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FOREIGN AID AND ECONOMIC PERFORMANCE IN TANZANIA

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Foreign aid and economic performance in Tanzania

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Abstract

This study examines the impact of foreign aid inflows to Tanzania on macroeconomic variables such as the real exchange rate, export performance, government expenditure, investment and growth.

The main hypothesis of the study is that aid inflows cause real appreciation. To test this hypothesis, we used cointegration techniques and an error-correction model to estimate the long-run equilibrium and the short-run real exchange rate, respectively.

The estimated model results suggest that foreign aid inflows, openness of the economy and devaluation of the local currency lead to depreciation of the real exchange rate, while government expenditure tends to appreciate the real exchange rate.

The study recommends that the correct policy response to the influx of foreign aid is to direct the aid to domestic productive investment in order to induce a positive supply response. The government should also reduce its expenditure and enhance economic liberalization.

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I. Introduction

Background

The history of macroeconomic management in Tanzania is marked by pervasive controls (see Bevan *et al.*, 1990). Consequent to the command and control policies, the economy experienced an appreciation of the real exchange rate, declines in export performance and falling real incomes in the late 1970s (see tables 1 and 2). The nature and causes of the economic crisis have been well documented (see Lipumba, 1984; Ndulu, 1987; Baregu, 1993).

By the early 1980s, the government realized that it had to reform its policies. Economic reforms began with the introduction of the national economic survival programme (NESP) and the structural adjustment programme (SAP) in 1981 and 1982, respectively. The reform policies culminated in the economic recovery programmes, ERP I and ERP II, which started in 1986 and 1989, respectively.

The most successful reforms were the economic recovery programmes, which were at the behest of and sponsored by the donor community, especially the International Monetary Fund (IMF) and the World Bank. The main items of the reforms included devaluation of the local currency, decontrolling prices, government retrenchment policies and opening up the economy to international trade. Increased openness was to be achieved through liberalizing imports and promoting exports.

Concomitant with the implementation of the reforms was a massive inflow of foreign aid that jumped in real terms from US$266.20 million in 1985 to US$522.27 million in 1992 (see Table 1). As a percentage of the GDP the aid jumped from an average of 9% during 1983–1985 to 34% in 1986–1993, (see Table 1). Net official development assistance to Tanzania since 1986 has been around one billion current US dollars a year (see Table 2).

Tanzania is among the leading aid-dependent countries in Africa. Tarimo (1995), who compared Tanzania with Kenya, Uganda, Ghana and Malawi, found that Tanzania receives more aid both in per capita terms and as a percentage of GDP than do the other countries in question.

While seemingly beneficial, foreign aid inflows may generate undesirable effects in the economy. These undesirable effects — generally knows as Dutch disease — include a decline in export performance and manufacturing production caused by appreciation of the real exchange rate and resources moving out of manufacturing into other sectors.[1]

Table 1: Foreign aid and the real exchange rate in Tanzania (base year is 1977 for the real exchange rate)

Year	Aid as % of GDP	Aid in 1977 mil US$[1]	RER[2]	Year	Aid as % of GDP	Aid in 1977 mil US$[1]	RER[2]
1967	2.3	52.83	99.5	1981	11.1	457.07	72.6
1968	2.6	61.75	86.9	1982	10.7	434.98	62.5
1969	3.4	81.61	79.3	1983	9.2	355.87	61.5
1970	4.0	101.32	83.9	1984	9.4	321.34	59.6
1971	4.6	116.53	92.0	1985	6.9	266.20	51.4
1972	3.9	108.29	88.6	1986	13.8	346.67	145.2
1973	5.4	162.67	88.1	1987	25.0	439.53	223.4
1974	7.2	229.89	88.7	1988	30.3	485.49	246.7
1975	11.7	373.04	97.2	1989	32.3	416.84	303.0
1976	9.2	293.47	98.1	1990	45.2	498.88	309.7
1977	9.0	315.00	100.0	1991	34.0	436.00	315.6
1978	10.1	403.05	99.5	1992	49.5	522.27	335.0
1979	13.2	517.37	112.8	1993	44.3	349.09	386.5
1980	12.7	497.95	95.6				

[1]Deflated by average consumer price index of Tanzania's trade partners: United Kingdom (UK), Germany (GERM), Japan (JAP), Italy (ITAL), Saudi Arabia (SAUDI), United States of America (USA) and Sweden (SWED).
[2]Real exchange rate defined as $RER = \Sigma_i (\varnothing_i E_i CPIF_i / CPITZ)$ where $\varnothing_i$, $CPIF_i$ and $CPITZ$ are, respectively, weight of trade partner i, nominal exchange rate of Tanzania shilling to a unit of the trade partner's currency, and trade partner CPI and Tanzania's CPI.

The weights for the trade partners are:

Year	UK	Germ	Jap	Ital	Neth	Saudi	USA	Swed
1967-79	.220	.175	.183	.048	.052	.151	.142	.029
1980-85	.292	.178	.158	.088	.121	.001	.111	.051
1986-93	.273	.143	.173	.163	.074	.029	.069	.076

Sources:BOS (1994a) *National Accounts of Tanzania 1976-1993*;BOS (1994b) *Selected Statistical Series 1951-1991;* DAC, *Geographical Distribution of Financial Flows to Developing Countries;* IMF (1995) *International Financial Statistics CD-ROM Disk.*

Arguments for foreign aid are based on the belief that the aid will contribute positively to the country's development efforts in terms of, among other things, supplementing domestic savings and achieving higher economic growth.[2] However, one should realize that inflows of foreign aid cannot continue indefinitely given donor fatigue and the growing competition for aid funds (see Adams *et al.* 1994; Likwelile *et al.*, 1994a/b; Wendler, 1994).

Table 2: Foreign aid and selected macroeconomic indicators

Year	Aid (mil US$)	OPEN[1]	Current account deficit as % of GDP	GDP per capita in 1976 prices (1977=100)	Manufacturing output as % of GDP	Merchandise exports as % of GDP
1967	23.61	44.4	0.2	96.2	10.2	23.8
1968	28.56	42.4	0.6	98.6	10.4	21.6
1969	39.30	39.6	-2.8	98.2	11.1	20.8
1970	51.20	41.2	2.8	99.4	11.2	19.2
1971	62.50	44.2	7.3	100.2	11.8	19.1
1972	61.20	43.2	4.2	103.8	12.0	20.2
1973	100.40	42.9	5.8	103.8	12.2	19.5
1974	162.30	47.3	12.7	102.4	12.2	17.8
1975	302.70	40.4	8.9	103.8	11.7	14.5
1976	267.70	35.9	1.2	102.7	13.0	16.8
1977	315.00	34.0	2.1	100.0	12.2	15.5
1978	423.00	32.5	11.4	99.1	12.3	11.4
1979	584.00	34.1	7.9	98.5	12.4	12.4
1980	650.00	32.5	10.2	98.1	11.5	11.3
1981	657.00	28.2	6.9	94.6	10.2	10.3
1982	673.00	20.2	8.4	92.2	9.8	6.6
1983	579.00	17.2	4.8	87.3	9.2	6.1
1984	549.00	19.9	6.2	87.4	9.1	6.9
1985	477.00	17.3	5.4	86.9	8.5	4.8
1986	675.00	25.6	6.6	86.9	7.9	6.9
1987	882.00	36.6	12.7	88.4	7.9	8.2
1988	1012.00	42.6	11.3	89.0	8.1	11.6
1989	917.00	52.3	12.9	89.6	8.4	14.6
1990	1171.00	61.6	16.4	90.9	7.8	15.7
1991	1081.00	51.7	14.2	93.3	8.2	11.4
1992	1343.00	63.2	15.6	92.6	8.2	14.8
1993	924.80	84.2	19.6	94.2	8.0	22.2

Sources: BOS (1994 a&b); IMF (1995); and DAC, various issues.
[1]OPEN = openness of the economy defined as the sum of merchandise exports and imports expressed as percentage of the GDP.

The motives for foreign aid

Foreign aid is defined as transfers from abroad that have a grant element. The transfers may be in the form of soft loans, grants or technical assistance. Foreign aid may be administered on bilateral, government to government, or multilateral basis. Multilateral aid is provided through international institutions such as the IMF, the World Bank and the various agencies of the United Nations.

Aid can be provided for either self-interest or altruistic reasons (see Eaton, 1989).

Self-interest motives include the donor's own national security considerations and national economic benefits. This kind of aid is mostly exogenous; that is, the aid recipient country does not have to ask or negotiate for it. Altruistic reasons include the pursuit of an objective ethical function, relief aid to maintain current consumption levels in times of temporary shortfall in incomes, and development assistance to raise investment and future consumption. Foreign aid may also be a response to seemingly permanent low incomes in the recipient country.

While relief or emergency aid may be exogenous, development assistance and aid coming to finance economic reforms is to a large extent endogenous. It responds to economic shocks in the recipient country and depends on negotiations between the government and the donor community (such as the IMF and the World Bank). While the donors may already have the aid money for disbursement, the actual flow of the funds depends — in most cases — on the intended country agreeing with and fulfilling the terms and conditions of the donors.

Statement of the problem

It has been observed that there has been a boom in foreign aid inflows to Tanzania since the mid 1980s. In theory, aid inflows should cause the real exchange rate to appreciate. Tanzania's experience, on the contrary, is that the aid inflows were marked by a depreciating real exchange rate. Contrary to Dutch disease postulates, the massive aid inflow was also accompanied by high positive growth in manufacturing production and export performance. This prompts us to analyse the macroeconomic impacts of foreign aid and the potential for aid-induced Dutch disease in the country.

Relevance to existing analysis

The findings of our study seem to corroborate what has already been established in empirical studies on foreign aid and the Dutch disease in Tanzania and a few other African countries.

Using an econometric model, Ogun (1995) found that capital inflow to Ghana caused the real exchange rate to depreciate. In the study by Bevan *et al.* (1993) for Kenya, it was found that the spending effect of the 1976–1979 coffee boom was negligible and that rather than causing a Dutch disease the boom produced a construction boom. The results of the two studies for Ghana and Kenya corroborate our study.

In their study of foreign aid and the Dutch disease in Tanzania, Adams *et al.* (1994) found that the allocation of foreign aid and other resources is an important factor in determining export performance. They argued that the state-led, import-substituting industrial policy biased resource allocation against production for export and thus limited the performance of the latter. The study also found that the aid inflows were buying economic reforms and policy changes that were pro-tradeables and dampened the potential for the aid-induced real appreciation.

Falck (1992) found that foreign aid was mostly spent on the services sector, which increased upward pressure on domestic prices and potential for real appreciation.

Luvanda and Mndeme-Musonda (1992) studied the Dutch disease effects of the 1976/77 coffee boom in Tanzania and concluded that the boom was mostly used to finance government expenditure.

The Adams *et al.* (1994), Falck (1992), and Luvanda and Mndeme-Musonda (1992) studies stopped short of giving an empirical analysis of the real exchange rate determination to support their findings. Ndulu (1993) and Ndulu and Semboja (1993) did estimate the real exchange rate for Tanzania, but did not include foreign aid or capital inflows as an explicit determinant. These gaps will be filled by our study.

Hypothesis

The main hypothesis to be tested in this study is that foreign aid inflows into Tanzania caused the real exchange rate to appreciate. We will test this hypothesis by using the theory of real exchange rate determination.

II. Foreign aid, Dutch disease and macroeconomic management in Tanzania

The Dutch disease model

The term "Dutch disease" was first used to reflect the decline in the Netherlands' export competitiveness following the discovery of the Groningen gas fields in the early 1970s (Benjamin *et al.*, 1989).

Most studies of Dutch disease have been done for developed countries. The impact of a discovery of natural resources or an influx of foreign revenues may be different in developing countries for three main reasons (Benjamin *et al.*, 1989). First, it is agriculture rather than manufacturing that is most likely to be hurt. Second, as domestic prices rise, consumers may not shift entirely to imported goods since the domestically produced manufactured goods are imperfect substitutes for goods sold in world markets. Third, the resource movement effect associated with the influx of foreign revenues may be limited if the booming sector is an enclave that uses mainly imported capital and labour. Alternatively, if foreign aid is spent on imports there may be little or no impact on the real exchange rate or on the resource movement effect.

Dutch disease refers to the coexistence within the traded goods sector of progressing and declining, or booming and lagging, sub-sectors (Corden and Neary, 1982). A boom in one of the traded goods sectors (due to, for example, a discovery of natural resources) raises the marginal product of the mobile factors employed in that sector. Higher factor returns in the booming sector will draw mobile factors away from the other sectors and into the booming sector. This is the *resource movement effect*. The non-booming sectors will thus contract. The higher real incomes resulting from the boom lead to extra spending on non-tradeables, which raises their price. This is the *spending effect*. The spending effect will, in turn, cause the real exchange rate to appreciate.

The effects of increased incomes from natural resources is similar to an increase in foreign aid inflows (see Edwards and van Wijnbergen, 1989). They all have the potential for causing the real exchange rate to appreciate.

In the Dutch disease model, the real exchange rate (RER) is defined as the domestic relative price of tradeable goods (P_T) to non-tradeable goods (P_N), that is, $RER=P_T/P_N$.[3] This definition of the real exchange rate summarizes incentives that guide resource movement across the traded and non-traded goods sectors. An increase in the real exchange rate is referred to as real depreciation and will make the production of traded goods relatively more profitable, inducing resource movement out of the non-tradeable and into the tradeable goods sector. The real exchange rate thus defined also provides a

good indicator of the country's competitiveness in the world markets.

The RER measures the cost of domestically producing the traded goods. When the RER declines — that is, when there is real appreciation — it signifies that the domestic cost of producing tradeable goods is increasing. If relative prices in the rest of the world are constant, the decline in the real exchange rate corresponds to a deterioration of the country's international competitiveness. The country is thus producing the tradeable goods in a relatively (that is relative to the rest of the world) less efficient way than before. A real depreciation, on the other hand, represents an improvement in the country's degree of international competitiveness.

The real exchange rate and some main determinants

One of the pertinent questions of this study is whether or not foreign aid causes Dutch disease in Tanzania. Foreign aid may cause Dutch disease only if the aid inflow causes the real exchange rate to appreciate. This calls for an analysis of the determinants of the real exchange rate.

As already noted, Tanzania faced severe economic crisis beginning in the late 1970s. The bad performance of the economy meant the government was less able to balance its budget and hence took recourse to increased borrowing and foreign assistance. In Table 1 it can be seen that foreign aid measured in 1977 prices increased during 1967–1979 and declined during 1979–1985. Thereafter it increased again.

The measured real exchange rate seemed to follow the same trend as the aid inflow; that is, the RER depreciated as aid inflows increased and appreciated as aid declined. This positive correlation between aid inflows and the RER is inconsistent with the real exchange rate and Dutch disease theories. These theories predict that, if there is one — freely functioning —foreign exchange market, aid inflows would result in real appreciation. It must be noted, though, that foreign exchange in Tanzania was being rationed during most of the period. If foreign exchange is being rationed it can result in movements of the real exchange rate that are different from those that would occur in the case of a freely functioning foreign exchange market.

One possible explanation of the trade-off between a depreciating real exchange rate and increasing aid inflows is that there were some offsetting capital flows (or "capital flight"), or that the impact of the aid was neutralized through increased imports or sterilization by the central bank.[4] However, a look at the trends in net private transfers and capital flows in the balance of payments statistics in Table 3 suggests that there was more capital flowing into than out of the country throughout the period in question. Hence capital outflows may not be strongly argued to have offset the impact of the aid inflows.

Table 3: Selected balance of payments statistics in Tanzania (million US$)

Year	Trade balance	Net private transfers	Current account balance	Net long-term capital	Net short-term capital	Changes in reserves
1970	-33.2	12.8	-35.6	71.6	-56.6	20.6
1971	-83.3	3.5	-99.8	137.7	-51.2	13.3
1972	-43.6	-14.5	-65.7	108.4	7.3	-50.0
1973	-74.2	-14.4	-107.5	139.5	0.0	-32.0
1974	-261.2	-11.4	-285.3	124.7	23.0	137.5
1975	-297.1	11.5	230.0	206.4	8.9	14.7
1976	-65.2	11.5	-33.7	102.4	-46.4	-22.3
1977	-108.2	19.4	-70.2	96.6	133.8	-160.1
1978	-516.5	23.1	-472.0	136.0	164.8	171.2
1979	-415.0	29.5	-345.2	225.4	62.8	57.0
1980	-506.4	21.8	-521.2	289.1	166.0	66.0
1981	448.3	22.6	-406.6	295.3	114.3	-3.0
1982	-539.1	25.4	-523.3	345.1	176.5	1.8
1983	-325.2	18.7	-304.6	238.3	107.7	-41.5
1984	-361.8	63.0	-359.0	-46.3	437.6	-32.3
1985	-540.7	236.3	-375.1	20.6	348.5	6.0
1986	-577.4	250.6	-321.1	1204.8	-860.7	-23.0
1987	-712.6	314.3	-446.0	221.2	155.6	69.2
1988	-646.5	231.9	-375.8	261.0	117.2	-2.4
1989	-655.0	182.4	-367.3	286.6	60.6	20.1
1990	-778.6	158.5	-425.1	387.8	176.4	-139.1
1991	-922.6	269.2	-451.3	228.2	262.0	-38.9
1992	-912.9	325.0	-421.9	162.2	357.9	-98.2
1993	-837.9	193.2	-408.5	321.9	35.5	51.1

Source: World Bank (1995), *World Tables 1995.*

A decline in the level of trade restrictions is one of the factors that has tended to depreciate the real exchange rate in Tanzania. The sharp decline in trade and exchange controls after 1986 resulted in a rapid increase in the openness of the economy, which in turn led to a rapid depreciation of the real exchange rate during that period (see Tables 1 and 2). Trade liberalization has also been found to be a significant determinant of the real exchange rate in the country (see, for example, Ndulu, 1993).

The trend in imports indicates that storable imports as a percentage of the GDP averaged 7% during 1967–1991 (see Table 4). The aid boom beginning in 1986 was not followed by an increase in storable imports. As a percentage of the GDP, storable imports during 1986–1991 remained at 7% as was the case for the sample period average. Hence Tanzanians did not save the aid. A look at the trend in foreign assets that correspond to both the money base and the money supply indicates that foreign assets declined during the aid boom compared to non-boom years (see Table 4). Hence the aid money was left to filter into the economy unsterilized.

Table 4: Imports and net bank foreign assets in Tanzania

Year	Storable imports as % of GDP[1]	Total imports as % of GDP	Net foreign assets as % of money supply	Net foreign assets as % of base money[2]
1967	6.5	18.5	37.3	50.1
1968	5.7	19.5	31.3	52.3
1969	5.3	17.2	32.3	52.4
1970	8.2	21.1	32.7	30.6
1971	10.3	24.6	33.0	23.9
1972	8.9	22.8	43.3	43.1
1973	8.4	24.0	43.6	51.2
1974	8.3	30.4	20.2	14.8
1975	9.2	27.9	17.2	15.2
1976	6.6	19.2	19.2	24.7
1977	7.6	21.3	28.4	51.7
1978	10.9	27.6	2.4	14.7
1979	8.6	25.0	6.4	10.7
1980	7.3	24.9	6.9	4.5
1981	7.1	20.5	4.1	3.9
1982	6.6	18.1	3.1	2.7
1983	4.2	12.0	6.5	2.5
1984	3.6	10.9	-25.1	4.0
1985	4.1	12.7	17.8	0.7
1986	3.6	19.1	-25.6	6.0
1987	4.1	26.2	-30.0	2.8
1988	5.9	24.4	-26.0	6.2
1989	9.6	36.0	-19.0	5.2
1990	8.0	52.6	4.7	10.5
1991	12.4	48.6	12.6	11.0

Source: Computed from BOT, *Economic and Operations Report*, various issues.
[1]Storable imports are machinery and metal imports.
[2]Base money in money at the central bank.

Since foreign aid was neither saved by the economic agents nor sterilized by the monetary authorities, it may be argued that Tanzanians perceive the aid inflow to be permanent. The rate of foreign aid flowing into Tanzania has been quite substantial since 1967. Expressed in real terms, foreign aid has been flowing at an average annual rate of 7.5% between 1967 and 1993. There may thus be reason for Tanzanians to suspect that aid inflows will not decline in the future, but this should be a cause for concern, as we noted above that aid inflows cannot continue indefinitely. A development strategy based on foreign assistance is bound to fail once the aid is cut significantly.

Since aid was perceived by agents to be permanent, and since the aid money was not being sterilized, the real exchange rate in Tanzania should have appreciated in the late 1980s and early 1990s when there was a boom in aid inflows. As discussed above, the inability of aid inflows to explain the real depreciation may be explained by the dominating impact of economic liberalization and the devaluation of the nominal exchange rate.

Macroeconomic impacts of foreign aid

Apart from being a potential cause of Dutch disease — in particular, decline in the tradeable sectors — foreign aid may also have an impact on government expenditure patterns, money supply, inflation, domestic savings, investment and growth (see also Eaton, 1989; and Likwelile *et al.*, 1994b).

Foreign aid and government expenditure

In Table 5 it can be seen that the government managed to keep a high and undiminishing proportion of recurrent expenditure, which

Table 5: Indicators of macroeconomic impacts of foreign aid (inflation and growth rates are in percentage)

Year	Inflation (changes in CPI)	Nominal money supply % growth	Recurnt governt expend as % of GDP	Develop governt expend as % of GDP	Domestic savings as % of GDP	Domestic investmt as % of GDP	GDP per capita % growth
1967	13.04	-7.04	13.94	4.01	17.91	16.78	1.56
1968	15.38	15.85	13.53	4.37	16.71	16.54	2.48
1969	16.67	17.86	14.34	5.57	17.49	14.67	-0.42
1970	2.86	4.86	16.64	6.66	17.11	20.47	1.29
1971	5.56	19.31	16.62	8.44	17.56	24.17	0.79
1972	7.89	14.54	15.94	6.61	16.61	21.16	3.58
1973	9.76	19.20	17.37	5.68	14.18	19.84	0.05
1974	20.00	24.33	17.42	10.27	8.42	18.96	-1.40
1975	25.93	23.38	20.84	11.70	8.32	18.62	1.35
1976	6.62	26.05	15.22	9.23	20.69	21.13	-1.01
1977	11.72	21.09	16.29	11.24	22.80	23.08	-2.62
1978	11.73	13.31	17.29	10.27	10.01	22.79	-0.92
1979	13.81	37.41	22.86	13.06	13.31	23.68	-0.66
1980	30.10	30.83	22.42	12.89	9.82	20.49	-0.34
1981	25.37	22.19	20.83	11.40	16.20	21.64	-3.57
1982	29.17	17.97	22.69	8.90	13.60	18.59	-2.51
1983	26.96	14.72	20.69	6.25	8.42	10.99	-5.37
1984	36.12	8.10	17.94	5.02	7.20	13.47	0.17
1985	33.33	9.42	17.86	5.78	7.11	13.99	-0.54
1986	32.40	31.30	14.95	4.91	5.46	17.96	-0.09
1987	29.98	33.47	15.25	2.75	11.47	28.74	1.65
1988	31.20	34.27	16.95	2.81	-4.82	29.38	0.84
1989	25.82	35.74	20.11	3.21	2.72	31.69	0.64
1990	19.71	32.90	22.13	2.38	11.49	43.03	1.38
1991	22.29	32.90	23.26	3.10	4.38	33.17	2.61
1992	22.07	26.23	25.38	3.86	4.64	37.79	-0.64

Source: BOS (1994 a&b); IMF (1995).

averaged 15% and 20% of GDP during 1967-1978 and 1979-1992, respectively. Government development expenditure was, on average, only 6% of GDP during 1979–1992, having slightly declined from an average of 8% during 1967–1978.

The foreign aid boom of the late 1980s and early 1990s was marked by a declining share of government development expenditure and increasing recurrent expenditure as a percentage of GDP. Government development expenditure was the lowest (only 3% of GDP) during 1986–1992, while recurrent expenditure averaged 20% of GDP during the same time. This tends to suggest that the influx of foreign aid allowed the government to free resources from development expenditure in order to maintain or increase its recurrent expenditure.

Foreign aid, money supply and inflation

In theory, foreign aid inflows will lead to increased money supply and inflation if the aid money is not sterilized by contractionary monetary policies or used to purchase imports. As can be seen in Tables 1 and 5, the rising trend in foreign aid inflow has been accompanied by high rates of money growth and inflation. This underscores the contention that the Tanzanian government let the aid money filter into the economy, causing macroeconomic management problems — that is, high inflation rate and the increasing potential for the real exchange rate to appreciate.

Foreign aid and domestic savings

Proponents of foreign aid argue that since aid is a resource it should lead to increased investment and growth. Economic growth will consequently lead to higher incomes and increased savings. In Table 5, however, it can be seen that domestic savings as a percentage of GDP was, on average, only 5% during 1986–1992 compared to 13% a decade earlier. This would suggest that in Tanzania foreign aid has been replacing domestic savings. This contention on the negative correlation between foreign aid or capital inflows and domestic savings in Tanzania is shared by Mjema (1985, 1994), Likwelile *et al.* (1994b) and Mwinyimvua (1988).

Foreign aid, manufacturing and export performance

According to the Dutch disease theory, the influx of foreign aid will result in declining exports and manufacturing performance. However, in the long run and if properly invested, foreign aid may lead to improved manufacturing and export performance. A look through Table 6 will reveal that growth in the manufacturing sector was negative during 1977–1986 but positive during 1986–1992. The negative growth in manufacturing production coincided with relatively lower foreign aid inflows, while the higher aid inflow during 1986 was marked with record high positive growth rates. This observation does not corroborate the Dutch disease hypothesis of negative correlation between aid inflows

and manufacturing production.

Since the effectiveness of aid depends on resource allocation across sectors, an analysis of the structure of investment in the country is pertinent.

Table 6: Tanzania gross domestic product at 1976 prices (percentage growth)

Year	Agriculture	Manufacturing	Energy and water	Transport and communication	Public administration
1977-82	1.05	-2.69	11.47	0.50	7.33
1982-86	4.64	-3.58	6.68	-2.93	-2.41
1986-92	5.49	4.97	0.33	3.67	2.34
1977	1.15	-6.05	11.42	-1.96	6.62
1978	-1.66	3.37	17.21	2.84	12.01
1979	0.76	3.33	11.19	-3.83	12.44
1980	3.88	-4.89	25.79	11.26	1.37
1981	0.99	-11.22	4.25	-9.13	11.39
1982	1.35	-3.27	0.71	2.54	0.14
1983	2.85	-8.72	1.67	-13.05	-3.37
1984	4.01	2.66	6.31	0.61	0.06
1985	6.00	-3.89	5.01	1.82	1.89
1986	5.73	-4.05	18.00	-0.33	-10.81
1987	4.40	4.52	7.35	5.59	0.56
1988	4.48	7.06	-1.71	3.46	3.08
1989	4.58	7.68	-29.27	12.72	3.95
1990	6.61	-2.54	26.35	-3.40	2.24
1991	9.55	11.51	13.65	1.17	2.04
1992	3.46	2.15	-3.95	3.15	1.67

Source: BOS (1993 & 1994a) *National Accounts of Tanzania*

The picture emerging from the distribution of gross fixed capital formation by sector (Table 7) is that of declining resources allocated to agriculture (which is the mainstay of employment and exports) and of (virtually) undiminishing resources allocated to the manufacturing (the importables) sector. However, despite high rates of investment by international standards — more than twice the average rate in 16% of sub-Saharan Africa (World Bank, 1994b, pg. 38) — growth has been only modest. Anti-export bias in resource allocation and low capacity utilization (below 30%) are the main reasons behind the sluggish growth (see Adams *et al.*, 1994).

The relationship between foreign aid and export performance is mainly through the real exchange rate and the disincentive the aid provides to policy makers. Foreign aid usually comes in terms of foreign exchange or goods and services that would otherwise be imported by the recipient country. The aid recipient's urge to produce for export is thus diminished.

In theory, export performance responds positively to price incentives or the real exchange rate. Empirical studies for Tanzania seem to confirm this contention. In the study by Ndulu and Semboja (1993), for example, it is shown that a depreciating real

exchange rate tends to stimulate exports. This would suggest that since, at least in theory, foreign aid tends to cause real appreciation, it may discourage production for export. This is the dilemma to which policy makers must address themselves. How can the country overcome this dilemma? The answer depends on how the country manages the influx of the foreign aid. Profligate spending of aid money will always result in undesirable consequences.

Table 7: Gross fixed capital formation by economic activity in current prices (as percentage of total investment, unless otherwise stated)

Year	Agriculture	Manufacturing	Transport and communication	Public administration	Other sectors	Total investment
1976	8.61	26.03	31.61	12.66	21.09	5159
1977	6.72	33.50	25.90	11.48	22.40	6663
1978	9.22	22.81	30.80	13.56	23.61	7330
1979	7.98	21.71	29.38	20.87	20.06	8592
1980	8.08	22.65	22.17	22.03	25.06	8630
1981	7.84	22.72	22.33	21.07	26.04	10624
1982	7.82	27.92	19.97	17.66	26.63	10825
1983	12.54	22.24	24.34	15.58	25.30	7752
1984	12.47	21.62	23.71	12.11	30.09	11973
1985	2.83	26.55	29.97	8.14	32.51	16872
1986	2.55	20.45	27.42	6.22	43.36	26939
1987	11.82	24.09	27.20	7.39	29.50	65608
1988	6.65	17.77	26.91	5.82	42.85	102392
1989	2.37	22.18	27.40	5.34	42.71	144087
1990	2.97	23.79	32.17	5.75	35.32	178475
1991	4.75	22.75	30.72	6.20	35.58	250252
1992	4.59	23.51	32.11	6.65	33.14	337325

Source: BOS (1994a; 1993).

Foreign aid, investment and growth

The theoretical positive relationship between foreign aid and growth seems to be valid in Tanzania. In Tables 1 and 5, it can be seen that the boom in the aid inflow during 1986–1992 was marked by record high domestic investment to GDP ratios averaging 32% and positive growth in real per capital GDP averaging 1.07%. On the contrary, lower aid inflow in the previous decade (1976–1996) was marked by a lower domestic investment ratio (averaging 19%) and negative growth of -1.84% of the real per capita GDP.

Given that foreign aid seems to promote investment and growth in Tanzania, it is pertinent to ask whether or not (and to what extent) the country should continue to depend on foreign aid in order to achieve higher investment ratios and positive growth given the potential for a drastic cut-back in aid.

Foreign exchange allocation and productivity growth

In the analysis of the Dutch disease problem, it is pertinent to examine the allocation of foreign exchange resources, especially the extent to which the resources have been used to enhance productivity in the tradeables sectors.

Looking through Table 8 we may see that, during 1986–1992, foreign exchange was allocated mainly to the energy and water, manufacturing, transport and communications, and agricultural sectors.

Table 8: Foreign exchange allocation by sector (percentages, unless otherwise stated)

Sector	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	Average
Agriculture	16.1	18.0	18.6	13.6	17.2	15.2	16.5
Transport and communication	17.2	19.2	14.6	15.7	12.7	12.2	15.3
Energy and water	25.1	25.2	23.6	23.2	22.0	22.7	23.6
Manufacturing	17.9	14.1	15.2	15.7	15.7	15.2	15.6
Mining	2.3	2.5	3.0	4.3	4.6	5.3	3.6
Construction	4.9	4.5	4.5	4.6	4.1	3.5	4.4
Community services	8.6	8.0	7.6	7.7	8.0	7.5	7.9
Others	7.9	8.5	12.9	15.2	15.7	18.4	13.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total foreign exchange (million US$)	1205.8	1230.2	1300.4	1332.0	1421.0	1510.0	

Source: Computed from Economic Recovery Programme 1 (Table 4.2) and Economic Recovery Programme II (Table 3).

The impact of foreign aid allocation on productivity may be deduced from Table 6, where it is shown that growth in the tradeable sectors (agriculture and manufacturing) increased during 1986–1992. The manufacturing sector recorded an average annual growth rate of 5% during 1986–1992 compared to the annual decline of between 3% and 4% in the previous nine years. The growth in agriculture was positive during the period in question, jumping from an average annual growth rate of 1% during 1977-1982 to about 5% during 1982-1992. All this seems to suggest that foreign exchange (or aid) allocation in Tanzania has had a positive impact on productivity.

Policy recipe for managing foreign aid

From the above discussion, we may say that the response of the Tanzanian government to the influx of foreign aid has been a combination of expansionary macroeconomic (or monetary) policies, running down foreign exchange reserves and maintaining the share

of storable imports in the gross domestic product.

Policy responses to foreign aid booms depend on whether the shock is temporary or permanent (see Younger, 1992). For temporary windfalls, the basic life-cycle consumption theory suggests that economic agents would prefer to spread the benefit of the boom over time with a larger proportion of the aid being saved. In such a case, the aid has less potential for Dutch disease. However, saving aid may be undesirable from the policy perspective since it implies lending the aid abroad and thus making it unavailable for financing domestic investment. The correct policy response to the influx of aid would be to direct it to domestic productive investment to induce a positive supply response over time.

If the foreign aid inflow is in fact permanent, there is less need for policy intervention as most of the aid is spent on imports.

Since foreign aid tends to generate real appreciation if spent for investment purposes or directly on final consumption of domestic goods and services, the government should adopt other policies to offset the impact of the aid inflows. Such policies include increasing openness to international trade, and non-inflationary fiscal and monetary policies.

III. Determining the real exchange rate in Tanzania

This section discusses the determination of the real exchange rate and estimates the static long-run equilibrium and dynamic short-run RER models in Tanzania. This will help us to assess whether or not foreign aid causes real appreciation and hence the potential of the aid to cause Dutch disease in the country.

The real exchange rate and its determinants

In the long run, the real exchange rate is determined by real variables only. In the short run, however, devaluation of the nominal exchange rate and macroeconomic policy are also important determinants (see Edwards, 1989).

Nominal exchange rate is a monetary concept that measures the relative price of two currencies, that is, the price of foreign currency in terms of the domestic currency. The actual or observed real exchange rate (RER), on the other hand, is a real concept measuring the relative price of two goods. It is defined as the ratio of the price of tradeable goods to the price of non-tradeable goods.

Changes in the RER may be justified by real events in the economy such as technological progress and changes in the international terms of trade. Such changes are equilibrium phenomena and may not require policy intervention. There can also be unjustified departure of the observed real exchange rate from its equilibrium value. The unjustified departures are cases of real exchange rate disequilibrium or misalignment of the real exchange rate. Real exchange rate misalignment is defined as sustained deviation of the actual real exchange rate from its long-run equilibrium level. If the actual RER is below the equilibrium real exchange rate, we have over-valuation of the real exchange rate. If the actual real exchange rate exceeds its equilibrium level, then we have under-valuation of the RER.

Equilibrium real exchange rate (ERER) is defined as that relative price of tradeables to non-tradeables that is compatible with attainment of internal and external equilibrium. Internal equilibrium means that the non-tradeable goods market clears in the current period and is expected to be in equilibrium in future periods. External equilibrium means that the current account balances (current and future) are compatible with long-run sustainable capital flows.

The determination of the equilibrium real exchange rate has been well elaborated in, for example, Edwards (1989), Elbadawi (1993) and Ndulu (1993). In the analysis of the

ERER, it is important to separate the variables that enter the long-run specification, that is the fundamentals, from the short-run influences that affect the dynamic behaviour of the real exchange rate. In theory of equilibrium real exchange rate, the most important fundamental determinants of the ERER are: foreign aid or net capital inflows; external terms of trade; government consumption of non-tradeables; exchange and trade controls; and technological progress. The model for the ERER can thus be written as:

$$log(ERER)_t = \alpha_0 + \alpha_1 log(AID)_t + \alpha_2 log(TOT)_t + \alpha_3 log(GCON)_t + \alpha_4 log(OPEN)_t + \alpha_5 log(TEKP)_t + \mu_t \quad (1)$$

where ERER is equilibrium real exchange rate as defined above; AID is net official development assistance expressed as a percentage of the GDP; TOT is external terms of trade; GCON is government consumption as a percentage of the GDP; OPEN is openness of the economy defined as the sum of exports and imports expressed as a percentage of the GDP; TEKP is technological progress proxied by time trend; and μ is an error term.

The ODA figures were obtained from the various issues of DAC, *Geographical Distribution of Financial Flows to Developing Countries*. The data on external terms of trade were obtained from the World Bank *World Tables*. The data on openness and government consumption were obtained from the IMF *International Financial Statistics*.

Foreign aid (and net capital) inflows tend to cause an appreciation of the real exchange rate by increasing real incomes and consequently the demand for both traded and non-traded goods. Since prices of importables are determined in the world market, a surge in demand for such goods will have no impact on domestic prices as long as the nominal exchange rate is not altered. The increase in the demand for non-tradeables, however, will put upward pressure on domestic prices and thus cause real appreciation.

The effect of terms of trade shocks on the equilibrium real exchange rate depends on whether or not the income effect exceeds the substitution effect. If the income effect associated with a terms of trade deterioration dominates the substitution effect, a worsening of the terms of trade will result in an equilibrium real depreciation.

The imposition of tariffs will generally result in real appreciation. With initial low rates, the import tariffs (either temporarily or permanently) will usually generate an equilibrium real appreciation in the current and future periods. A sufficient condition is that there is (net) substitutability in demand among all three types of goods — exportable, importable and non-tradeable. For this result to hold when initial tariffs are high, we need, in addition, that income effects do not dominate substitution effects. If, however, there is complementarity in consumption, it is possible that the imposition of import tariffs will generate a real equilibrium depreciation.

Empirical studies for Tanzania suggest that tariffs are not significant determinants of the behaviour of the real exchange rate (see, for example, Ndulu, 1993). We instead use the openness of the economy as a proxy for trade and exchange controls. An increase in the openness will tend to cause real depreciation.

The effect of an increase in government consumption on the equilibrium real exchange rate depends on the composition of this consumption. If it falls fully on non-tradeables,

the equilibrium real exchange rate will tend to appreciate. If it falls fully on tradeables there will be an equilibrium real depreciation. For these effects to hold, we assume that increased government consumption is financed through an increase in public debt, which, in turn, requires a hike in taxes to be sustainable (see Edwards, 1989, pg. 46).

Technical progress also has an impact on the equilibrium real exchange rate (ERER). According to Balassa (1964), if the gains of productivity improvement are higher in the tradeable relative to the non-tradeable sectors, there will be an appreciation of the ERER — the Ricardo-Balassa effect (see Ghura and Grennes, 1993). This is because the technological progress in the tradeables sector will result in a greater shift to the right of the supply curve for tradeable goods than the shift in supply for non-traded goods. The price of tradeable goods will thus fall relative to that of the non-tradeables. Technological progress may also increase the demand for non-traded goods due to the income effect.

Nominal devaluation will tend to cause a depreciation of the observed real exchange rate while expansionary macroeconomic policy will cause the real exchange rate to appreciate.

Following Edwards (1989), the dynamics of the real exchange rate can be captured by the following equation:

$$\Delta \log RER_t = \Theta\{\log ERER_t - \log RER_{t-1}\} - \lambda\{Z_t - Z_t{}^*\} + \varnothing\{\log E_t - \log E_{t-1}\} \qquad (2)$$

where RER_t is the actual or measured real exchange rate; $ERER_t$ is the equilibrium real exchange rate, which is itself a function of real variables (the "fundamentals") only; Z_t is an index of macroeconomic policies; $Z_t{}^*$ is the sustainable level of macroeconomic policies; E_t is the nominal exchange rate; and Θ, λ and $\varnothing$ are positive parameters capturing the most important aspects of the adjustment process.

The short-run real exchange rate model is obtained by substituting Equation 1 into Equation 2 and replacing the expressions for the macroeconomic and devaluation variables in Equation 2 to get

$$log(RER_t) = \beta_0 + \beta_1 log(AID)_t + \beta_2 log\ (TOT)_t + \beta_3 log(GCON)_t + \beta_4 log(OPEN)_t + \beta_5 log(TEKP)_t - \beta_6 logRER_{t-1} + \beta_7 log(CRED)_t + \beta_8 DLEX_t + \mu_t \qquad (3)$$

where the β_i's (i=1,..8) are positive parameters and RER, AID, TOT, GCON, OPEN and TEKP are as defined above. CRED is a proxy for macroeconomic policy and DLEX is devaluation of the local currency. The data on domestic credit and nominal exchange rate were obtained from the IMF *International Financial Statistics*.

Econometric results of the empirical RER models

In order to avoid spurious regression, we use cointegration techniques in estimating the

real exchange rate model. Behind the cointegration technique lies the idea that some non-stationary variables may drift apart in the short run but may eventually converge toward an equilibrium in the long run. In order to test this hypothesis, we first have to determine whether the variables in question are stationary or non-stationary. A stationary time series has a finite variance, transitory innovations from the mean and a tendency to return to its mean value. In contrast, a non-stationary series has a variance that is asymptotic infinite, with permanent innovations to the series; moreover, the series rarely crosses the mean (in finite samples).

According to Granger (1986) and Engle and Granger (1987), a non-stationary time series X_t is said to be integrated of order *d* (or I(*d*) if it achieves stationarity after being differentiated *d* times. In turn, two I(*d*) variables are said to be cointegrated if a linear combination of them is integrated of any order less than *d*.

In Table 9 we present the stationarity tests for the variables used for the static cointegration equation and the dynamic short-run RER model.

Table 9: Unit root tests for the RER model variables

Variable	Sample: 1969-1993 Critical value at 5% level = -3.603	Sample: 1971-1993 Critical value at 5% level = -3.622
	t-adf	t-adf
$\log(RER)_t$	-1.1804	
$\log(RER)_{t-1}$	-1.5607	
$\log(AID)_t$	-2.1717	
$\log(AID)_{t-1}$	-2.2249	
$\log(OPEN)_t$	-0.0915	
$\log(OPEN)_{t-1}$	-0.5786	
$\log(GTEX)_t$	-1.8721	
$\log(GTEX)_{t-1}$	-2.0780	
ECT_{t-1}		-5.0574
ECT_{t-2}		-3.9035
$DL(RER)_t$		-3.6427
$DL(RER)_{t-1}$		-3.0470
$DL(AID)_t$		-4.7050
$DL(AID)_{t-1}$		-3.1241
$DL(OPEN)_t$		-3.4021
$DL(OPEN)_{t-1}$		-2.6733
$DL(GTEX)_t$		-4.1438
$DL(GTEX)_{t-1}$		-3.6372
$DL(CRED)_t$		-5.1544
$DL(CRED)_{t-1}$		-5.0675
$DDLEX_t$		-7.2134
$DDLEX_{t-1}$		-4.9904

The DL (.) variables are the first difference of the log variables while DDLEX is the second difference of the log of the nominal exchange rate. ECT_{t-1} is the lag of the error-correction term or the residuals of the cointegration regression.The tests were done using the PCGIVE software developed by Hendry (1989). The software was used to compute both the t-adf statistics and their critical values.

The stationarity tests indicate that all the long-run RER model variables are non-stationary as indicated by the ADF — augmented Dickey-Fuller — statistics that are greater than their critical value (-3.603) at the 5% significance level. All of the short-run RER variables are stationary except $DL(RER)_{t-1}$ $DL(AID)_{t-1}$ $DL(OPEN)_{t-1}$ and $DL(OPEN)_t$ — the first lags of the real exchange rate, foreign aid, openness of the economy and contemporaneous level of openness, respectively. The t-ADF statistics for $DL(RER)_{t-1}$ $DL(OPEN)_t$ and $DL(AID)_{t-1}$ are, however, close to their critical values and thus we complemented the ADF test by the plot of these three variables. The plots suggest that the variables are fairly stationary.

The long-run RER regression results

In estimating the long-run equilibrium real exchange rate (ERER) we first checked for cointegration between the contemporaneous RER and the explanatory variables in logarithmic levels. We started by estimating the general model (Equation 1) and testing for stationarity of the residuals. Once the residuals were found to be stationary, we tested for the goodness of fit (R^2) using the F-test.

The estimated long-run equilibrium real exchange model is presented in Table 10.

Table 10: The long-run equilibrium RER model results

Modeling log(RER) by OLS
Sample: 1967-1993

Variable	coefficient	std.error	t-value
Constant	3.256	0.494	6.592
log(AID)	0.560	0.037	14.972
log(OPEN)	0.825	0.067	12.333
log(GTEX)	-0.864	0.148	-5.831

R^2 = 0.962; F(3,23) = 192.56; RSS = 0.359; σ = 0.125; DW = 1.97;

Unit root test for residuals: t-adf(0) = -5.3795; t-adf(1) = -4.0076; Critical values for cointegration test with 25 observations and three variables: -3.60 at 5% level; -3.20 at 10% level (see Blangiewicz and Charemza, 1990, p. 310).

Diagnostic tests:

AR(1-2)	F(2,21)	= 0.05087
ARCH(1)	F(1,21)	= 0.00439
Normality	$\chi 2$	= 0.75077
RESET	F(1,22)	= 0.04181

Figure 1: Long-run equilibrium real exchange rate

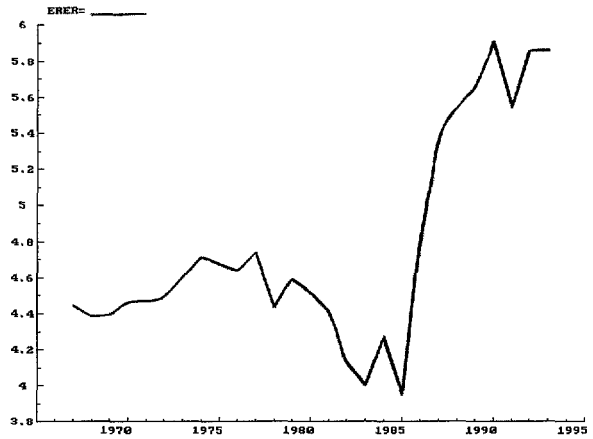
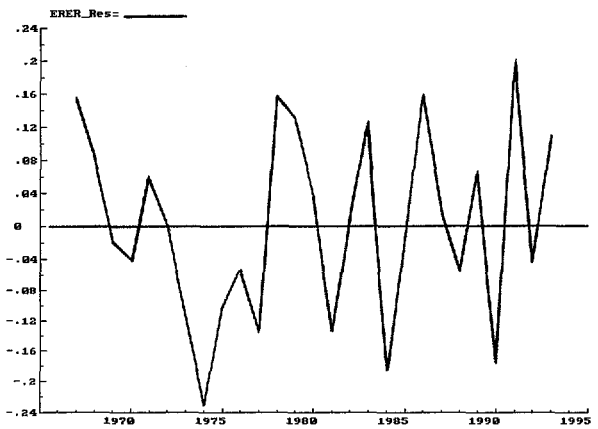


Figure 2: Residuals of the equilibrium real exchange rate



Omitted from the cointegration equation are the variables for government consumption, external terms of trade, import tariffs and technological progress. These variables were found not to be cointegrated with the long-run equilibrium RER.

The equilibrium real exchange rate and the residuals from the cointegration regression are shown in Figures 1 and 2, respectively.

From Figure 2 we may say that the ERER residuals seem to be stationary and thus confirm the existence of cointegration between the real exchange rate, foreign aid, openness of the economy and government expenditure.

As shown in Table 10, the unit root test for the residuals of the cointegration equation reveals that the residuals are stationary as indicated by ADF statistics that are less than their critical values (-3.60 at the 5% significance level).

We then performed diagnostic tests for the cointegration equation (see Table 10). The maximum likelihood (LM) autocorrelation test indicates absence of autocorrelation since the AR (1-2) F-statistic is less than its critical value (of 3.47 at the 5% significance level). The ARCH(1) test suggests the absence of autoregressive-conditional heteroscedastcity as indicated by the low F (1,21) statistic, which is lower than its critical value of 4.32 at the conventional significance level. The model also passes the normality Chi^2 test since the Chi^2 statistic is less than its critical value of 5.99 at 5% significance level. This implies that the residuals are white noise. The F (1,22) statistic for the regression specification test (RESET) — which is less than its 4.30 critical value at 5% significance level — suggests that our model is correctly specified in the sense that the values of the coefficients for the omitted variables are zeros.

Total government expenditure is inversely related to the equilibrium real exchange rate in Tanzania and is statistically significant at the conventional level. This is consistent with the theoretical discussion above in which it was argued that increases in government consumption will tend to cause the real exchange rate to appreciate. The fact that the real exchange rate depreciated in the late 1980s and early 1990s is an indication that government expenditure has been curtailed.

In line with the theory of real exchange rate determination, openness of the economy bears a positive sign and is statistically significant at 5% significance level. This suggests that the reduction in trade and exchange controls in Tanzania tends to cause real depreciation.

Contrary to the RER theory, foreign aid bears an unexpected positive sign and is statistically significant at 5% significance level. This is to say that foreign aid inflow in Tanzania causes the real exchange rate to depreciate. A similar result was obtained (between capital flows and the RER) for Nigeria in the study by Ogun (1995). The positive correlation between foreign aid and the real exchange rate in Tanzania may be due to the fact that the aid inflows have a larger impact on the nominal exchange rate (or devaluation) through increased money supply than on the domestic price level or the consumer price index.

The short-run RER regression results

In estimating the short-run RER model we used residuals from the cointegration regression as the error-correction term (ECT). We then formed an error-correction model of the real exchange rate. The estimated general and parsimonious error-correction models are presented in Tables 11 and 12, respectively.

Table 11: The general short-run RER model estimates

Modeling Δlog(RER) by OLS
Sample: 1970 - 1993

Variable	coefficient	std.error	t-value
Constant	-0.0429	0.0572	-0.750
$\Delta\log(RER)_{t-1}$	0.7431	0.2136	3.479
$\Delta\log(AID)_t$	0.0731	0.0963	0.759
$\Delta\log(AID)_{t-1}$	-0.1090	0.1310	-0.832
$\Delta\log(OPEN)_t$	0.4343	0.1910	2.274
$\Delta\log(OPEN)_{t-1}$	0.0249	0.1932	-0.129
$\Delta\log(GTEX)_t$	-0.1637	0.1455	-1.125
$\Delta\log(GTEX)_{t-1}$	0.1309	0.1974	0.663
ECT_{t-1}	-0.6667	0.2323	-2.871
$\Delta\log(CRED)_t$	0.0278	0.1774	0.157
$\Delta\log(CRED)_{t-1}$	0.1483	0.1919	0.772
$\Delta DLEX_t$	0.6911	0.1261	5.482
$\Delta DLEX_{t-1}$	0.0960	0.0691	1.390

$R^2 = 0.966$; $F(12,11) = 25.937$; RSS = 0.049; $\sigma = 0.067$; DW = 2.10.

Schwarz = -4.4813

AR(1-1)	F(1,10)	= 0.4409
ARCH(1)	F(1,9)	= 0.4368
Normality	$\chi 2$	= 0.9795
RESET	F(1,10)	= 2.9565

Table 12: The short-run RER parsimonious model estimates

Modeling Δlog(RER) by OLS
Sample: 1970 - 1993

Variable	coefficient	std.error	t-value
Constant	-0.011694	0.01409	-0.830
$\Delta\log(RER)_{t-1}$	0.69702	0.11161	6.245
$\Delta\log(AID)_t$	0.13154	0.07111	1.850
$\Delta\log(OPEN)_t$	0.37350	0.12897	2.896
$\Delta\log(GTEX)_t$	0.18516	0.11835	-1.565
ECT_{t-1}	-0.54601	0.15076	-3.622
$\Delta DLEX_t$	0.68907	0.08787	7.842

$R^2 = 0.9551$; $F(6,17) = 60.319$; DW = 2.33; RSS = 0.0638; $\sigma = 0.0597$.

Schwarz = -5.0025

Diagnostic tests:

AR(1-2)	F(2,15)	= 1.5414
ARCH(1)	F(1,13)	= 0.1407
Normality	$\chi 2$	= 0.8389
RESET	F(1,16)	= 1.9789

From the general error-correction model, we eliminated variables that had low t-statistics and applied the F-test to check for each of the reduced models. Omitted variables from the parsimonious model included the proxies for macroeconomic policy, that is excess credit as defined above, changes in the logarithm of nominal domestic credit and fiscal policy.

The general short-run RER model passes the diagnostic tests for autocorrelation (the AR test), autoregressive-conditional heteroscedasticity (ARCH test), normality Chi^2 test and the model specification (RESET) test as indicated by the test statistics, which are lower than their critical values at 5% significance level.

The final and parsimonious model is presented in Table 12. The Schwarz criterion has fallen from -4.4813 in the general model to -5.0025 in the parsimonious model. This suggests that we have achieved model parsimony as we reduced the general model.

We then tested for the stability of the coefficients of the parsimonious model. To do so we re-estimated the model using the recursive least squares (RLS) method. The results seem to suggest that all the variable coefficients were stable during the whole sample period.

In Figures 3 and 4 we present graphs for the one-step residuals and the one-step Chow test, respectively.

The graph for the one-step recursive residuals indicates that at no point in the sample period was the one-period equation error statistically significant. The one-step Chow test for the entire sample period indicates that over the period the model never failed to explain changes in the real exchange rate.

The regression results for the dynamic parsimonious RER model indicate that in the short run the contemporaneous changes in government expenditure, openness of the economy and foreign aid inflows are significant determinants of the RER. While foreign aid and openness of the economy tend to depreciate the RER, government expenditure tends to appreciate it. The lag of the RER bears an expected positive sign.

The error-correction term is negative and significant, implying that when the RER deviates from its equilibrium level, there will be a feedback mechanism (through changes in the fundamentals) to correct the misalignment.

Nominal devaluation is significant and bears an expected positive sign. The large coefficient (0.69) suggests that devaluation is an important policy instrument for correcting misalignment of the real exchange rate.

Figure 3: One-step residuals

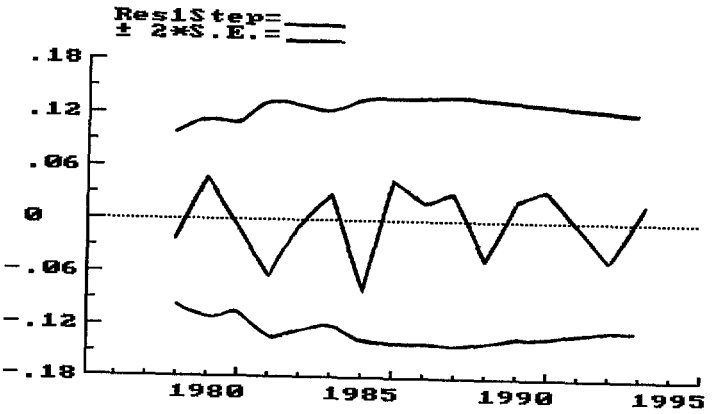
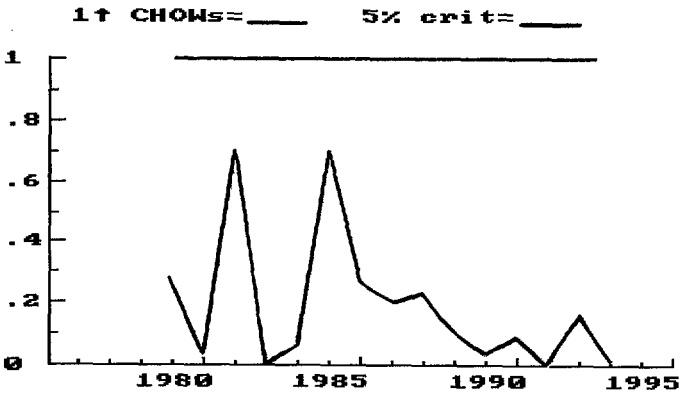


Figure 4: One-step Chow test



IV. Conclusions and policy recommendations

In this paper we examined the question of foreign aid to see whether, through its impact on the real exchange rate, it causes Dutch disease in Tanzania. We then analysed the country's policy response to the influx of foreign aid. We argued that although seemingly beneficial, foreign aid may generate undesirable consequences for the recipient country. These undesirable impacts include appreciation of the real exchange rate and the consequent decline in export performance.

The correct policy response to the aid syndrome is for economic agents to spend the aid money for direct productive investment to induce a positive supply response. The government (which is the main recipient of the aid) should also implement suitable economic policies that will offset the tendency for foreign aid to generate real appreciation. High on the list of the accompanying policies is enhancing economic liberalization, establishing a freely functioning foreign exchange market, and instituting non-inflationary monetary and fiscal policies.

In the analysis of the determination of the real exchange rate, we found that the important determinants of the long-run RER are the extent of trade and exchange controls, government expenditure, and foreign aid inflows. In the short run, the RER is also determined by nominal devaluation.

We cannot reject the hypotheses that increases in openness of the economy and nominal devaluation cause real depreciation and that increased government expenditure causes real appreciation. However, the hypothesis that foreign aid inflow causes real appreciation is rejected for the case of Tanzania. This then tends to refute the proposition that foreign aid has caused Dutch disease in the country, since rather than appreciating the real exchange rate, the aid leads to real depreciation. However, when the foreign exchange market is freely functioning, aid inflows will tend to appreciate the real exchange rate. This is therefore a problem that policy markers will have to deal with in the years to come.

Notes

1. For a detailed analysis of Dutch disease see Corden and Neary (1982).

2. I would like to thank one anonymous referee who brought to my attention that, as observed by Boone (1995), the growth objectives may not be achieved because some (if not most) of the aid is spent on public consumption rather than investment.

3. Another popular definition of the real exchange rate is based on the purchasing power parity (PPP) approach according to which the PPP real exchange rate (e_{PPP}) is defined as e_{PPP}=E.P*/P where E is the nominal exchange rate and P* and P are the foreign and domestic consumer (or producer) price indexes, respectively. The P* and P are each weighted averages of tradeable and non-tradeable goods. Depending on the behaviour of foreign relative prices, (P_T*/P_N*), it can be shown that changes in the e_{PPP} and RER=P_T/P_N are not the same and can even move in opposite directions (see Edwards, 1989, p. 6).

4. There are multiple definitions and measurements of the phenomenon of "capital flight". For detailed analysis of capital flight, see Nyoni (1996), Eggerstedt *et al.* (1995), Cuddington (1986), and Lessard and Williamson (1987).

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Appendix tables

Table A1: Total government expenditure, population, gross domestic product and gross fixed capital formation in Tsh millions

Year	Total government expenditure in current Tsh	Population	GDP in current Tsh	Real GDP in 1976 Tsh	Investment in 1976 Tsh
1967	1185	12.26	7343	15145	3216.83
1968	1417	12.59	7874	15939	3334.55
1969	1642	12.93	8271	16301	3011.85
1970	1918	13.27	9174	16945	4447.88
1971	2405	13.63	9814	17542	5471.01
1972	2376	14.00	11172	18664	5111.84
1973	2995	14.37	13103	19166	4940.14
1974	4230	14.76	15994	19411	4837.63
1975	6163	15.31	19011	20407	5022.06
1976	6326	16.41	24419	21652	6074.55
1977	6270	16.92	28868	21739	6663.00
1978	9622	17.44	32169	22202	6717.94
1979	11921	17.98	36283	22739	7150.56
1980	13943	18.58	42118	23419	6372.20
1981	14755	19.17	49102	23301	6694.87
1982	17387	19.78	58226	23439	5786.66
1983	18993	20.41	70509	22886	3340.73
1984	20409	21.06	88892	23656	4231.16
1985	28509	21.73	120621	24278	4509.56
1986	31710	22.46	159648	25070	5980.44
1987	47871	23.22	226444	26345	10053.78
1988	75297	24.00	331217	27460	10711.77
1989	106098	24.80	407085	28558	12019.45
1990	140871	25.63	505210	29921	17098.17
1991	207292	26.40	697688	31623	13692.20
1992	261051	27.20	807336	32372	16259.50
1993	336015	28.02	845485	33925	17538.39

Sources: BOS (1994 a&b); IMF (1995).

Table A2: Selected macroeconomic indicators in Tanzania

Year	TOT (1977=100)	Official EXR (TShs/1US$)	Paral mrkt EXR (TShs/1US$)	Official EXR (TShs/SDR)	PREMIUM[1] (1977=100)	CPI (1977=100)
1967	69.44	7.14	8.70	7.14	13.7	32.10
1968	66.13	7.14	8.50	7.14	12.0	37.04
1969	81.47	7.14	8.70	7.14	13.7	43.21
1970	80.40	7.14	10.10	7.14	26.0	44.44
1971	70.33	7.14	11.60	7.76	39.2	46.91
1972	67.85	7.14	15.40	7.76	72.6	50.62
1973	84.60	7.02	14.50	8.32	66.9	55.56
1974	76.96	7.14	13.50	8.75	55.9	66.67
1975	65.94	7.36	20.60	9.66	112.7	83.95
1976	89.88	8.38	21.90	9.66	101.3	89.51
1977	100.00	8.29	21.50	9.66	100.0	100.00
1978	81.85	7.12	13.10	9.66	43.9	111.73
1979	81.73	8.22	20.00	10.83	89.9	127.16
1980	71.23	8.20	25.70	10.44	133.9	165.43
1981	60.53	8.28	35.10	9.69	203.3	207.41
1982	62.83	9.28	43.40	10.55	230.7	267.90
1983	64.80	11.14	39.60	13.04	160.3	340.12
1984	68.49	15.29	60.00	17.75	183.5	462.96
1985	64.42	17.47	100.80	18.12	299.3	617.28
1986	73.77	32.70	167.50	63.26	258.7	817.28
1987	63.65	64.26	180.00	118.77	113.0	1062.35
1988	62.00	99.29	210.00	168.21	70.0	1393.83
1989	58.24	143.38	270.00	252.71	55.4	1753.70
1990	50.03	195.06	330.00	279.70	43.4	2099.38
1991	49.52	219.16	370.00	334.58	43.2	2567.28
1992	45.13	297.71	450.00	460.63	32.1	3133.95
1993	45.13	405.27	475.00	659.13	10.8	3869.14

Source: BOS, various issues; IMF (1995) for the exchange rates; World Bank (1994) *World Tables* for external terms of trade; Kaufmann and O'Connell (1992) and own observations for parallel market exchange rates.

[1] Index of parallel market premium. The premium is computed as (EU-EO)/EO where EU and EO are the unofficial or parallel market and official nominal exchange rate, respectively.