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# The Macroeconomics Of The Unofficial Foreign Exchange Market In Tanzania

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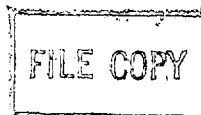
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# Economic Reform in Sub-Saharan Africa

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# *The Macroeconomics of the Unofficial Foreign Exchange Market in Tanzania*

*Daniel Kaufmann and Stephen A. O'Connell*

An active parallel foreign exchange market has existed in Tanzania since the early 1970s. The characteristics of the market have varied over time in response to economic shocks and the evolving policy regime, with saving and portfolio decisions featuring importantly in some periods and illegal trade transactions in others. At present, the market is very extensive, with both trade and financial transactions playing important roles.

This paper analyzes the macroeconomics of the parallel foreign exchange market in Tanzania. It focusses on the following questions: What factors led to the emergence of an unofficial market? What factors determine the premium between the unofficial and official exchange rates? What are the linkages between the unofficial foreign exchange market and the rest of the economy? The answers to these questions have important implications for macroeconomic management in Tanzania and provide essential background for consideration of such current policy issues as unification of the foreign exchange markets.

While the exact size of the unofficial foreign exchange market is (by its very nature<sup>1</sup>) difficult to judge, a recent policy measure legalizing one key dimension of the market provides an unambiguous indication of current orders of magnitude. Starting in mid-1984, individuals with access to unofficial foreign exchange were allowed to obtain import licenses without accounting for the source of their funds.<sup>2</sup> Based on official figures, the own-funds win-

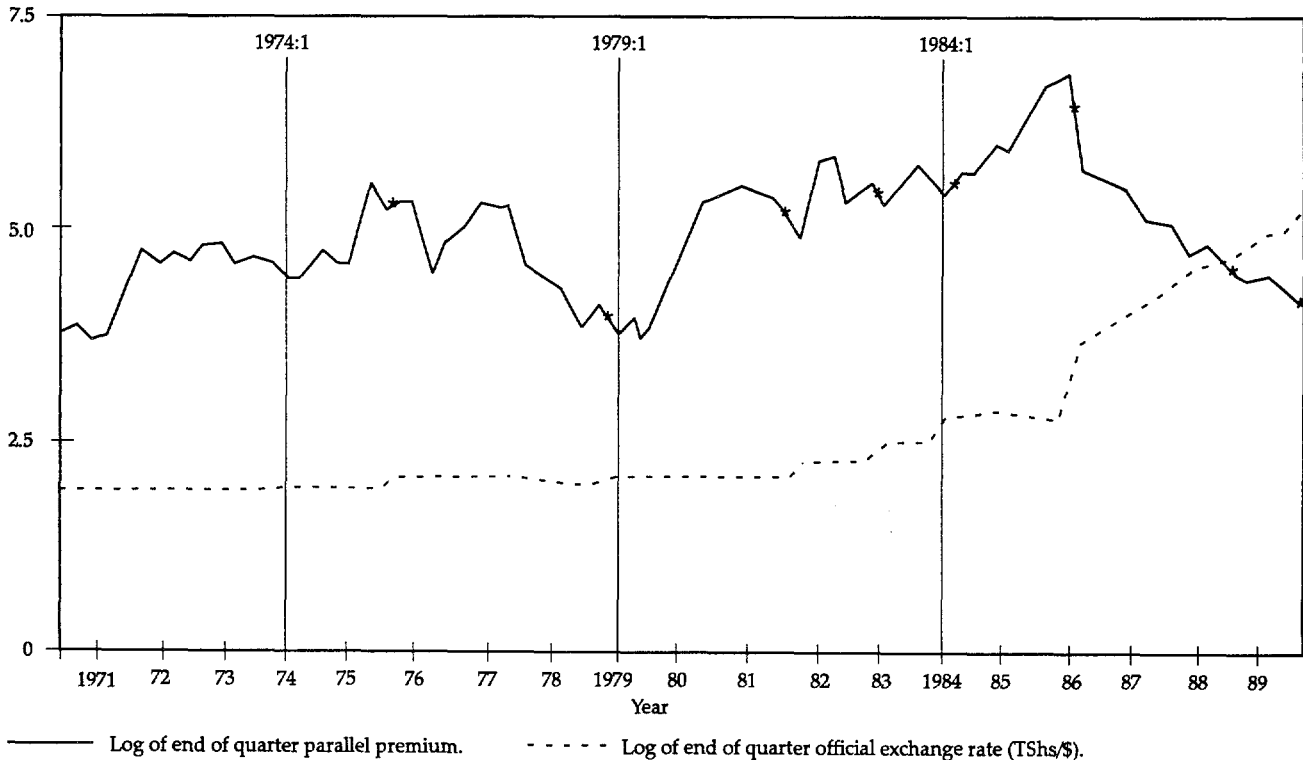
dow accounted for roughly 40 percent of import licenses issued in 1988. Unofficial estimates suggest that the share of own-funded imports in total imports is even larger perhaps significantly exceeding one half.<sup>3</sup> Given these orders of magnitude, it is clearly critical in the current policy context to have an understanding of the parallel foreign exchange market in Tanzania.

The second section begins with a brief summary of major policy developments since Independence. We then provide a detailed overview of macroeconomic developments in Tanzania since 1967, concentrating on the external sector and the evolution of the premium on foreign exchange in the parallel market. In the third section, we specify and estimate a simple empirical model of the parallel premium using annual data from 1966 to 1988. The fourth section summarizes the key conclusions and indicates our agenda for future work.

## **Economic Structure and Policy: An Overview**

Figure 6-1 shows quarterly movements in the parallel premium on the U.S. dollar in Tanzania since 1970 (table 6-1 gives annual observations back to 1966). Data for the unofficial rate are from the *World Currency Yearbook*, supplemented after 1984 by a small survey carried out in Dar es Salaam by Maliyamkono and Bagachwa (1990).<sup>4</sup> The figure also shows the official exchange rate against the dollar, periods of discrete devaluation against the relevant

Figure 6-1. Tanzania: Parallel Premium vs. Official Exchange Rate, 1970:3 - 1989:4



Note: Stars (\*) denote discrete devaluations of the official rate.  
Source: World Bank data.

currency basket are identified with asterisks. Table 6-2 provides a list of currency realignments over the sample.

The parallel premium shows substantial variations over time in both trend and level. Between July 1970 and March 1986, the premium increased at an average rate of nearly 1 percentage point per month; from April 1986 to the end of the sample (the period of the Economic Recovery Program), it declined at a rate of over 4 percentage points per month.<sup>5</sup> Fluctuations around trend, which are often large and persistent, occur throughout the sample in response to changes in the macroeconomic and regulatory environment.

#### 1967 To 1973

After the Arusha Declaration of 1967, the Government rapidly consolidated its control over all major aspects of the economy. In the external sector, the eight major private import-export firms were nationalized and replaced by the State Trading Corpora-

tion; the activities of trade finance were taken over by the National Bank of Commerce after nationalization of the banking sector.

Despite the abrupt and major institutional changes, real GDP per capita grew at an average annual rate of 5.2 in the period from 1967 to 1973. With the implementation of the Second Five-Year Plan (1969 to 1974), the gross investment rate rose to above 20 percent of GDP (from an average of 14.3 percent between 1964 and 1968), and Tanzania achieved significant improvements in the social sectors, particularly in education and health. Structural weaknesses were already beginning to emerge, however, which would become more pronounced and affect future economic performance. Agricultural exports began to stagnate in volume terms in the late 1960s. Domestic savings performance reached a peak of 18.1 percent of GDP in 1970 but fell to 15 percent by 1973, and then dropped as low as 8 to 9 percent of GDP in the crisis years 1974-75. The widening gap between investment and domestic savings was reflected in the external accounts: between 1970 and

Table 6-1. Exchange rates and the parallel premium, 1966-1989

Period	Official exchange rate		Unofficial exchange rate		Parallel premium	
	TShs/\$				(percentage)	
	(avg.)	(eop)	(avg.)	(eop)	(avg.)	(eop)
1966	7.14	7.14	8.6	8.6	20.4	20.4
1967	7.14	7.14	8.7	8.8	21.8	23.2
1968	7.14	7.14	8.5	8.3	19.0	16.2
1969	7.14	7.14	8.7	9.1	21.8	27.4
1970	7.14	7.14	10.1	10.5	40.8	46.3
1971	7.14	7.14	11.6	15.0	62.2	110.0
1972	7.14	7.14	15.2	15.4	113.0	115.6
1973	7.02	6.90	14.5	13.5	106.9	94.9
1974	7.14	7.14	13.5	13.0	88.5	96.0
1975	7.41	8.26	20.6	25.0	176.5	202.5
1976	8.38	8.32	21.9	20.4	161.8	145.1
1977	8.27	7.96	21.5	15.1	159.1	89.1
1978	7.69	7.41	13.1	11.8	69.8	58.5
1979	8.25	8.22	12.0	13.5	45.2	64.2
1980	8.19	8.18	21.0	26.5	156.6	223.9
1981	8.29	8.32	27.6	24.4	232.7	192.6
1982	9.33	9.57	32.6	29.2	247.5	204.7
1983	11.26	12.46	39.6	50.0	252.8	301.4
1984	15.51	18.11	55.9	70.0	259.5	286.6
1985	17.35	16.50	100.8	150.0	487.6	809.1
1986	34.26	51.72	165.0	180.0	478.0	248.0
1987	65.62	83.72	180.0	190.0	178.3	127.0
1988	100.39	125.00	210.0	230.0	110.2	84.0
1989	144.47	190.00	254.2	300.0	76.7	57.9

Source: Official exchange rates: IMF, International Financial Statistics, Unofficial exchange rates: *World Currency Yearbook* (formerly *Pick's Currency Yearbook*) for monthly rates from July, 1970 to January, 1984; unofficial survey by Maliyamkono and Bagachwa at University of Dar es Salaam for monthly rates from February 1984 to November 1989; our estimate for December, 1989. Unofficial rates before July, 1970 are based on occasional observations reported in *Pick's Currency Yearbook*.

1973, the trade deficit was already 6 or 7 percent of GDP, as compared with balanced trade in the mid and late 1960s.

Under the Currency Board system, balance of payments problems had been virtually nonexistent in East Africa. The currency issue of the East African Currency Board was backed virtually 100 percent by sterling, so that the currency stock moved one-for-one with the sterling reserves of the Board (see Newlyn 1967).<sup>6</sup> Proponents of an independent central bank viewed the introduction of the Bank of Tanzania in 1966 as an opportunity to move to a less conservative monetary policy more in tune with the country's ambitious development program.

Tanzania's balance of payments performed favorably in the first three years of operation of the Bank of Tanzania, with gross reserves rising steadily from 1966 to 1969. Serious pressures first began to emerge in the early 1970s, in response to the rise in internal

demand, stagnating exports, and capital flight. Tanzania's first (minor) balance of payments crisis occurred in 1970-71, when international reserves fell by 25 percent between the end of 1969 and the end of 1971. Relative to the rising import bill, the decline in reserves was more drastic, with import coverage dropping from 4 months to less than 2 months over the period. The Government weathered the crisis by tightening import controls, extending exchange controls to Kenya and Uganda, and mobilizing inflows of concessionary financing (Green, Rwegasira and van Arkadie 1980).

The use of direct controls for balance of payments adjustment was consistent with the ongoing transition to socialism and the Government's already-established aversion to exchange rate devaluation;<sup>7</sup> it was institutionalized with the introduction of foreign exchange budgeting in 1970/71. A domestic credit planning apparatus was introduced in the

Table 6-2. Major party changes since 1970

Period	Change
July 1973	revaluation 3.4%
January 1974	devaluation 3.4%
October 1975	switch to SDR and devaluation 16%
January 1979	switch to undisclosed basket, and devaluation 10%
March 1982	devaluation 10%
June 1983	devaluation 20%
June 1984	devaluation 36%
June 1986	devaluation 55% and initiation of weekly crawl
November 1988	devaluation 23%
December 1989	devaluation 29%

same year, with the intention of implementing the Government's development priorities and influencing the overall growth of credit.

With the advent of the semi-annual foreign exchange plan, trade policy (as represented by the set of import quotas implicit in foreign exchange allocations) became an endogenous function of foreign exchange revenues. With the exception of a brief period immediately following the Arusha Declaration, the parallel premium in Tanzania was below 30 percent until the 1970-71 mini-crisis. From the experience of other countries, a premium of this magnitude is consistent with the operation of binding capital controls in a stable and otherwise relatively undistorted macroeconomic environment. With the emergence of the crisis, however, the premium moved above 50 percent. By the end of 1971, following the extension of exchange controls to Kenya and Uganda, it exceeded 100 percent. While these short-run movements can plausibly be attributed to intensified desires for capital flight, the premium did not return to its previous low level after the bulk of the nationalizations had been accomplished. This corroborates our observation (see also Green, Rwegasira and van Arkadie (1980)) that although the 1970-71 mini-crisis was successfully contained by short-run measures, the crisis itself was an indication of the emergence of more fundamental imbalances.

#### 1974 To 1978

The 1974 to 1978 subperiod began with the country's first serious balance of payments crisis, brought on by two years of drought and the first oil shock. The crisis exposed some of the longer-term weaknesses in economic performance. Large current account deficits (averaging 14 percent of GDP) were

financed by increased aid and capital inflows in 1974 and 1975, as the government froze wages and restricted imports other than oil and food in an attempt to manage the short-term situation. International reserves fell by nearly 70 percent in 1974, and for most of 1975 covered only about three weeks of imports.

The Government's management of the 1974-75 crisis represented a conscious decision not to sacrifice the development program in the face of adverse circumstances (Green, Rwegasira and van Arkadie (1980)). In practice, this meant increased reliance on aid and capital inflows. Pressures on the external accounts were eased dramatically in 1976-77 with the recovery of domestic food production and the arrival of the coffee boom. By the end of 1977, reserves were at the unprecedented level of nearly 5 months of imports. Fiscal pressures were eased as well, since the Government chose to tax away most of the windfall in export proceeds.

The weak underlying external situation emerged dramatically in 1978, however, when the government loosened import constraints in response to the boom-related inflow of foreign reserves (as it had done in 1973).<sup>8</sup> As imports expanded dramatically, the coffee boom collapsed; the current account deficit rose to above 15 percent of GDP in 1978 and gross reserves fell by nearly \$200 million over the course of the year. External arrears appeared for the first time in 1978.

The parallel premium fluctuated dramatically over the 1974 to 1978 period, rising to above 250 percent by the end of 1975, and nearly as high again in the first half of 1977, and then falling sharply starting in the third quarter of 1977. These movements reflect a number of macroeconomic influences, including increased savings incentives associated with the temporary coffee boom revenues (see Bevan, Collier and Horsnell 1989) and the foreign aid inflows and import liberalization in 1978. The 1977 breakup of the East African Community was a further influence; in that year, the Tanzanian Government closed its border with Kenya, which probably raised the cost of illegal trade between the two countries substantially.<sup>9</sup>

#### 1979 To 1984

This was a period of fiscal and external crisis and cumulative economic collapse. Soon after the ill-fated import liberalization of 1978, the economy was hit by the second OPEC oil price increase and the onset of war with Uganda. In contrast to the balance of payments crises of 1970-71 and 1974-75, when Tanzania managed to maintain consumption per

capita through increased inflows of external capital, adjustment to the economic shocks of 1978-79 eventually required a substantial cutback in both consumption and aggregate investment.

The macroeconomic collapse that unfolded in the first half of the 1980s has been analyzed carefully by Bevan et al (1990), Ndulu (1987), and others. Starting in 1979, the government tightened import controls severely, while at the same time raising producer prices for export crops in the hope of improving export incentives. The import compression fell particularly strongly on intermediates and consumption goods, in line with government and donor priorities which remained strongly geared towards the Basic Industrial Strategy objective of increasing manufacturing capacity (and over 1978 to 1981, defense). The compression of intermediate imports drove down capacity utilization in the manufacturing sector; together with the direct compression of consumer imports, this produced a severe shock to the supply of consumer goods.

In an exchange-control regime without domestic price controls or government control of internal trade, a reduction in the supply of consumer goods would be equilibrated by a rise in the domestic relative price of imports and import substitutes (and probably a rise in the real consumption rate of interest, provided the shock were viewed as temporary). In Tanzania, where price controls were pervasive<sup>10</sup> and a "confinement" policy restricted most domestic and foreign trade operations to selected parastatal agencies, the consequence of import compression was the emergence of widespread shortages of consumer goods, particularly in rural areas. Moreover, since the government resisted devaluing the exchange rate, the rise in producer prices meant substantial losses by the exporting parastatals and a corresponding increase in the public sector borrowing requirement and in inflationary pressure.<sup>11</sup> Under the combined pressure of shortages and falling real producer prices, peasants retreated into subsistence production (Bevan et al 1987, 1990) and, to a limited degree, increased smuggling of the export crop.

The collapse of recorded exports in the early 1980s was dramatic: exports declined by roughly 10 percent between 1979/80 and 1981/82, and then by a further 20 percent in 1983. Against this background of macroeconomic collapse, the parallel premium increased dramatically throughout the third subperiod, with only minor and short-lived interruptions in response to devaluations of the official rate. Given the key role of shortages of consumer goods in exacerbating the collapse, it is important to ask why

shortages were not averted by inflows of illegal imports financed by unofficial foreign exchange and sold at market-clearing prices. Surveys conducted by Bevan et al (1990) document that especially in rural areas, goods could not in fact be obtained even through illegal channels. One reason is that the elaborate system of controls on distribution meant that the costs of avoiding detection were extremely high. A second factor is that the activity of smuggling is transport-intensive and therefore subject to the serious deterioration of infrastructure that occurred beginning in the late 1970s. Illegal activity was further discouraged by the 1983 "economic saboteurs" campaign during which a large number of businessmen were jailed (Maliyamkono and Bagachwa 1990).

A concomitant of the shortages that emerged starting in 1979 was that the monetary expansion of that year did not immediately push prices up; instead, the velocity of money fell by 40 percent in 1979, and then stayed at the lower level until the introduction of the own-funds scheme and domestic price decontrol in 1984. Although the unofficial exchange rate did not immediately reflect the expansion of real money balances (one would expect a depreciation in the presence of portfolio substitution between domestic money and unofficial foreign exchange holdings), it did begin to rise dramatically by the end of 1979.

During the early 1980s a number of attempts at policy reform (e.g., small devaluations) failed to address the key problems and did not always obtain the necessary political support.<sup>12</sup> The 1984/85 budget represented a turning point, and provided the first indication of a major shift towards pragmatism in the Government's economic management. The exchange rate was devalued by one-third, parastatal subsidies were cut, an import liberalization program was initiated through introduction of the own-funds import scheme, an export retention scheme was introduced allowing exporters to retain a portion of their proceeds to purchase imports, and restrictions on the movement of grain were eased. Simultaneously, cooperatives (which had been abolished in 1976) were reestablished, and took over many of the functions of the parastatal crop authorities.

#### *1985 To Present*

This was a period of regime change and gradual recovery. The period from 1985 to the present is one of gradual economic recovery coinciding with a sustained liberalization of economic policy. In mid-1986, the Government produced a medium-term "Economic Recovery Program." The Economic Recovery Program aimed at achieving a positive growth rate



in per capita income, reducing the rate of inflation, and restoring a sustainable balance of payments position. Its main thrust was to reduce distortions and encourage more efficient resource allocation while exercising fiscal and monetary restraint. In the public sector, rehabilitation of the transport infrastructure and support for agricultural production were identified as the most urgent priorities. The measures initiated at the time of the 1986/87 budget and continued thereafter include: (1) significant adjustments in the official exchange rate; (2) increases in interest rates, resulting in positive real interest rates by 1988; (3) increases in producer prices for export crops; and (4) a significant reduction in the number of price-controlled items.

Both GDP per capita and trade volumes began to rebound in 1986 after reaching their lowest points in 1985. Real GDP growth averaged 4 percent from 1986 to 1989, with even higher growth evident in the extensive informal sector. The most visible source of growth has been the agricultural sector, where overall production increased between 4 and 5 percent in both 1987 and 1988, reflecting continued increases in production of foodgrains and some traditional export crops.

The cornerstone of the Economic Recovery Program has been the adjustment of the Tanzanian currency. Although the devaluation of mid-1984 was substantial, it did not represent a fundamental change in the Government's approach to exchange rate management. The parallel premium continued its twenty-year rising trend, reaching over 700 percent in early 1986, perhaps in anticipation of the major devaluation and policy shift that accompanied the 1985/86 budget and agreement with the IMF and World Bank. Since March, 1986, the premium has gradually fallen, reaching roughly 50 percent in the first half of 1990, a level not experienced since the early 1970s and briefly following the coffee boom. While a mild premium (e.g., below 30 percent) can be expected to persist reflecting capital controls, convertibility of the exchange rate for current account transactions now appears to be a realistic option.

#### The Parallel Premium: Some Empirical Results

The chronology presented above suggested that a variety of forces were at work in determining the parallel premium in Tanzania. In this section, we present some empirical results and suggest directions for further work on the determination of the parallel premium.

One of the key questions emerging from the second section is the relative importance of trade and

portfolio factors in the determination of the parallel premium, both in the short run and over time. In table 6-1, we address this issue using static and dynamic versions of the Dornbusch, et al (1983) model for the parallel premium. The model builds on two basic relationships. The first is a flow equation in which the change in private holdings of unofficial foreign exchange,  $dF$  (the unofficial trade balance), is a function of the incentives for illegal trade, including the parallel premium  $z$ , the official real exchange rate  $RER$ , and other variables  $w$ :

$$(6-1) \quad dF_t = f(z_t, RER_t, w_t) + +$$

We provide a detailed rationale for an equation like (6-1) below.

The second equation is a portfolio equilibrium condition in which the allocation of financial wealth between domestic assets  $M$  and unofficial foreign exchange is a function of the uncovered interest parity differential. Letting the notation  ${}_t y_{t+1}$  denote the expected value of  $y_{t+1}$  conditional on information available at time  $t$ , the portfolio balance condition is

$$(6-2) \quad M_t = g(i^*_t + {}_t d \ln U_{t+1} - i_t, x_t)(M_t + u_t F_t), g'_t < 0$$

where  $i^*$  and  $i$  are the foreign and domestic nominal interest rate, respectively, and  $x$  is a vector of other variables affecting portfolio behavior. The uncovered interest parity differential measures the difference in expected yields between dollar and TSh-denominated assets (not including the expected penalty, if any, associated with holding illegal foreign assets); a rise in this differential lowers the desired share of domestic bank deposits and other TSh-denominated assets in the overall portfolio. Other influences on relative yields, or on the relative liquidity or risk of domestic and foreign assets, are captured by  $x$ . An increase in penalties for violations of exchange or capital controls, for example, would simultaneously reduce the expected yield and decrease the liquidity associated with illegal foreign exchange holdings; at the same time, it might well increase the riskiness of dollar assets. The overall effect would be to lower  $g$  for any value of the interest parity differential.

Using the identity  ${}_t d \ln z_{t+1} = {}_t d \ln U_{t+1} - {}_t d \ln E_{t+1}$  where  $U$  and  $E$  are the unofficial and official exchange rates, respectively, equation (6-2) yields the following dynamic equation for the parallel premium:

$$(6-3) \quad {}_t d \ln z_{t+1} = h(M_t / E_t, F_t, z_t, x_t) - (i^*_t + d \ln E_{t+1} - i_t) - + +$$

Equations (6-1) and (6-3) form a second-order dynamic system in which the parallel premium and the private stock of foreign exchange evolve together in response to current and anticipated movements in the real exchange rate, the domestic asset stock (measured in foreign exchange), the interest parity differential, and the other flow and stock determinants,  $w$  and  $x$ .<sup>13</sup>

It is apparent from equation (6-1) that for fixed values of the right-hand side variables, the model has a steady state in which the parallel premium is a function only of the flow determinants  $RER$  and  $w$  (simply set  $dF_t = 0$ ). On the other hand, the portfolio determinants, by equation (6-3), clearly affect the parallel premium in the short run. We therefore estimate the following dynamic specification that allows for separate short and long run effects of both groups of determinants:<sup>14</sup>

$$(6-4) \quad \ln z_t = a_0 + a_1 \ln z_{t-1} + a_2 d(M/E)_t + a_3 dIPD_t \\ + a_4 dRER_t + a_5 (M/E)_{t-1} \\ + a_6 IPDEV_{t-1} + a_7 RER_{t-1}$$

Table 6-1 gives the results of OLS and instrumental variables estimation of equation (6-4). The data are given in table 6-2.<sup>15</sup> We use the *ex post* interest parity deviation as a proxy for the expected deviation, and apply instrumental variables to handle the implied measurement error.<sup>16</sup> For the value of domestic assets, we use  $M2$  (= Currency + Demand Deposits + Time Deposits). The real exchange rate is a trade-weighted index of bilateral real exchange rates with the eight major trading partners.

Given the short sample and the uncertain quality of the data, the basic results (columns 1 and 3) are quite satisfactory. They give strong support to the conclusion that both trade and portfolio factors are at work in determining the premium on unofficial foreign exchange in Tanzania. The short-run effects of the various determinants, given by  $a_2 - a_4$ , are all of the expected signs: a rise in the interest parity deviation or an increase in the real value of domestic financial assets leads to portfolio substitution towards unofficial foreign exchange, raising the premium; a real appreciation shifts incentives away from export smuggling and towards import smuggling, raising the premium. An appreciation of the real exchange rate raises the parallel premium in both the short run and the long run, as predicted by the model; moreover, since  $a_4$  and  $a_7 > 0$ , an unanticipated shock to the real exchange rate produces an "overshooting" of the parallel premium in the short run.

The results also support the conclusion that nominal devaluations are capable of lowering the parallel

premium to the extent that they lower the share of domestic financial assets in private portfolios or depreciate the real exchange rate. In both cases, the results clearly indicate the need for complementary macroeconomic policies, since the effect of a nominal devaluation can be nullified by increases in nominal money or domestic prices.

With respect to the long-run effects of the portfolio factors, the results are mixed. We cannot reject the null hypotheses that  $a_4$  and  $a_5$  are simultaneously zero, using standard F-tests. In this sense, the results support the prediction that portfolio factors influence the parallel premium in the short run only, and that the premium is determined by flow factors alone in the long run.<sup>17</sup> Taken separately, however, it appears that while changes in real money balances have no effect in the long run (i.e.,  $a_5$  is negligible), changes in the interest parity deviation do have a cumulative effect over a two-year horizon. And when we drop the long-run portfolio effects from the regression (columns 2 and 4), the overall performance deteriorates noticeably. Caution is clearly appropriate in interpreting the results regarding dynamics.

While the hypothesis of no serial correlation of the residuals cannot be rejected at the marginal 5 percent significance level based on the Box-Pierce statistic, both the Durbin-Watson (which is biased towards 2 given the lagged dependent variable) and the Box-Pierce statistic suggest that further work on the dynamic specification and/or estimation with a serial correlation correction may be in order.

#### Extending the Analysis

The discussion above emphasized that in an exchange control regime, the parallel premium is jointly determined with the domestic price of imports, since the marginal supply of imported goods enters the country through smuggling and underinvoicing. A rise in the official allocation of foreign exchange, for example, will increase the total supply of imports, thus reducing the domestic price of imports relative to the world prices and depreciating the real exchange rate; simultaneously, it will reduce the value of illegal imports, reducing the flow demand for foreign exchange in the parallel market and lowering the parallel premium.

To incorporate these considerations, we first specify flow equilibrium in the parallel foreign exchange market more carefully and then take care of endogeneity of the real exchange rate. The flow demand for foreign exchange comes from two sources: (1) directly smuggled imports,  $M^s$ , or imports through the own-funds window,  $M^{own}$ ; and (2) imports brought

in through the official window, but underinvoiced to avoid payment of tariff. In the underinvoicing case, we denote the officially reported value of imports and the amount by which these imports are underinvoiced by  $V^{off}$  and  $V^u$ , respectively. In a strict foreign exchange budgeting regime,  $V^{off}$  is not a choice variable, since it equals the official allocation of foreign exchange for imports. Note  $V^u$  need not be positive; imports may be overinvoiced as a way of obtaining official foreign exchange for sale on the parallel market.

To derive the flow demand for foreign exchange, consider first the case where there is no own-funds scheme, so that the marginal supply of imports into the economy is through smuggling and underinvoicing. Suppose (1) that the marginal cost of smuggling a unit of imports rises with the amount smuggled, and is denominated in the good being smuggled (cf. Bhagwati and Hansen (1974)); and (2) that the cost of underinvoicing is denominated in foreign exchange and is an increasing function of the distance of  $v = V^u/V^{off}$  from zero (i.e., an increase in fraud in either direction raises marginal costs; cf. Macedo (1987)). Then letting  $w^s$  and  $w^u$  be variables like the government enforcement effort that increase the marginal costs of smuggling and underinvoicing, respectively, the flow demand for foreign exchange for illegal imports takes the form.<sup>18</sup>

$$\begin{aligned}
 (6-5) \quad FD &= P_m^* M^s + V^u = p^* M^s (q, z, t_m, w^{m^s}) \\
 &\quad + v^u (q, z, t_m, w_m^u) V^{off} \\
 &= FD (q, z, t_m, V^{off}, P_m^*, w_m^s, w_m^u),
 \end{aligned}$$

where  $q = (P_m - EP_m^*)/EP_m^*$  is the premium of the domestic price of imports over the world price at the official exchange rate,  $t_m$  is the import tariff rate, and  $z = (U-E)/E$  is the parallel premium.

For smugglers or for underinvoicers with fixed individual foreign exchange allocations, the optimal illegal behavior embodied in equation (6-5) is straightforward: smuggle and/or underinvoice those goods whose price on the domestic market is high enough to offset the parallel premium (i.e., those goods for which  $q > z$ ), and overinvoice the rest (i.e. those for which  $q < z$ ).<sup>19</sup>

Notice that the tariff rate does not affect the demand for foreign exchange of these agents, since it does not affect their marginal incentives for illegal activity once  $q$  and  $V^{off}$  are given. This is obvious for smugglers, who avoid tariffs altogether; for underinvoicers who receive a fixed allocation of foreign ex-

change, the value of reported imports (and therefore the base of the import tariff) is fixed in advance, so that changes in tariffs affect overall profits but not the optimal degree of underinvoicing.

We include the tariff rate as an argument in the underinvoicing function to capture the fact that while the overall allocation of official foreign exchange may be determined in advance, individual traders may view themselves as having some influence over their own allocation of foreign exchange. For these traders, cost-minimizing behavior requires trading off the marginal benefit of an additional dollar of underinvoicing, which is  $t_m$  against the marginal cost, which is  $z$  plus the marginal increase in expected penalties. Underinvoicing will occur on those goods for which  $t_m$  exceeds  $z$ ; if  $t_m$  is less than  $z$ , the good will be overinvoiced. Similar behavior is exhibited by individuals who illegally import either a given quantity of goods (e.g., a single car or machine tool) or goods without well-developed markets within the country, such as specialized spare parts. Cost minimization yields an amount of smuggling and underinvoicing that is an increasing function of the tariff rate and a decreasing function of the parallel premium (and zero for  $t_m = z$ ).

Finally, notice that the effect on  $FD$  of an increase in officially recorded imports is uncertain, since it depends on the sign of  $v$ , i.e., on whether imports through the official window are being underinvoiced or overinvoiced on average. If the average domestic price premium  $q$  is below the parallel premium, however, the overall incentive will be to *overinvoice*, so that  $v$  is negative; in this case a rise in  $V^{off}$  will decrease the flow demand for foreign exchange, and a rise in  $w_{mu}$  will increase it.

The flow supply of foreign exchange,  $FS$ , comes from direct export smuggling in amount  $X^s$  and from underinvoicing of exports officially reported to the authorities,  $X_u$ . The amount of underinvoicing of exports is given by  $X^u = x^u(t_x, x)[X(RER_x, ODA) - X^s]$ , where  $X(RER_x, ODA)$  is total export supply as a function of the real official exchange rate for exports and the level of official development assistance. We use the latter as a proxy for the demand for exports of housing services and tourism, two major channels of illegal exports in Tanzania.<sup>20</sup> Both  $X^s$  and  $x^u$  depend positively on the parallel premium and on the gap between the domestic price of exports and the world price at the official exchange rate,  $t_x$ . Again letting  $w^s$  and  $w^u$  be variables like government enforcement efforts that increase the marginal cost of smuggling and underinvoicing, respectively, we have:

$$(6-6) \quad FS = P^* x \{x^s(t_x, a, w_x^s) + x^u(t_x, z, w_x^u)\} \{X(t, z, w^u) \\ + + - \quad + + - \\ [X(RER_x ODA) - X^s(t_x, z, w_x^s)]\} \\ - \quad + \\ = FS(t_x, z, RER_x ODA, P_x^*, w_x^s, w_x^u) \\ + + - \quad + + - -$$

Notice that there are two sources of increases in  $t_x$ , given the world price of exports: (1) decreases in producer prices paid by marketing boards without a change in the exchange rate (e.g., through higher overhead margins being charged by marketing parastatals, or through a policy decision to tax exports more heavily); (2) devaluations in the official exchange rate that are not passed on to producers. Notice also that in Tanzania, the relevant "world price" for key export commodities may in fact be the producer price being paid in neighboring countries (e.g., the producer price for arabica coffee in Kenya).

Taking equations (6-5) and (6-6) together gives us the following version of equation (6-1) (we consolidate the  $w$ 's into a single vector for notational convenience):

$$(6-7) \quad z = z(q, t_m, t_x, RER_x, V^{off}, ODA, P_m^*, P_x^*, w, FS-FD) \\ ++ - + \quad -? \quad - \quad + \quad - \quad +$$

The real exchange rate for exports,  $RER_x$ , is the ratio of the consumer price index to the price received by exporters (we use  $PP_x$ , the producer price for agricultural exports):<sup>21</sup>

$$(6-8) \quad RER_x = \frac{P_m^* P_n^{1-\alpha}}{PP_x} = \left[ \frac{1+q\alpha}{1-t_x} \right] \alpha (P_n/EP_x^*)^{1-\alpha} \\ (P_m^*/P_x^*)^\alpha = RER_x (q, t_x, P_n/EP_x^*, P_m^*/P_x^*) \\ + + \quad + \quad +$$

Equation (6-7) can therefore be written

$$(6-9) \quad z = z(q, t_m, t_x, P_n^*/EP_x^*, P_m^*, P_x, ODA, V^{off}, w, S-FD) \\ ++ \quad ? \quad + \quad + \quad - \quad - \quad -? \quad +$$

The effect of a rise in  $t_x$  is uncertain a priori, since there are two opposing effects: the real exchange rate for exports rises, reducing aggregate export supply, while the share of exports that is diverted onto unofficial channels also rises. The net effect on illegal exports, and thus on  $z$ , is an empirical question.

Equation (6-9) contains four potentially endogenous variables:  $q$ ,  $P_n/EP_x^*$ ,  $V^{off}$ , and  $dF = FS-FD$ . Consider the relative prices first. Both  $q$  and  $P_n/EP_x^*$  are relative prices of goods that are nontraded at the

margin; these prices are determined by overall absorption,  $A$ , and by supply conditions. In the case of nontraded, an upward-sloping supply curve comes from standard general equilibrium considerations (resources must be attracted from other sectors, including the export sector, to increase the supply of nontraded); for the case of imports under exchange control, the marginal supply of imports comes from smuggling and underinvoicing, so that  $q$  is a function of  $t_m$  and  $z$  as well as  $A$ .<sup>22</sup> Substituting for  $q$  and  $P_n$  in equation (6-9), we have

$$(6-10) \quad \{z = z_m(t_m, t_x, M^{off}, A, P_m^*, P_x^*, ODA, w, FS-FD) \\ + ? \quad - \quad -? \quad + \quad + \quad - \quad - \quad +$$

Finally, we need models for  $A$ ,  $V^{off}$  and  $FS-FD$ . In the Tanzanian context of foreign exchange rationing,  $V^{off}$  is a policy variable. We can therefore either take it as exogenous or specify a "reaction function" in which the amount of foreign exchange allocated for imports depends on other variables. Based on actual Tanzanian experience as outlined in the second section, one possibility is to have  $V^{off}$  endogenously respond to the reserves position in the previous period, and to current official exports and aid receipts:

$$(6-11) \quad v^{off} = f(V_{t-1}^{off}, (R_{t-1}-R_{t-2}), P_x^* (x-x^s), ODA) \\ + \quad + \quad + \quad +$$

where  $R_{t-1}$  is reserves at the end of period  $t-1$ .<sup>23</sup> In this case, equation (6-11) becomes

$$(6-12) \quad z = z(t_m, t_x, V_{t-1}, R_{t-1}-R_{t-2}, A, P_m^*, P_x^*, ODA, w, FS-FD) \\ + \quad ? \quad -? \quad -? \quad + \quad + \quad - \quad - \quad +$$

Equation (6-12), together with (6-13), provides a rich structure for incorporating flow determinants of the parallel premium and analyzing the linkages of the parallel foreign exchange market with the rest of the economy. Intertemporal considerations, for example, enter through the determination of  $A$ : a commodity boom that raises desired absorption will tend to raise the parallel premium by driving up the domestic relative price of imports and raising the profitability of import smuggling; on the other hand, it will (i) increase the foreign exchange value of any given volume of smuggled exports, and (ii) rapidly feed into higher allocations of foreign exchange through the official window, with the opposite effect on the premium. The net effect on the parallel premium over time is an empirical question, depending largely on the degree to which the commodity boom

is perceived as temporary. In the case of the 1976-77 coffee boom, which was clearly the effect of a temporary supply shock (a frost affecting the Brazilian crop), we would expect a very mild effect on aggregate expenditure, and therefore, given the time path of the domestic money stock and official exchange rate, a tendency for the parallel premium to be driven down by the valuation effect on smuggling volumes and the endogenous trade liberalization.

*Aid Inflows.* With respect to an increase in Official Development Assistance (ODA), holding desired absorption constant, the effect should be to lower the premium, both by increasing the flow supply of foreign exchange onto the parallel market and by producing an endogenous trade liberalization. On the other hand, increased aid should raise disposable income and therefore desired absorption, again depending in part on how permanent the increase is expected to be; this would tend to raise the domestic relative price of imports and the parallel premium.

As in the case of a commodity boom, the net effect is an empirical question.

A major weakness of equation (6-12), in combination with (6-3), is that it leaves out the government budget constraint. It therefore misses the endogenous determination of the domestic money stock and the official exchange rate. This is an important potential direction for extensions. In the commodity boom case, for example, the commodity revenues would be received by the private sector primarily in domestic currency, since the bulk of the export crop is marketed through official channels. In the absence of sterilization, portfolio balance considerations would then tend to push the unofficial exchange rate up in the short run, counteracting the effect of the (actual and anticipated) trade liberalization.

*Own funds.* Extending the derivation of an equation like (6-12) to the case of an own-funds scheme is relatively straightforward. Since the costs of direct smuggling are positive, imports that were previously

Table 6-3. OLS and instrumental variables estimation results for equation (6-4)

	Dependent variable: Parallel premium (PPREM) <sup>1</sup>			
	OLS		IV <sup>2</sup>	
	1967-1988		1968-1988	
	1	2	3	4
CONSTANT	191.38 (-2.27)	-259.94 (-2.69)	-195.95 (-1.39)	-285.31 (-2.47)
PPRT <sub>T-1</sub> EM	0.38 (1.49)	0.45 (2.03)	0.71 (1.41)	0.40 (1.60)
d(M2/ <sub>t</sub> E)	0.19 (2.58)	0.24 (2.82)	0.22 (1.55)	0.27 (2.32)
d(IPD <sub>t</sub> )	2.45 (2.16)	1.20 (1.09)	1.91 (0.76)	0.89 (0.58)
d(RE <sub>t</sub> R)	3.32 (2.24)	0.80 (0.69)	6.13 (2.03)	0.48 (0.37)
(M2/E <sub>t-1</sub> )	-0.05 (-1.40)	—	-0.12 (-1.60)	—
IPD <sub>t-1</sub>	3.63 (3.03)	—	4.97 (2.74)	—
RE <sub>t-1</sub> R	2.46 (2.78)	3.08 (3.09)	2.56 (1.84)	3.17 (4.26)
RBA <sup>3</sup> R	0.86	0.79	0.80	0.78
(Q11) <sup>3</sup>	-14.73 (0.20) <sup>4</sup>	16.76 (0.12) <sup>4</sup>	8.67 (0.56) <sup>4</sup>	14.78 (0.14) <sup>4</sup>

Note: (t-statistics are in parenthesis) a. The data are in table 6-2. b. Instruments for d(REER)<sub>t</sub> and d(IPD)<sub>t</sub> are M2<sub>t-2</sub>, REER<sub>t-2</sub>, and IPD<sub>t-2</sub> (along with the other right-hand side variables, which are assumed to be predetermined; note that in the case of PPREM<sub>t-1</sub>, this is only valid if the disturbances are serially uncorrelated). c. Q is the Box-Pierce statistic for testing general serial correlation. For columns 3 and 4, the statistic reported is Q(10).

own-funds scheme.<sup>24</sup> Ignoring the cost of operating in the (still illegal) foreign exchange market, and assuming that expected penalties for underinvoicing are an increasing function of the ratio of underinvoicing to reported imports, there will be a perfectly elastic supply of imports through the own-funds window at the price  $q - t^e = z$ , where  $t^e$  is the effective tariff paid on own-funds imports.<sup>25</sup> The amount of own-funds imports will then be determined residually, as the difference between total import demand  $M$ , and the amount of imports brought in through the official window:  $M^{own} = M - (V^{off} + V^u) / P_m^*$ . We therefore have

$$(6-13) \{FD = P_m^* M^{own} + V^u = P_m^* M(A, z, t_e, y) - V^{off}, \\ = FD(A, z, t_m, w_m^u, (V^{off}/P_m^*), y), \\ + \quad - \quad - \quad - \quad +$$

where  $A$  is aggregate expenditure,  $y$  is a vector of other variables influencing the aggregate demand for imports (e.g., government absorption of imports),

and  $V^u$  (recall) is underinvoicing through the official window. The statutory tariff rate  $t_m$  and the enforcement variable  $v_{mu}$  enter as determinants of  $t^e$ , and  $z$  enters through the arbitrage relationship  $q - t^e = z$ . The resulting reduced form can be written exactly as in (6-12), although the parameters will differ reflecting the change in the supply function for imports financed by unofficial foreign exchange.

One conclusion that emerges unambiguously in the current model is that introduction of an own-funds scheme will raise the parallel premium consistent with any given value of the private current account surplus  $FD-FS$ , and therefore that it must raise the steady state parallel premium, ceteris paribus (since in the steady state  $FD-FS$  is fixed at zero). The reasoning is straightforward: by reducing the costs of import smuggling, an own-funds scheme shifts out the supply of imports and drives down the gap between the domestic price of imports and their international price at the official exchange rate (i.e.,  $q$  falls). Total imports are therefore higher under the

Table 6-4. Data for parallel premium regressions

Period	PPREM	M2E\$	IPDOP	REER	TAXCINV	TOT	AID
1966	20.40	190.54	n.a.	97.61	49	96.8	81.49
1967	23.20	215.56	1.96	99.14	50	91.9	70.29
1968	16.20	253.93	2.86	105.99	47	93.0	68.71
1969	27.40	277.39	6.26	104.91	71	112.3	117.32
1970	46.30	310.74	5.02	101.22	53	106.5	105.52
1971	110.00	364.41	3.08	97.09	54	98.8	136.10
1972	115.60	432.56	0.17	91.83	75	95.3	191.48
1973	94.93	529.42	7.13	88.03	39	118.8	170.00
1974	96.00	624.69	11.21	92.94	35	107.9	148.87
1975	202.53	671.95	16.93	99.60	35	92.8	332.93
1976	145.07	834.52	0.25	93.02	27	126.3	331.65
1977	89.07	1048.58	-5.44	92.94	23	140.3	393.36
1978	58.46	1267.25	11.72	93.11	40	115.1	404.55
1979	64.21	1679.35	6.26	87.03	34	114.9	535.91
1980	223.89	2141.34	10.37	100.00	52	100.0	546.61
1981	192.59	2486.09	25.55	131.93	52	85.2	496.25
1982	204.70	2584.86	29.04	158.73	57	88.4	405.17
1983	301.40	2338.33	43.44	171.82	52	91.1	318.69
1984	286.63	1668.01	16.39	177.94	53	96.4	310.80
1985	809.13	2387.37	103.98	206.61	50	90.5	424.92
1986	248.04	972.73	94.50	113.12	43	103.0	447.41
1987	126.95	793.62	42.36	174.52	50	89.6	704.92
1988	84.00	702.24	33.79	49.83	46	94.3	818.79
1989	57.89	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Note: n.a. not available. PPREM=100\*(U-E)/E is the end-of-the-year parallel premium in percentage points, with the unofficial and official exchange rates  $U$  and  $E$  taken from table 2-1. M2E\$ is the end-of-the-year M2 in TShs (source: IMF, IFS), deflated by the official exchange rate. IDPOP=100\*[(1+i)(E<sub>t+1</sub>/E<sub>t</sub>)-(1+i)] is the uncovered interest parity differential, with  $i$  given by the London Eurodollar deposit rate (source: IFS) and  $i$  by the Saving deposit rate in Tanzania (source: Bank of Tanzania). REER is the ratio of the Tanzanian CPI to a trade-weighted average of WPIs of 8 major developed country partners (source: World Bank).

own-funds scheme than previously, for a given supply of official foreign exchange. Smuggled exports must therefore rise to finance the higher imports if the private current account surplus is to remain unchanged. The only way this can occur is for the parallel premium to rise.<sup>26</sup>

#### *Implementing the Extended Model*

Table 6-3 shows the results of estimation of a version of the extended model. The parallel premium is regressed on the portfolio determinants (imposing the condition that these operate only in the short run) and on a subset of the flow determinants in equation (6-12). The data are in table 6-4. TAXCINV corresponds to the inverse of  $t_x$  in (6-12): it is the ratio of the domestic producer price of coffee to the fob export price (converted to TShs).<sup>27</sup> As discussed above, the effect of export taxes on the premium is theoretically ambiguous; a positive net effect would indicate (i) that coffee growers are actively adjusting the share of the crop sold through official channels in response to taxes and the parallel premium, and (ii) that these adjustments are large enough to have macroeconomic implications.

TOT is the terms of trade; it enters (1) through the endogenous trade liberalization that follows an improvement in the balance of payments; (2) through a direct valuation effect on the illegal trade deficit; (3) through resource movements in favor of exports and away from imports; and (4) through effects on aggregate demand, depending on the savings response. The first three of these would be expected to lower the parallel premium; the third would raise it, to an extent depending on the savings response. Overall, we expect a net negative effect.

AID is net official resource transfers in dollars; a rise in AID should lower the premium both through direct increases in illegal export flows (expatriate housing, etc.) and through the endogenous trade liberalization effect; it should raise the premium to the degree that it raises aggregate demand. Again, we expect a negative effect on balance, although the aggregate demand effect might be rather strong given that changes in aid have a strong permanent component.

Own funds is a dummy variable for the period from 1984 to the end of the sample, during which the own-funds scheme was in operation. By the arguments given above, we expect it to have a positive effect on the premium, given the values of the other variables. Interpretation of the estimated coefficient will be complicated, however, by the fact that the 1984/85 budget, in which the own-funds policy was

introduced, was an integrated policy package that included a devaluation of the official rate, decontrol of some prices, and other policy actions. To the degree that the package was perceived as a signal of genuine policy reform, and thus of a prospective increase in the return on domestic real assets, it would have tended to lower, rather than raise, the parallel premium.

Finally, D83 is a dummy variable for the 1983 crackdown on "economic saboteurs"; its effect on the premium is theoretically uncertain. From the illegal trade side, while a crackdown unambiguously reduces the volume of illegal trade, it may either raise or lower the premium, since it simultaneously affects both the supply and the demand for illegal foreign exchange. On the portfolio balance side, a crackdown impairs the liquidity of foreign exchange assets and reduces their expected yield; both effects would tend to lower the parallel premium.

Most of the variables have the expected signs. Both portfolio determinants enter significantly, with magnitudes generally close to those found in table 6-1. Of the flow determinants, only the TOT comes in strongly, with the lagged TOT exerting a strong negative effect on the premium (as observed, for example, during and after the coffee boom). Lagged aid inflows also lower the premium, although the effect is not estimated precisely. The effect of lagged TOT and lagged aid is consistent with a substantial endogenous trade liberalization in response to balance of payments improvements; this corroborates evidence from import equations in Ndulu and Lipumba (1988).

The coefficient on the coffee tax variable is consistently negative but insignificant, implying that any smuggling response is more than offset by an aggregate coffee supply response in the opposite direction. While this finding does not rule out a macroeconomic role for coffee smuggling in determining the parallel premium (cf. Donnelly and Mshomba (1989), who argue that up to 25 percent of the arabica coffee crop has been smuggled to Kenya in some years), it suggests that the elasticity of smuggling supply is low in the coffee sector, at least over the horizon of a year.

The own-funds scheme appears to have raised the premium, *ceteris paribus*, as predicted by the model. The magnitude of the increase, between 150 and 240 percentage points, is impressive, and suggests that the low elasticity of smuggling response indicated in the coffee case may be a more general phenomenon. More obviously, the results indicate that the lowering of the parallel premium since 1986 has been a function of other developments in policy and external conditions, such as (i) cumulative depreciations of

the official exchange rate that reduced the real stock of domestic money, and (ii) large inflows of foreign aid, and not of the own-funds scheme itself.

Implementation of the extended model using annual data is clearly problematic given the short sample. Nonetheless, while the results in table 6-3 should be interpreted with caution, they suggest that there may be significant payoff to further work using equation (6-12).

## Conclusions

This paper has taken a macroeconomic perspective on the parallel foreign exchange market in Tanzania. We discussed the emergence and behavior of a premium on foreign exchange over the period since 1966, and presented some preliminary empirical evidence on the determination of the premium. In this conclusion, we briefly discuss selected empirical and policy issues and the agenda for future work.

The results of the third section show that both portfolio and trade factors are at work in determining the parallel premium in Tanzania. They therefore suggest that rises in the premium in the early 1980s may have been in part due to the substantial monetary expansions that occurred starting in 1979. In the context of the model, however, the resulting rise in the premium should have raised the market-clearing domestic prices of imports and import-substitutes. But in this case, real money balances would not have risen as dramatically as they did in 1979, with velocity falling by 40 percent (for both M1 and M2) and remaining at the lower level until 1984 (at which time it equally abruptly returned to trend). Surveys conducted by Bevan, et al (1990) and Ndulu and Hyuha (1989) suggest that while official price indices did not fully reflect transactions prices during the third sub-period, the gaps are not large enough to explain the fall in measured velocity. One of the important issues for further investigation, therefore, is the impact of failure of market clearing on the behavior of the parallel premium and its interaction with other macroeconomic variables.

A second empirical issue has to do with handling the change in regime that occurred between 1984 and 1986. For familiar reasons, a major change in policy regime should be expected to change the parameters of behavioral equations and reduced forms. The short sample, particularly after the regime change, has prevented us from investigating this issue carefully; one possible avenue for future work is to implement simple versions of the model using quarterly data (which are available for prices, interest rates, money stocks and exchange rates).

On the policy side, the key issue regarding the unofficial foreign exchange market is unification. The resource allocation gains of a single market-determined exchange rate for commercial transactions are well known, and do not require elaboration here. Holding aside the question of capital account liberalization, what are the prospects for adoption of an essentially market-determined official exchange rate for commercial transactions?

First, there is a fiscal impact of unification. Pinto (1987) has emphasized that if the government is a net buyer of foreign exchange from the private sector, unification will worsen the real deficit and raise the inflation rate required to finance the fiscal deficit. Preliminary calculations we have made suggest that Tanzania is on the favorable side of this calculation. Given the large inflows of aid being channeled by the Government, increases in the official exchange rate provide a fiscal bonus, lowering the fiscal deficit in domestic currency terms. Moreover, devaluation will improve the trade tax base, both by moving activity from unofficial channels to official channels (a real devaluation is required here), and by the valuation effect of higher official exchange rate (since import tariffs are levied on the domestic value at the official exchange rate). It therefore appears likely that official exchange rate adjustments in the course of unification will not contribute to inflation via the fiscal channel.

Second, while unification through adoption of an across-the-board floating exchange rate has been tried in other African countries, capital controls are likely to be in place in Tanzania for the foreseeable future. This means that a parallel rate will continue to exist, and that some amount of trade activity will take place at this rate. "Unification" therefore means the removal of rationing of import licenses at the official rate, and the provision of a competitive official outlet for export proceeds, rather than the reduction of the parallel premium to zero. Moreover, unification in this sense is a complex process, involving change in policy institutions and gradual adjustment on the part of market participants. In this context, the parallel rate is likely to play an important allocative and signalling function for a long time to come. Characterizing the nature of this role is an important part of our agenda.

As a final observation, one of the most interesting aspects of the Tanzanian experience, and a potential lesson for other countries similarly situated, is the role of the own-funds scheme. The de facto dismantling of the QR-dominated trade regime through the own-funds policy resulted in a significant inflow of consumer and intermediate imports, providing in-



centives to farmers to increase production, and channeling scarce spare parts and transport equipment to industry and agriculture. The resulting supply response was significant. This, coupled with the price alignment to reflect scarcity values in virtually all commodities (brought about by the de facto trade liberalization itself and the price decontrol), implied that the official devaluations initiated in 1986 did not result in an acceleration of inflation, even though there was a marked increase in money supply growth during the 1987 to 1989 period. The success of the own-funds scheme suggests that carefully identified policies linking the parallel market for foreign exchange with the official economy can provide a significant supply response and price alignment immediately preceding the adoption of politically controversial structural adjustment efforts.

## Notes

1. The parallel foreign exchange market in Tanzania is an illegal or "black" market. We use the terms "unofficial" and "parallel" interchangeably in this paper, although the latter term is broader and in some countries refers to a legal, officially recognized market.

2. Similar schemes have been operated in Ghana and The Sudan in recent years.

3. Ndulu and Hyuha (1989) give three reasons why the share of licenses may underestimate the true share: (1) own-funds consignments under TShs 10,000 (approximately USD 50) do not require licenses, (2) the utilization rate of own-funds licenses is considerably higher than that of licenses accompanied by official foreign exchange; and (3) the incentive to underinvoice own-funds imports to avoid customs duties is much stronger than for officially financed imports, since the cost of foreign exchange on the underinvoiced portion is identical to that on the declared portion.

4. The *World Currency Yearbook* publishes monthly data from July 1970 (with annual observations back to 1966). The series used in this paper is the *World Currency Yearbook* series up to January 1984, and the Maliyamkono and Bagachwa (1990) series thereafter. While the two series move closely together for most of the period since 1984, an exception occurs in 1985, when the *World Currency Yearbook* shows a stabilization of the parallel rate in contrast to the trend depreciation reported by Maliyamkono and Babachwa. We use the latter series based on our own observations during that period, and consultation with other observers, who unanimously regarded the *World Currency Yearbook* data for 1985 as anomalous.

5. The trends are calculated by regressing the monthly parallel premium on a constant and a trend over the period in question. The coefficients on the trend term are 0.0091

for July, 1970 to March, 1986 and -0.041 for April, 1986 to December, 1989.

6. Starting in 1955, the Board was allowed to issue currency against government securities. By the end of 1965, however, 82.5 percent of the currency issue was still backed by sterling.

7. The Tanzanian government decided not to follow the devaluation of sterling in 1967. Arguments given then about the inefficacy of devaluation in the Tanzanian context became an established part of the policy canon until the mid-1980s.

8. A second policy development in 1978 with possible implications for the balance of payments was the amendment of the Bank of Tanzania Act, which abolished the previous limit of 25 percent of recurrent revenue on government borrowing from the Central Bank (Ndulu and Hyuha 1989). It is not clear, however, that this represented a genuine loosening of fiscal constraints, since parastatals had always been able to borrow from the National Bank of Commerce (itself a parastatal), and the National Bank of Commerce from the Bank of Tanzania.

9. The border was re-opened in 1984. The effect of the border closure on the parallel premium is ambiguous, since it should raise the cost of both import smuggling (thus reducing the demand for illegal foreign exchange) and export smuggling (thus reducing the supply of foreign exchange). The theoretical model in the third section captures the effects of macroeconomic and regulatory changes on the parallel premium.

10. The National Price Commission existed from 1973 to 1984. By the mid 1970s, it controlled some 2000 prices of imported and domestically produced goods. Prices were decontrolled starting in 1984; only 12 commodities remained under price control by July, 1988.

11. The fiscal developments largely accounted for the government's failure to meet performance criteria associated with IMF borrowings in the 1979-80. The absence of IMF support meant an additional shock to external funds.

12. Ndulu (1987) gives a chronicle of official responses to the external crisis starting in 1979; there were three unsuccessful short-term government/IMF ventures in 1979-80, and then the unsuccessful government three-year Structural Adjustment Program starting in June 1982.

13. The system is saddle-path stable; in each period, the parallel premium jumps to clear the asset market, and the resulting incentives for illegal trade determine the flow addition to private foreign exchange holdings. Dornbusch et al (1986) and Rocha (1990) give a diagrammatic analysis.

14. See also Rocha (1990) for an application to Algeria, and Fishelson (1988) for an application of the model to 19 developing countries. Fishelson uses the uncovered differential at the unofficial rate, on the argument that movements in the unofficial rate provide a good proxy for expected movements in the official rate. Neither of these

papers makes a distinction between the dynamic effects of the portfolio determinants and those of the flow determinants.

15. The dependent variable actually used in the regressions is the parallel premium, defined as  $100*(U-E)/E$ , where  $U$  and  $E$  are the unofficial and official exchange rates, respectively, rather than  $\ln z = \ln (U/E)$  as defined in the text.

16. Assuming market participants have rational expectations, the forecast error will be uncorrelated with variables observed at time  $t$  or earlier. We therefore can use lagged values of the right-hand side variables as instruments for the interest parity deviation. We also instrument for the change in the real exchange rate, on the grounds that the current real exchange rate is jointly determined with the parallel premium. We treat the nominal money stock and the official exchange rate as predetermined.

17. This interpretation of equation (4) reflects a backward-looking interpretation of the dynamic adjustment towards the steady state. In reality, the system formed by (1) and (3) has both a stable and an unstable root, so that the rational expectations solution for  $z$  takes the form  $z_{t+1} = a[z_t - \bar{z}_t]$ ,  $0 < a < 1$ , where  $\bar{z}_t$  is a function of current and expected future levels of the flow determinants and changes in the stock determinants of the parallel premium. Since future values of these variables must be predicted based on current information, however, the final solution for  $z$  would include a distributed lag on current and past values of the determinants, as in equation (4).

18. The exact form of the smuggling function depends on the costs associated with the illegal activity. While our formulation is fairly general, we have made one key simplification in assuming that the costs of smuggling are ultimately denominated in foreign exchange: this implies that only the parallel premium, and not the level of the official exchange rate, will directly affect smuggling incentives.

19. Smuggling profits are equal to  $R^s = P_m M^s - U[M^s + C(M^s)]$ , where  $C(M^s)$  is the smuggling cost function. The first-order condition is  $C'(M^s) = (q-z)/(1+z)$ , yielding a smuggling function  $M^s(q,z)$  with the properties given. Under (or over)invoicing profits are given by  $R^u = P_m[(V^{off} + V^u)/P_m^*] - E(1+t)V^{off} - U(V^u + c(v)V^{off}) = \{(q-t) - (q-z)v - (1+z)c(v)\}EV^{off}$  (we have assumed that the invoicing cost function is homogeneous of degree one in  $V^u$  and  $V^{off}$ ). Given  $V^{off}$ , the first-order condition for  $v$  is similar to the smuggling case:  $c'(v) = (q-z)/(1+z)$ . This yields the invoicing function  $V^u = V^u(q,z)V^{off}$  given in equation (5).

20. We use the real official exchange rate as the relative price influencing export supply decisions under the assumption that peasants continue to voluntarily sell some portion of their export crop to the marketing authorities rather than selling it on the parallel market. In this case, arbitrage between the two markets implies that the domes-

tic price of exportables will equal the producer price. Notice that the same is not true on the import side; there, the relevant marginal price for imports is the unofficial exchange rate (plus the costs of smuggling), because exchange controls act like an import quota and imply that the marginal source of imports is illegal activity.

21. The real exchange rate for exports is usually defined as the domestic price of nontradables relative to exports. We use the CPI relative to the export price to capture the resource pull away from exportables production more comprehensively.

22. The domestic price premium  $q$  falls towards  $t_m$ , the tariff rate, as the official foreign exchange allocation rises. For sufficiently high tariffs and liberal foreign exchange allocations, the implicit quota on imports becomes non-binding, and imports become a legally traded good on the margin. We then have  $q = t_m$ , and aggregate absorption is no longer a determinant of  $q$ .

23. One could also make  $M^{off}$  an increasing function of  $q$  and  $z$ , on the argument (suggested earlier) that official foreign exchange allocations may respond to rent-seeking behavior. This does not affect the signs of the derivatives in (10) provided that the effect of  $q$  on foreign exchange allocations is not large enough to offset the positive effect of  $q$  on  $z$  through the incentive to smuggle.

24. Provided, that is, that the authorities credibly commit not to scrutinize the source of funds. This does appear to have been the case in Tanzania. Informal sources suggest that surveillance on the own-funds window has been extremely loose in general.

25. Note that imports brought in through the own-funds window are fully financed at the parallel exchange rate, regardless of the degree of underinvoicing chosen by the importer. The incentive to underinvoice is therefore stronger for own-funds importers than for importers using the official window, since in the latter case an increase in underinvoicing raises the trader's costs by increasing the share of the import that must be financed at the parallel rate. The effective tariff in the own-funds case will therefore be below that on officially financed imports, *ceteris paribus*. In the Tanzanian case, this difference is exacerbated by the general laxity of surveillance of goods coming in through the own-funds window.

26. Notice the importance of our assumption that the costs of import smuggling are independent of the costs of export smuggling. If import and export smuggling were joint activities, then an own-funds scheme might not drive out all import smuggling. The assumption that smuggling costs are private costs is also important; if the cost of smuggling were a loss of some portion of the good being smuggled, then the own-funds scheme would represent an improvement in the economy's marginal terms of trade and therefore in the productivity of a unit of illegal exports in generating imports. In this case, while an own-funds

scheme would raise total imports, it is an empirical question whether this would require an increase in the flow of illegal exports, and thus in the premium (we are grateful to K. Krumm for pointing this out).

27. We use an average ratio for arabica and robusta, calculated by taking the ratio of payments to producers for the two types of coffee to the total fob export value of the two types. For data availability reasons, we use the advance price for coffee.

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