 for France.

As shown in table 10.4, the negative foreign asset position of the commercial banks overtook the claims of the central bank in 1979, and the operations account of the central bank moved from a claim of CFAF 54.6 million on France in December 1979 to a liability of CFAF 13.2 million in March 1980. The steep increases in the reserves of Togo in 1981 and 1982 were no longer sufficient to offset the declines of the two major partners, Ivory Coast and Senegal. The external liabilities of the banking system increased from 10 percent of the money stock in December 1979 to 36 percent in June 1982 and reached 56 percent in June 1983.

Put in another way, domestic assets increased from 96 percent of the union money stock in 1978 to 143 percent in 1982. In the meantime the domestic assets of France fell from 82 percent to 69 percent of the money stock in 1980 and increased to 77 percent in 1981 and 1982. This change reflected the loss of foreign exchange reserves associated with the expected devaluations of the franc during those two years (and thus offset the revaluation of existing resources).

The evolution of the shares of UMOA members in the union's money stock (M2) is summarized in table 10.5. Measured by the coefficient of variation, the Senegalese share was the second most stable, but it was the most unstable over the entire period 1962–82. Of the two largest shares, the share of Ivory Coast has been positively correlated with the UMOA share in the French money stock, whereas the corresponding correlation for Senegal has been negative. During the 1960s the

Table 10.4 **The Net Foreign Assets of the UMOA, 1975–83 (CFAF billion)**

	Assets of the Central Bank (1)	Liabilities of the Commercial Banks (2)	[(1) − (2)] (3)
December			
1975	66.4	44.8	19.7
1976	70.2	44.0	26.2
1977	94.6	41.3	53.3
1978	125.2	90.4	34.9
1979	32.5	131.5	−99.0
1980	−120.2	189.5	−309.7
1981	−237.8	190.1	−427.9
1982	−356.8	203.6	−560.5
June			
1982	−260.4	174.1	−434.5
1983	−533.0	180.3	−713.3

Source: BCEAO (includes long-term borrowing and SDR allocations that are excluded in the IFS presentation of table 10.3).

Notes: The totals in column (3) may not add due to rounding. The figures in (2) represent new series since 1979. The June 1983 figure in (3) excludes Benin (data not available).

converse was true (−.55 for Ivory Coast and .62 for Senegal, as reported in Macedo 1985a). For the last few years Senegal's allocation was therefore insulated from the decline of the total.

That the insulation was on average at the expense of Ivory Coast is suggested by the negative correlation of .8 between the two monetary allocations, shown in table 10.6. The strength of the inverse link between the two economies was even higher in the 1960s (over the years 1962–72 the correlation reached −.99), largely because of the deterioration of the Ivorian external position after 1980.[10] If the French transfer decreases, however, the negative shares correlation will increase again.

The increase in UMOA money relative to French money has reversed in the last few years, as France has grown reluctant to replenish the operations account on a continuing basis. This implies that in the future the monetary allocation of the transfer will become a central policy issue for the members of the UMOA. The membership of Mali, another country with a structural deficit, is also likely to tighten the constraint on the shares.

Table 10.5 **Summary Statistics of Members' Shares in the UMOA Money Stock, 1973–82, in Percentages**

Country	Mean		Coefficient of Variation		Correlation	
Ivory Coast	58	(54)	6	(12)	.33	(.37)
Senegal	19	(22)	8	(29)	−.72	(−.37)
Togo	7	(7)	14	(19)	.24	(.43)
Niger	6	(6)	18	(14)	.26	(.06)
Benin	5	(6)	18	(14)	−.42	(−.46)
Upper Volta	5	(5)	9	(12)	−.44	(−.47)
Total/France	1	(1)	17	(22)	1.00	

Source: IFS, lines 34 and 35.

Notes: The numbers in parentheses refer to data for 1962–82. The coefficient of variation is the standard deviation divided by the mean (times 100).

Table 10.6 **Correlations of Monetary Allocations, 1973–82**

	Ivory Coast	Senegal	Togo	Niger	Benin
Senegal	−.76(−.96)				
Togo	−.71(.60)	.41(−.76)			
Niger	−.52(−.24)	−.10(.02)	.52(.20)		
Benin	−.78(−.65)	.60(.51)	.24(−.27)	.24(.21)	
Upper Volta	−.82(−.88)	.65(.81)	.27(−.58)	.34(.31)	.84(.66)

Source: Same data as in table 10.5.

Note: The numbers in parentheses refer to 1962–82.

10.3.3 Nominal Stability and Real Volatility

Table 10.7 lists the 1980 trade shares of France, Senegal, and the other African countries covered in table 10.2 by loosely defined Ecu and dollar areas. The shares of the Franc Zone (including France) and of the United States are also indicated. The non–U.S. members of the dollar area are obtained residually.

Ivory Coast, Madagascar, and Mali show a lower share for imports from the dollar area than Senegal. Their share of imports from the United States is similar to that of Mauritania, Cameroon, and Madagascar. The Franc Zone export share is highest in Senegal, followed by Mauritania, Mali, and Ivory Coast. On the import side, however, Senegal has the lowest share among Franc Zone countries. Thus, trade diversification increased the dollar-area share in the trade of the Franc Zone countries, but, as mentioned earlier, the trend has probably been reversed in recent years.[11]

Because of the different trade patterns, there are sizable differences between the nominal effective exchange rate of France and

Table 10.7 **Trade Shares by Currency Area, 1980, in Percentages**

	Ecu	Of which Franc Zone	Dollar	Of Which Unified States
Imports				
Senegal (1)	53	37	47	4
France (1)	47	0	53	8
Ivory Coast (2)	52	42	48	7
Cameroon (3)	51	43	49	5
Mali (3)	79	67	21	0
Mauritania (5)	37	29	70	5
Madagascar (3)	62	41	38	4
Kenya (1)	31	0	69	17
Sudan (5)	29	5	71	8
Exports				
Senegal	56	46	44	0
France	48	0	52	5
Ivory Coast	63	29	37	9
Cameroon	53	21	47	29
Mali	59	26	41	0
Mauritania	48	29	52	0
Madagascar	40	23	60	19
Kenya	34	0	66	4
Sudan	16	5	84	0

Source: International Monetary Fund, *Direction of Trade* (Washington, D.C.).

Notes: The numbers in parentheses indicate the minimum share; for example, for Senegal all partners with a one percent share or larger were included in the computation. Except for the United States, the dollar area is obtained residually. The data on French shares are for 1981.

those of the Franc Zone countries. In the 1970s changes in the effective exchange rate of the U.S. dollar have also become an important source of divergence. Thus, the mean annual rate of depreciation over the 1973–82 period was 2.5 percent for France, 1 percent for Ivory Coast, and zero for Senegal, using 1980 import weights. With export weights, there was no change for the UMOA countries and a 2 percent per annum change for France. The standard deviation was also lower for the UMOA countries, but relative to the mean their nominal effective rates were more volatile than France's, as shown in table 10.8.

After a decade of experience with flexible exchange rates, the notion that real exchange rates would be stabilized by the offsetting of nominal variations by inflation differentials, very popular in the mid-1970s has been abandoned even by its most ardent defenders. The failure of purchasing power parity is evident in the substantial variability of most measures of real effective exchange rates in the industrialized countries.[12] Data availability precluded the computation of effective exchange rates using more narrowly based indexes than the so-called African consumer price index or even correcting prices for exchange rate changes.[13]

Table 10.8 **Nominal and Real Exchange Rates, 1973–82**

	Mean (% p.a.)		Coefficient of Variation		Correlations Between Nominal and Real
	Nominal	Real	Nominal	Real	
Export Weights					
Ivory Coast	.32	−1.92	15.53	3.18	.63
Cameroon	1.95	−.24	2.93	26.04	.82
Madagascar	2.84	−.96	2.41	5.78	.10
Mauritania	−1.61	−.64	4.14	14.95	.96
Sudan	11.19	3.28	1.51	4.39	.82
Kenya	−2.08	−2.41	4.97	5.36	.90
Senegal	.36	.84	6.66	7.83	.70
France	1.70	.83	2.92	5.12	.96
Import Weights					
Ivory Coast	1.11	−1.51	2.85	4.16	.62
Cameroon	1.37	−.41	1.72	7.41	.57
Madagascar	1.91	−1.32	2.14	4.08	−.19
Mauritania	−1.76	−1.13	3.66	8.52	.98
Sudan	11.43	3.44	1.60	4.33	.87
Kenya	4.26	.87	.90	5.24	.33
Senegal	.16	1.69	28.13	5.60	.77
France	2.54	1.44	2.28	5.53	.86

Source: IFS, with weights as described in Macedo (1985a).

The evolution of real effective exchange rates in table 10.8 shows Senegal and France as the only French-speaking countries to have depreciated in real terms. In terms of real variability, Senegal was also close to France (6), with Mauritania the highest (8), and Ivory Coast the lowest (4). The mean changes are close in absolute values, but the correlation between nominal and real changes is lower in Ivory Coast. Furthermore, the correlation between the real rates in the two countries increased to .45 in the 1970s.

Figure 10.1 shows a real depreciation of the franc since 1968 and pronounced swings around the upward trend, which are most pronounced when the 1981 weights are used. It is also evident from the figure that after 1976 Senegal moved opposite to France, whereas Ivory Coast magnified the French movement. There was a substantial gap between the real rates of the two partners until 1980, as would be expected from the automatic adjustment mechanism of the balance of payments. This suggests that the monetary allocation rule did respond to the external performance of the economies, particularly when the total share of the UMOA ceased to increase in relation to the French money stock.[14]

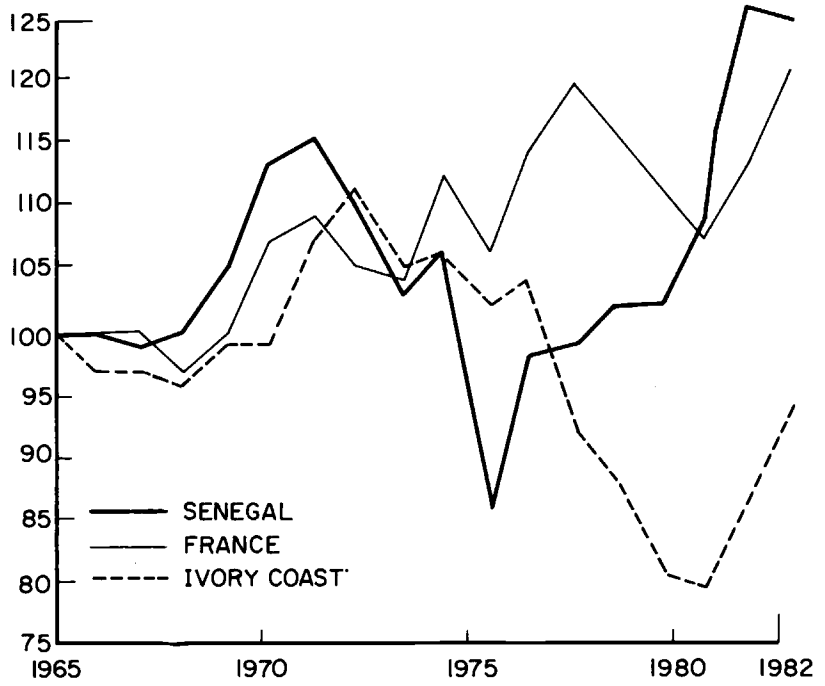

Fig. 10.1 Real effective exchange rate indices (1980 import weights). Source: Same as table 10.8.

10.4 Conclusion

Although there are few monetary unions, there are many models thereof. Most of those models are concerned with the choice of a single country to peg to a single currency. The case analyzed in this paper is even more unusual because it involves a collection of countries pegging to a single currency. Nevertheless, an effort was made to analyze the workings of a full monetary union that has been in existence for about four decades.

The theoretical model presented in section 10.2 focused on the interaction of two small and two large countries and showed under what conditions the monetary union would imply changes in the real exchange rates of its members. A transfer of real resources from the large partner was an especially relevant case, since this is what has happened in the last few years with the UMOA and France.

Building on the available studies of the institutional structure of the UMOA, section 10.3 described the process of monetary allocation. The drastic deterioration of the net foreign asset position of the UMOA over the last five years shows the importance of the French transfer. Over the last 20 years, however, monetary allocation within the union was associated with a very high negative correlation between the two major partners, Senegal and Ivory Coast. To the extent that the transfer from France disappears, a fixed exchange rate with the French franc will require a restoration of this pattern rather than the growing union-wide deficit that has been observed since 1979.

The comparison of the interaction between exchange rate and relative price changes in Senegal, Ivory Coast, and France confirmed the expected failure of purchasing power parity to stabilize the real exchange rate. More surprising—despite the presence in the price index used of nontraded goods and goods whose prices are controlled—was the insulation of (African) consumer price inflation in the UMOA from French consumer price inflation. The stability of the nominal effective rates in the UMOA was therefore accompanied by unstable real effective exchange rates. Since this relative price is only weakly positively correlated with the terms of trade, it can be said that the monetary union achieved nominal stability at the expense of real volatility. The unfortunate consequences of this pattern for resource allocation led Nascimento (1983) to propose a basket peg for the UMOA. But his argument ignores the increasing French transfer of the last four years.

The comparison of the real effective exchange rates of Senegal and Ivory Coast with several other African countries confirms the singularity of the Senegalese experience. All the rates depreciated in nominal terms, but Senegal achieved a real depreciation during the floating rate period, whereas the other former French colonies appreciated in real

terms. Real exchange rate variability over the sample period was less pronounced in Madagascar, Mauritania, and Sudan.

This comparison suggests that if the loss of monetary autonomy did not induce a gold-standard type of adjustment to external inflation in Senegal (as it did in Ivory Coast before 1980), the reason is to be found in the increase of the unionwide money stock relative to the exogenously determined French money stock in the 1970s. More important, from 1975 to 1980, if the monetary allocation rule allowed Ivory Coast to drain money from Senegal through the balance of payments, it would have induced real appreciation in the former country and real depreciation in the latter, as was indeed observed.

Needless to say, this paper merely scratches the surface of the problem of choosing an exchange rate regime for the members of the UMOA and for developing countries in general. The model does not capture enough stylized features of the small African economies, and much more work needs to be done on characterizing them empirically. Some features of the large industrialized economies were also left out, especially the effect of the changes in the franc-Ecu rate.

Finally, the model suggested an exogenous administrative procedure to determine the crucial monetary allocation parameter. The effect of the recent threat of a reduction in the transfer from France is therefore likely to be increasing conflicts about the monetary allocation rule, making it endogenous. A model like the one presented in section 10.2 can, of course, be extended to incorporate some of these conflicts.

Notes

1. Since the survey by Tower and Willet (1976), there have been contributions by Allen and Kenen (1980), Aoki (1983), Marston (1984a; 1985), Melitz (1984), and Huizinga (1984), among others. On exchange rate policy in developing countries, see Lewis (1977) and Kenen (1978).

2. See Macedo (1983) for a two-country model along the same lines and Marston (1984b) for a discussion of supply effects. The model used here is a simplified version of that in Macedo (1985b).

3. It is possible to introduce further asymmetries by marginal changes in the parameters, using the methodology developed by Aoki (1981).

4. The homogeneous solution is in Macedo (1985b).

5. The relationship between monetary and real integration in Africa is emphasized in Letiche (1972). On the West African experience, see McLenaghan, Nsouli, and Riechel (1982) and Robson (1983). Helleiner (1983) assessed the prospects for Africa's relations with the International Monetary Fund. Note that since Sudan is in the Middle Eastern Department at the IMF, it is not included in IMF (1968–77).

6. Raffinot (1982) is one of the most systematic attempts at defending this view. It surfaces, however, in Mulumba (1976), cited almost approvingly by Connolly (1983).

7. Indeed, Allen (1983) reviewed the institutional structure of the UMOA as part of the preparation for setting up the East Caribbean Central Bank.

8. See the analysis of Branson and Katseli (1982) and, on the choice of indicators, Branson and Macedo (1982).

9. Bhattia (1982) emphasized the importance of the 1974 reform in his study of the UMOA up to that date. The need for a more active interest rate policy is clear from Leite (1982).

10. Discreetly, the 1980 report of the BCEAO assigned the responsibility for the decline to "un État membre de l'Union" (p. 45).

11. The use of export and import shares to measure the relative importance of trading partners' currencies neglects the growing weight of services and interest. In the case of Senegal the current-account shares are not very different from the ones reported in table 10.7. See Macedo (1985a).

12. Nascimento (1984) and Connolly (1983) assumed that purchasing power parity holds between the UMOA and the EMS (or France).

13. Plane (1983) compared the African index and the national output deflator. He also computed "synthetic indices of competitiveness" based on ratios of unit values as well as on average market shares. Those indexes behave quite differently from the real exchange rates. No real rates are reported here for Mali because the IFS lists no price index. Plane (1983) presented such an index and singled it out as showing a clear overvaluation, unlike the other nine African currencies he studied.

14. The correlation of the relative shares of the two countries in the UMOA and the ratio of their real effective exchange rates was rather weak during the period 1965–82 ($-.25$ using 1980 import shares) and basically disappeared in the 1970s ($-.05$). This was also the case, but to a lesser extent, of the correlation between money shares and relative consumer prices, which dropped from $-.35$ to $-.15$ between the two sample periods.

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Comment Liaquat Ahamed

Macedo's paper addresses two quite separate conceptual issues associated with the West African Monetary Union (UMOA). The first is the problem of the most appropriate exchange rate regime for a small African economy. The paper focuses specifically on the consequences for a small country of pegging its exchange rate to the currency of a large country, as each of the countries in UMOA have done with respect to the French franc. The second issue is the effect of establishing a monetary union among a number of small countries, whereby they share a common central bank and pool their foreign exchange reserves. Although both of these financial arrangements are found in the UMOA, it is important to keep them conceptually separate. It is perfectly possible, for example, for each country in the UMOA to have singly pegged its exchange rate to the French franc without entering into the monetary union. By the same token, a monetary union among the members of the UMOA would have been perfectly feasible without necessarily setting up a fixed exchange rate between the French franc and the franc of the UMOA.

In a world of generalized floating exchange rates, why does a small country choose to peg its exchange rate to the currency of a single large country rather than to some optimally chosen basket of currencies? The answer, it seems, lies in the credibility of the two different quasi-fixed exchange rate regimes. When a developing country pegs to a basket, the credibility surrounding the maintenance of that peg depends mainly on perceptions about the policies of the government of the developing country. By contrast, in an arrangement such as the UMOA, France is lending its authority to the peg. It is implicitly announcing that it will exert the necessary discipline on its African partners' macroeconomic policies and will also provide to its partners the required credit line to support the convertibility of the UMOA franc at the fixed peg. Although Macedo alludes to these considerations, particularly the effects of the transfer from France, the sort of macroeconomic model that he presents in his paper is not really an adequate framework for formalizing the full range of benefits accruing from the peg to the French franc. The empirical section of the paper does, however, contain a discussion of some of the benefits. For example, the greater propensity to hold near-money in the Franc Zone than in the other African countries is highlighted in the paper. This financial deepening could be the consequence of an enhanced credibility regarding the stability of the exchange rate.

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There are two types of costs associated with the peg against the French franc. When a country fixes its exchange rate, it is renouncing the use of the nominal exchange rate as an instrument. This does not pose a problem for macroeconomic policy as long as domestic prices and wages are perfectly flexible. If, however, there is some degree of nominal price rigidity, one of the costs of a fixed exchange rate regime is the possibility of domestic unemployment in the event of an adverse shock, such as a fall in the demand for exports. A further cost arises when a country pegs its exchange rate to the currency of another country. Here, the country is not merely renouncing an instrument. It is, in effect, handing it over to the monetary authorities of another country—in this case France. The macroeconomic model outlined by Macedo does offer some insights into the costs of the fixed peg against the French franc. To complement the theoretical model, it would have been useful to have some empirical comparisons of the macroeconomic performance of the Franc Zone and that of the other African countries, particularly with regard to output growth, unemployment, and inflation.

Let me now turn to the consequences of establishing a monetary union. The first step is to clarify precisely what monetary arrangements and capital market policies bind a union together. At one extreme, for example, is the form of union that prevails between Texas and California, whereby there is a free mobility of capital. As a consequence, the distribution of money stock between Texas and California is demand determined. A monetary allocation rule by the Federal Reserve Board would have no influence on such a monetary union. At the other extreme, one can envisage a monetary union in which there are controls on internal flows of capital so that each individual partner, within certain limits and for short periods of time, can pursue an independent monetary policy. The joint central bank in such a union would serve primarily as an institution for pooling and thus economizing on foreign exchange reserves.

From the information provided in Macedo's paper, I find it difficult to assess where to place the UMOA along this spectrum of possible monetary unions. This not only has implications for the macroeconomic behavior of members of the UMOA but also for the efficiency of resource use by the members. In terms of the formal model outlined in the paper, the question essentially boils down to one of specifying how the money supply is determined for each of the partners of the UMOA. Is the money supply in each of the member countries exogenously determined by the joint central bank, or are capital transactions among the member countries sufficiently fluid that it is endogenously determined? The model the author uses is based on the assumption that the central bank can and does control the money supply in each member country. This assumption needs some justification.

In sum, although the paper and its model do provide some important insights into the workings of the UMOA, a broader conceptual framework is necessary to evaluate fully the costs and benefits of the monetary system embodied in the UMOA.

Comment

Stephen O'Brien

The author's purpose in this paper has been to examine the costs and benefits, within a monetary union, of pegging to a single currency. Macedo demonstrates that, ceteris paribus, pegging to a single currency cannot be an optimal choice for the members of the union, and that, a fortiori, pegging to a fixed rate over the long term, as has been the case for the West African Monetary Union (UMOA), must be suboptimal. Nevertheless, he concludes that on balance the union has been beneficial to its members, when the transfers from France through the "operations account" are taken into account, and probably has been on balance a net benefit to France as well, at least until 1977 when the overall foreign asset position of the UMOA began to deteriorate sharply.

It is precisely these broader issues of the overall costs and benefits of such a monetary system for developing countries that is of particular relevance, I believe, for the theme of this volume: structural adjustment and the real exchange rate. In this brief comment I would like to draw on some of the points raised in the paper to examine further these costs and benefits.

On the cost side the lack of national control over exchange rate policy clearly must be flagged. The author points out that there have been significant changes in the real exchange rates of UMOA member countries; and in recent years those changes have had adverse effects on the development of several of the members' economies. At the same time the members have been constrained in their ability to adjust to these changes. (Nevertheless, it must be acknowledged that the majority of the other African countries that have had the freedom to pursue an active exchange rate policy have not done so.) Along with the loss of freedom to determine exchange rates, the UMOA members have been forced to rely on second-best instruments for balance-of-payments management: subsidies, tariffs, quantitative restrictions, price controls, and so on. In recent years, member countries such as Ivory coast, Senegal, and Togo have intensified their use of those policy instruments in pursuit of stabilization and structural adjustment. It is too early,

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however, to assess the impact of these policy adjustments, or to compare these examples with countries that have relied primarily on exchange rate movements.

With respect to benefits the author rightly mentions the importance of the French transfer, but any full assessment of the UMOA cannot be based only on the operations account. This account is only the cornerstone of the relationship between France and the African member states, a relationship that also includes trade, investment, technical assistance, and various forms of concessional aid. French underwriting of the deficits of the union, and its assurance of the convertibility of the CFA franc, also facilitates trade and capital flows (but not significantly increased trade among the UMOA members). Another important benefit the union confers is the fiscal and monetary discipline it imposes on its members under the rules of the West African Central Bank. There are indications, however, that this discipline has been weakening since the late 1970s, as all the member countries have faced severe fiscal problems leading to the accumulation of domestic arrears and other manifestations of internal imbalance. This has contributed to the rapid buildup in the operations account. Although the UMOA still represents only a negligible share of the French money stock, there nevertheless exists the possibility, as the author mentions, that France might be compelled to change the rules of the monetary "game" in response to the rising burden placed on the French Treasury by the union.

Finally, in support of the thesis that the union, and the associated linkages with France, confers a net benefit on its African members, one can point to both its durability and its growth prospects. It is truly remarkable, given the rather disappointing record of regional organizations in Africa, that the UMOA has lasted for over 40 years, and for some 25 years since the independence of the member states. And the union is likely to expand rather than contract. Mali reentered the UMOA in 1984. (The author speculates that Mali may have wished to rejoin so as to receive the transfer necessitated by its persistently negative operations account through UMOA rather than directly from France; one could argue instead that France encouraged the Malian reentry on the grounds that the fiscal and monetary discipline mentioned above could be more effectively applied through the union than bilaterally.) Other countries are likely to follow: Guinea, possibly Mauritania in time, and even nonfrancophone countries such as Guinea-Bissau and Gambia, following the example of Equatorial Guinea and the Central African Monetary Union.

This paper has provided us with useful information and analysis on the functioning of the UMOA and its impact on its members. Further research on the union and its developmental significance is clearly warranted. This is so for at least two reasons: first, because the union

has demonstrated its staying power and is almost certain to become more important in the economy of West Africa in the future; and second, because at the same time, the members of the union are collectively experiencing the most severe economic crisis they have faced since independence, and this crisis is putting heavy pressure on the union and its financial links with France.

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