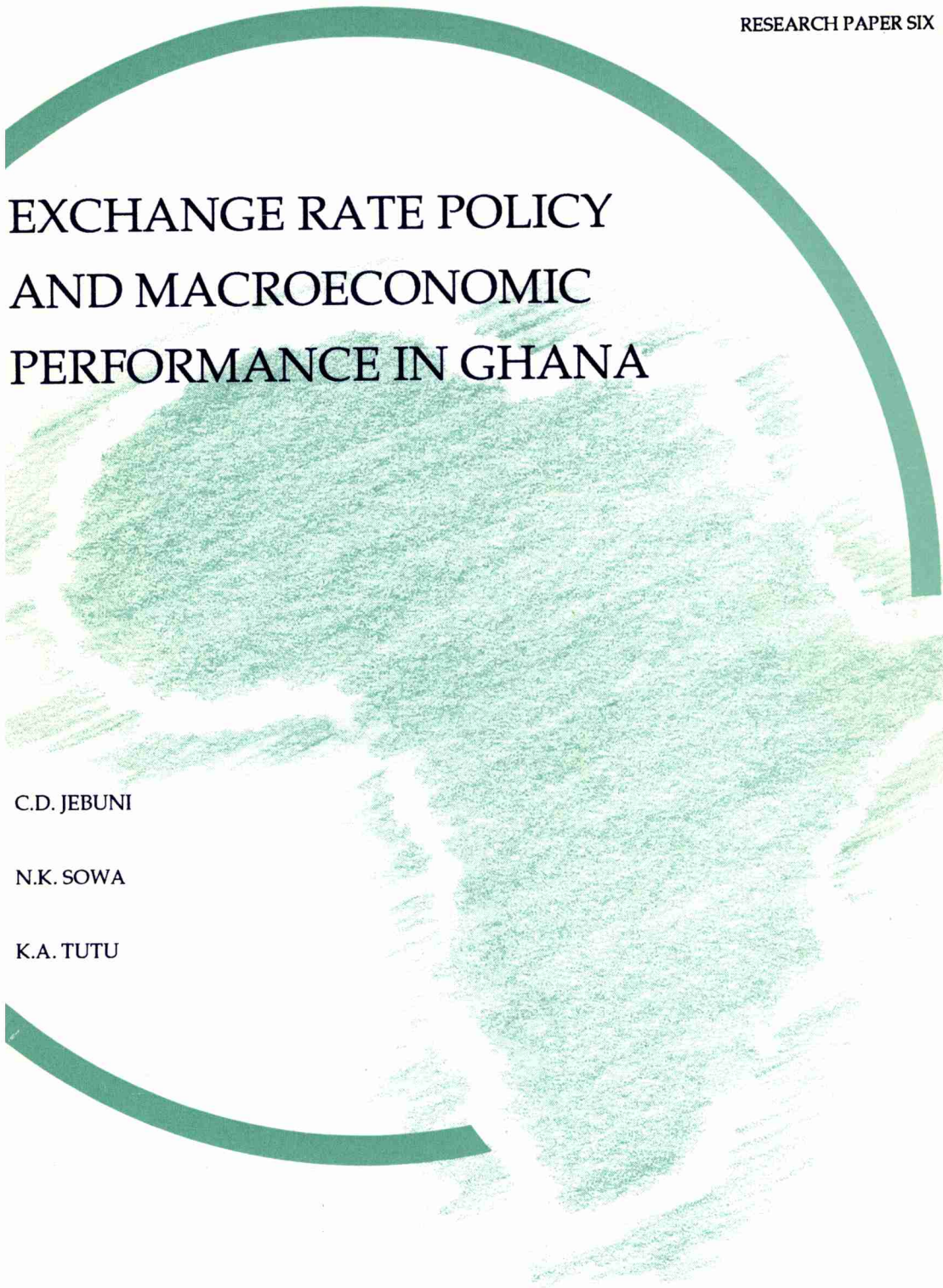


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EXCHANGE RATE POLICY AND MACROECONOMIC PERFORMANCE IN GHANA

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I. Introduction

The economy of Ghana has persistently declined since the early 1960s. GDP declined at the rate of 1.3 percent between 1960 and 1982. By 1983, the rate of inflation had climbed to 123 percent. Food production also declined over the years, while the population was growing at a staggering 3.2 percent. All these factors meant economic hardship for the country. Balance of payment difficulties and shortage of foreign exchange also meant low industrial output. Most industries in Ghana were operating greatly below capacity prior to 1986.

A number of factors could account for this poor performance. One of the main ones is thought to be policy-induced distortions in the economy. It was therefore felt that through appropriate exchange-rate, fiscal, monetary, trade and payments policies these distortions could be removed, creating a structure that would favour the productive sectors of the economy. This was the basis of the economic recovery programme initiated in April 1983 and planned to continue to at least 1992.

This is not the first time that Ghana has undertaken such programmes. In response to similar conditions in 1967, 1971/72 and 1978, a similar set of Bank/Fund-supported programmes was initiated. However, on each occasion the programmes lasted for a very short time. Ghana's first military regime, the National Liberation Council (NLC), followed an IMF adjustment programme for two years (1967 to 1969). The current programme, which began in 1983, has been the longest and most persistent. Indeed, very few countries can boast of having assiduously followed an IMF programme for so long. It is no wonder that Ghana has become a "pet" of the Fund and the Bank, and has received all six facilities under the Fund's structural adjustment programme.

The initial years of the programme produced a dramatic change in the Ghanaian economy which caught the attention of the whole world. The downward trend in the economy was reversed; gross national output, which had been declining throughout the 1970s, started to show signs of growth, inflation was lowered and the country's balance of payments showed promise of a recovery.

Whereas the timing of this recovery coincided with the initiation of the adjustment programme, recognition should also be given to some natural factors, particularly the weather. In other words, the issue of causality between the adjustment measures and the recent "recovery" of the Ghanaian economy has not been fully established.

A central issue in the economic recovery programme (ERP), is the removal of distortions in the economy which had prevented the proper allocation of resources. These distortions were exacerbated by government interventions in several sectors of the economy. Price controls increased activities in the parallel markets, including foreign exchange.

As part of the measures taken under the adjustment programme, trade was liberalized, price controls were removed and exchange rate reforms were introduced.

Ghana has an import-constrained economy. The country's foreign exchange earning is dependent on the export of a few primary products—basically cocoa, gold and timber. Most development activities hinge on the availability of imports. In such an import-constrained economy exchange rate policies are very important in the performance of the economy.

Exchange rate policy has been an important component of orthodox stabilization programmes. Devaluation has been the consistent policy used in Ghana since 1967. It is supposed to lead to expenditure switching, increased production of tradables, higher exports, lower imports and, consequently, an improved external payments position for the country. Such measures in other developing countries have had mixed results. In some cases, real devaluations have been found to be contractionary. Such contractionary effects could happen through a negative real balance effect (Frenkel and Johnson, 1976) or through redistribution of income (Diaz-Alejandro, 1965; Krugman and Taylor, 1978). On the supply side, real devaluation may also lead to recessionary shifts in aggregate supply (Van Wijnbergen, 1986). Other studies by Gylfason and Radetzki (1985) and Branson (1986) also found real devaluations to have contractionary effects.

On the other hand, real devaluation could also lead to expansionary effects (Gylfason and Schmidt, 1983; Katseli, 1983; Buffie, 1984; Hanson, 1983; Connolly, 1983; Taylor and Rosensweig, 1984; Krueger, 1978; and Cooper, 1971).

This paper seeks to examine the effect of various exchange rate policies on the economy of Ghana. In particular, it addresses itself to the effect of adjustments in the exchange rate on growth of the economy—both sectoral and global, exports and imports.

Section II presents an analysis of the various exchange rate policies Ghana has had since independence. Special attention is given to the ERP period since the exchange rate seems to have gone through more changes under this regime. Section III analyses the recent performance of the economy using the basic available data without attributing any causality. In Section IV an attempt is made to model the relationship between macroeconomic performance and changes in the real exchange rate. Section V presents the empirical results. Recommendations and conclusions follow in the last section.

II. Exchange rate policy in Ghana

The Pre-ERP period

Prior to the advent of the Economic Recovery Programme, Ghana's exchange rate policy had involved the maintenance of a fixed exchange rate with occasional devaluations. This passive attitude towards exchange rate management was one of the factors which led to the crisis in the Ghanaian economy in the late 1970s and early 1980s.

At independence, Ghana had accumulated external reserves of about \$269 million. The Nkrumah government, which took over from the British, engaged in massive development and modernization projects. A social and economic infrastructure was established, and some import substituting industries were set up. These projects started at a time when cocoa, the country's chief foreign exchange earner, was in a boom. Soon after these projects had begun, the price of cocoa started to fall; the London price declined from US\$ 977 per tonne in 1958 to an all-time low of US\$ 400 per tonne in 1965, and continued falling. By 1972, the price of cocoa had still not returned to its 1958 level. The falling price of cocoa led to a fall in Ghana's external and internal revenues. As early as 1961, the country's reserve position had become precarious. Pressure from the IMF and the World Bank for the country to accept an orthodox stabilization policy, including devaluation, was rejected, and Ghana continued to maintain an overvalued fixed-exchange rate.

Ghana was the first country in the West African Currency Union to disengage herself from the West African Currency Board and form its own central bank, the Bank of Ghana. In November 1958, the country introduced a new currency, the Ghana pound (£G) which was set at par with the British pound sterling, then exchanging for US\$ 2.80. On 19 July 1965, the pound was decimalized and a new name, "cedi" was introduced. The external value of the cedi was established at C1 = US\$ 1.166. This decimalization was not accompanied by a change in the external value of the Ghana currency. The Ghana pound was formally demonetized on 17 December 1966.

After the NLC coup of 1966, the basis of the currency unit was changed from 8s 4d to 10s. In other words the smallest currency unit in Ghana, the "pesewa" was valued greater than the British penny.

On 23 February 1967, a new currency, known as the new cedi (NC), was established at $NC1 = US\$ 1.166$. The new cedi exchanged with the old at the rate of $NC1.00 = 1.20$, and the external value of the new cedi was fixed at $US\$ 1.00 = NC 0.714$. This change in the monetary unit did not lead to a revaluation of the currency. Later the prefix “new” was dropped from the name.

By the time the National Liberation Council government took over from Nkrumah, the economy was thought to have declined to its lowest level. Exports were at best stagnant and imports scarce. There were shortages of some consumables—especially milk and sugar. Most factories were producing below capacity because of lack of raw materials. Growth rate in per capita GDP had remained negative for four consecutive years since 1964. The NLC government accepted the IMF and World Bank economic package and on 8 July 1967 Ghana had its first official devaluation of the cedi. The par value of the new cedi was set at $US\$ 1.00 = C1.02$, a devaluation of about 30 percent. With the support of both the Fund and the Bank, credit facilities were extended to the government and this momentarily eased the import pressure that the Nkrumah government had faced.

Up to 1971, Ghana’s currency had remained pegged to sterling. Yet in November 1967, when the pound sterling was devalued,¹ Ghana like many other sterling area countries, did not devalue her currency.

As a result of increasing balance of payments difficulties, depletion of foreign reserves and a build-up of uncleared short-term debts, in December 1971 the Busia government devalued the currency again, this time by 44 percent to a par value of $C1.82 = US\$ 1.00$. The cedi was later revalued to $C1.28 = US\$ 1.00$. The coup d’état in January 1972 resulted in a real depreciation of the currency by 25 percent. However, from 1973 the currency started appreciating and continued to do so up to 1978, largely as a result of rising government deficits and inflation.

In June 1978, Ghana introduced a flexible exchange system under which the exchange rate for the cedi in terms of the US dollar was to be adjusted to reflect the underlying economic, financial, and balance of payments situation. Such adjustments were discontinued in August 1978 when the rate of exchange was fixed at $C2.75 = US\$ 1.00$. This was the rate inherited by the Provisional National Defence Council (PNDC). The real exchange rate depreciated in 1979 and continued the appreciation from 1980 to 1982, as shown in Table 1 and Figure 1.

The ERP period

The “adjustment era” has been characterized by massive reforms in exchange rate policy. The country has moved from the fixed exchange rate regime of the pre-adjustment period to a regime of “managed float” in which rates are determined at weekly auctions.

In April 1983, as a harbinger to the Economic Recovery Programme to be introduced a few months later, a system of multiple exchange rates based on bonuses and surcharges applied to specified transactions was tried and aban-

done. In October 1983, the exchange rate system was unified at the rate of C30 = US\$1. During 1985, the exchange rate of the cedi was adjusted three times, culminating in a rate of C60:US\$1. In January 1986, the exchange rate was again adjusted to C90 = US\$1, representing a depreciation of 33.3 percent

In September 1986 the government of the Provisional National Defence Council (PNDC) introduced an auction system for determining exchange rates. These rates were to be determined by "market forces" through biddings.

The auction system started with two "windows"—Window 1 for official transactions and Window 2 for all other transactions. Initially, transactions through Window 1 were allowed at the fixed exchange rate of C90 to the dollar. In February 1987, however, the two windows were merged and all foreign transactions were made at the auction-determined marginal rates.²

Table 1 Trends in the real exchange rate in Ghana, 1970–1988

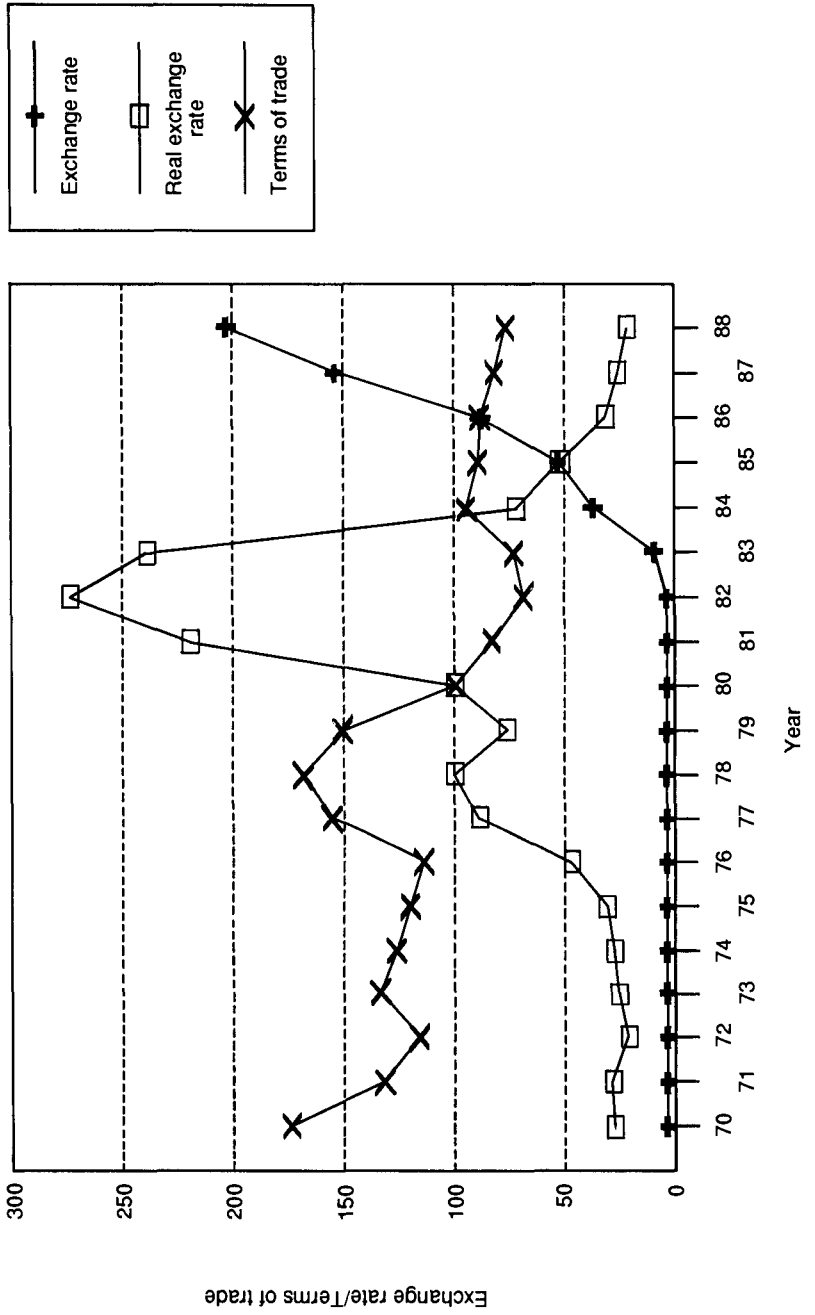
Year	XR	NEER	REER	MUV	XUV	TOT
1970	1.02	279.67	27.73	24.36	42.81	1.76
1971	1.03	274.88	28.73	25.66	34.25	1.33
1972	1.33	205.68	21.84	27.91	32.53	1.17
1973	1.17	222.09	25.43	33.52	45.19	1.35
1974	1.15	230.67	27.07	48.37	61.56	1.27
1975	1.15	229.30	30.37	54.13	65.49	1.21
1976	1.15	249.65	46.20	54.40	62.21	1.14
1977	1.15	251.85	89.57	59.86	93.65	1.56
1978	1.76	182.14	101.73	67.03	113.95	1.70
1979	2.75	98.88	75.44	80.16	119.84	1.50
1980	2.75	100.11	100.00	100.00	100.00	1.00
1981	2.75	115.71	221.48	99.18	82.78	0.83
1982	2.75	131.29	277.67	95.52	65.42	0.68
1983	8.83	56.77	242.99	90.60	65.62	0.72
1984	35.99	13.52	72.27	87.92	83.10	0.95
1985	54.37	9.78	52.23	85.58	76.56	0.89
1986	89.20	4.93	30.54	94.74	82.78	0.87
1987	153.73	3.15	25.13	103.99	84.28	0.81
1988	202.35	2.42	20.46	108.31	82.97	0.77

Source: IMF data.

Notes: XR: Exchange rate (C/\$)
 NEER: Nominal effective exchange *
 REER: Real effective rate (1980 = 100)*
 MUV: Import unit value (1980 = 100)
 XUV: Export unit value (1980 = 100)
 TOT: Terms of trade (XUV/MUV)

* A decrease means a depreciation.

Figure 1 Trends in the ER, REER, and TOT (1970-1988)



Initially, the rate seemed to be approaching the fairly stable parallel market rate. For instance, at the start of the auction the marginal rate was C128 per dollar as against C200 on the parallel market. Two weeks later, the rate on the parallel market dropped while the marginal rate on the auction kept rising. However, after the accumulated rent elements in the parallel rates had been eaten up by the rise in the auction rates, the former started to rise again. The continued operation of the parallel market prompted the government to legislate the setting up of purely private market-oriented foreign exchange bureaux. The first bureau was established in February 1988.

The establishment of the forex bureaux and the other trade and payments policies³ brought in since the Economic Recovery Programme, liberalized the foreign exchange market, and consequently enhanced the government's trade liberalization policies.

These policies have resulted in the continuous depreciation of the real exchange rate from 243 in 1983 to 20 in 1988 (1980 = 100).

III. Recent macroeconomic performance

Growth in GDP

The ERP/SAP has contributed in reversing the negative growth rate in GDP throughout the 1970s and the early part of the 1980s. For the first time in a long period, real GDP recorded a positive rate of growth of 8.96 percent in 1984. For the entire period 1984–1988, GDP recorded an average annual growth rate of 5 percent (Table 2). All sectors had positive growth, while within sectors, utilities and manufacturing showed the highest growth rates. The performance of utilities and manufacturing could be explained by the dramatic increases in the charges to utility users and the rehabilitated manufacturing capacity. It is only construction and mining which registered negative growth rates of 2.6 percent and 3 percent, respectively, in 1986.

Table 2 Growth of GDP by kind of economic activity at constant 1975 prices (percent)

	1980	1981	1982	1983	1984	1985	1986	1987
Agriculture	2.17	-2.56	-3.25	-9.11	9.71	0.65	3.31	0.04
Industry	-1.85	-14.46	-16.67	-6.77	11.94	17.60	7.56	11.34
Services	-2.79	2.73	-4.65	4.54	6.63	7.52	6.50	9.38
Total GDP	-0.23	-3.18	-5.85	-4.34	8.96	5.09	5.20	4.80

Source: Calculated from data obtained from *IMF Financial Statistics and Quarterly Digest of Statistics*, GSS, Accra, several years.

An examination of the sectoral sources of growth shows that over the 1984–1987 period, total aggregate growth rates for industry, services and agriculture were 48 percent, 30 percent and 14 percent respectively (Table 2). Industry recorded the highest growth, albeit starting from a low base.

It is important to take into consideration the relative importance of each sector to the GDP. Table 3 shows the percentage contribution of various sectors to GDP growth. In 1984, due basically to good rains, maize production alone increased by 42 percent. This resulted in agriculture providing more than 50 percent of the growth in GDP, followed by services and industry in order of importance.

Table 3 Percentage contribution of sectors to GDP Growth

	1984	1985	1986	1987
Agriculture	57.25	5.42	31.48	0.39
Industry	15.15	42.81	18.86	32.43
Services	26.98	53.71	46.95	67.56

Source: Calculated from GSS, *Quarterly Digest of Statistics*, various issues.

Note: The figures do not add up to 100 in certain cases because of rounding.

In subsequent years, however, the growth rate of non-cocoa agricultural production (food crops, livestock) declined drastically, while that of cocoa production increased, resulting in a decrease in overall agricultural production. This decline led to a fall in agriculture's contribution to GDP growth. Meanwhile, services maintained their growth and increased their contribution to over 60 percent of GDP growth in 1987, with industry making up 30 percent. Thus, with this approach, it can be seen that a major part of the growth can be explained by the growth in services.

Gross capital formation as a percentage of GDP increased from 4.0 to 10.8 between 1980–1983 and 1987, as can be seen from Table 4. Non-traded goods, such as buildings, which had the largest share of gross fixed capital formation, reached their highest level at 5.0, but fell to 4.0 in 1987, while traded goods like transport and machinery have increased continuously since 1980. The ratio of non-traded capital to traded capital fell from 2.8 during the period 1980–1983 to 0.7 in 1987. This shows a movement away from less expensive non-traded capital to more expensive traded goods.

Table 4 National savings and gross capital formation as percent of GDP in purchaser's value (market prices)

	1980–83	1984	1985	1986	1987
Gross capital formation	4.0	6.9	9.6	9.7	10.8
Buildings	2.8	3.9	5.0	4.1	4.0
Transport equipment	0.5	1.3	1.2	1.8	2.3
Machinery	0.5	1.3	2.3	2.8	3.4
National savings	3.9	4.0	5.4	5.5	5.9
Public ^a	-4.4	-0.6	0.1	1.7	3.3
Private ^b	8.3	4.6	5.4	3.7	2.7
Foreign saving	0.6	2.8	4.2	4.2	4.9

Sources: World Bank Staff Estimates, Statistical Service, Accra, *Quarterly Digest of Statistics*, December 1987, June 1988.

a. Represents Central Government's savings only.

b. Includes state enterprises.

To explain the increase in capital formation, the behaviour of national and foreign savings is important. National savings increased from an average of 3.9 percent of GDP between 1980 and 1983 to 5.9 percent while foreign savings also registered progressive increases over the years. Between 1980 and 1984, private savings were the main factor behind the increasing national savings. While public savings began to grow from 1986, private savings declined.

Several explanations can be given for the decline in private saving. In the first place, a positive outlook for the future economic situation makes permanent income greater than current income. Individuals basing their consumption expenditures on permanent income dissave in order to maintain their level of expenditures. Secondly, the economic recovery has led to the availability of goods and services. In order to maintain past standards of living, individuals dissave because current income cannot meet current consumption expenditures. Thirdly, an increase in the cost of services such as utilities, education and health, implies a higher financial burden on families and hence a reduction in private savings. An effective tax collection procedure, coupled with restraint on government expenditures, has contributed to the increase in public savings since 1985.

Balance of payments

Ghana experienced her first balance of payments crisis in 1961. In that year, current account deficit amounted to 12 percent of GDP. Since then, the balance of payments position has remained precarious. The first attempt to tackle the balance of payments problem and its squeeze on the economy was in 1967. As indicated earlier, the government implemented an orthodox IMF stabilization package, including a devaluation of the currency. The balance of payments position improved temporarily in 1968 and 1969, but worsened again in 1970 and 1971 due to declining cocoa prices and increased imports. This forced the government to devalue the currency in December 1971 with subsequent revaluation in 1972 but leaving a net devaluation. There was a positive response on net current account for 1972 and 1973. By 1974 the situation had worsened.

The 1978 manipulation of the exchange rate resulted in a positive net balance on current account for 1979 but the situation worsened again with net current account in millions of dollars of -55, -508, and -158 for 1980, 1981 and 1982, respectively, as can be seen from Table 5.

Table 5 Balance of payments

		1970	1975	1979	1980	1981	1982	1983	1984	1985	1986	1987
Current a/c	(\$m)	-81	-51	+40	-55	-508	-158	-230	-214	-264	-204	-224
Merchandise (\$m):												
Exports	(\$m)	481	728	1066	1104	711	641	439	567	632	749	827
Imports	(\$m)	449	651	882	972	1021	631	539	681	729	805	1012

Source: World Bank, *Ghana: Structural Adjustment for Growth*, 1989.

The performance of the balance of payments in response to the series of measures taken since 1983 seems to follow the same pattern. Following the introduction of the programme in 1983, the net current account improved in 1984 and 1986 but worsened in 1985 and 1988 and is projected to deteriorate further in 1989 and 1990.

The poor performance is due to the inelastic supply response of cocoa and the mining sector. While real cocoa producer prices doubled over the period, cocoa output, allowing for weather, increased by only 30 percent. At the same time, the availability of foreign loans and the trade liberalization increased import quantities, thus creating deficits in the balance of trade, contrary to the past record.

Inflation

Until 1964, inflation had not been a problem in Ghana, averaging around 6 percent per annum. Inflationary pressure began in 1965 with a rate of 22.8 percent. This was basically a result of a shrinking in the supply of basic consumer goods coupled with a money growth rate of 41 percent.

However, in the late 1970s inflation became a serious issue. From a rate of 56 percent in 1976, inflation peaked at 117 percent in 1977 and closed the decade with 54 percent. This was a monetary phenomenon because while the GDP recorded negative growth rates of 12 percent, 4 percent in 1975 and 1976 respectively, money supply grew at the rate of 25 percent and 44 percent for 1974 and 1975, respectively.

The other peak inflation figure of 123 percent in 1983 is explained by the Sahelian drought and the widespread bush fires that destroyed farm produce, sharply reducing supply of food and other consumables. Since 1984, the rate of inflation has been comparatively moderate. The highest was 40 percent in 1984. Although increases in money supply have been considerable, averaging 49 percent for M1 and 47 percent for M2, the positive GDP growth rate coupled with the increased imports of goods and services has dampened the inflationary process. In spite of conscious efforts at reducing the rate of inflation, mainly through monetary and fiscal policies, it has remained above target.

IV. The model

A number of alternative models are available for modelling the growth of GDP in less developed countries (Ndulu, 1990). One of the most common models, taking into consideration the constraints to growth in such economies, is the three-gap model. In these models, real growth in GDP is conceived as the sum of capacity growth (g_c) driven by investment and growth in the rate of capacity utilization (g_n)

$$g = g_c + g_n$$

where g is real GDP growth.

Using this basic relationship, it can be shown that the growth in real output is a function of the savings constraint, the foreign exchange constraint, and the fiscal constraint (Ndulu, 1990).

These models typically sought to explain the medium-to-long-term growth in real output.

However, in the circumstances under which most LDCs undertake stabilization programmes, considerable levels of under-utilization exist. In Ghana, for instance, at the time of initiating the economic recovery programme, capacity utilization rate in industry was about 30 percent. In such circumstances, considerable growth in real output can be achieved with the right mix of policies without significant increases in capacity growth. The under-utilization of capacity may be due to lack of demand or import compression and the distortionary influence of such import-control measures.

In assessing the response of real output to policy changes in such circumstances, the long-term perspective of gaps models may be inappropriate. In this paper, therefore, we use a modified version of Khan and Knight's (1981) reduced-form equation for the effect of stabilization policies on aggregate production in developing countries. This attempt was made by Edwards (1986).

In this paper, we use Edwards' reduced-form equation for real output to estimate the relations between GDP and the exchange rates. Thus the reduced-form equation for our GDP growth is:

$$(1) \quad Y(t) = f [M(t), G(t), REER(t), REER(t-1), TOT]$$

where Y is growth in GDP

G is the ratio of government expenditure to GDP

M is unexpected money growth

TOT is the terms of trade, and

REER is the real exchange rate variable.

This equation therefore includes elements of fiscal and monetary policy as well as the terms of trade and the exchange rate. The expected growth of money is estimated for the following money-generating process and fiscal term:

$$(2) \quad M(t) = g[M(t-1), M(t-2), \dots, M(t-n), FD]$$

where $M(t)$ is the money supply in year t , and FD is a fiscal deficit term.

As pointed out in the introduction, the exchange rate may exert a negative or positive influence on GDP. If the rational expectation argument is correct, surprise money growth can be expected to have a positive effect on GDP growth. Government expenditure may have a positive or negative sign depending on whether its effect is a net crowding in or crowding out.

In addition to the variables identified in the above model, imports may be a significant factor in explaining GDP growth, particularly in the Ghanaian economy and less industrialized countries (LIC) in general. The history of the Ghanaian economy has shown that the availability of imports may play a significant role both in policy decision and performance of the economy. This assertion is strongly made by Tony Killick (1978) who analyses a number of ways in which imports can impinge on the performance of the economy. In this analysis, therefore, we include imports (IMP) which are expected to have a positive impact on GDP.

The trade sector

We adopt a partial equilibrium approach for the analysis of the trade sector. Emphasis in this analysis is on the effect of the real exchange rate on the trade sector. Making the small country assumption implies that on the export side, the volume of exports equals the supply. This assumption is applicable to all Ghanaian exports except for cocoa in which Ghana is not a price-taker in the world market.

Based on the imperfect substitutes model, the empirical forms of the supply and demand functions for exports and imports are fairly well known. On the exports side, the standard model (Bond, 1985; Moran, 1988), assumes that producers base their decisions on domestic capacity and the relative profitability of producing for exports relative to producing home goods. The basic model, therefore, expresses exports as a function of domestic capacity constraint and price effects. Domestic capacity may be proxied by trend GDP (Y^*). The price effects are usually measured by two different measures: (a) the real exchange rate which indicates the relative profitability of producing tradables relative to non-tradables, and (b) the ratio of the prices of exports to other domestic tradable goods which indicates the relative profitability of producing exports *vis à vis* other

tradables. Thus in the basic model, export supply is specified as

$$(3) \quad X(t) = f[(P_x/PT)_t, (P_h/PT)_t, Y^*]$$

where P_x = price of exports
 PT = price of domestic tradables
 P_h = price of non-tradables
 Y^* = trend in GDP
 t = time

Khan and Knight (1988) have argued that this standard model may be inappropriate for LICs facing foreign exchange constraints and where export production may rely on imported inputs. This is because the standard model does not take into consideration the feedback relations between imports and exports. Imports of intermediate and capital goods may be crucial in exports production in LICs. At the same time, poor export performance reduces foreign exchange availability leading to import compression.

The extended export supply function may therefore be written as

$$(4) \quad X(t) = f[(P_x/PT), REER(t), MI(t), Y^*]$$

$REER(t)$ = real exchange rate
 MI = imported inputs

Using a delayed response according to the following partial-adjustment process:

$$(5) \quad \log X(t) = k [\log X_s(t) - \log X(t-1)], 0 < k < 1$$

The reduced form equation in log-linear can be specified as:

$$(6) \quad \log X(t) = a_0 + a_1 \log IMP(t) + a_2 \log (P_x/PT)_t + a_3 \log REER(t) + a_4 \log Y^*(t) + a_5 \log X(t-1)$$

In our analysis, we use the above reduced-form export equation.

Our import demand function is based on Khan and Knight (1988) except that the relative price of imports is replaced by the real exchange rate to reflect the emphasis in this paper. The reduced form of the import demand function is therefore given as:

$$(7) \quad \log IMP(t) = b_0 + b_1 \log Y^*(t) + b_2 \log REER(t) + b_3 \log Fr(t) + b_4 \log IMP(t-1)$$

where Fr is foreign reserves.

The model is then completed with the trade balance equation:

$$TB = (X.P_x)_t - (M.P_m)_t$$

The partial derivatives indicate that exports are positively related to both the real exchange rate and GDP. Exchange rate devaluation in Ghana has always occurred as part of a package. As a result, these devaluations have been accompanied by substantial external assistance. The 1967, 1971 and 1978 devaluations

and the current programme are of that type. External assistance, particularly when it is programme aid, improves the availability of foreign exchange and can be expected to exert a positive impact on imports. In this analysis, therefore, net capital inflow will be incorporated.

Where the tariff system also changes, the relevant measure of the real exchange rate for export is

$$\text{REER}(x) = \frac{e(1-t_x) P^*}{P_d}$$

and that for imports is

$$\text{REER}(m) = \frac{e(1+t_m) P^*}{P_d}$$

where t_x is the export tax and t_m is the import duty rate.

V. Empirical results

The system of equations in the model is block triangular with the explanatory variables in the output and import equations being exogenous. Therefore ordinary least squares (OLS) was applied to the data set from 1970 to 1988 in order to obtain consistent estimates for the parameters of the output and import equations. The export and output equations, however, included imports as an explanatory variable. These equations were, therefore, estimated using the instrumental variables technique with foreign reserves as an instrument.

Aggregate output

Table 6 shows the results of the output equation. The only variables that are significant in the equations are the exchange rate and imports. In equation 1, only the exchange rate variable is significant and indicates that a real depreciation in the currency has an expansionary effect on GDP in the short run. This trend is not reversed in the second period since the sign of the lag of the real exchange rate is still negative (eq. 3). The equation is satisfactory in terms of its explanatory power and fit. The signs of the other parameters are as expected, but the coefficients of the fiscal term, surprise money and the terms of trade are not significant. The negative coefficient for time reflects the downward trend in the economy for most of the 1970s and the early 1980s.

Other formulations of the output equation did not yield any significant change. When imports were added to the output equation, the results did not change much in terms of signs but the real effective exchange rate is no longer significant due to the high correlation between them (eq. 2). However, the imports coefficient became significant when the real exchange rate was dropped from the equation.

It seems from these results that the real devaluation has an expansionary effect on the GDP. The results also show the dominance of the external sector in explaining the performance of the GDP. Ghana's economy is highly dependent on imports. The manufacturing sector depends on imported raw materials and capital goods, while the service sector hardly utilizes any domestic resources. Even though the level of utilization of imported inputs in agriculture is very low,

production in this sector is affected by the high level of imports in the distribution system.

Table 6 Results: output equations

Dependent variable	Explanatory variable	Equation number			
		(1) OLS	(2) IV	(3) OLS	(4) OLS
Real GDP					
Log Y	C	7.5141 (33.1039)	5.6118 (3.2229)	7.4007 (37.5083)	5.4755 (14.7814)
	Time	-0.0307 (-4.0144)	-0.0260 (-3.3194)	-0.0291 (-4.3864)	-0.0255 (-4.0574)
	Log (GE/GDP)	0.0654 (0.3864)	0.0297 (0.1980)	-0.1428 (-0.8771)	0.0437 (0.3117)
	Log (M/M*)	0.0129 (0.0506)	-0.1371 (-0.5289)	-0.0464 (-0.2164)	-0.1500 (-0.7030)
	Log (TOT)	-0.0728 (-0.5018)	-0.1468 (-1.0298)	0.0285 (0.2248)	-0.1548 (-1.2823)
	Log (ER)	-0.2235 (-5.3902)	-0.0212 (-0.1130)	-0.1372 (-2.6085)	-
	Log (ER(-1))	-	-	-0.1561 (-2.3598)	-
	Log (IMP)	-	0.2449 (1.0995)	-	0.2629 (6.8537)
	R-bar sq.	0.8751	0.9063	0.9125	0.9125
	F	26.2336	30.0001	30.5446	38.5197
	D W	1.2737	1.6761	1.8398	1.7548

Surprise money does not seem to have any significant impact on output. This could be due to the fact that part of the role of surprise money is picked up by government expenditure.⁴

Sectoral output

When the economy is disaggregated into agriculture, industry and services, similar results are obtained (Table 7a). Real devaluation and imports continue to have an expansionary impact. Government expenditure on agriculture continues to be insignificant but is important in industry. Agriculture has traditionally been dominated by small-scale farmers with very little government support. On the other hand, the positive effect of government expenditure on industry can be explained by the role of the state in the industrialization process in Ghana.

Parastatal industries comprise a high proportion of the total industrial sector. A decrease in government expenditure could affect working capital and purchase of inputs, thereby adversely affecting industrial output. The service sector has historically been dominated by the non-governmental sector. Government expenditure, which has traditionally been financed by resort to borrowing from the banking system, crowds out private-sector credit.

Table 7a Results: Sectoral equations

Explanatory variable	Sector		
	Agriculture OLS	Industry OLS	Services OLS
C	6.3455 (18.9608)	7.4630 (21.6213)	4.9634 (6.9695)
Time	-0.0235 (-2.0887)	-0.0207 (-1.7785)	0.3378 (14.0891)
Log (GE/GDP)	-0.0213 (-0.0855)	0.5609 (2.1793)	-1.0924 (-2.0573)
Log (M/M*)	-0.0354 (-0.0943)	0.2827 (0.7306)	0.0773 (0.0968)
Log (TOT)	0.1747 (0.8168)	0.1043 (0.4731)	-0.2594 (-0.5722)
Log (REER)	-0.1509 (-2.4690)	-0.4851 (-7.6939)	-0.2840 (-2.1837)
R-bar sq.	0.6652	0.9317	0.9749
F	8.1511	50.1389	140.7683
DW	1.1024	1.4513	0.6241

Table 7b replaces the real exchange rate with lagged imports. The results emphasize the importance of the external sector in the Ghanaian economy. It would seem from these results that the same output response could be induced from either an exchange rate depreciation or increased imports. There is a tendency, therefore, to conclude that external assistance leading to increased imports could achieve the same results as exchange rate depreciation. However, increased imports without the changes in incentive structure and efficiency induced by exchange rate depreciation may not achieve the desired objective. There is a need for further analysis on the relative effectiveness of exchange rate and foreign assistance *vis à vis* foreign assistance cum non-exchange rate policies.

Table 7b Results: Sectoral equations

Explanatory variable	Sector		
	Agriculture OLS	Industry OLS-AR(3)	Services OLS-AR(3)
C	3.5414 (4.0862)	5.0730 (3.0494)	3.4785 (3.6460)
Time	-0.0191 (-2.0040)	-0.0050 (-0.3191)	0.4162 (8.9891)
Log (GE/GDP)	-0.4990 (-1.7020)	1.3528 (2.4535)	-0.4264 (-1.1929)
Log (M/M*)	-0.1832 (-0.5666)	1.4374 (2.7941)	0.3395 (0.8481)
Log (TOT)	0.2111 (1.1413)	-0.9726 (-3.0357)	0.5112 (1.8129)
Log (IMP(-1))	0.3150 (3.5700)	0.4129 (2.2832)	0.2153 (1.5293)
R-bar sq.	0.7611	0.9259	0.9933
F	11.8334	22.8544	260.0069
DW	2.1375	2.4448	2.4949

Trade sector

Total exports were disaggregated into cocoa beans and non-cocoa exports because of the dominance of cocoa in total exports. The results for non-cocoa exports are not reported because they are similar to the results of aggregate exports. Like the output and disaggregated sectors, changes in the real exchange rate have a positive impact on the aggregate exports (Table 8a). However, for cocoa beans the sign of the real exchange rate is mixed and insignificant.

In the full model, Table 8b (eq. 1), the exchange rate has a positive sign, while in the model without cocoa prices (eq. 2) it has a negative sign. This may be due to the marketing or pricing system. Cocoa prices are fixed by the marketing board which may not pass on the full effect of the exchange rate devaluation to producers.

In conformity with the import compression model, the level of imports tends to be important for total exports. However, for cocoa this is not the case. Contrary to the results obtained for exports as a whole, imports are not crucial in the exports of cocoa beans. This may be due to the low level of imported inputs in cocoa production. The other exports such as timber and minerals depend heavily on imported inputs. The exchange rate is also not significant in explaining cocoa exports. This is because, as explained earlier, exchange rate depreciation may not be passed on to cocoa farmers in the form of higher domestic prices. The most important variables in explaining cocoa exports are the pro-

ducer prices of cocoa and the level of economic activity. These results are consistent with other work done on the cocoa industry in Ghana (Okyere, 1989).

Table 8a Regression results: Trade sector

Dependent variable	Explanatory variable	Equation number			
		(1)	(2)	(3)	(4)
Exports Log (Xt)	Constant	-2.0241 (-0.9836)	-4.0593 (-2.8874)	-3.7686 (-3.0543)	-1.0696 (-1.1115)
	IMP	0.5650 (4.2399)	0.8110 (7.2146)	0.7906 (9.0438)	0.6495 (6.0969)
	Px	0.1924 (1.2046)	0.3414 (2.2041)	0.3267 (2.2518)	-
	Px(-1)	- (-0.4618)	-0.0660	-	-
	REER(x)	-0.2552 (-2.3448)	-	-	-0.2955 (-3.1464)
	Y*	0.6943 (2.2379)	0.7149 (2.9036)	0.6679 (3.0700)	0.5832 (3.4335)
	X(-1)	0.0391 (0.3911)	-	-	-
	R-bar sq.	0.9842	0.9784	0.9806	0.9845
	F	200.2635	181.9144	286.7188	360.4997
	DW	1.9395	1.7037	1.6712	1.6781

Table 8b Regression results: Trade sector

Dependent variable*	Explanatory variable	Equation number		
		(1)	(2)	(3)
	C	-2.2817 (-2.3676)	-1.7828 (-1.3747)	-1.7889 (-1.9923)
	Cpx	0.4182 (3.7023)	-	0.3586 (3.4293)
	IMP	0.1449 (1.2014)	0.1215 (0.7425)	0.0114 (0.1939)
	REER(x)	0.1479 (1.2601)	-0.0340 (-0.2348)	-
	Y*	0.7647 (4.0974)	1.0422 (4.4866)	0.8934 (5.6119)
	R-bar sq.	0.8692	0.7583	0.8640
	F	30.9835	19.8264	39.1285
	DW	1.8672	1.7701	1.9029

* Cocoa (beans).

Table 8c Regression results: Trade sector

Dependent variable	Explanatory variable	Equation number		
		(1)	(2)	(3)
Imports	C	0.3017	-21.4644	4.4611
Log (IMP)		(0.0359)	(-2.1290)	(1.1028)
	IMP(-1)	0.1664	0.7423	0.1325
		(1.0035)	(5.0314)	(0.8319)
	REER (m)	-0.7140	-	-0.7383
		(-4.3112)		(-5.8507)
	Capital inflow	0.0234	0.2916	-
		(0.2392)	(2.5704)	
	FR	-	-	-0.1082
				(-0.6338)
	Y*	0.9381	3.3156	0.4239
		(0.7946)	(2.1147)	(0.7478)
R-bar sq.		0.9086	0.7937	0.9109
F		43.2363	22.8055	44.4629
DW		2.6319	1.7054	2.2161

Domestic export and producer prices have a significant and positive effect on export volumes, both for aggregate exports and cocoa. However, export unit values based on world market prices did not have a significant effect on export volumes. Again, this is due to the fact that world market prices may not be transmitted to domestic export prices.

The import equation shows a significant effect of the real exchange rate but with the unexpected sign. From our results, real devaluation increases the level of imports. This may be due to the fact that the economy is highly dependent on imports. Imported inputs are very significant for key sectors such as industry, mining and timber. Consequently, an increase in imports in these sectors has a positive effect on output. The real devaluations have led to massive inflows of foreign resources in terms of loans, grants and transfers. This has increased Ghana's ability to import. In the short run, therefore, real devaluation is expected to have a positive impact on imports. In the longer run, however, the relative price increases for imports resulting from real devaluation could lead to the use of substitutes and hence a fall in imports.

VI. Conclusion

This paper has attempted to examine the relationship between exchange rate policies and certain macroeconomic aggregates, particularly within the context of the current economic recovery programme. The analysis was based on a reduced-form equation for real output to estimate the relationship between GDP and the real exchange rate. Real devaluation had an expansionary effect on GDP. The accompanying capital inflow led to an increase in imports. Growth in GDP was positively influenced by imports. These results would seem to indicate that, for such import-dependent economies, pursuing structural adjustment programmes with devaluation as a major component increased external capital inflow enhancing imports may be necessary for success.

Real devaluation had a positive impact on both imports and exports. In an import-compressed economy the ensuing inflow of external resources can be expected to lead to a positive relationship between imports and devaluation. Depending on the level of the increase, the trade balance could worsen. There was a significant feedback effect of imports on exports.

Domestic export producer prices were significant in the export equations when they were substituted for world export prices. This suggests that in a regulated market system favourable world market prices may not be passed on to the producer. For cocoa, the marketing board prices may not reflect an improvement in the world market price. The cocoa results also suggest that exchange rate depreciation which is not passed on as higher producer prices may actually have a contractionary effect on output.

Our work shows the need for further analysis of questions of long-run sustainability of the programme, the social implications and replicability in other countries.

Appendix 1

Developments in the value of the cedi

- July 1967 - Devaluation (C1.02 = \$1.00)
- December 1971 - Devaluation (C1.82 = \$1.00)
- February 1972 - Revaluation (NC1.28 = \$1.00)
- February 1972 - The appellation “new” was dropped and the currency referred to as the cedi
- February 1973 to June 1978 - The cedi was allowed to appreciate in stages against the dollar when the dollar was devalued until the rate C1.15 = \$1.00 was obtained
- August 1978 - Devaluation (C2.75 = \$1.00)
- 19 September 1986 - Two-tier exchange-rate system adopted. The rate at Window 1 remained fixed at C90.00 = \$1.00, while the Window 2 rate was determined at a weekly foreign exchange auction
- February 1987 - Window 1 was abandoned and the marginal rate established at the weekly auction became the exchange rate for transactions for that week.

Appendix 2

Growth of GDP by kind of economic activity, 1975 prices (percent)

	1980	1981	1982	1983	1984	1985	1986	1987
<i>Agriculture</i>	2.17	-2.56	-3.25	-9.11	9.71	0.65	3.31	0.04
<i>Industry</i>	-1.85	-14.46	-16.67	-6.77	11.94	17.60	7.56	11.34
Mining and quarrying	-3.15	-7.34	-8.38	-13.64	13.49	6.45	-3.03	7.89
Manufacturing	-1.44	-19.27	-20.49	-11.17	12.90	24.32	10.95	10.01
Electricity and water	12.86	11.86	-8.11	-38.91	42.96	20.73	18.03	18.73
Construction	-7.44	-4.79	-91.15	27.43	2.33	2.81	-2.66	15.02
<i>Services</i>	-2.79	2.73	-4.65	4.54	6.63	7.52	6.50	9.38
Wholesale, retail, restaurants, hotels	-8.63	-1.92	-10.38	-5.26	10.15	13.68	9.02	17.45
Transport, storage and communication	-13.24	6.76	1.13	7.26	12.76	8.45	5.62	10.89
Finance, insurance, real estate and business services	1.29	1.66	-1.38	14.12	9.26	2.58	7.66	5.48
Community, social and personal services	22.97	15.23	-4.99	7.09	20.10	7.76	46.02	19.20
Less imputed bank charges	1.12	0.41	-2.16	5.60	7.90	7.84	5.72	9.58
<i>Sub-total: Domestic production of industry</i>	-0.44	-3.85	-5.89	-6.12	10.35	4.80	5.60	5.03
Producers of Government services	1.81	6.73	-4.15	5.94	0.44	4.65	2.35	2.97
Producers of private non-profit services to household	25.00	-17.45	21.15	-1.09	-6.62	38.58	-22.16	19.34
<i>Domestic product excluding import duties</i>	-0.09	-2.71	-5.55	-4.56	8.85	4.95	5.00	4.84
Import duties	-9.12	-34.08	-35.53	27.70	20.55	18.75	22.17	1.96
<i>Total gross domestic in purchaser's value</i>	-0.23	-3.18	-5.85	-4.34	8.96	5.09	5.20	4.80

Source: Calculated from data obtained from *IMF Financial Statistics and Quarterly Digest of Statistics*, GSS, Accra, several years.

Appendix 3

Regression results: Trade sector

Dependent variable	Explanatory variable	Equation number		
		(1)	(2)	(3)
Imports Log (IMP)	C	0.3017 (0.0359)	-21.4644 (-2.1290)	4.4611 (1.1028)
	IMP(-1)	0.1664 (1.0035)	0.7423 (5.0314)	0.1325 (0.8319)
	REER (m)	-0.7140 (-4.3112)	-	-0.7383 (-5.8507)
	Capital inflow	0.0234 (0.2392)	0.2916 (2.5704)	-
	FR	-	-	-0.1082 (-0.6338)
	Y*	0.9381 (0.7946)	3.3156 (2.1147)	0.4239 (0.7478)
R-bar sq.		0.9086	0.7937	0.9109
F		43.2363	22.8055	44.4629
DW		2.6319	1.7054	2.2161

Appendix 4

List of Variables

Y	=	growth in GDP
G	=	ratio of government expenditure to GDP
M	=	unexpected money growth
TOT	=	terms of trade
REER	=	real effective exchange rate
FD	=	ratio of government deficit to GDP
Y*	=	trend GDP
X	=	exports
P _x	=	price of exports
P _T	=	price of domestic tradeables
P _h	=	price of non-tradeables
t	=	time
MI	=	Imported inputs
X _s	=	desired level of exports
IMP	=	import demand
Fr	=	foreign reserves
TB	=	trade balance
P _m	=	Price of imports
tx	=	export tax rate
tm	=	import duty rate
REER (x)	=	real effective exchange rate for exports
REER (m)	=	real effective exchange rate for imports
GE	=	Government expenditure
C	=	constant term
C _{px}	=	producer price of cocoa
M*	=	money supply

Notes

1. The pound was devalued from 1: US\$ 2.80 to US\$ 2.40.
2. The auction process involves users submitting sealed bids for foreign exchange at rates they wish to purchase them through their bankers to the Bank of Ghana. On Fridays, the Bank of Ghana opens the bids and allocates its foreign exchange supply for the week, starting with the highest bid. The rate at which the foreign exchange supply for the week is exhausted is declared the marginal rate for the week.
3. Other policies include:
 - (a) Operation of foreign exchange accounts with the local commercial banks;
 - (b) The amount of foreign currency that can be taken out of the country on business trips may be up to a maximum of \$3,000.00;
 - (c) Import licenses have been abolished.
4. Our attempt to eliminate the role of government expenditure in surprise money did not yield good results.

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