JOURNAL OF ECONOMIC DEVELOPMENT
Volume 23, Number 2, December 1998

The Economic Determinants of the Parallel Currency Premium: Evidence from Select African Countries*

Zelealem Yiheyis**

The imposition of trade restrictions and capital control generates a demand for foreign currency in the parallel market where it is traded normally at a positive premium. The magnitude of the premium, which has implications for economic performance, varies among countries and over time in the same country. Drawing on the literature, the paper develops a model which integrates the flow and portfolio motives for holding parallel currency on the demand side and a supply equation that recognizes the dependence of the supply of foreign exchange on the parallel currency premium, with a view to identify the primary economic determinants of the latter in select African countries. The paper documents the relevance of both the flow and portfolio motives in the determination of the parallel currency premium in the sample countries.

I. Introduction

Like in many other developing countries, parallel markets for foreign exchange are common in sub-Saharan Africa, although their scope and degree of importance vary across countries. The emergence of these markets is largely attributed to the imposition of foreign trade restrictions and capital control and the consequent excess demand for foreign currency at the prevailing official exchange rate. Part of the desired demand for foreign goods and assets that cannot be met in the official market is financed through the parallel currency market where foreign currency is traded at a rate typically higher than the official exchange rate.

The parallel currency premium-the percentage by which the parallel exchange rate exceeds its official counterpart-is determined by the interaction of market forces in the parallel foreign exchange market. This market is increasingly recognized to bear important implications for "the transmission process of short-run macroeconomic policies" (Agénor (1992)) and for economic performance in general as changes in the premium lead to portfolio reallocations (between domestic and foreign assets), and alter the incentive for illegal transactions (Kiguel and O'Connell (1995)). There is some empirical evidence to suggest that a high currency premium negatively influences aggregate economic activity (see e.g., Edwards (1989, p.331), Easterly (1994)). The determination of the parallel exchange rate has, therefore, been the subject of numerous studies, based on different models, samples and types of data (see e.g., Agénor (1990), Yin and Soever (1994), Culbertson (1989), Azam and Besley (1989)).

* The author gratefully acknowledges the helpful comments received from Professors John Loxley and Wayne Simpson and from an anonymous referee of this journal on an earlier draft. The usual disclaimer applies.
** Department of Economics, Clark Atlanta University, Atlanta, GA 30314 USA.

The empirical evidence on the experiences of sub-Saharan Africa has been rather tenuous, although many countries in the region are known to have active parallel markets for foreign exchange, with sizeable premium. In fact, many countries in sub-Saharan Africa (outside the Franc-Zone) had traditionally larger premium than other developing countries (World Bank (1994, p.51)). In view of the importance of parallel markets in a number of countries in the region-judging by the size of the premium-and of their possible of effects on overall economic activity (see e.g., Yiheyis (1997)), attempting to identify the economic factors that account for the variation in the premium within and between countries would be worthwhile. Such an attempt constitutes the object of this paper.

The paper investigates the pattern of the premia in twelve sub-Saharan African countries with a view to identify their primary economic determinants and, in the process, to test the validity and relevance of some of the existing models of premium determination for the region. The remainder of the paper is organized as follows. The next section provides an overview of the parallel premia and some other related financial variables in the sample countries. The third section specifies an empirical model of the determination of the parallel premium. Estimates of different variants of the model are presented and discussed in the fourth section. The final section summarizes and concludes.

II. Parallel Currency Premium in the Sample Countries: an Overview

This section describes the behaviour of the parallel currency premium and other relevant nominal variables in the sample countries. The mean parallel premium over the study period is presented in Table 1, where the sample countries are classified into two groups on the basis of the size of their parallel premium. The period-average size of the premium ranged from eight percent (in Mauritius) to 21,970 percent (in Uganda). The premium was above 100 percent in half the countries under study. It was incomparably large in Uganda, and very high in Ghana. In contrast, the exchange-rate differential averaged below 30 percent in Mauritius, Botswana and Burundi.

Table 1 also summarizes the average growth rate of the money supply (broadly defined) and the inflation rate along with the rate of official depreciation. A look at these variables indicates that, in general, the money supply and, especially, the CPI grew at a much higher rate in the "large-premium" than in the other group of countries. The exception is Ethiopia where the premium was large despite relatively modest monetary expansion and low inflation rate. This, however, is not surprising in view of the fact that the official exchange rate in that country was maintained unaltered through out the study period. The "large-premium" countries, except Ethiopia, allowed their official exchange rates to depreciate at a higher rate than the other countries, probably reflecting the relative overvaluation of the pre-existing official rates (as proxied by the premium) in the former group.

The size of the premium varied not only across countries but also over time as depicted in the following graphs. The premium was subject to more frequent swings, with no detectable trend, in Burundi, Kenya and Sierra Leon, while it displayed a clear and substantial downward trend in Uganda, Ghana and Tanzania during the second half of the study period. The premium almost steadily increased in Ethiopia from roughly 36 percent in 1980 to 224 percent in 1991.

Table 1 The Mean Parallel Premium, Inflation, Money Supply Growth and Devaluation Rates (5), 1980-94*

Country	Premium	Inflation	Money Gr.	Dev. Rate
Low or Moderate Premium:				
Mauritius	8	7	20	7
Kenya	18	14	18	17
Botswana	20	10	22	10
Burundi	29	7	10	8
Malawi	43	15	21	20
Zimbabwe	65	14	14	20
Large Premium:				
Sierra Leone	111	38	55	77
Zambia	116	36	65	72
Ethiopia	123	6	13	0
Tanzania	169	23	28	38
Ghana	318	25	42	66
Uganda	21970	43	109	148

* Except in the following countries where the study period ends in the year indicated in parentheses: Botswana (1993), Burundi (1992), Ethiopia (1991), Sierra Leone (1990), Tanzania (1993), Zimbabwe (1992) and Uganda (1992). Money Gr. = growth rate of the money supply broadly defined; Dev. rate = rate of devaluation of the official exchange rate.

Zambia saw little fluctuation in its currency premium until 1988 whereupon the gap between the two exchange rates widened sharply and decreased for a couple of years thereafter. The premium in Botswana, Zimbabwe and Malawi exhibited a downward trend commencing in the mid 1980s, although it was subject to fluctuation in the interim.

Apparent from the graphs is that the gap between the parallel and official exchange rates shrunk in some countries as it widened in others in the second half of the 1980s and early 1990s. Segmenting the study period between 1980-86 and 1987-94 reveals a sharp change in the magnitude of the premium for the majority of the sample countries. The cutoff year conforms, by design, with the demarcation adopted by the World Bank in its study of structural adjustment in Africa where the post-1986 period is designated as the adjustment period for adjusting countries in the region, although the demarcation is admittedly not strictly applicable in all instances (World Bank (1994)).

As can be gleaned from Table 2, the parallel currency premium dropped in seven of the sample countries and substantially so in Uganda, Ghana, Tanzania and Malawi, where it was relatively sizeable during the initial sub-period. This occurred, except in Ghana, in spite of higher or sustained inflation and probably, in part, because of larger rates of official devaluation (except Uganda in the latter case). It is noteworthy, however, that sizeable reductions in the premium appear to have coincided with interest-rate liberalization, as the experiences of these four countries seem to indicate. On the other hand, Ethiopia, Zambia and Sierra

The Parallel Currency Premium

The Parallel Currency Premium

The Parallel Currency Premium

Leone-in that order-experienced a considerable rise in their currency premium in the second sub-period during which a higher rate of inflation was recorded. For Sierra Leone and Zambia, this sub-period is marked by a greater rate of official depreciation and a substantial rise in the interest rate.

Table 2 The Mean Parallel Premium, Inflation, Devaluation, and Interest Rates (%) by Sub-Period

Country	Sub-period	Premium	Inflation	Dev. Rate	Interest Rate
Mauritius	1980-86	10	7	10	10.3
	1987-94	6	7	4	10.6
Kenya	1980-86	15	11	14	12.5
	1987-94	20	17	19	20.2
Botswana	1980-86	24	10	17	9.9
	1987-93	16	11	4	8.8
Burundi	1980-86	28	7	5	6.7
	1987-92	29	7	11	8.3
Malawi	1980-86	64	12	15	11.0
	1987-94	24	17	24	16.0
Zimbabwe	1980-86	78	13	18	10.9
	1987-92	51	16	22	13.3
S. Leone	1980-86	74	34	70	11.4
	1987-90	155	45	86	22.4
Zambia	1980-86	47	20	53	10.0
	1987-94	176	49	86	23.8
Ethiopia	1980-86	76	4	0	2.9
	1987-91	189	9	0	3.0
Tanzania	1980-86	263	23	29	4.8
	1986-93	75	22	45	11.9
Ghana	1980-86	665	31	107	13.7
	1987-94	13	21	36	18.9
Uganda	1980-86	36806	44	183	14.4
	1987-92	4660	43	114	28.7

Note: Interest rate refers to the deposit rate except in the following countries where interest rates in parentheses are used: Burundi (discount rate), Ethiopia (treasury bill) and Kenya (treasury bill).

For the participating countries the major attribute that distinguishes the two sub-periods is the implementation of structural adjustment programs (SAPs); and all countries but Botswana, Ethiopia and Mauritius have participated in the program in the relevant sub-period considered in this study. It may be noted that the countries which saw a substantial decline in their parallel premium (Uganda, Ghana, Tanzania and Malawi) were adjusters as were two of the countries where a sharp rise in the premium was observed (Sierra Leone and Zambia). Evidently, the above sketch is a descriptive summary of the behaviour of the parallel currency premium

and related variables in the countries under study. Although suggestive, the sketch is not meant to explain the behaviour of the premium-a task which is attempted in the next two sections.

III. The Empirical Model

As noted above, the parallel currency premium generally reflects the practice of exchange control and the resulting excess demand for foreign currency at the official exchange rate. This excess demand is translated into a demand for foreign currency in the parallel market where the exchange rate adjusts to bring about equilibrium between the demand for and existing supply of foreign currency in that market. The supply of and demand for foreign exchange in the informal market originate from various sources. Their relative importance differs among countries and largely depends on the nature and effectiveness of exchange restrictions in place (see Agénor (1992), Agénor and Montiel (1996, p.68)).

The sources of foreign exchange in the parallel market include smuggling out or under-invoicing of exports, over-invoicing of imports, remittances from abroad, foreign tourists and resale of officially allocated foreign exchange; which are generally motivated by a positive currency premium, for given level of relevant behaviour-influencing factors such as risks, tariffs, and subsidies. The demand for parallel currency arises from attempts to finance current-and capital-account transactions that are not carried out through official channels because of trade and exchange restrictions. Parallel currency is purchased to finance imports, travel abroad, portfolio diversification and capital flight. This suggests that, in principle, the demand for foreign exchange in the parallel market has both a flow and stock component. Which of these components dominates turns, among others, on the type of restriction and on the degree of macroeconomic stability.

The empirical model of the parallel currency premium adopted in this paper reflects the aforementioned supply-and demand-side considerations. In formulating the model, we follow Lizondo (1987), Kharas and Pinto (1989) and Agénor (1990) in making a distinction between the flow and stock demand for parallel currency and adopt the framework used by the latter to link the two motives, with some modifications of the underlying equations. Consider first the flow market for parallel currency which involves the sale and purchase of foreign currency to finance current-account transactions in that market. The flow supply of parallel currency is hypothesized to respond positively to the parallel currency premium. Given the official exchange rate, the retention rate of export proceeds and the export tax/subsidy structure, a depreciation of the parallel rate diverts foreign exchange flow from the official to the parallel market.

The supply of foreign exchange in the parallel market is also expected to positively depend on the foreign price of exports, especially where illegal trade in the form of smuggling and under-invoicing of exports is the primary source of foreign exchange. Other things being equal, a hike in the foreign price of exports would boost foreign exchange earnings from a given supply of exports and also by stimulating its production. Thus, given the premium, a rise in the domestic-currency price of exports (valued at the parallel rate) relative to production costs or to the prices of domestically consumed goods-to be proxied by the consumer price

index-is expected to increase the supply of foreign exchange in the parallel market, it might be added, without necessarily diverting it from official channels.

Also, for given premium, changes in export policy would influence the incentive for under-invoicing and smuggling of exports. For example, export liberalization in the form of a decrease in export taxes will, *ceteris paribus*, render parallel market activities less attractive, reducing the flow supply of foreign exchange in that market. Thus, abstracting from costs of illegal transaction (for empirical reasons), the flow supply of foreign currency in the parallel market can be written as

$$\Delta \log S = \alpha_0 + \alpha_1 \log (b/e) + \alpha_2 \log (bP^*_X/P) + \alpha_3 DXT, \quad (1)$$

where b = parallel exchange rate, e = official exchange rate, P^*_X = average foreign-price of exports, P =Consumer price index, DXT = degree of export tightening; and $\alpha_1, \alpha_2, \alpha_3 > 0$.

On the demand side, the level of real GDP, the relative price of imports (where the domestic-currency price of imports is valued at the parallel rate) and the extent of import and exchange control are included as determinants of the flow demand for parallel currency. The higher the level of economic activity, the greater the demand for imports and, hence, for foreign exchange. A fall in the relative price of imports stimulates demand for imports and for the foreign exchange with which to finance them.

As alluded to elsewhere, the demand for foreign exchange in the parallel market is the reflection of excess demand in the official market, which, in turn, is linked to the size of foreign exchange allocation. *Ceteris paribus*, the smaller the quantity of foreign exchange allocated by the authorities for purposes of current-account transactions, the greater the excess demand for foreign currency in the official market and, as a consequence, the higher the flow demand for foreign exchange in the informal market. The size of foreign exchange allocation is expected to be influenced, among other factors, by the external debt burden. A sizeable external debt burden represents a drain on available foreign exchange resources because of interest and principal payments. Moreover, it undermines creditworthiness and, thereby, restricts a country's ability to replenish its stock of reserves and to finance its current account transactions through increased borrowing. Consequently, a mounting external debt burden is expected to lead to import compression. It is therefore reasonable to hypothesize an inverse relation between the size of the external debt burden and the amount of foreign exchange allocated for financing imports and, by extension, a positive correlation between the former and excess demand for foreign currency at the official exchange rate.

Further, given the parallel exchange rate and the risks involved in illegal trade, the higher the level of import tariffs and other import barriers, the greater the incentive to smuggle imports, raising the flow demand for foreign exchange in the unofficial market (see e.g., Branson and Macedo (1989)).

On the basis of these arguments, the flow of demand for foreign currency is specified as

$$\Delta \log D = \beta_0 + \beta_1 \log Y + \beta_2 \log (bP^*_m/P) + \beta_3 DMT + \beta_4 XDB, \quad (2)$$

where Y = real GDP, P^*_m = foreign-price of imports, DMT = degree of import tightening, XDB = external debt burden; and $\beta_1, \beta_3, \beta_4 > 0; \beta_2 < 0$.

As a starting point, the portfolio motive of holding parallel currency is modelled following Dornbusch *et al*. (1983) on the assumption that the private sector allocates its net financial assets between domestic money (M) and foreign currency (F) assets. The stock demand for foreign currency is specified as a positive function of the depreciation-adjusted interest-rate differential;[1] and it is assumed to be proportional to financial wealth. Equilibrium in the stock market for foreign exchange can, therefore, be written as

$$bF = \theta(i^* + d - i)(M + bF), \tag{3}$$

where bF = the supply of foreign currency holdings valued at the parallel rate; i^* and i are the nominal interest rates on F and M, respectively; d = rate of depreciation of the parallel exchange rate; and $\theta > 0$.

Specifying foreign currency holdings (valued at the parallel exchange rate) as a proportion of total financial wealth in units of the official exchange rate, we obtain:

$$(b/e)F/[(M/e) + (b/e)F] = \theta(i^* + d - i). \tag{4}$$

Representing Equation (4) by the following specific form:

$$\log\{(b/e)F/[(M/e) + (b/e)F]\} = \theta_0 + \theta_1(i^* + d - i) \tag{5}$$

approximating $\log[(M/e) + (b/e)F]$ by

$$\gamma_0 + \gamma_1 \log(M/e) + (1 - \gamma_1)\log[(b/e)F] \tag{6}$$

solving for $\log F$ and taking the first difference of the resulting equation yield:

$$\Delta \log F = (\theta_1/\gamma_1)\Delta(i^* + d + i) + \Delta \log M - \Delta \log(b/e) - \Delta \log e. \tag{7}$$

The net rate of addition to the stock of parallel foreign currency is expressed as the difference between the flow supply of and demand for the currency in the parallel market; i.e.,

$$\Delta \log F = \Delta \log S - \Delta \log D. \tag{8}$$

Equation (8) indicates that a disequilibrium in the flow market changes the stock of foreign currency willingly held by the private sector at a given point in time. Substituting Equation (1) and (2) in (8), imposing a restriction on certain coefficients[2] and rearranging terms yield

1. This specification will be modified during estimation.

the following behavioral equation for the parallel currency premium, with a stochastic term added.

$$\log(b/e) = \pi_0 + \pi_1 \log Y + \pi_2 \log TT + \pi_3 DXT + \pi_4 DMT + \pi_5 XDB + \pi_6 \Delta(i^* + d + i) + \pi_7[\Delta \log M - \Delta \log e + \log(b/e)_{-1}] + \varepsilon, \quad (9)$$

where TT is the terms of trade $(= P^*_X / P^*_M)$ and ε is the error term; and π's are combinations of coefficients in the respective equations.

Equation (9) provides the basic framework for the empirical investigation of the parallel currency premium in the sample countries. Though subject to modification, the model, as it stands, recognizes the impact on the premium of shifts in the relative demand for foreign and domestic assets as well as the effects of unofficial current-account transactions. The model predicts that, given the official exchange rate, a higher relative yield on foreign currency holdings, a rapid monetary expansion, reduced foreign exchange allocations, tightening of import policies and a higher level of economic activity would lead to an increase in the premium through their positive impact on the parallel rate. The premium is expected to decrease with a rise in the rate of official devaluation. The premium effect of the terms of trade is indeterminate apriori as it partly depends on the sources of its change.[3] Equation (9) embodies a dynamic adjustment process whereby the currency premium is partly determined by its own past. On the flow-market side, Equation (9) differs from a comparable model developed by Agénor (1990) in explicitly recognizing terms of trade shocks, commercial policy stance and external debt accumulation.

IV. Estimation Results

The preceding model and its variants were estimated on pooled yearly data drawn from the countries and time period indicated in Table 1 above.[4] The pooling procedure adopted in this study is the classical pooling method which was preferred to its fixed-effects counterpart, for the data failed to reject the null hypothesis that country-specific intercepts are equal[5] and also because of the substantial loss of degrees of freedom that would otherwise be incurred.[6] The results obtained from estimating various versions of the empirical model are presented

2. The coefficients of the relative price terms in the flow supply and demand equations are constrained to be equal, thereby generating the terms of trade (TT) variable.
3. The terms of trade also operates through its effect on wealth and the resulting impact on the accumulation of foreign currency. Under certain assumptions, an improvement in the terms of trade can be shown to be associated with a decrease in the premium (see Kharas and Pinto (1989)).
4. However, the first several observations were lost due to data transformation which the estimation of the model entailed.
5. The F statistic associated with the said null hypothesis is computed to be $F(12, 97) = 1.4$, with a P-value of 18 percent.
6. Estimation with the assumption of random effects generated results that are generally consistent with those of the pooled model without fixed effects. See Appendix for results of one of the variants of the model estimated alternatively with the assumptions of fixed and random effects.

in Table 3.[7] By way of a general remark, it may be mentioned that most of the coefficients appear with the anticipated signs; and the incorrectly signed coefficients are statistically zero. The model accounts for at least 85 percent of the variation in the premium.

Table 3 Parameter Estimates of Alternative Variants of the Model

Explanatory Variables	Model I	Model II	Model III	Model IV	Model V
$\log TT$	0.243	0.354	0.367	0.349	0.377
	(1.677)	(2.086)	(2.325)	(2.216)	(2.087)
DXT	-0.016	-0.017	-0.012	-0.013	0.001
	(1.512)	(1.302)	(0.973)	(1.050)	(0.059)
DMT	0.034	0.062	0.068	0.076	0.060
	(2.282)	(2.251)	(2.648)	(2.883)	(2.138)
XDB	0.081	0.097	0.099	0.131	0.106
	(1.507)	(1.494)	(1.654)	(2.030)	(1.516)
$\Delta \log e$	-0.905	-0.649	-0.686	-0.571	-0.569
	(6.324)	(3.796)	(4.318)	(3.155)	(2.825)
$\log (b/e)_{-1} + \Delta \log M$	0.886	0.794	0.775	0.784	0.764
	(26.743)	(19.548)	(20.434)	(20.446)	(18.618)
$\Delta (i^* + d^e - i)$	0.002	0.002	0.006	0.006	0.009
	(6.233)	(0.924)	(2.204)	(2.367)	(3.148)
$\Delta (\Delta \log P - \Delta \log P^*)$	-	-	0.906	0.787	1.153
			(4.315)	(3.449)	(4.483)
$\Delta \log e^e$	-	-	-	-	0.701
					(1.373)
$\Delta \log e_{-1}$	-	-	-	-0.231	-0.420
				(1.310)	(1.648)
Adjusted R^2	0.900	0.854	0.874	0.875	0.888
F	166	98	101	91	83
N	129	117	117	117	105

Note: d = rate of depreciation of the parallel exchange rate (in percentage terms); superscript "e" indicates expectation, except in Model I where the realized value is used. N = number of observations.

The parameter estimates of the basic model on the assumption of "perfect foresight" are presented as Model I in Table 3 where the expected rate of depreciation of the parallel exchange rate is replaced by its realized value in constructing the deprecation-adjusted interest-rate differential. A change in the relative yield thus defined exerts a statistically significant positive influence on the premium as do import control, monetary expansion and inertia.[8]

7. In view of the possible effect of the premium on real GDP, the latter was represented by a linear combination of instruments. However, the logarithm of the level of real GDP, instrumentalized or otherwise, was found to be highly insignificant in all variants of the model estimated, with no effect on the explanatory power of the model. It was therefore dropped as a regressor during estimation.
8. Unless otherwise noted, the cutoff point adopted in this study for the level of significance is the five percent level.

The rate of official devaluation has the opposite effect.

Although not uncommon in related empirical studies, the assumption of perfect foresight is rather strong.[9] Dropping this assumption and representing the expectation of the rate of depreciation by the predicted value[10] of the latter effected a substantive change on the numerical and statistical significance of the parameter estimates of the model, as can be seen from the third column of Table 3. Thus, the coefficient of the adjusted interest-rate differential has now become numerically smaller and statistically insignificant, although it continues to be positive. Other parameter estimates have also been affected quantitatively, but not qualitatively.

The apparent insignificance of the adjusted interest-rate differential suggests that the previously reported premium effect of the differential heavily depends on the change in the actual rate of depreciation of the parallel exchange rate. In sub-Saharan Africa, financial markets are relatively underdeveloped and thin, and interest rates are determined more by administrative fiat than by market forces (see e.g., World Bank (1994, p.50)). Consequently, the interest rates in these countries may have comparatively low information content; in which case, changes in the difference between the domestic and foreign interest rates may not signal to decision markers as much information as would be expected in economies with well developed financial systems. Interest rates in many of the sample countries have historically been characterized by a low degree of variability until recently when (where it occurred) interest-rate liberalization was underway. Between 1981 and 1986, for example, the inflation rate was-judging by the coefficient of variation-more variable than the interest rate in the majority of the sample.[11] Although the interest rate has become more variable in the latter part of the study period, it still lagged behind inflation in roughly half the sample countries. The low degree of correlation between the aforesaid variables observed in the majority of the sample countries reflects the relative irresponsiveness of the interest rate to market pressure the burden of which appears to have fallen on the inflation rate.

In such an economic environment, the differential in the interest rate alone would not contain and signal all the information that it is ordinarily supposed to. The model was, therefore, augmented by incorporating the negative of the inflation differential (i.e., $\Delta \log P - \Delta \log P^*$), which helps capture the opportunity cost of holding domestic currency in terms of its relative purchasing power, for given change in the interest-rate differential. All else equal, a faster acceleration of the inflation rate at home than observed abroad would cause a substitution in demand away from domestic and toward foreign currency, thereby, precipitating a hike in the currency premium. This is particularly relevant in economies where financial systems are underdeveloped and non-interest-bearing assets constitute the portfolios of domestic agents

9. For example, Dornbusch *et al.* (1983) and Yin and Soever (1994). However, the relevant variable in these models is the rate of depreciation of the official exchange rate, which is treated as exogenous.
10. The information set used to generate the expectation term includes once, twice and three times lagged rates of depreciation of the parallel exchange rate (see e.g., McCallum (1976) and the reference therein). For this particular variant of the model, expanding the list of instruments to include other regressors consistent with the underlying model (see Ibid) yield qualitatively similar results. However, proxying expected rate of depreciation by the lag of the realized value rendered the variable in question statistically significant. In either case, the qualitative implications of the other parameter estimates remain unchanged, although a better fit was obtained when the latter and the first option were used.
11. See Appendix for details.

(Agénor (1992)).

When the basic model was thus modified and estimated, its explanatory power was enhanced, and the newly added regressor emerged with a significantly positive coefficient, confirming the hypothesis alluded to above. This exercise rendered the coefficient of the depreciation-adjusted interest-rate differential not only numerically larger but also statistically significant. These results indicate that the two variables exert independent effects on the premium. Model IV includes the lag of official devaluation in an attempt to determine the duration of devaluation's effect on the response variable. The contemporaneous effect remains relatively sizeable and significant while the lagged effect is less significant numerically and statistically, lending support to the view that devaluation's long-run effect on the premium is negligible.

Portfolio models emphasize the role of expectations in the short-term fluctuation of the parallel currency premium (see e.g., Dornbusch *et al*. (1983), Agénor (1992), Kiguel and O'Connell (1995)). Assuming forward-looking behaviour, current anticipation about the future path of macroeconomic variables is shown to influence the current size of the premium. Given that the long-run effect of a one-shot devaluation is negligible, news of an impending devaluation causes a jump in the premium as it leads to the expectation that the parallel exchange rate will depreciate, inducing a shift in demand toward foreign assets. The model was extended to incorporate the effect of current anticipation of future devaluation-represented by the predicted value of the rate of depreciation of the official exchange rate one period ahead.[12] As can be seen from the last column of Table 3, actual devaluation and the expectation of future devaluation exert independent and opposite effects on the premium. The effect associated with the expectation variable is not equally discernable, however. This is hardly surprising, when one reckons the low frequency (yearly) data utilized here and the rather fast adjustment of the premium to news of impending devaluation. The signs of the parameter estimates are in consonance with the view that the premium rises before a devaluation occurs and falls when the devaluation is implemented.[13]

Overall, the estimation results presented above are reasonable. A number of inferences and policy implications can be drawn from these estimates some of which are identified below. The variables associated with the flow-side of the market were found to be jointly significant according to an F test which compared the unrestricted model with one that excluded these variables, indicating the relevance of current-account transactions in explaining the variation of the premium.[14] Import liberalization and a reduction in the external debt burden are associated with a fall in the premium, although the latter explanatory variable is significant only in one variant of the model. The relative imperceptibility of the premium effect of external debt accumulation may be attributed, in part and depending on the sample country, to the build-up of arrears and to debt rescheduling and relief arrangements, which tend to make the corresponding

12. The information set is assumed to include the once, twice and three times lag of the rate of official depreciation.
13. The current expectation of future devaluation became significant at the 10 percent level when the model was estimated with the assumption of perfect foresight (i.e., when the expectation term was replaced by the lead of the realized value of official depreciation).
14. The computed F statistic for the null hypothesis is F (4, 97) = 4.02, the P-value of which is 0.005 (upper tail area).

debt-service payments lower than what is implied by the size of the debt: GDP ratio.

The implied effect of export liberalization on the flow supply of foreign exchange in the parallel market, albeit negative as expected, could not be firmly established because of the imprecise estimates, which probably reflect the presence of offsetting effects on the premium that the proxy for export tightening represents. An export tightening that would elicit a positive supply response in the parallel foreign exchange market would exert the opposite effect in the official market, with implications for foreign exchange availability and allocation and for the extent of excess demand for foreign exchange at the official rate. An improvement in the terms of trade is observed to be positively correlated with the premium, supporting the findings reported by Edwards (1989, p.146) for a different sample of countries.

Our results corroborate previous findings (e.g., Agénor (1990)) that monetary expansion is an important factor in the determination of the premium.[15] The results further suggest that, given the rate of monetary expansion, changes in inflation and depreciation-adjusted interest-rate differentials have independent effects on the premium. The sign and statistical significance of the coefficients associated with the said financial variables point to the relevance of the portfolio motive and of financial instability in the determination of the parallel currency premium. However, the findings seem to suggest that portfolio models of the Dornbusch *et al*. (1983) type perform better when they are appropriately modified to reflect institutional and other pertinent peculiarities of the sample countries. A case in point, which the data appear to bear out and which is one of the distinguishing features of most developing countries, is the rudimentary and thin nature of financial markets and the historically administrative determination of the interest rate.

The foregoing parameter estimates are generally consistent with the observation made earlier that the currency premium dropped, for the most part, in the latter part of the study period, which coincided with the implementation of SAPs in the participating countries in the region. One would expect the currency premium to fall in the adjusting countries if only because exchange-rate adjustment, mainly, in the form of devaluation is an integral part of the reform package under the program. Furthermore, the other components of the program including credit restraint, and interest-rate and import liberalizations would be anticipated to narrow the gap between the official and parallel exchange rates by slowing down the rate of depreciation of the latter.[16]

The derivation of the basic model implies that the coefficients attached to the rate of devaluation, the lagged value of the premium and the growth rate of the money supply are equal in absolute value (π_7 in Equation (9)), which seems to be broadly consistent with the data, especially according to the basic model. The implied elasticity of the flow supply of foreign currency in the parallel market with respect to the premium may be derived from

15. The dependent variable in the said study is the parallel exchange rate.

16. It should be noted, however, that a direct test of the program's effect on the premium by incorporating into the model a participation-status dummy variable revealed no evidence of the presence of independent effect to be ascribed to SAPs. This probably reflects not only differences in the scope, speed and continuity of adjustment among the adjusting countries - which would not be captured by a single variable of participation status - but also the representation of possible program's effects by the included explanatory variables most of which are components of a typical SAP reform package.

either coefficient, noting that $\pi_7 = (1+\sigma_1)^{-1}$. For $\pi_7 = 0.7$, for example, the model would predict that the supply elasticity of foreign exchange in the parallel market with respect to the premium would be roughly 0.4, suggesting supply inelasticity in that market.

To sum up, in the presence of foreign exchange restrictions, it appears that narrowing the gap between the parallel and official exchange rates calls for not only devaluation, but also import liberalization, monetary restraint and breaking the upward momentum built in the evolution of the premium. The latter would require, in addition to the aforesaid policy measures, changing expectations about the economic and political environment of the respective economies. The observed statistical significance of the terms-of-trade shocks and of changes in the differentials of depreciation-adjusted interest rates and inflation performance shows the susceptibility of the premium not only to domestic factors but also to external developments, which may be beyond the control of authorities who wish to pursue independent policies.

V. Summary and Conclusions

The object of this paper has been to investigate the pattern of the parallel currency premia in a sample of sub-Saharan African countries with a view to identify their primary economic determinants. The paper provided an overview of the behaviour of the premia, which were characterized by substantial cross-sectional and timewise variability. An econometric model which recognizes the flow and stock aspects of the parallel exchange market was formulated and its different variants estimated.

The degree of import tightening, the terms of trade and, variably, the external debt burden were detected to exert perceptible effects on the premium, while the level of real GDP was highly insignificant. Monetary events were observed to be of consequence. Monetary expansion, a change in the depreciation-adjusted interest-rate differential and an acceleration of inflation at home relative to abroad were associated with a rise in the premium. Although the parameters were imprecisely estimated, the current expectation of devaluation and the degree of export tightening turned up with the anticipated signs. The premium responded significantly to the current rate of official devaluation, but less so as time progressed, with inertia playing a considerable part in its determination.

Because of scope and data limitation, the paper focussed on major economic factors, excluding-but not denying the importance of-other institutional, political and social factors in the determination of the premium; and it utilized annual observations, as a consequence of which some information and insight that would have been gained in a high-frequency data may have been lost. Despite these and other shortcomings, the paper sheds light on the nature of the adjustment of the premium in the sample countries by taking stock of their experiences in this regard.

Appendix

1. Data and Variable Representation

The degree of tightening of export policy (DXT) is represented by the pre-existing ratio of nominal GDP to exports on the assumption that the disincentive effects of such a policy would manifest itself in the reduction of the share of exports in GDP. Likewise, the degree of import tightening (DMT) is proxied by the once-lagged value of the ratio of nominal GDP to imports.

The external debt burden (XDB) is represented by the lag of total external debt in local currency normalized by nominal GDP. Official devaluation is represented by the first difference of the logarithm of the official exchange rate. The interest rate (i) refers to deposit rates where available. Money supply (M) is represented by money supply broadly defined to include M and quasi money. Variables with "*" pertain to the United States.

2. Parameter estimates of the modified model with fixed and random effects

Fixed-effects model

$$\log(h/e) = \text{Intercepts} + \underset{(1.917)}{0.361}\log TT - \underset{(3.364)}{0.093}DXT + \underset{(3.829)}{0.144}DMT + \underset{(1.383)}{0.159}XDB$$

$$- \underset{(3.704)}{0.724}\Delta\log e + \underset{(10.341)}{0.631}[\Delta\log(h/e)_{-1} + \Delta\log M] + \underset{(2.131)}{0.005}\Delta(i^{*} + d^{e} - i)$$

$$+ \underset{(3.867)}{0.832}\Delta(\Delta\log P - \Delta\log P^{*}) + \text{Error term}$$

Random-effects model

$$\log(h/e) = \underset{(2.507)}{-1.90} + \underset{(2.260)}{0.368}\log TT - \underset{(1.189)}{0.016}DXT + \underset{(2.754)}{0.075}DMT + \underset{(1.277)}{0.084}XDB$$

$$- \underset{(4.275)}{0.688}\Delta\log e + \underset{(19.321)}{0.768}[\Delta\log(h/e)_{-1} + \Delta\log M] + \underset{(2.242)}{0.006}\Delta(i^{*} + d^{e} - i)$$

$$+ \underset{(4.356)}{0.899}\Delta(\Delta\log P - \Delta\log P^{*}) + \text{Error term}$$

3. Coefficients of Variation of the Inflation and Interest Rates and Their Correlation Coefficient

		Coefficient of Variation*		Correlation Coefficient
Country	Period	Inflation	Interest Rate	
Botswana	1981-93	0.216	0.292	0.418
	1981-86	0.252	0.132	-
Burundi	1981-92	0.472	0.196	0.184
	1981-86	0.599	0.123	-
Ethiopia	1981-91	1.59	0.020	0.006
	1981-86	2.29	0.028	-
Ghana	1981-94	0.558	0.234	-0.520
	1981-86	0.629	0.183	-
Kenya	1981-94	0.511	0.597	0.806
	1981-86	0.379	0.196	-
Malawi	1981-94	0.380	0.319	0.666
	1981-86	0.240	0.129	-
Mauritius	1981-94	0.497	0.120	0.216
	1981-86	0.540	0.109	-
Sierra Leone	1981-90	0.389	0.584	0.365
	1981-86	0.370	0.136	-
Tanzania	1981-93	0.114	0.580	-0.088
	1981-86	0.102	0.375	-
Uganda	1981-92	0.377	0.448	-0.115
	1981-86	0.325	0.449	-
Zambia	1981-94	0.526	0.760	0.564
	1981-86	0.463	0.517	-
Zimbabwe	1981-92	0.442	0.466	0.808
	1981-86	0.326	0.223	-

* Coefficient of variation is computed as the ratio of standard deviation to the respective mean.

4. Data Sources

Data are drawn from the following sources: IMF's *International Financial Statistics*, various issues; World Bank's *World Tables*, 1995; World Bank's *African Development Indicators*, 1996; and *World Currency Year Book*, various issues. A few missing observations on interest rates and money supply are filled by their respective period averages.

References

Agénor, P.R., "Parallel Currency Markets in Developing Countries: Theory, Evidence, and Policy Implications," *Princeton Essays in International Finance 188*, Princeton, N.J: Princeton University.

_____ (1990), "Stabilization Policies in Developing Countries with a Parallel Market for Foreign Exchange: A Formal Framework," *IMF Staff Papers*, Vol. 37, September, 560-92.

_____ and P.J. Montiel (1996), *Development Macroeconomics*, Princeton: Princeton University Press.

Azam, J.P., and T. Besley (1989), "General Equilibrium with Parallel Markets for Goods and Foreign Exchange: Theory and Applications to Ghana," *World Development*, Vol. 17, No. 12, 1921-30.

Branson, W.H., and J.B. de Macedo (1989), "Smuggler's Blues at the Central Bank: Lessons From Sudan," in *Debt, Stabilization and Development*, eds. by Guillermo Calvo *et al*., Cambridge, Mass: Basil Blackwell Inc.

Culbertson, W.P. (1989), "Empirical Regularities in Black Markets for Currency," *World Development*, Vol. 17, No. 12, 1907-19.

Dornbusch, R., D.V. Dantas, C. Pechman, R.R. Rocha, and S. Simoes (1983), "The Black Market for Dollars in Brazil," *Quarterly Journal of Economics*, Vol. 98, 25-40.

Edwards, S. (1989), *Real Exchange Rates, Devaluation, and Adjustment*, Cambridge: The MIT Press.

Easterly, W. (1994), "Economic Stagnation, Fixed Factors, and Policy Thresholds," *Journal of Monetary Economics*, 33, 525-57.

Kharas, H., and B. Pinto (1989), "Exchange Rate Rules, Black Market Premia, and Fiscal Deficits: The Bolivian Hyperinflation," *Review of Economic Studies*, Vol. 56, July, 435-47.

Kiguel, M., and S.A. O'Connell (1995), "Parallel Exchange Rates in Developing Countries," *The World Bank Observer*, Vol. 10, February, 21-52.

Lizondo, J.S. (1987), "Unification of Dual Exchange Markets," *Journal of International Economics*, Vol. 22, February, 57-77.

_____ (1991), "Alternative Dual Exchange Market Regimes," *IMF Staff Papers*, Vol. 38, September, 560-581.

McCallum, B.T. (1976), "Rational Expectations and the Natural Rate Hypothesis: Some Consistent Estimates," *Econometrica*, Vol. 44, January, 43-52.

Yiheyis, Z. (1997), "Export Adjustment to Currency Depreciation in the Presence of Parallel Markets for Foreign Exchange: The Experience of Selected Sub-Saharan African Countries in the 1980s," *Journal of Development Studies*, Vol. 34, October, 111-130.

Yin, J.Z., and W.A. Soever (1994), "Testing the Causes of Discontinuities in the Black Market Exchange Rate in China," *World Development*, Vol. 22, No. 9, 1413-1424.

World Bank (1994), *Adjustment in Africa: Reforms, Results, and the Road Ahead*, New York: Oxford University Press.