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Daniel Kaufmann and Stephen A. O'Connell

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The Macroeconomics and Delayed Exchange Rate Unification: Theory and Evidence from Tanzania

Daniel Kaufmann and Stephen A. O'Connell

Abstract

Parallel exchange rate markets have often been dismissed by authorities as a nuisance or as the domain of a small group of economic saboteurs. Taking Tanzania as a case study, we argue instead that such a market played a central macroeconomic role throughout the seventies and eighties. We provide a rigorous macro-economic analysis of the parallel foreign exchange market and its fiscal implications.

First, the evolution of the parallel foreign exchange market in Tanzania from the mid-1960s to 1990 is investigated. This period stretches from the adoption of exchange controls to the macroeconomic collapse and subsequent reforms in the mid-to-late 1980s. A reduced form econometric equation (of a Dornbush stock-flow model type) indicates that both trade and financial portfolio factors were important in determining the parallel premium, with trade determinants dominating in the long run, as suggested by theory.

In the second part of the paper, we investigate the fiscal impact of the parallel exchange rate premium, an issue emphasized in the literature on exchange-rate unification. We construct a counter-factual simulation of fiscal and balance-of-payments flows under alternative assumptions regarding the indexation of these flows to the parallel and official exchange rate. We find that a more aggressive move towards exchange rate unification would have already delivered a fiscal bonus by the mid-1980s. Accordingly, a unification of the exchange rate would have reduced monetary growth and inflationary pressures.

Thus, contrary to conventional advice in much of Africa and other countries, the case of Tanzania illustrates that even from a purely fiscal implication standpoint there was no economic rationale for delaying a move towards convertibility.

Daniel Kaufmann is a Visiting Scholar at HIID. A Chilean national, he completed his B.Sc. studies in Jerusalem and received his Ph.D. in Economics from Harvard University. In the early nineties, he was the World Bank's Chief of Mission in Ukraine. His other work for the World Bank has included writing and research on various topics of development and transition, along with operational and research work in Africa, Latin America, and countries of the former Soviet Union. Mr. Kaufmann was one of the authors of the Bank's World Development Report in 1991, entitled "The Challenge of Development."

Stephen A. O'Connell received his Ph.D. from MIT. He has taught at the Universities of Pennsylvania (1984-90), and Dar-es-Salaam (1990), was a Research Associate at the University of Nairobi (1986), and is currently an Associate Professor of Economics at Swarthmore College. Dr. O'Connell was a Ford Foundation/International Affairs Fellow of the Council on Foreign Relations in 1990 and a visiting scholar at the Centre for Study of African Economies, Oxford University, in 1993/94. He has served as a consultant to the governments of Tanzania and Sweden and to the research department of the World Bank. Since 1990, he has served as a resource person for the African Economic Research Consortium. His research on macroeconomic policy in sub-Saharan Africa has appeared in a number of professional journals. His book "Parallel Exchange Rates in Developing Countries," jointly edited with Miguel Kiguel and Saul Lizondo, is forthcoming in 1997.

1. Introduction[1]

At independence, Tanzania operated a relatively open trade and payments regime supported by conservative monetary and fiscal policies. These policies survived the introduction of the Tanzanian shilling in 1965, but the Arusha Declaration of 1967 generated a fundamental reorientation under the rubric of self-reliance and African socialism. In the two decades following the Arusha Declaration, the exchange rate in Tanzania's illegal parallel foreign exchange market rose at a rate of nearly 2.5 percent per month, more than three times as rapidly as the official exchange rate. By early 1986, the parallel rate exceeded the official rate by more than 800 percent.

Trade and exchange rate reforms formed the centerpiece of the 1986 Economic Recovery Program and its successors, with the result that the country moved gradually but determinedly over the next 8 years towards a unified foreign exchange market. By early 1990, the premium had fallen to roughly 50 percent. In early 1992, the Government introduced foreign exchange bureaus, allowing these entities to transact in foreign exchange at freely determined exchange rates for current account transactions. The spread between the parallel market rate and the bureau rate quickly narrowed to below 10 percent, and over the subsequent year the spread between the official exchange rate and the bureau rate gradually fell, reaching roughly 10 percent in mid-1993. During 1993 the Government liberalized nearly all remaining restrictions on foreign exchange transactions for current account purposes, and late in that year the official and bureau markets were officially unified. At the time of writing (early 1995), a vestigial parallel market remains, with a small premium reflecting the operation of residual capital controls, the financing of illegal activities, and tax evasion.

This paper focuses on the development and evolution of the parallel foreign exchange market in Tanzania during its "heyday", in the period from 1967 to 1990. While parallel foreign exchange markets are common in developing countries, the Tanzanian case is particularly interesting given the size and persistence of its premium. We use the Tanzanian case to shed light on issues that are important not only for Tanzania but also for other countries with extensive exchange controls.[2] The first half of the paper characterizes the macroeconomic sources and consequences of the parallel market both during its long expansion and in the subsequent move towards convertibility on the current account. While the parallel market was variously dismissed by the policy authorities as a nuisance or as the domain of a small group of economic saboteurs, we argue instead that it played a central macroeconomic role throughout most of the 1970s and 1980s, and that the dynamics of the parallel exchange rate followed those of the free rate in a well-functioning dual exchange market. The second half of the paper then focuses particularly on the fiscal implications of exchange rate unification.

The paper is organized as follows. Section 2 provides an overview of macroeconomic developments from 1967 to 1990, focusing particularly on the external sector and the parallel foreign exchange market. In Section 3, we specify and estimate an empirical model for the parallel premium. The empirical results indicate that portfolio determinants have an important

influence on the premium in the short run and that trade balance determinants are dominant in the longer run. We extend the basic model by endogenizing the real exchange rate and find limited evidence of a long-run effect of aid flows, the terms of trade, and other determinants of the trade balance. A further extension leads to the somewhat paradoxical theoretical presumption that Tanzania's own-funds scheme implemented in 1984 should have raised the premium; the empirical results provide some support for this view.

Section 4 takes up the more narrow question of the fiscal effect of the premium. Our main concern here is to assess the possibility, raised by Pinto (1989,1991), that exchange rate unification may require a simultaneous fiscal contraction in order to avoid an increase in money growth and inflation. We generalize Pinto's theoretical analysis and provide estimates that suggest that the opposite was true for Tanzania: for much of the sample, and particularly beginning in the late 1980s, more aggressive moves towards unification would have provided a fiscal bonus and a reduction in inflation.

Section 5 concludes the paper.

2. Emergence and growth of the parallel market, 1967-90[3]

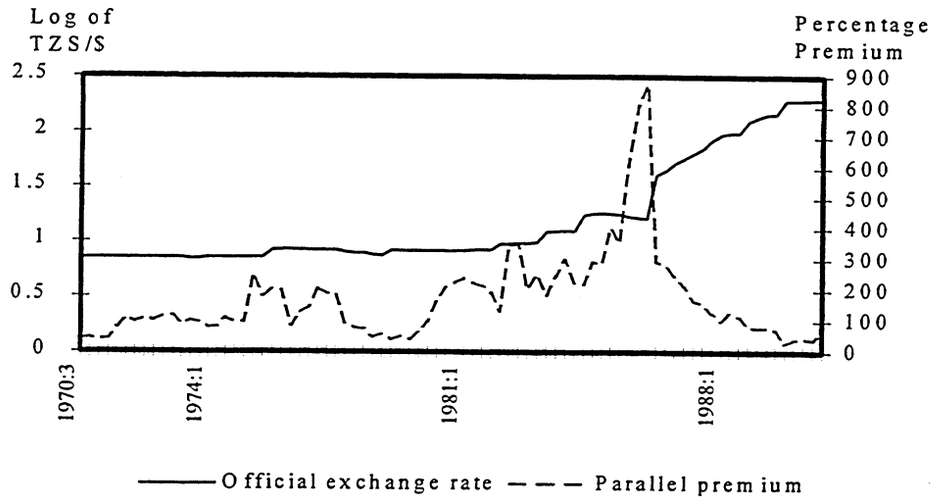
Foreign exchange black markets arise in response to restrictions on the convertibility of domestic assets into foreign exchange. Although such restrictions may be imposed with microeconomic goals in mind (such as a reduction of luxury imports), they become important at the macroeconomic level when used as a mechanism to offset sustained pressure on the balance of payments. In Tanzania, balance of payments pressures first emerged in the early 1970s, in response to capital flight and expansion of the public sector. The situation was exacerbated by a combination of drought and the first OPEC oil shock in 1974-75. Figure 1 shows the official exchange rate and the parallel premium from 1970 to 1990.

Exchange controls, which had been in place since the introduction of the Tanzanian Shilling in 1965, were tightened in response to the 1970-71 balance of payments "mini-crisis" and supplemented by the introduction of an administrative scheme for the allocation of foreign exchange (Green, Rwegasira and Van Arkadie (1980)).[4] They were then tightened further in response to the more severe crisis in 1974-75. The external situation was dramatically improved by the arrival of the coffee boom in 1976, but by this time the parallel premium was over 200 percent.

The foreign exchange inflows associated with the coffee boom helped reduce the premium to 100 percent by the end of 1977, but the Government chose to use the windfall to initiate the Basic Industrial Strategy (BIS), a major public investment program whose introduction had been deferred in response to the 1974-75 crisis. Increases in public sector spending under the BIS at least partially offset the reduction in monetary financing that might otherwise have accompanied the coffee boom. The presence of an underlying balance of

payments disequilibrium was dramatically revealed in 1978 when the Government loosened import controls in response to its comfortable reserves position (see Figure 2). Reserves fell by 63 percent in 1978, to less than a month of imports (roughly the crisis level before the coffee boom), and controls were re-imposed.

Figure 1: Parallel Premium and Official Exchange Rate, 1970-1990
(End-of-Quarter Data)



Source: Official exchange rate from IMF, *International Financial Statistics*; Parallel exchange rate from International Currency Analysis, Inc., *World Currency Yearbook*, and

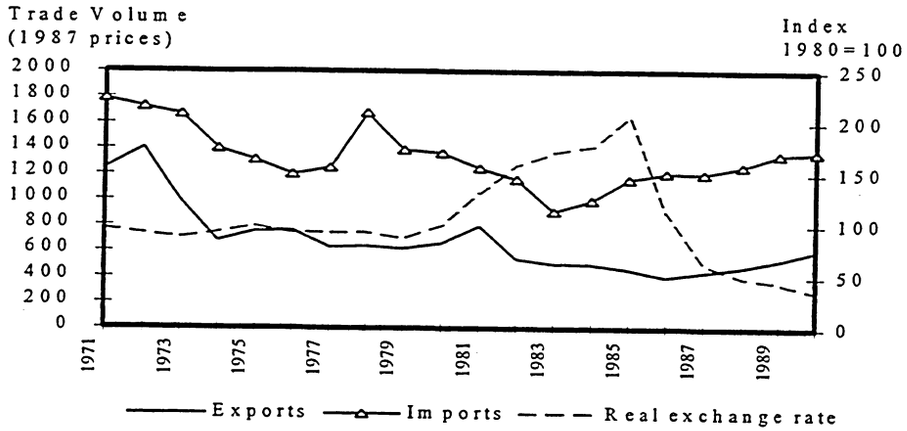
The war with Idi Amin began in late 1978. Government expenditures roughly doubled in 1979 as a share of GDP, to nearly 20 percent. The accompanying compression of parastatal and private sector imports helped initiate a period of macroeconomic collapse (Bevan, *et al* (1989,1990)). The premium rose rapidly, exceeding 200 percent between 1981 and 1984; the devaluation of 1984 brought it down only momentarily, and it reached 800 percent at the time of adoption of the crawling peg exchange rate regime and a major structural adjustment program in early 1986.

In retrospect, it is clear that a key missing element in the Tanzanian policy package up to the mid-1980s was exchange rate adjustment. A bias against devaluation had emerged in Tanzania as early as 1967, when the Government decided not to follow the 14.3 percent devaluation of sterling. Arguments were based on the belief that import and export volumes would respond only weakly to changes in the real exchange rate; a devaluation was therefore unlikely to improve the external balance. Compounding this elasticity pessimism was the view that a nominal devaluation would in any case lead to a general increase in wages and prices, undercutting any desired real devaluation. Finally, opponents of devaluation argued that capital flight was motivated primarily by fears of expropriation rather than by exchange rate expectations; and the Bank of Tanzania viewed existing exchange controls as sufficient to

contain any speculative pressure that might emerge in the immediate aftermath of the sterling devaluation.[5]

The decision not to devalue in the face of balance of payments pressures led inexorably to the need for direct balance of payments controls and increasingly severe convertibility restrictions. These restrictions enabled the authorities to maintain an increasingly overvalued real exchange rate, as indicated in Figure 2. An important side effect of this overvaluation was to exacerbate the secular decline in exports that had begun as early as the collapse in world sisal markets in the late 1960s. The decline in measured, or official, exports shown in Figure 2 was even more dramatic than the decline in export production, since it was the joint effect of deteriorating incentives for export production (e.g., the worsening real exchange rate for exports) and an increasing incentive, embodied in the rising parallel premium, to divert export proceeds away from official channels.

Figure 2: Trade Volumes and Real Official Exchange Rate, 1971-1990



Note: Real exchange rate, increase = appreciation. Trade flows consist of goods and non-factor services. The real exchange rate is the Tanzanian CPI divided by a trade-weighted average of WPIs of Tanzania's 8 largest trading partners.
Source: Trade flows from World Bank; real exchange rate calculated by authors using official exchange

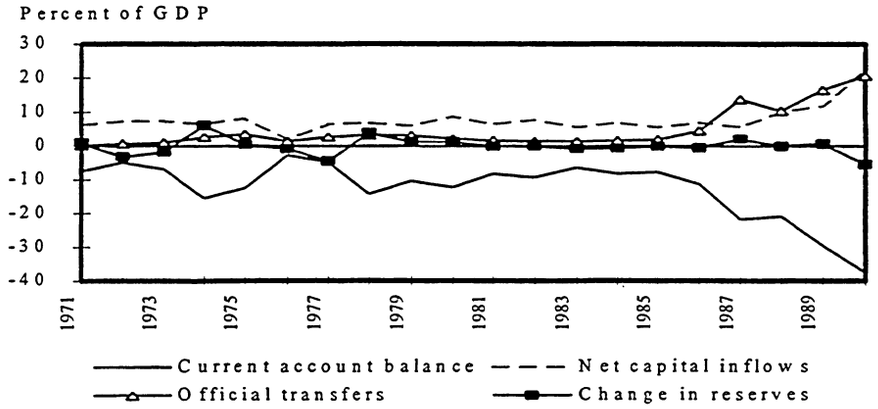
The steady decline of official export revenues, punctuated only briefly by the coffee boom, meant a steady tightening of import restrictions, the results of which are apparent in the declining import volume in Figure 3. Since price controls had been imposed in 1974, the response to import compression beginning in the mid 1970s was a combination of limited increases in official prices and increased reliance on direct rationing of goods. Shortages of intermediate imports and of both imported and domestically produced consumer goods, which began to emerge in the 1974-75 crisis only to subside during the coffee boom and subsequent

import liberalization, re-emerged strongly beginning in 1979. Shortages of consumer goods were particularly severe in rural areas, where they led to a reduction in peasant labor supply, leading to further declines in export production in a vicious circle of output decline and declining availability of goods (cf. Bevan, *et al* (1989,1990), O'Connell (1993)).

The import compression of the late 1970s was insufficient to prevent the emergence of arrears in 1978 and the onset of an increasingly difficult confrontation between Tanzania and its external creditors and donors over the issue of devaluation and macroeconomic adjustment.[6] Aid flows fell in the early 1980s, further contributing to the cycle of import compression and output reduction. The collapse of the early 1980s began to be reversed only with the reforms of 1984, which included a 36% devaluation, removal of price controls on a number of goods, and implementation of an "own-funds" import license scheme. Under the own-funds (OF) scheme, individuals with access to their own foreign exchange were granted import licenses without having to purchase the corresponding amount of official foreign exchange. By divorcing the Government's import licensing function from its foreign exchange allocation function, this amounted to a legalization of what would previously have been import smuggling. Moreover, goods imported through the OF window, some of which still carried controlled prices if purchased from official sources, could be sold at market-clearing prices.

Although the OF scheme produced a substantial import liberalization (Figure 3), with favorable effects on output in the short run, it represented an asymmetric liberalization of foreign exchange controls, lowering the cost of import "smuggling" relative to export smuggling. It may well have contributed, along with expectations of a further maxi-devaluation, to the increase in the parallel premium that occurred between 1984 and the

Figure 3: Current Account and Financing, 1971-1990



initiation of the major structural adjustment program in 1986.

Note: The current account is before official transfers. Net capital inflows include errors and omissions.
Source: World Bank data.

From the perspective of the parallel foreign exchange market, the key elements of the 1986 structural adjustment program were the maxi-devaluation and adoption of a crawling peg, large inflows of external assistance (Figure 3), and a commitment to public sector reform with the objective, among other things, of reducing the government's overall borrowing requirement. The OF scheme was broadened, and the process of price decontrol gradually proceeded until by mid-1988 only 12 commodities remained under control. The premium fell dramatically with the maxi-devaluation of early 1986, and continued to fall with the subsequent smaller adjustments in the official exchange rate. Full unification of the exchange rate for current account purposes was achieved in the early 1990s, in a sequence of steps that began with the licensing of private foreign exchange dealers in 1992 and the introduction of a weekly Central Bank auction to registered dealers and commercial banks in 1993, and culminated with the removal of remaining payments restrictions on the current account (e.g., export remittance requirements) in late 1993. In 1994, the move to a market-determined exchange rate was completed with the elimination of the Central Bank auction and its replacement with a daily inter-bank foreign exchange market as the mechanism for determining the official exchange rate (Bank of Tanzania (1994)).

In summary, the Tanzanian experience indicates the difficulties that can emerge if the burden of external adjustment is placed on exchange controls and concessional financing rather than on the exchange rate itself or on policies affecting aggregate demand. Such a policy is economically sustainable as long as the shocks in question are sufficiently small and short-lived that they can be absorbed (as in the early 1970s) by a combination of temporary aid inflows, a tightening of import controls, and a modest rise in the premium. Exchange controls are significantly less successful when used to maintain an overvalued official exchange rate in the face of systematic internal demand pressures. In this case, growing resource misallocations and macroeconomic difficulties associated with the exchange control regime eventually lead to a reversal of the government's stance with respect to the official exchange rate; in Tanzania, policy since 1986 has been geared towards achieving a more competitive real exchange rate and restoring convertibility at the official exchange rate for current account purposes. Lasting reductions in the parallel premium required a restoration of consistency between aggregate demand and the exchange rate, or effectively between fiscal policy and exchange rate policy. Reductions in the primary deficit, increases in external aid, and increases in the rate of crawl of the official exchange rate all contributed to the Tanzanian success in this endeavor.

1.1 How large was the parallel market?

Since the parallel foreign exchange market is illegal, there are no direct measures of the stock of privately held foreign exchange or the flow of foreign exchange through the parallel market. Here we report two sets of evidence on the size of market flows in the 1980s. The best single estimate is the volume of imports brought in through the own-funds scheme. The proportion of import licenses allocated to the OF window rose from 19 percent in 1984 to an average of 36 percent between 1985 and 1988. The share of actual imports financed by own funds is almost certainly greater; unofficial estimates suggest a share exceeding one half.[7] This would imply

that as of the late 1980s, some $500 million of imports were being financed through the parallel foreign exchange market.

For the economy as a whole, there are two sources of foreign exchange for OF imports. The first is decumulation of private net foreign assets. Individuals with assets abroad can repatriate their dollars, either by selling them on the parallel foreign exchange market (where they can be recycled to individuals using the OF window), or by purchasing own-funded imports directly. Individuals without access to foreign balances can bring in own-funded imports by borrowing foreign exchange from relatives or associates abroad or by purchasing the required foreign exchange on the parallel market.[8] In all of these cases, the net result is a decumulation of net foreign exchange holdings by the private sector, i.e., the reverse of capital flight.

The second source of foreign exchange for own-funded imports is the flow supply of foreign exchange generated by illegal exports (e.g., gold smuggling or illegal sale of housing services to expatriates) and overinvoicing of officially financed imports. What proportion of OF imports were financed by illegal trade? Since the own-funds program undoubtedly led to a net repatriation of flight capital, the magnitude of OF imports provides an upper bound on the value of gross foreign exchange inflows from illegal trade. However, adjustments in private foreign exchange stocks would be expected to play themselves out fairly rapidly, even taking into consideration the possibility of a gradual response as market participants assess the credibility of the "no questions asked" provision.[9] Therefore, although it is likely that reverse capital flight was an important source of own-funded imports early in the program, we would expect the stock adjustment in response to the OF opportunity to have been largely completed by 1987 or 1988. The magnitude of OF imports in the late 1980s should therefore be a good indication of the flow supply of foreign exchange into the parallel market from various illegal trade channels.

Table 1 draws upon three detailed studies (Bagachwa, Luvanga and Mjema (1989), Maliyamkono and Bagachwa (1990), and Mshomba (1994)) to give some indication of the primary categories of illegal exports and the associated magnitudes in the latter half of the 1980s. The largest suspected sources of illegal foreign exchange earnings were gold exports, unrecorded tourist expenditures, expatriate housing services, illegal ivory and rhino horns, and coffee. The total estimated foreign exchange inflow from these activities is on the order of $275 million in 1988; this accounts for somewhat more than half of the illegal trade suggested by the own-funds approach. The discrepancy is presumably accounted for by some combination of other illegal exports, reverse capital flight, and overinvoiced imports.

Table 1:
Disaggregated Estimates of Unrecorded Exports

Export	Source	Annual Amount ($ Millions)	Period of Estimate
Minerals (mainly gold)	M&B	10	1985-88
Gold	BLM	14	1988
Diamonds	BLM	1	1988
Tourist expenditure	M&B	36	1980-85
	BLM	69	1988
Private expatriate housing	M&B	43	1988
	BLM	34	1988
Illegal tusks and rhino horns	BLM	148	1988
Coffee arabica	M	8 26	1969-85 1984-85

Sources: M&B: Maliyamkono and Bagachwa (1990); BLM: Bagachwa, Luvanja and Mjema (1989); M: Mshomba (1993).

2. Macroeconomic determinants of the parallel premium[10]

The preceding discussion suggests that one should be able to account for movements in the parallel premium using a combination of trade and portfolio factors. In this section, we estimate a simple version of the Dornbusch, *et al* (1983) stock-flow model, which incorporates both portfolio and trade determinants of the parallel premium (see Paper 1). The portfolio determinants are the stock of domestic monetary assets measured in dollars at the official exchange rate (*M2/E*) and the relative yield on unofficial foreign exchange and domestic monetary assets (or "interest parity differential," *IPD*). A rise in the domestic money stock measured in foreign exchange implies an excess relative supply of domestic assets (denominated in Tanzanian shillings) and a rise in the parallel premium; a rise in the relative

yield on unofficial foreign exchange implies an excess demand for foreign exchange and also raises the premium.

As an overall proxy for the trade determinants, we use the official real effective exchange rate (*REER*): a real appreciation reduces overall exports and therefore unofficial exports as well, given the value of the premium; at the same time, it increases the smuggling of imports by leading to a tightening of foreign exchange rationing controls and an increase in domestic price premia on imports. The net effect of a real official appreciation is therefore to worsen the unofficial trade balance for any given level of the parallel premium; equivalently, for any given value of the unofficial trade surplus, a real appreciation raises the value of the parallel premium.[11]

Since the unofficial trade balance does not depend on the portfolio factors, the requirement that it approach zero in the long run implies that the parallel premium is determined only by trade factors in the long run, and not by portfolio factors. To allow for differences in the short and long run effects of the various determinants, we estimate the following autoregressive distributed lag equation for the parallel premium:

$$(1) \quad \ln z_t = a_0 + a_1[(M2/E)_t - (M2/E)_{t-1}] + a_2(IPD_t - IPD_{t-1}) + a_3(REER_t - REER_{t-1}) + a_4(M/E)_{t-1} + a_5 IPD_{t-1} + a_6 REER_{t-1} + a_7 \ln z_{t-1}$$

The coefficients a_1, a_2 and a_3 capture the short-run effects of the three determinants of the parallel premium; they give the immediate impact of a one-unit increase in each of the determinants. The coefficients a_4, a_5 and a_6 (divided by $1 - a_7$) give the long-run effects. The hypothesis that portfolio factors matter only in the short run is given by $a_4 = a_5 = 0$.[12]

Table 2 gives the results of estimating equation (1) using annual data from 1967 to 1988. The results are very satisfactory, particularly given the short sample and the uncertain quality of the data.[13] 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. All variables enter with 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 (which is an increase in *REER*) shifts incentives away from export smuggling and towards import smuggling, raising the premium. Moreover, we cannot reject the null hypotheses that a_1 and a_2 are zero, using standard F-tests. The results therefore support the prediction of the model that portfolio factors influence the parallel premium in the short run only, and that the premium is determined by flow factors in the long run.

The parameter estimates in Table 2 also support the conclusion that nominal devaluations are capable of lowering the parallel premium to the degree that they lower the foreign exchange value of domestic financial assets or depreciate the real exchange rate. In both cases, the need for complementary macroeconomic policies is clear, to ensure that a

nominal devaluation is not offset by increases money supply or domestic prices. While the underlying mechanisms driving the domestic money supply and the domestic price level are left implicit, a more sophisticated analysis would give a central role to the public sector deficit (including parastatal borrowing from the banking sector) in monetary growth and inflation. This would in turn imply that control of the public sector deficit is a fundamental requirement for achieving a lasting reduction in the parallel premium.

Table 2:
Determinants of the Parallel Premium

Dependent Variable: Parallel Premium (*PPREM*)

	OLS 1967-1988		IV[1] 1968-1988	
	1	2	3	4
CONSTANT	-191.38 (-2.27)	-259.94 (-2.69)	-195.95 (-1.39)	-285.31 (-2.47)
$PPREM_{t-1}$	0.38 (1.49)	0.45 (2.03)	0.71 (1.41)	0.40 (1.60)
$d(M2/E)_t$	0.19 (2.58)	0.24 (2.82)	0.22 (1.55)	0.27 (2.32)
$d(IPD)_t$	2.45 (2.16)	1.20 (1.09)	1.91 (0.76)	0.89 (0.58)
$d(REER)_t$	3.32 (2.24)	0.80 (0.69)	6.13 (2.03)	0.48 (0.37)
$(M2/E)_{t-1}$	-0.05 (-1.40)	--	-0.12 (-1.60)	--
IPD_{t-1}	3.63 (3.03)	--	4.97 (2.74)	--
$REER_{t-1}$	2.46 (2.78)	3.08 (3.09)	2.56 (1.84)	3.17 (4.26)
RBAR[2]	0.86	0.79	0.80	0.78
Q(11)[(2)]	14.73 (0.20)[3]	16.76 (0.12)[3]	8.67 (0.56)[3]	14.78 (0.14)[3]

(t-statistics are in parentheses.)

Source: Kaufmann and O'Connell (1991), Table 3.1.
Notes:
[1] Instruments for d($REER$)$_t$ and d(IPD)$_t$ are $M2_{t-2}$, $REER_{t-2}$ and IPD_{t-2} (along with the other right-hand side variables, which are assumed to be predetermined; note that in the case of $PPREM_{t-1}$, this is only valid if the disturbances are serially uncorrelated).
[2] Q is the Box-Pierce statistic for testing general serial correlation. For columns 3 and 4, the statistic reported is Q(10).

[3] This is the marginal significance level for the Q statistic.
Data definitions:
PPMREM=100*(*U-E*)/*E* is the end-of-year parallel premium in percentage points, with the unofficial and official exchange rates *U* and *E* taken from Kaufmann and O'Connell (1991), Table 2.1.
M2E$ is end-of-year M2 in TShs (source: IMF, IFS), deflated by the official exchange rate.
IPD = $100*[(1+I^*)(E_{t+1}/E_t)-(1+I)]$ 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).
TAXCINV is the ratio of the producer price for coffee to the f.o.b. export price in TShs (sources: 1966-79, Bank of Tanzania, *Twenty Years of Independence*, Table 24; 1980-88, our calculation using data from the Tanzania Marketing Development Board, *Annual Review of Coffee, 1988*).
TOT is the terms of trade (sources: UNCTAD and World Bank).
AID is net official resource transfers in millions of US$ (sources: 1966-84, Collier (1988); 1985-88, World Bank).

2.1 Extending the basic model

While equation (1) captures a large share of the variation in the parallel premium, the extremely simple form of the equation obscures some of the underlying forces at work in determining the parallel premium. In this section we report the results of estimating an extended form of the model that captures the trade determinants more carefully as well as key features of the exchange control regime. Along with the portfolio factors, we explore the role of the following determinants: (I) the (inverse of the) direct tax on coffee exports, measured by the ratio of the domestic producer price of coffee to the f.o.b. export price converted to Tanzanian shillings (*TAXCINV*)[14], (ii) the terms of trade (*TOT*), (iii) net official resource transfers in dollars (*AID*), (iv) the own-funds scheme (*OWNFUNDS*), and finally (v) *D83*, a dummy variable capturing the 1983 crackdown on 'economic saboteurs' during which a large number of businessmen were jailed (Maliyamkono and Bagachwa (1990)).

As outlined in Kaufmann and O'Connell (1991), the extended model is derived in four steps. First, the unofficial trade balance equation is specified more carefully. This allows for the introduction of a range of "trade" determinants of the parallel premium, including the tax on coffee exports, the domestic price premium on imports, the intensity of the enforcement effort, and the real exchange rate for exports. Second, the domestic price premium on imports and the real exchange rate for exports are modeled directly as functions of the overall expenditure and the official allocation of foreign exchange. Third, official foreign exchange allocations are modeled as a function of official foreign exchange availability, thus capturing the endogenous trade liberalizations and import compressions that accompanied balance of payments fluctuations in the 1970s and 1980s. Finally, overall expenditure is modeled as a

function of the terms of trade and other variables determining income and desired aggregate saving. The resulting reduced form replaces the real exchange rate in (1) with an unrestricted linear function of *TAXCINV*, *TOT*, *AID*, *OWNFUNDS*, and *D83*.

The theoretically predicted signs on these variables are generally not unambiguous. Given the parallel premium, a rise in *TAXCINV* has two opposing effects on the premium: the real exchange rate for coffee exports improves, increasing aggregate coffee supply and thus increasing coffee smuggling; but the share of exports diverted onto unofficial channels also rises, reducing the premium. The net effect on illegal exports, and thus on the premium, is an empirical question.

TOT enters in a number of ways: (I) 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.

A rise in *AID* should lower the premium both through direct increases in illegal export flows (e.g., aid flows may serve as a proxy for the demand for expatriate housing services) 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.

OWNFUNDS is a dummy variable for the years 1984 and 1985, during which the own-funds scheme was in operation (due to data availability limitations, the sample only extends to 1985). As argued in O'Connell (1992), an own-funds scheme reduces the cost of what was previously import smuggling, leading to a rise in the volume of imports financed at the parallel rate; unless the import liberalization gives rise to a strong aggregate export supply response, the parallel premium must rise to bring forth the required increase in export smuggling. We therefore expect *OWNFUNDS* to have a positive effect on the premium, given the values of the other variables.

D83 has a theoretically ambiguous effect. From the illegal trade side, a crackdown simultaneously affects the supply and the demand for illegal foreign exchange, with uncertain net result. Effects operating through the portfolio side are clearer, since a crackdown impairs the liquidity of foreign exchange assets and reduces their expected yield; these effects tend to reduce the premium.

The results are in Table 3. Most of the variables have the expected signs. Both portfolio and flow determinants enter significantly, with magnitudes generally close to those found in Table 2. Of the flow determinants, however, 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 terms of trade 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 (n.d.).

Table 3:
Determinants of the Premium: Extended Model

Dependent variable: Parallel Premium (*PPREM*)
1967-1988

	OLS		IV[1]	
CONSTANT	369.06 (1.33)	285.57 (1.19)	381.13 (1.33)	226.83 (0.73)
$PPREM_{t-1}$	0.51 (2.08)	0.66 (3.01)	0.60 (1.78)	1.12 (2.66)
$d(M2/E)_t$	0.19 (1.85)	0.29 (2.98)	0.16 (1.50)	0.55 (2.54)
$d(IPD)_t$	3.33 (2.83)	2.28 (2.08)	3.46 (2.22)	0.58 (0.28)
$TAXCINV_{t-1}$	-1.00 (-0.48)	-1.01 (-0.57)	-1.02 (-0.47)	-0.40 (-0.17)
TOT_{t-1}	-2.42 (-1.30)	-1.68 (-1.03)	-2.60 (-1.35)	-1.72 (-0.83)
AID_{t-1}	-0.12 (-0.82)	-0.24 (-1.83)	-0.14 (-0.89)	-0.42 (-2.01)
OWNFUNDS	157.46 (2.59)	203.93 (3.68)	160.81 (2.58)	232.26 (3.18)
D83	--	222.07 (2.41)	--	315.10 (2.32)
$RBAR^2$	0.73	0.81	0.72	0.68
D-W	1.39	1.78	1.54	2.79
$Q(10)^{(2)}$	5.49 (0.86)[3]	12.05 (0.28)[3]	5.92 (0.82)[3]	16.86 (0.08)[3]

(t-statistics are in parentheses)

Notes:
[1] Instruments for d(IPD)$_t$ are $(M2/E)_{t-2}$, $TAXC_{t-2}$, TOT_{t-2}, and $D83$, along with the other right-hand side variables.
[2] Q is the Box-Pierce statistic for testing general serial correlation. For columns 7 and 8, the statistic reported is Q(9).
[3] This is the marginal significance level for the Q statistic.
Data definitions: see Table 2.

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, 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 in the absence of a strong aggregate export supply response. The magnitude of the increase, between 150 and 240 percentage points, is impressive, and suggests that the low elasticity of export smuggling indicated in the coffee case may be a more general phenomenon in Tanzania. More obviously, the results suggest 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.

The 1983 crackdown also appears to have raised the premium, holding other variables constant; this suggests that the crackdown had a particularly strong effect on export smuggling.

These results must be viewed as provisional, given the short sample and the limited set of variables that we were able to incorporate. Nonetheless, they do shed some light on the particular forces at work in determining the parallel premium in Tanzania.

3. Fiscal effects of unification

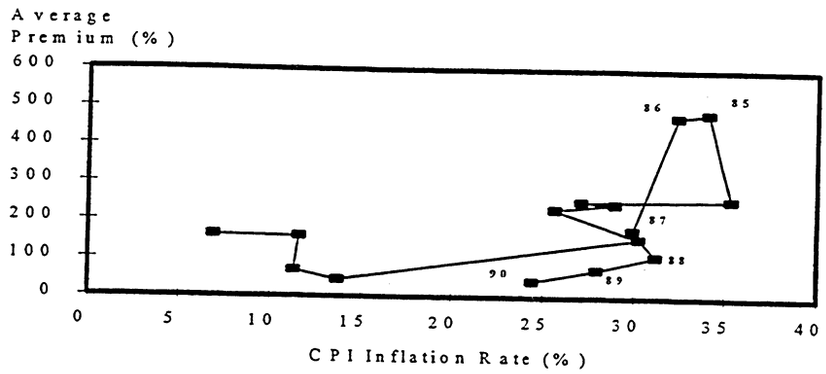
One of the goals of Tanzanian policy since the mid-1980s has been to restore the central role of commercial policy considerations in the granting of import licenses, a role usurped by constraints on overall foreign exchange availability since at least the late 1970s. For the remainder of the paper, we consider the fiscal implications of "unifying" the official and parallel exchange markets for current account purposes, by which we mean achieving and sustaining full convertibility of the shilling for imports (subject to commodity-specific tariffs and/or quotas). We model a movement towards unification as a sustained fall in the parallel premium that is achieved through simultaneous liberalization of import licensing at the official exchange rate and exchange rate adjustments designed to facilitate this occurring without excessive losses in international reserves. The theoretical literature on dual exchange rate

systems suggests that required adjustments in the exchange rate may be accomplished either through an 'overnight' float of the exchange rate or through an appropriate combination of changes in the level and possibly rate of crawl of the official rate.[15] Capital controls are assumed to remain in place; this implies that the parallel market will not disappear altogether, since any situation of portfolio disequilibrium will give rise to a premium (which may be negative) and illegal trade flows. But in the absence of convertibility restrictions on the trade account, the premium will be zero in a steady state.

The effects on government revenue of central bank transactions at multiple official exchange rates are well known (e.g., Sherwood (1956), Easterly, *et al* (1994)). Recent work on parallel markets has emphasized that exchange controls have important "shadow" fiscal implications even when all transactions of the central bank take place at a single exchange rate. In particular, Pinto (1989,1991) has argued that if the government is a net seller of foreign exchange to the private sector, exchange rate unification imposes a fiscal shock that will raise money growth and inflation in the long run unless the policy package includes contractionary fiscal measures.

As indicated in Figure 4, Tanzania appears to have avoided any tradeoff between inflation and the parallel premium during its move towards unification, enjoying a simultaneous reduction in both variables in the second half of the 1980s. Part of this may be associated with an improvement in inflationary expectations associated with the reduction in fiscal deficits in the first half of the decade (from 20 percent in 1979 to 7.5 percent in 1985), and the improvements in overall fiscal management obtained under the reform program. Moreover, the direct cost-push effect of nominal devaluations undertaken in the mid-1980s was minimized by the fact that domestic prices were determined at the margin largely by the parallel exchange rate rather than the official exchange rate. But the fiscal fundamentals made little direct contribution in the second half of the decade, as central government deficits fluctuated between 6 and 10 percent of GDP and off-budget losses of the public sector grew over the period (Mans (1994)). The relatively favorable outcome for inflation during the unification process therefore raises the possibility that the longer-run fiscal effect of the parallel premium was negative over the period in question, so that reductions in the premium--holding the fiscal deficit constant--had the direct effect of reducing the underlying rate of monetary growth and inflation.[16] In this section, we explore this possibility by providing rough counterfactual estimates of the fiscal effect of exchange rate unification from 1976 to the present. We begin by generalizing Pinto's theoretical analysis of the inflationary effect of exchange rate unification.

Figure 4: Inflation and the Parallel Premium, 1976-90



Source: CPI and official exchange rate from IMF, *International Financial Statistics*; parallel exchange rate from International Currency Analysis Inc., *World Currency Yearbook*, and Kaufmann and O'Connell (1991),

3.1 Some steady-state accounting[17]

The effect on inflation of a reduction in the parallel premium ultimately depends, given the growth in real money demand, on its effect on monetary expansion. We therefore require an expression for the flow supply of domestic monetary assets.

The consolidated public sector in Tanzania incorporates central and local governments, parastatals, and a banking system that until recently consisted of the Bank of Tanzania and a single nationalized commercial bank. Since the banking system did very little lending to the private sector and there was virtually no domestic government bond market in the period under study, the flow supply of broad money is approximately equal to the domestic financing of the consolidated public sector:[18]

$$\text{(2)} \qquad \dot{M} = D - E(a^* - \dot{r}^*),$$

Domestic financing = Public sector deficit − Foreign financing

where M and D are the broad money supply and the consolidated public sector deficit, and r and a are international reserves and foreign inflows in the form of aid and loans. The superscript "*" denotes a quantity denominated in foreign currency, and a dot over a variable denotes a time derivative.

Using the balance of payments identity $\dot{r}^* = b^{*g} + b^*$, where b^{*g} and b^* are the government and private-sector balances of official foreign exchange transactions with the

banking system, equation (2) can be written $\dot{M} = D - E(a^* - b^{*g}) - Eb^*$. But since all foreign exchange transactions by the public sector are mediated through the banking system, the quantity $E(a^* - b^{*g})$ is simply the foreign currency component of the public sector deficit. What is left over after subtracting this from the overall deficit is the domestic currency component, D^d, giving us the following alternative to (2):

$$(3) \qquad \dot{M} = D^d + Eb^*.$$

In real terms, equations (2) and (3) imply

$$(4) \qquad \dot{M}/P = \dot{m} + \pi m = d - e^{-1}(a^* - \dot{r}^*) = d^d + e^{-1}b^*,$$

where P is the domestic price index, $m \equiv M/P$ is real money balances, $\pi \equiv \dot{P}/P$ is the rate of inflation, and $e \equiv P/E$ is the (official) real exchange rate. The flow supply of domestic money balances can therefore be calculated either as the consolidated public sector deficit net of foreign financing or as the sum of the domestic currency component of the deficit and net purchases of foreign exchange from the private sector.

Turning to the demand side, the empirical evidence in the previous section is consistent with a model in which domestic monetary assets and foreign exchange are imperfect substitutes in private portfolios and that asset transactions take place at the parallel exchange rate. An asset demand formulation that captures these features can be written $m = \mathrm{h}(\dot{U}/U)w$, where $w \equiv (M + U \cdot f)/P$ is real wealth and $\dot{U}/U$ is the expected rate of depreciation of the parallel exchange rate (which is equal to the actual under perfect foresight). A rise in expected depreciation increases the opportunity cost of holding wealth in the form of domestic monetary assets, so that $\mathrm{h}' < 0$.[19] Since all nominal variables must grow at the same rate in a steady state, we have $\dot{U}/U = \pi$, and the following relationship holds between long-run values of the variables:

$$(5) \qquad \pi \mathrm{h}(\pi)w = d - e^{-1}a^* = d^d + e^{-1}\mathrm{b}^*.$$

Equation (5) helps tie down the inflation rate in the long run by requiring that the domestic financing requirement be fully covered by the inflation tax. More importantly for our purposes, to the degree that variables in (5) are jointly determined with the parallel premium, it provides a long-run relationship between inflation and the premium that can help determine the inflationary effects of exchange rate unification. These effects are complex in principle, since all of the variables in (5) are jointly determined with the parallel premium in general equilibrium. In the following limiting case, analyzed by Pinto (1989), the effect of unification on inflation comes down to a question of whether the private sector is a net buyer or seller of foreign exchange to the government:

Proposition 1 *(Pinto (1989)) Suppose (1) that the domestic financing requirement $d - a^*$ is positive; (2) that the private sector consumes only imports, and that these are priced at the parallel exchange rate ($P = U$); (3) that the elasticity of the function h is between zero and -1; (4) that real wealth (w) and private sector net sales of foreign exchange to the banking system (b^*) are constant with respect to the parallel premium across steady states; and (5) that the real domestic currency component of the public sector deficit (d^d) is also constant with respect to the parallel premium across steady states. Then: exchange rate unification will cause a rise (fall) in inflation if and only if the private sector is a net seller (buyer) of foreign exchange vis-a-vis the government.*

To prove Proposition 1, let $z \equiv U/E$ be (one plus) the parallel premium, and define

$$\theta \equiv e^{-1}b^*/(d^d + e^{-1}b^*) = e^{-1}b^*/(d - a^*)$$

as the ratio of the private sector official balance of payments to the overall financing requirement. Log-differentiate (5) under the stated assumptions to get $dln\pi/dlnz = \theta e_z/(1 + h_\pi)$, where we use subscripts to denote elasticities (e.g., h_π is the elasticity of the function h with respect to π). Since $P = U$ by assumption, we have $e = 1/z$ and $e_z = -1$. This implies

$$dln\pi/dlnz \equiv \pi_z = -\theta/(1 + h_\pi). \tag{6}$$

Since $\theta >(<) 0$ if and only if $b^* >(<) 0$, the reduction in z that accompanies unification will raise inflation if and only if $b^* > 0$ and reduce it if and only if $b^* < 0$.

Although the Pinto analysis would appear to rely on an impossibly restrictive set of assumptions, it is worth being precise about where these assumptions are weakest in describing the Tanzanian case. Assumptions 1 - 3 are in fact plausible approximations of reality for Tanzania and for many other countries with parallel markets. Assumption 1 is confirmed for Tanzania by column 3 of Table 4, where the growth of broad money typically exceeds 5 percent of GDP. Assumption 2 is simply an extreme version of our earlier argument that domestic prices are closely linked to the parallel exchange rate in an exchange-control regime with severe import rationing; what is actually required here is the weaker (and highly plausible) assumption that a sustainable exchange-rate-led unification must be accompanied by a real depreciation (so that $e_z < 0$). Assumption 3 is more questionable; it is equivalent to the requirement that the inflation rate be below the rate that maximizes inflation tax revenues. Measured inflation has never exceeded 40% in Tanzania, and we will proceed under the assumption that the rates experienced are below the revenue-maximizing rate.[20]

Assumption 4 abstracts from general equilibrium effects. We loosen this assumption in Section 3.1.1 below to allow changes in the parallel premium to be reflected in trade flows and private sector wealth. For the remainder of this section, however, we focus on Assumption 5, which restricts the base for the tax/subsidy scheme represented by the parallel premium to private sector net sales of foreign exchange to the banking system. The underlying assumption

is that net domestic currency flows in the public sector are fixed in real terms. This is a troublesome assumption in the Tanzanian case, since a number of important flows, including customs duties and parastatal purchases of the export crop, are more closely linked to the official exchange rate than to the overall price level. The following proposition generalizes the earlier result in a way that will be useful for our subsequent calculations, by identifying domestic currency flows that are indexed to the official exchange rate:

Proposition 2 *Suppose that assumptions 1 - 4 of Proposition 1 hold, and that assumption 5 is replaced by the assumption that an amount x^* (measured in dollars at the official rate) of the overall deficit consists of domestic currency flows indexed to the official exchange rate. All remaining domestic currency flows ($d^d - x^*$) continue to be fixed in real terms. Define*

$$\theta' \equiv e^{-1}(x^* + b^*)/(d^d + e^{-1}b^*) = e^{-1}(x^* + b^*)/(d - a^*)$$

as the ratio of such indexed flows to the overall domestic borrowing requirement. Then: exchange rate unification will cause a rise (fall) in inflation if and only if $\theta' > (<) 0$.

To prove this proposition, simply log-differentiate (5) as before to obtain $\pi_z = -\theta'/(1 + h_\pi)$.

In the Pinto analysis, unification tends to be inflationary when governments rely on net purchases of foreign exchange from the private sector to finance official imports (including debt service). According to Proposition 2, this tendency can be overturned if domestic currency flows that are closely linked to the official exchange rate are in sufficient surplus.

3.1.1 General equilibrium complications

The results of the previous section indicate that indexation of the domestic currency budget can be extremely important in determining the inflationary impact of exchange-rate-led unification. In this section we ask about the appropriateness of assumption (4), which abstracts from general equilibrium complications. The discussion suggests that the likelihood of a favorable impact of reductions of the premium on inflation is even stronger than indicated in the previous section.

The first general equilibrium complication arises from the linkage between export supply and real wealth that emerges from the requirement of a balanced overall current account in the long run. If aggregate export supply is negatively correlated with the parallel premium across steady states, as suggested by the Tanzanian experience reviewed in Section 1, a move towards unification will raise export supply and thereby increase the level of real wealth consistent with current account balance. This in turn increases the base for the inflation tax (see equation (5)), allowing a reduction in the required inflation tax rate.

The second complication works through the effects of the premium on official trade volumes. Pinto's analysis and our calculations both assumed that the private sector's net sales of foreign exchange to the banking system were uncorrelated with the premium across steady states. In reality, a reduction in the steady state premium will be associated with an increase in

official trade volumes, as aggregate exports respond to real depreciation and exports that would previously have been smuggled are channeled through the official market. The effect on the private sector's net sales of foreign exchange is likely to be negligible, since changes in export revenues are passed on directly to increased import allocations in an exchange control regime of the Tanzanian style; but the increase in import volumes brings a customs revenue boom. This revenue boom reduces the domestic currency component of the consolidated public sector deficit, reducing monetary emission and inflation in the steady state.

3.2 Calculating the fiscal effect

In this section we apply the logic of Proposition 2 to Tanzanian data by (I) using balance of payments data to approximate private sector net sales of foreign exchange to the banking system, and (ii) splitting domestic currency expenditure and revenue flows of the consolidated public sector into flows that are (to a first approximation) indexed fully to the official exchange rate and flows that are (to a first approximation) indexed to the domestic price level. We ask a simple question: viewing the parallel premium as an implicit tax on individuals who surrender foreign exchange receipts at the official exchange rate (or receive payments indexed to the official rate) and an implicit subsidy to individuals who receive foreign exchange at the official rate (or make payments indexed to the official rate), what are the direct effects on monetary emission of this "shadow" tax/subsidy scheme? We will see that there is a close relationship between this calculation, which is a generalization of familiar calculations of the revenue impact of multiple exchange rates, and the inflationary impacts of unification studied in the previous section.

Define the ***direct monetary effect*** (*DME*) of the premium as the reduction in monetary emission consequent on pricing foreign currency flows (and indexed domestic currency flows) at the official rather than the parallel rate, holding underlying real quantities (measured in dollars) fixed. From (3), this can be written

$$(7) \qquad DME = \underbrace{(U - E)x^*}_{\text{Domestic budget balance effect}} + \underbrace{(U - E)b^*}_{\text{Central bank profits effect}}.$$

The change in money growth has two components. Given our indexation assumptions, $(U\text{-}E)x^*$ is simply the change in the domestic currency component of the deficit that would occur if the official exchange rate were devalued by the amount $U - E$ and this was translated fully into a real devaluation (in this case, the domestic price level is unchanged; since we are assuming that the remainder of the domestic currency budget is fixed in real terms, there are no further effects on monetary expansion from domestic currency flows). The second term, $(U\text{-}E)b^*$, has a direct analogy in the fiscal gain enjoyed by the public sector in a multiple

exchange rate system when the central bank buys and sells foreign exchange at different rates (cf. Sherwood (1956), Dornbusch (1986a,b); we therefore call it the 'central bank profits' effect.

Equation (7) applies to an economy in which money growth is quite clearly a 'fiscal' phenomenon; indeed, the monetary effect can also be written as $DME = DFE - (U - E)(a^* - \dot{r}^*)$, where $DFE = (U - E)(x^* + a^* - b^{*g})$ is the (analogously defined) ***direct fiscal effect*** of the premium. The monetary effect is therefore simply the fiscal effect corrected for the implicit revaluation of net foreign financing implied by the premium. For a given value of DFE, a larger level of foreign financing reduces the monetary benefits of the premium, since it implies a reduction in the private sector's net sales of foreign exchange to the banking system. In effect, the government is implicitly passing on a larger net subsidy to the ultimate recipient--the private sector--of these foreign inflows.

Not surprisingly, the DME has a close relationship with the parameter θ' governing the inflationary impact of exchange-rate-led changes in the parallel premium across steady states. Denoting the parallel premium by $\phi \equiv z - 1 = (U - E)/E$, and noting that $\theta' = E(x^* + b^*)/\Delta M$, we have

$$DME/\Delta M = \phi\theta' \tag{8}$$

where ΔM is the monetary emission that would occur under the counterfactual of no change in the parallel premium.[21]

Implementation of (7) is made difficult by the fact that the fiscal and balance of payments accounts do not identify flows associated with the large Tanzanian parastatal sector. Data on the foreign exchange cash flow of the banking system, which would allow direct measurement of at least b^*, are also unavailable. We therefore approach (7) by making a set of adjustments to the standard fiscal and balance of payments accounts in order to separate the parastatal sector from the private sector. We also require a set of assumptions regarding indexation of the underlying flows; the assumptions regarding indexation are in Appendix Table 2. A thorough description of the calculations, which we summarize here, is also in the Appendix.

3.2.1 The central bank profits effect

Calculating private sector net sales of foreign exchange to the banking system requires two adjustments to the balance of payments data on trade flows. The first is to remove the influence of the public sector, including parastatals. On the export side, we subtract from total exports traditional exports (coffee, cotton, and other traditional crops), which are marketed through parastatals; we also subtract the 15 percent of non-traditional exports that we assume are produced by parastatals. The remainder is private sector exports, x_o^p. On the import side,

we use 1990 data to identify the share of the total import bill going to the consolidated public sector in that year; we then extrapolate backwards, making changes in the share to reflect our best assessment of the net impact of factors affecting the public share. We then multiply the implied private sector share by total imports to get official private imports, q^p.

The second adjustment to the balance of payments data is to eliminate own-funded imports, q_{own}, starting in 1984; these enter the official statistics but are not mediated through the banking system. Finally, private sector capital flows, which are illegal, are assumed t take place only in the parallel market. The central bank profits effect is therefore given by $(U-E)b^* = (U-E)(x_o^p - q^p + q_{own})$.

3.2.2 The domestic budget balance effect

Our task here is made simpler by the fact that we only have to identify public sector flows that are denominated in domestic currency but to a first approximation indexed to the official exchange rate. Among these we include marketing board purchases of traditional exports, in dollar amount x^m; using $m_x \equiv 1 - (P_x^m/E)$ to denote the margin imposed by parastatal export marketing boards between the world price and the domestic producer price of the crops purchased from peasants, and assuming this margin to be fixed with respect to the official exchange rate, the amount actually paid to peasants (measured in dollars at the official rate) is $(1-m_x)x^m$.[22] Also included are marketing board sales of imports, q^m, and taxes--primarily customs duties--directly indexed to the official exchange rate, τ.[23] All other domestic currency flows of the public sector are assumed to be indexed fully to the domestic price level. Under these assumptions, the domestic budget balance effect can be written $(U-E)[(1-m_x)x^m - q^m - \tau]$.

3.3 Baseline Results

Equation (7) can now be written

$$(9) \qquad DME = \underbrace{(U-E)[(1-m_x)x^m - q^m - \tau]}_{\text{Domestic budget balance effect}} + \underbrace{(U-E)(x_o^p - q^p + q_{own})}_{\text{Central bank profits effect}}.$$

Column 4 of Table 4 shows the estimated *DME* relative to current GDP for 1976-1993. The calculations through 1989 are based on actual fiscal and balance of payments data; for 1990-1993 we use our own projections of the underlying flows. Table 5 and Figure 5 decompose this overall effect into its two major components, the domestic budget balance effect and the central bank profits effect.

Table 4:
Direct Monetary Effect of the Parallel Premium[1,2]
(percent)

Year	Parallel Premium (1)	Actual: $\Delta M/M_{-1}$ (2)	Actual: $\Delta M/Y$ (3)	Estimates of DME/Y — Baseline: Using $U-E$ (4)	Estimates of DME/Y — Baseline: Using $.6(U-E)$[4] (5)	Estimates of DME/Y — Alternative Scenarios (Using U-E): Small/ Efficient Public Sector (6)	Estimates of DME/Y — Alternative Scenarios (Using U-E): Large/ Inefficient Public Sector (7)
1976	161%	25.1	5.7	7.5	4.5	3.0	14.5
1977	159	20.2	4.9	0.5	0.3	-4.0	7.4
1978	70	12.6	3.3	-4.1	-2.5	-6.5	-1.0
1979	46	46.9	12.2	-0.2	-0.1	-1.9	2.0
1980	156	26.9	8.9	0.4	0.2	-5.2	7.4
1981	233	18.1	6.5	4.1	2.5	-2.5	12.8
1982	251	19.5	6.9	-1.6	-1.0	-7.4	5.9
1983	255	17.8	6.3	0.6	0.4	-3.9	6.6
1984	266	3.7	1.2	-0.4	-0.2	-5.7	6.7
1985	477	30.3	7.3	-2.2	-1.3	-13.7	5.5
1986	405	27.9	7.1	-12.4	-7.4	-21.9	2.0
1987	180	32.1	7.3	-8.3	-5.0	-15.1	-0.7
1988	111	32.1	7.1	-7.3	-4.4	-10.6	-0.7
1989	77	29.5	6.6	-6.8	-4.1	-8.0	-0.7
1990[3]	78	42.1	12.1	-9.0	-5.7	-7.8	-3.2
1991[3]	71	26.1	8.1	-10.6	-6.2	-14.0	-5.7
1992[3]	19	38.9	12.0	-9.3	-2.0	-4.4	-1.9
1993[3]	2	28.4	9.6	-8.3	-0.2	-0.5	-0.2

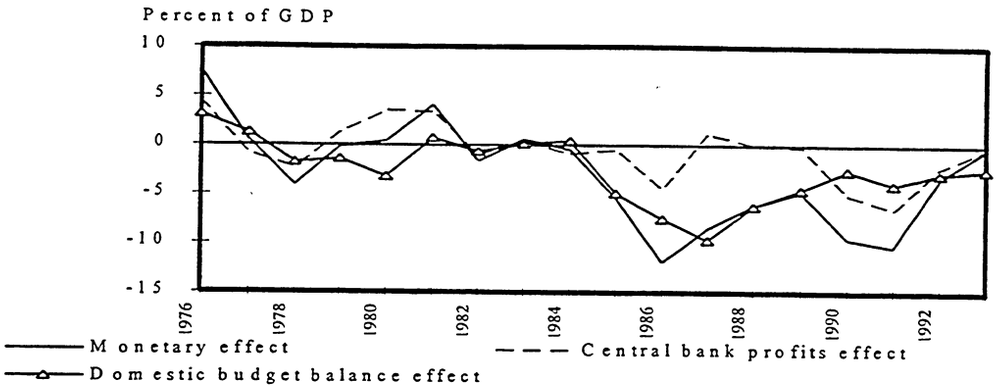
Sources: 1976-89: monetary, fiscal and balance of payments data are from the World Bank. Black market exchange rates from the *World Currency Yearbook*, various years, supplemented by the survey conducted by Maliyamkono and Bagachwa (1990); see Kaufmann and O'Connell (1991) for details. Official exchange rates are from the IMF. Parallel premium is the average of monthly figures.
1990-93: actual monetary and GDP data (columns 2 and 3) are from Bank of Tanzania, *Economic Bulletin*, September 1994. Balance of payments flows underlying columns 4-7 are based on authors' projections rather than actual data. Parallel premiums are based on end-of-year figures from *World Currency Alert* and IMF.
Notes:
[1] See Table 5 for a decomposition of the results in column 4 and Appendix Table 2 for a full description of the assumptions underlying the simulations in columns 4 - 7.
[2] Y is current year GDP.
[3] Based on authors' projections of fiscal and balance of payments data. See note on sources.
[4] This assumes that the parallel exchange rate overestimates the shadow equilibrium real exchange rate by 40 percent of the premium.

Table 5:
Decomposition of Baseline Case
(shares of GDP)

			Components of x^*			Components of b^*		
Year	x^* (1)	b^* (2)	$+(1-m_x)x^m$ Export crop outlays (3)	$-\tau$ Trade tax revenue (4)	$-q^m$ Sales of imports (5)	$+x_o^p$ Private sector exports (6)	$-q^p$ Private sector imports (7)	$+q_{own}$ Own-funded imports (8))
1976	2.0%	2.7	8.3	-3.8	-2.5	9.7	-7.5	0.5
1977	0.8	-0.5	7.8	-4.5	-2.5	5.6	-6.5	0.4
1978	-2.5	-3.3	4.8	-4.3	-3.0	5.9	-9.5	0.4
1979	-3.1	2.7	4.0	-3.8	-3.3	7.8	-5.4	0.3
1980	-2.0	2.3	3.7	-2.6	-3.2	7.9	-5.9	0.3
1981	0.3	1.4	4.4	-1.6	-2.5	6.7	-5.5	0.3
1982	-0.2	-0.4	3.1	-1.3	-2.0	3.9	-4.5	0.2
1983	0.1	0.2	2.9	-1.3	-1.6	3.4	-3.4	0.2
1984	0.2	-0.3	3.5	-1.6	-1.7	3.5	-4.5	0.7
1985	-1.0	0.5	2.4	-1.9	-1.5	3.7	-5.3	2.2
1986	-1.8	-1.2	4.4	-4.0	-2.2	3.1	-8.6	4.3
1987	-5.4	0.8	3.7	-5.8	-3.3	6.5	-13.3	7.5
1988	-5.6	-0.9	3.1	-5.1	-3.6	7.0	-16.1	8.2
1989	-6.4	-2.4	3.6	-5.8	-4.2	8.7	-22.1	11.0
1990[1]	-5.9	-6.3	4.9	-6.4	-4.4	12.2	-29.4	10.8
1991[1]	-5.4	-9.1	5.4	-6.5	-4.4	13.9	-32.8	9.9
1992[1]	-5.2	-11.7	6.5	-7.0	-4.7	18.5	-40.8	9.8
1993[1]	-4.4	-12.9	7.0	-6.7	-4.8	22.0	-43.7	8.8

Source: Underlying fiscal and balance of payments data are from the World Bank and the authors' projections.
Notes: This is a decomposition of column 4 in Table 4. The data in that column are given by DME/Y = $[(U-E)/E](x^* + b^*)$, where $[(U-E)/E]x^*$ and $[(U-E)/E]b^*$ are the "domestic budget balance effect" and the "central bank profits effect", respectively. The quantities in x^* and b^* are dollar flows converted to TShs using the official exchange rate and then deflated by nominal GDP.
[1] Results for 1990-93 are based on authors' projections of fiscal and balance of payments data.

Figure 5: Decomposition of the Direct Monetary Effect of the Parallel Premium



Source: Authors' calculations, summarized in Table 5.

Several conclusions can be drawn from the data. First, the *DME* is often large; it exceeds five percent of GDP in magnitude for half of the observations in the sample. The *DME* remains substantial in many years even under the conservative assumption that the parallel rate overstates the appropriate shadow rate by 40 percent of the observed premium (column 5). Second, the *DME* shows a substantial amount of persistence, so that it is possible to distinguish at least two, and perhaps three distinct regimes in the sample. The sample begins in 1976, the first year of the coffee boom, and the monetary effect makes a rapid transition from 7.5 percent of GDP to -4.1 percent in 1978. This is the joint effect of the collapse of the coffee boom, which improved the domestic budget balance by drastically reducing outlays for purchases of coffee by the marketing board, and the temporary import liberalization of 1978, which dramatically reduced private sector net sales of foreign exchange to the banking system.

After the 1976-78 transition, the *DME* fluctuates around zero for the period from 1979 to 1985, notwithstanding an increase in the parallel premium to over 230 percent by 1981 and a subsequent increase to nearly 500 percent in 1985. Both the domestic budget balance effect and the central bank profits effect are small for most of this period, a development driven by a reduction in export proceeds remitted to the banking system and the onset of severe rationing of foreign exchange for imports. The private sector's net purchases of foreign exchange hover near zero for most of the period, suggesting that the low and falling export receipts were being channeled directly to private sector imports, while official imports were largely financed through aid and increases in arrears. As indicated in the further decomposition in Table 5, the contraction in trade reduced the revenue base for customs duties and export taxes, roughly offsetting the net contractionary effect of other indexed items in the domestic budget balance.

A clear break occurs in 1986, a year in which the figures suggest that unification would have converted monetary growth of 7 percent of GDP into monetary contraction of over 5 percent. From 1986 on, the monetary effect is consistently negative and above 6.5 percent of GDP. On the domestic budget balance side, this dramatic change is largely the result of a customs revenue boom (Table 5). A strong contribution is also made by increases in the private sector's net purchases of foreign exchange from the banking system. Both developments were decisively influenced by the large inflows of external aid that became available starting in 1986. A large portion of this aid was channeled to the private sector, in line with the Government's liberalization and structural adjustment priorities. The customs revenue boom was further propelled by the expansion of aggregate imports brought about by the introduction of the own-funds window in 1984 and its rapid expansion starting in 1985.

3.3.1 Two alternative scenarios

Table 4 reports two further calculations using alternative assumptions about the size and efficiency of the public sector. The underlying assumptions are given in Appendix Table 2. Relative to the baseline, a large/inefficient public sector is assumed to take a 15 percent higher share of imports and to lose to corruption a share of the marketing margin equal to 15 percent of the producer price paid to peasant producers of traditional exports. For the period from 1991 to 1993, the large/inefficient public sector also collects lower import duties and sales taxes on imports (lowering the term τ in equation (7) by 2.6, 6.5, and 9 percent, respectively, relative to the baseline in 1991, 1992 and 1993), due to laxity in enforcement. A more efficient public sector takes a 15 percent smaller share of imports and collects higher trade taxes (by 5.1, 11, and 13.6 percent relative to the baseline in 1991, 1992 and 1993).

These differences in size and/or efficiency of the public sector affect the *DME* by changing the base for both the domestic budget balance effect and the central bank profits effect. Under the large/inefficient scenario, we attribute a larger share of total imports to the public sector and thus implicitly assume a larger private trade surplus; we simultaneously assume an increase in the government's deficit in items indexed to the official exchange rate, through a combination of corruption and laxity in enforcement. For both reasons, the direct monetary effect of the premium, and thus the temptation to maintain an overvalued official exchange rate, is greater than under the baseline case. In the efficient case, we implicitly assume a larger private trade deficit and a smaller public sector deficit in items indexed to the official exchange rate. Both assumptions weaken the incentive for containing monetary growth through an overvalued exchange rate; exchange rate unification would have tended for most of the sample to reward the efficient government with a *reduction* in monetary growth.

These calculations underscore the fundamentally fiscal impetus behind the maintenance of overvalued exchange rates and hence the adoption of exchange controls. They also give some sense of the sensitivity of our calculations to some of the underlying assumptions; while the magnitude of the *DME* is sensitive to these assumptions, there remains a clear reduction in the estimated *DME*s in the mid 1980s, suggesting a turning point in favor

of a positive fiscal effect of exchange rate unification. Rodrik (1989) applies a simple test to policy reforms that are ultimately guided by efficiency considerations but take place under conditions of macroeconomic instability and potentially low credibility: "does the proposed reform directly contribute to the goals of macroeconomic stability and fiscal retrenchment"? (p. 10). Our calculations suggest a resounding "yes" for exchange-rate unification by the mid-1980s.

4. Conclusions

Our first aim in this paper was to characterize the macroeconomic forces underlying the emergence and growth of the parallel market and the premium in Tanzania. We have found that both portfolio and trade flow determinants played important roles, and that the premium responded to these variables as predicted by the theory. We trace the rising premium between 1966 and 1986 to a growing inconsistency between macroeconomic policies and the exchange rate regime; the premium was brought down definitively starting in 1986 when the authorities instituted a maxi-devaluation, adopted a crawling peg, and entered upon a major structural adjustment effort generously supported by external donors.

Our second aim was to investigate the fiscal impact of the parallel premium in an exchange-control regime. We have shown that while a long-run tradeoff between inflation and the parallel premium will prevail if inflation rates are moderate and the real deficit and foreign financing flows are exogenous, an exchange-rate-led unification brings a variety of macroeconomic mechanisms into play that reduce the likelihood of a *highly* inflationary long-run outcome and may even produce a reduction in inflation. In the Tanzanian case, our calculations of the short-run outcome under plausible assumptions regarding the indexation of public sector revenues and expenditures suggest that starting in the mid-1980s, more aggressive depreciation of the official exchange rate would have delivered a substantial fiscal bonus, reducing monetary growth and therefore moderating inflationary pressures.

Notes

1. The authors are Visiting Scholar, Harvard Institute for International Development (on secondment from The World Bank), and Associate Professor of Economics, Swarthmore College. The authors are grateful to Saul Lizondo for many helpful discussions, to Paul Collier for comments on work in progress, and to Varga Azad, Jon Isham and David Ko for research assistance. Views expressed are solely those of the authors.

2. This paper draws on earlier work of the authors, including Kaufmann and O'Connell (1991) and O'Connell (1990,1992).

3. A more extensive account appears in Kaufmann and O'Connell (1991). See also Green, Rwegasira and van Arkadie (1980) and Bevan, Collier and Gunning (1987, 1990). Mans (1994) provides an excellent overview of the ERP period.

4. Before introduction of the Tanzanian shilling in 1965, Tanzania was part of the sterling area and thus effectively subject to exchange controls prevailing in Britain. In June of 1965, Tanzania adopted its own tighter set of controls, exempting only Kenya and Uganda. These controls were extended to Kenya and Uganda in March of 1971, after having been temporarily extended to these countries in the four months following the Arusha Declaration of February 1967. See Mtei (1973).

5. See Bank of Tanzania, *Economic Report* December 1967 and June 1968, and particularly the address by E.I.M. Mtei in the June 1968 *Economic Report*. While capital flight was reasonably well contained in 1967, the adequacy of exchange controls was called into question by intensified capital flight in 1970-71, leading to the tightening of controls referred to above and to an increase in the enforcement powers of the exchange control authorities (Mtei (1973)).

6. Loxley (1989) provides a thorough analysis of the degree to which "the single issue of the exchange rate dominated the rift between Tanzania and the IMF in the years 1981 to 1983" (p. 32).

7. The import license data are from the Bank of Tanzania. Ndulu and Hyuha (1989) give three reasons why the share of licenses may underestimate the true import share: (1) OF consignments of under 10,000 Tanzanian shillings ($50) do not require licenses; (2) the utilization rate of OF licenses is considerably higher than that of licenses accompanied by official foreign exchange; and (3) the incentive to underinvoice OF imports to avoid customs duties is much stronger than for officially financed imports (which may even be overinvoiced).

8. Note that of these alternatives, only the direct repatriation in the form of own-funded imports is legal. It is still illegal to acquire or sell foreign exchange.

9. Note that fears of a reversal of the policy have two opposing effects on the rapidity of the stock adjustment: fears of legal reprisals would slow down the adjustment, and fears of a reversal of the program would speed it up.

10. This section draws on Kaufmann and O'Connell (1991) and O'Connell (1990).

11. These effects are the conventional ones suggested by the theoretical literature on parallel foreign exchange markets; Lizondo (1990) and Agénor (1992) review the literature.

12. Equation (1) is a standard autoregressive distributed lag (ADL) specification with one lag. Parameter estimates and t-statistics from this equation are numerically identical to those from the error-correction model $\Delta lnz_t = a_0 + a_1\Delta ln(M2/E)_t + a_2\Delta IPD_t + a_3\Delta REER_t - (1-a_7)lnz_{t-1} + a_4(M/E)_{t-1} + a_5IPD_{t-1} + a_6REER_{t-1}$. The latter specification accommodates the possibility that the variables are non-stationary and cointegrated, with cointegration vector $[1, -a_4/(1-a_7), -a_5/(1-a_7), -a_6/(1-a_7)]$ (see Banerjee, et al (1993)).

13. There are potential simultaneity problems in the OLS results. First, we assume rational expectations and therefore use the actual rate of depreciation of the parallel exchange rate, in the interest parity variable. This introduces an error-in-variables problem because actual depreciation incorporates a forecast error that is correlated with other variables in the current period. The real exchange rate is also jointly endogenous with the parallel premium. To handle these problems, we re-estimated the equations using instrumental variables. The IPD variable becomes statistically insignificant, but the results do not otherwise change substantially. One reason for the weaker results for IPD may be that we do not have good instruments for the increase in expected depreciation in 1985-86.

14. 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.

15. See for example Kiguel and Lizondo (1990) and the references therein. For a cautionary note, see Morris (1995).

16. See also Morris (1995), who independently derives steady-state results similar to ours and reaches the same conclusion about unification and money growth for Uganda in the late 1980s. His calculations differ in some key respects from ours; in particular, they include credit to the private sector (assumed to be zero in our analysis) and are imbedded in a model in which unification has no implications for trade flows. His paper incorporates a full discussion of the short-run dynamics; in his model, the sign of what we call the 'direct monetary effect' of the premium (see below) affects not only the steady state but also the stability properties of the model.

17. Appendix Table 1 contains a full list of variable names and descriptions.

18. As emphasized by Collier and Gunning (1991), the National Bank of Commerce, Tanzania's sole commercial bank until recently, has essentially operated as a government finance agency, channeling private sector deposits into loans to the public sector. Loans to the private sector constituted less than 9 percent of commercial bank assets on average between 1980 and 1988 (Bank of Tanzania, *Economic and Operations Report* (30 June, 1989), Table 10). Thus the entire stock of broad money constituted 'outside' money in Tanzania, as implied by equation (9).

19. Since m refers to broad money, the opportunity cost of holding m rather than f should include domestic and foreign interest rates as well as the rate of expected depreciation, as in the empirical work reported in section 2. We omit these for notational convenience.

20. This is not uncontroversial. Adam, Ndulu and Sowa (1996) estimate dynamic money-demand equations for Ghana, Kenya and Tanzania, and conclude on the basis of point estimates that Tanzanian inflation rates were above the revenue-maximizing rate for most of the 1970s and 1980s. But the Tanzanian results are the weakest econometrically, due to the difficulty of capturing the determinants of the huge fall in velocity associated with rationing in the goods market in 1979-84 (see Bevan, Collier and Gunning (1990)); in fact, for most years, it is difficult to reject the null hypothesis that the economy is on the good side of the inflation tax Laffer curve. See also Easterly, Mauro and Schmidt-Hebbel (1994) for an argument that more flexible functional forms for the money demand equation tend to produce significantly higher revenue-maximizing inflation rates for developing countries.

21. It is important to emphasize that the results of Section 3.1 are based on steady state comparisons. Not surprisingly, unification is not typically attempted from a position of steady state. One must therefore use caution in using (8) to work backwards from the *DME*s estimated below--which use the *actual* gap between the parallel and official rate in each year--to conclusions about the precise long-run inflationary impact of unification.

22. These assumptions are approximations to what would occur under a counterfactual policy of exchange rate unification. In actual practice, producer prices were determined on a cost-plus basis, and maxi-devaluations were often not passed along to peasant producers in the form of increased prices paid by the marketing boards. Our assumption is that pass-through would have been substantial under a determined policy of exchange-rate unification, as it has generally been in the post-1985 period.

23. We are assuming that $m_q \equiv (P_q^m/E) - 1$, the before-tax markup on world import prices charged by the import marketing parastatals, is zero, or equivalently that the after-tax margin consists of customs duties and sales taxes that are already counted in τ.

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