EXCHANGE RATE POLICY: A ZERO-SUM DECOMPOSITION DEMAND ANALYSIS OF CFA EXPORTS AND A MONETARY APPROACH ANALYSIS OF THE CFA FRANC PEG TO THE FRENCH FRANC

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PREFACE

This dissertation concerns the Communauté Financière Africaine (CFA) countries and their practice of collectively pegging their currency, the CFA franc, to the French franc as well as its effects on their trade performance and their pattern of trade. This collective peg to the French franc is otherwise known as a single peg and the objective is to look at the competitive aspects of this type of exchange rate regime and the question being asked is whether it causes trade bias by discouraging attempts by the CFA countries to diversify their trade with nonFrench partners. A related issue is whether the French authorities have intervened successfully in the foreign exchange market to stabilize the fluctuation of the French franc against other major currencies. This is important because if the French franc is not stable, the CFA franc cannot be stable; if the CFA franc is not stable, its fluctuation will be arbitrarily determined by the behavior of the French franc. This will have economic consequences that are not the policy objectives of the CFA countries.

An important issue and the focus of the research in this dissertation is the pattern of trade of the CFA countries in relation to their competitors and their trading

partners, and the role played by their choice of exchange rate regime.

The pattern of international trade has been one of the major preoccupations of international economists and policy makers. Certain aspects of the pattern of trade are easy to comprehend. Thus climate and natural resource endowments explain why some countries export oil, others export apples, while others export pineapples. But much of the pattern of trade is not due to such obvious reasons. For instance, one has to look deeper to explain why Japan, a nation with few natural resources, has become the world's leading trading power and a fierce competitor of the United States and other industrial countries in electronics and automobile trade.

For the purpose of studying the impact of single pegging on the trade performance of the CFA countries relative to their competitors, a sample of eleven coffee exporters and nine coffee importers was taken. For cocoa, the sample consisted of six exporting countries and seven importing countries. The choice of exporting countries reflected the diversity of exchange rate regimes among developing countries today (i.e., French franc peggers, Dollar peggers, SDR peggers and relatively more flexible regimes such as the crawling or gliding peg). The choice of coffee and cocoa for analysis reflected the fact that these commodities are the main source of foreign exchange earnings for the countries studied. The study was intended to determine the extent to which relative prices, exchange risk and the

choice of exchange rate regime affected the market shares of the exporters. This was done using a demand side analysis based on Armington's framework. In this framework, exports of a given kind are viewed as differentiated by origin. The conclusion from this assumption is that the demand curve facing coffee and cocoa exporters is not infinitely elastic as is usually claimed for primary products. It is therefore conceivable, as is usually the case in the theory of imperfect competition, that each country exporting coffee or cocoa faces a downward, albeit relatively flat, demand curve for its exports. This means that it has some control over price. The main point is that in such imperfectly competitive situations, sellers can vie for market share through price or nonprice competition (i.e., through real or perceived differences). Real differences can come about through better quality or lower prices to the buyer, which will increase demand and therefore the market share of the seller.

In this study, the focus was on how the real price of coffee or cocoa, exchange risk and choice of exchange rate regime affected their market share or export demand. The results showed that exchange rate regime does affect market share. This is because the coefficient of the relative price variable, which measures the elasticity of substitution in demand in the importing countries, was significant in all cases. The results showed unquestionably that being pegged to the French franc had a negative impact on the per-

formance of the CFA countries in their export markets relative to their competitors.

With regard to the scope of the dissertation, while prior studies on the trade pattern of developing countries used an aggregate approach and were therefore more concerned with issues of elasticity pessimism, it used a disaggregated analysis by focusing on specific SITC commodity categories. Its focus was the competitiveness of the CFA country exports measured by the ratio of an index of their export price relative to a weighted average of the export prices of their competitors in given export markets. The research was confined to determining if the peg of the CFA franc to the French franc, and the joint float that this implies, increased uncertainty and had a negative impact on their trade shares. The results confirmed this.

The special difficulties encountered in this effort were the lack of original data especially exporter's supply price in the matrix of bilateral flows. As a result, unit values were used as a proxy. Another difficulty encountered was that because the CFA countries are French-speaking and located in Africa, original data on them would have been accessible only by traveling to West and Central Africa or to France. The same problem would have been encountered with their competitors located in Asia and South America. Financial constraints ruled out this possibility. So there was much reliance on secondary data sources, mainly IMF and UN publications.

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CHAPTER I

INSTITUTIONAL BACKGROUND

The CFA Franc Zone and Problems of Adjustment and Convergence

The CFA countries encountered several economic problems in the 1980s:

1. current account and public sector deficits;
2. debt service problems;
3. macroeconomic problems (inflation and unemployment); and
4. poverty or growth problems (declining or stagnant per capita GNP).

It would be too ambitious to attempt to address all these problems in one study. So the focus here is on the role of the institutional arrangement (i.e., membership in the CFA zone) in affecting internal and external balance. Specifically, it looks at how zone membership has hindered economic adjustment in the CFA countries. A related issue is to look at how the CFA zone's choice to peg the CFA franc to the French franc has been a source of their economic and financial problems. This will help to determine the partial cause or causes of these problems so that appropriate

policies can be adopted. The study is a contribution to the literature on the debates now raging about the viability and desirability of the zone in its present structure.

The first part of the study looks at how the structure of the zone contributes to internal and external disequilibria. This is done using a simple model of an open economy under a fixed exchange rate. It is shown that zone membership leads to a trade-off between internal imbalance and external balance.

The second part of the study then examines how zone membership affects economic adjustment in the CFA countries. This is done using a simple model of balance of payments adjustment under a fixed exchange rate to show how economic adjustment is affected by certain institutional features of the zone. It is shown that economic adjustment is hindered by rigidities in the zone resulting from the abdication of monetary and exchange rate tools, and by lack of fiscal and monetary discipline which are the vaunted advantages of single pegging. With fiscal policy as the major tool to rely on, these countries face the added policy problem of using one tool to address internal and external imbalance problems, leading to the possibility of a trade-off between the two.

Structure of the CFA Zone

The CFA zone comprises eleven francophone countries and one Spanish-speaking country, which have formed two monetary unions:

1. the West African Monetary Union whose members are Senegal, Ivory Coast, Burkina Fasso, Togo, Niger, and Benin; and
2. the Central African Monetary Union whose members are Cameroon, Gabon, Chad, Congo, Central African Republic, and the only Spanish-speaking member, Equatorial Guinea.

Each union has a central bank which coordinates monetary policy for its members. A common currency, the CFA franc, circulates within each union.

Both unions have a monetary cooperation with France characterized by (Engberg, 1973):

1. a fixed parity (1 French franc = 50 CFA francs) between the CFA franc and the French franc which has remained unchanged since 1948;
2. free and "unlimited" convertibility between the CFA franc and the French franc;
3. guarantee by France of the external convertibility of the CFA franc through the operations account mechanism at the French Treasury. By this mechanism, the union banks are required to deposit 65% of member countries' foreign exchange reserves holdings in this account. The French treasury

then manages the account for the purpose of guaranteeing the external convertibility of the CFA franc;

4. harmonization of exchange control regulations to permit free capital mobility within the zone; and
5. common monetary policy for all member countries such as ceilings on credit to the government (at most 20% of fiscal revenues for the previous year), and credit allocation to the private sector.

This policy of limits and of credit control is intended to preserve monetary stability and external balance, and to promote economic development of member countries.

Union Objectives and Reality

The achievement of these objectives of the unions has been no easy task. The reality is that in the 1980s, the system has been fraught with problems, as can be gleaned from news paper reports. The first indication of stress on the system was reported in 1987 (West Africa Magazine, Aug., 1987) when Ivory Coast expressed its desire to devalue the CFA franc because it was experiencing budgetary shortfalls as well as external and internal economic problems. The magazine, Jeune Afrique (oriented towards francophone countries), has alluded to zone problems in some of its issues. Pointing to the ambiguity of relationships in the franc zone between the CFA countries and France, it observed (Jeune

Afrique, Sept. 1989) " ... while it contributes to monetary stability, it smacks of neocolonialism" (my translation).

The system is also seen as contributing to the stagnation of salaries (i.e., slow growth in per capita income). One issue (Jeune Afrique, Sept. 1989) asks if the CFA franc should be devalued and points out that an overvalued CFA franc could discourage exports and contribute to external imbalance. Another issue (Jeune Afrique, Oct. 1989) talks about "the rumors of devaluation of the CFA franc and of the possible disintegration of the franc zone," and how these were quickly laid to rest by French and African Finance authorities who met to discuss the problems of the zone. Also on their agenda was "the debts" of some of the zone countries and "the bank crisis" within the zone. Finally, as an indication of the severity and graveness of the situation in the CFA zone, one issue (Jeune Afrique, Apr. 1990) talks about "the bitter pill" (draconian measures) that the Ivory Coast has had to swallow to avoid bankruptcy such as salary cut-backs, budgetary cut-backs with attendant early forced retirement of civil servants, not to mention outright refusal by the government to pay up any accumulated back-pay. Similar measures are reported for Cameroon (Jeune Afrique, Mar. 1990).

The interest in the franc zone has not only been motivated by the newspaper reports, but also by the fact that the international monetary system underwent a transformation in 1973 from the Bretton Woods system of fixed but

adjustable peg regimes to the floating or managed float regime among the major currencies. This transformation had some implications for a single peg regime and has been examined under the theory of optimal peg (Williamson, 1982).

This study examines a specific case of a single peg; i.e., the peg of the CFA franc to the French franc in a different dimension, not just in terms of minimizing real exchange rate variability as has been done in the optimal peg theory. That is, it looks at single pegging of the CFA franc to the French franc and why it has hindered economic adjustment in the CFA countries.

Implications of Transformation of International Monetary System for French Franc-Pegging Countries

For a minor currency that is pegged to a major currency, such as the CFA franc peg to the French franc, the transformation of the international monetary system means basically that both currencies move jointly and simultaneously against other currencies that float against the French franc. Hence, whatever happens to the French franc affects the CFA franc accordingly.

Economic conditions in these countries are very dissimilar and call for different policies to address specific circumstances. But the unchanging parity between both currencies can create problems such as balance of payments deficits, domestic unemployment and/or inflation. These

problems will then need to be addressed with suitable policies such as fiscal policy, monetary policy, exchange rate policy, or a combination of these. This requires control by the CFA countries over these instruments of policy. But because of their affiliation with the monetary union and the franc zone, their commitment to union objectives and to monetary cooperation with France means that they have to abdicate the active use of these stabilization tools for steering their economies in desired directions. It also forces them to sacrifice domestic macroeconomic objectives for the sake of attaining union objectives. This dialectic between individual country objectives and union objectives can result in serious conflicts of interest which can threaten the foundation and stability of the union and sometimes might even lead to its disintegration.

To understand the predicament of the CFA countries, it will be instructive to look at the Currency Board System in anglophone Africa. Institutional problems are dealt with in Kratz & Shannon (1966) and also in Ord & Livingston (1978), King (1979), and Furness (1975). Valuable lessons can be learned from their origin, functioning and disintegration. It will be seen that the operation of the Currency Board System was in many ways similar to that of the CFA franc zone system [Liddell, (1979) and Engberg, (1973) give the English description; Kouadio (1984), Alibert (1983), and Ossa & Lapiquonne (1984) give the French]. It was also known as the sterling area, a monetary union whereby the

anglophone African countries pegged their currencies to the (metropolitan) pound sterling. After the international monetary transformation in 1973, most of them deserted the sterling peg. By contrast, the CFA countries have remained steadfastly pegged to the French franc. This begs the question "Why?" It is best tackled by seeking an explanation for the disintegration of the sterling peg system and this calls for a closer examination of the Currency Board System which laid down the ground rules for the operation of the sterling peg.

The Currency Board System

An indication of the cause of the break-up of this system can be discerned from the statement of an East African politician-economist, Mwai Kibaki, the Kenyan Minister of Finance in the early 1970s. He said (King, 1979):

> An essential ingredient of economic independence is the ability of a country to formulate and execute her own economic and social policies (p. 57).

This point of view is echoed by a French analyst (Vallée, 1989) who says:

> ... la monnaie est indissociable de la question de l'État.... L'aspect "administré" de la création monétaire en Afrique ... allait bien sur contre l'expansion du crédit et le développement de la circulation monétaire (p. 31).

Or,

> ... the State and money are one.... That money creation in Africa was "dictated," ... hindered the expansion of credit and development of monetary flows" (my translation).

Either way, the emphasis is on policy autonomy. The operation of both systems led to the demand for autonomy, starting with the Currency Board System. The sterling peg regime was an off-shoot of the Currency Board System which evolved in the latter part of the nineteenth century and the early part of the twentieth century. The West African Currency Board was established in 1912 and its members were Nigeria, Ghana, Gambia and Sierra Leone. The East African Currency Board was established in 1919 and included Kenya, Tanzania, Uganda, and Zanzibar, and for a time, Somaliland, Aden and Ethiopia. These boards issued local currency at a fixed parity in exchange for the (metropolitan) currency, sterling, and also redeemed currency for sterling. Initially, the local currency was fully backed by sterling assets.

The main advantage of the system was that it generated financial confidence due to the currency being backed by the metropolitan currency. But it was criticized on several grounds (Furness, 1975):

1. because foreign exchange earnings to back the local currency were held in sterling assets, it deprived the African countries of scarce funds which could have been used for development purposes;
2. for the African countries that had just gained political independence, it was a poor substitute for their own central banks which could serve not

only as a symbol of sovereignty (money and the state are indissociable), but also as a tool to foster and regulate the domestic financial system, to provide financial guidance and service to the government in economic planning for growth, and to carry out monetary policy;

3. the policy of the expatriate-owned banks was unduly influenced by the economic conditions which prevailed in the metropolitan country rather than the conditions in the territories;
4. by investing reserves and liquid assets in the money market of an international financial center in London, the commercial banks were said to be exporting savings from a capital-poor country to a capital-rich country; and
5. the banks applied conventional criteria of credit-worthiness which were beyond the reach of the average native customer, and showed an unwillingness to extend sufficient credit to native borrowers as well as a lack of concern with the promotion of domestic industry and trade (pp. 51-54).

While measures were taken to correct some of these problems (such as indigenization of the banks, orientation of lending and investment policies to meet domestic needs), in most territories, this process was regarded as inadequate. The banking and credit system was regarded as one of the most important and powerful instruments for fostering

economic development. Thus the feeling was that it was politically and economically wrong that this vital tool should be under the control of foreigners. This led to a demand in each territory for the establishment of a central bank and for the indigenization of the commercial banks so as to provide the monetary authorities with more power of control over the commercial banks to pursue goals more relevant to the domestic economy. Specific courses of action that were taken to achieve these objectives ranged from complete nationalization of the banking system, domestic incorporation of banks, state participation in commercial banking through government purchase of shares, and the establishment of wholly-owned indigenous banks to compete with the expatriate-owned banks. For example, complete nationalization of the banking system was undertaken by Tanzania. Kenya, Nigeria, Uganda, Malawi, and Zambia provide examples of State participation in commercial banking through government purchase of shares in foreign-owned banks. Finally, wholly-owned indigenous banks could be found in Nigeria, Uganda, and Ghana (Furness, 1975).

In contrast to these changes that have occurred in the banking systems of the anglophone countries, there has been far less revision of the banking system in francophone countries where even today nearly all the commercial banks are expatriate-owned. France still exerts a strong influence on the unions (through its being represented in the central banks' boards) and on the franc zone (through management of

the foreign exchange reserves of the CFA countries; i.e, operations account).

Besides the issue of central bank control, the exchange rate arrangement within the sterling area caused problems which gave the colonial territories little room for maneuver in matters of exchange rate policy. This can be seen by looking at the features of the exchange rate arrangement in the sterling area. The local currencies of the territories were linked directly to sterling through a sterling exchange standard, whereby the Currency Boards stood ready to convert the local currencies into pounds at a fixed parity.

The features of the system were (Ord & Livingston, 1978):

1. Britain held gold and dollar reserves for the sterling area;
2. sterling area members were required to economize on scarce currencies through exchange controls to preserve the exchange rate for sterling;
3. in exchange, Britain permitted greater freedom of capital and current account transactions from Britain to the rest of the sterling area; and
4. Britain acted as international banker for the sterling area whose foreign exchange reserves were kept in London as sterling balances. A country experiencing a balance of payments deficit could draw on these balances to finance imports. If the sterling area as a whole was experiencing a bal-

ance of payments deficit relative to non-sterling areas, Britain, as banker for the sterling area, would pay out whatever currency was required. As Britain's total short term liabilities tended to exceed the short term assets (claims to foreign reserves), the exchange rate of the pound and Britain's balance of payments caused much concern to the sterling area members.

Another source of concern for the sterling area members was their experience with the effects of devaluation of the pound due to the sterling peg. During the sterling peg period, the pound was devalued twice. When it was devalued in 1949, sterling countries followed Britain and devalued concurrently since (Ord & Livingston, 1978):

1. due to the colonial structure of trade, they exported mostly to Britain;
2. they depended on imports of British capital funds and failure to devalue concurrently would have compromised capital imports if British investors had to give up more pounds to get the same amount of a territory's currency that was not devalued concurrently with the pound;
3. their currency and other reserves held in sterling balances would suffer a capital loss by depreciating in value; and
4. territories on the legally-based sterling exchange standard were effectively using sterling as domes-

tic currency and could not adopt a different exchange rate to that of Britain.

The pound was again devalued in 1967. The two British devaluations occurred during the Bretton Woods era when the pound was relatively fixed. Most sterling area countries remained pegged to the pound despite the inconveniences of the devaluations. The benefits of staying pegged must have more than offset the costs and inconveniences of the two devaluations. But since 1973, when the international monetary system changed to floating among the major currencies, most of the sterling area countries have long since given up their peg to the pound. This can be attributed partly to (King, 1979):

1. their experience with pre-1973 inconveniences with the peg resulting from the institutional constraints to which they were subjected, namely:
2. inability to use the exchange rate as an instrument of policy.
3. abdication of use of domestic monetary policy resulting from the guarantee of free convertibility into sterling at a fixed exchange rate. In effect, this transformed the sterling area into an extension of the British financial system. Hence the lending behavior of the commercial banks operating in this area were influenced more by their head offices in London than by the local authorities in the territories. Thus there was no reason

why their lending and deposits in any single territory should bear a particular relationship to one another;

4. holding of sterling reserve assets to back up the issue of domestic currency; and
5. limited latitude for the fiscal authorities to print money (i.e., borrow from central bank).

It is worth pointing out at this point that there is a close parallel between the history, characteristics, functioning and experience of the sterling area and the CFA franc area which was the French counterpart of the currency board system during the colonial period. To quote a passage from a French scholar (Vallée, 1989):

> La République ... s'efforce de trouver dans l'empire un nouveau ressort qui passe par l'extension de la circulation monétaire, par une plus grande contiguité des mécanismes financiers et par une homogénéisation des flux d'échanges. ... les banques ayant le privilège d'émettre la seule monnaie légale étaient soumises à des règles strictes du régime d'émissions, soit qu'elles observent un plafond fixé par décret, soit qu'elles conservent une encaisse de contrepartie des billets en circulation. L'aspect "administré" de la création monétaire en Afrique ... allait bien sur contre l'expansion du crédit et le développement de la circulation monétaire (p. 33).

This quotation says:

> The Republic (French) sought (to expand French interests in its territories) by extending its monetary and financial principles overseas in order to integrate trade flows. (For this purpose) Banks (in the territories) that could issue money were subject to strict control either through ceilings on money creation placed by law, or by being required to hold assets to back up the currency in circulation. This "administered" nature of money creation in Africa worked against the

> expansion of credit and the development of the monetary system (my translation).

Thus the CFA franc zone operated on the same principles as the sterling zone and both basically shared the same experiences.

That the sterling peggers quit the peg can also be partially attributed to the inconveniences of the post-1973 experience with the pound peg.

This can be referred to as the problem of single pegging under floating major currencies or joint floating. By 1973, most anglophone and francophone African countries had achieved political independence. As part of their desire to assert their independence, most had also been trading more and more with non-metropolitan countries. This was important due to the heavily bilateral and involuntary nature of pre-independence trade between the territories and the metropolitan countries. Post-independence trade was not heavily one-sided as it had been during the colonial era. It reflected the desire of the new nations to diversify their trade towards new partners.

Under these circumstances, the argument for single pegging (that it frees the pegging country from having to deal with uncertainty due to changing exchange rates if it trades mostly with the numeraire currency country), was no longer tenable. The literature on optimal pegging studied the issue of joint floating and demonstrated that single pegging under floating is bad policy if the pegging country is engaged in multilateral trade. CFA zone trade has diversi-

fied considerably since attainment of independence, as Table I shows.

TABLE I

EXPORTS BY PRINCIPAL COUNTRIES OF DESTINATION: VALUE AS PERCENTAGE OF WORLD TRADE

Countries:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
					Cameroon					
U.S.A.	2.7	2.8	4.8	5.5	20.8	30.2	37.7	40.1	22.7	14.2
France	26.8	25.4	28.3	33.7	25.1	21.8	19.3	15.8	30.0	32.9
Netherlands	21.4	22.6	27.3	27.8	20.8	19.2	14.2	19.5	19.7	21.5
W. Germany	7.4	8.8	10.4	7.5	4.3	6.0	5.8	5.0	5.6	6.3
Italy	3.9	6.3	8.1	7.1	6.8	8.2	5.0	4.2	3.6	5.5
Japan	4.0	3.9	2.0	2.0	3.7	2.2	1.4	1.2	1.6	2.1
					Ivory Coast					
U.S.A.	10.4	11.7	14.5	9.5	8.3	11.4	14.0	12.4	15.0	12.7
France	25.4	25.5	23.2	23.7	21.7	18.5	19.6	19.0	16.4	17.9
Netherlands	13.1	14.9	18.7	17.4	13.6	13.1	12.2	11.6	16.4	10.3
Italy	9.2	8.5	5.7	8.4	11.5	7.9	8.7	8.8	6.4	9.9
W. Germany	7.2	5.3	4.8	5.8	8.6	6.6	4.5	3.9	5.2	5.8
U.K.	4.0	3.7	3.7	4.5	3.5	3.9	3.5	4.5	3.4	4.7
					Senegal					
U.S.A.	7.4	5.4	8.4	7.7	4.7	4.4	4.5	3.7	3.2	3.1
France	48.3	47.0	44.7	41.7	44.7	32.0	21.3	29.4	31.7	30.6
U.K.	6.0	7.4	8.4	5.7	7.2	6.1	5.1	4.1	5.3	5.7
Italy	2.9	5.2	4.7	1.3	4.7	1.9	.6	3.1	4.1	2.7
Netherlands	3.6	3.3	1.9	1.1	.9	.4	.4	3.4	4.1	2.7
W. Germ.	1.2	1.8	2.1	2.1	2.1	2.5	1.2	1.8	1.9	1.1

Source: UN: Yearbook of International Trade Statistics: various issues

What emerges from Table I is a downward trend of trade between the CFA countries and France, their colonial trading partner. The trend of trade diversification away from this traditional partner is shown by rising shares with the non-French partners.

As can be seen, their trade is no longer solely with the metropolitan country. It has become increasingly multilateral in nature. Thus by pegging to a single currency, instead of a basket of currencies, only one source of variability and uncertainty is eliminated. Only a part of external disturbances due to exchange rate fluctuations is therefore eliminated. The other part will persist and be a source of economic problems. To avoid this situation, it will be necessary to leave the single peg for more efficient exchange rate regimes such as the basket or the SDR pegs which have been proven to be superior to the single peg by the optimal peg literature. Most, if not all, the sterling area (anglophone) countries quit the single peg regime in favor of other arrangements.

This begs the question of why the CFA zone (francophone) countries have not given up pegging their currency to the French franc. Is it that they are not experiencing problems with the peg? The answer is "no" since, as the newspaper reports pointed out at the beginning, these countries have been experiencing external and internal disequilibria, stagnant per capita incomes and foreign debt problems. Given the nature of these problems, how are the

CFA countries responding? To answer this question, let us pose it in a different way. How does a country in the CFA zone engaged in international (multilateral) trade adjust to internal and external disequilibria when, because of institutional constraints, it can't carry out its own monetary policy nor exchange rate policy? This is the predicament of the CFA countries.

In what follows, it will first be argued that the problems encountered by these countries can be traced partially to the institutional arrangement in which they have chosen to operate. Then it is argued that this choice leaves them with a poor adjustment mechanism. Basically, these problems are due to rigidities within the union and to a lack of fiscal and monetary discipline in some countries even though the latter are the vaunted advantages of pegging.

For the CFA franc zone to function properly, so as to maintain the external convertibility of the CFA franc, the zone is most concerned with its overall balance of payments situation. Its policies are therefore designed to attain external balance. The effect is that if, for instance, there is a balance of payments deficit in a country, the mechanisms of the operations account are, in principle, supposed to go into effect and slow down the growth rate of the money supply and thus aggregate demand. In practice, there are violations of the requirements of the mechanism. The biggest such violation is the failure of the fiscal authorities to limit their borrowing from the regional central

banks (i.e., printing money) to no more than 20% of their tax revenues of the previous fiscal year as required by the statutes of the operations account. This violation of the institutional check on the growth of domestic money is due to the share size and power of the public sector in these countries. Its net effect is that rather than decreasing domestic demand, it increases it and contributes to the deficit. A point to note is that the public sector in these countries is also the biggest employer. In most of them, the operating budget (i.e., the recurrent budget for civil servants) is often one of the largest components of the public budget. An implication of this is that when the CFA franc is overvalued (as the IMF and the World bank think it is), this large consuming public sector (the so-called elite) tend to spend on imported luxury consumer goods now made artificially cheaper by the overvaluation. This has serious economic consequences for these economies as will be shown later.

Vallée (1989) points out:

> C'est d'autant plus facile que le secteur public peut se financer auprès de la banque centrale, en étant comptabilisé dans la rubrique "Entreprises privées." Par ce biais, la politique monétaire ne vient pas restreindre le déficit budgétaire, mais au contraire autorise son accroissement ... (p. 132).

Or,

> It is very easy for the fiscal authorities to borrow from the central bank and be entered as "Private Enterprises" in the central bank's accounts. By this means, monetary policy does not really succeed in limiting the financing of the

> budget deficit, but instead contributes to its growth... (my translation).

Coupled with the fixed peg, this is a home-made prescription for economic woes for the CFA countries of the kinds they are going through right now. As we shall see, the institutional structure which guarantees the fixed CFA/French franc parity deprives them of an adjustment mechanism and can also be a direct cause of their problems. The value of economic theory lies in the fact that it allows us to understand and to explain the causes and effects of phenomena. Knowing the causes, if the effects are undesirable, steps can be taken to avoid them. Such steps call for new measures by policy makers. The CFA zone countries are experiencing the problems they are going through right now because of the consequences of their policy choice and because of what can be termed a "crippling policy inelasticity" (my own term) which I define as an inability or a very slow response to problems when you know the cause of those problems, can do something about it, and yet for some reason, you keep vacillating and procrastinating, thus compounding your problems.

Policy Choice and Current Problems of the CFA Zone: Economic Analysis

To what extent can the current problems of the CFA countries be traced to their choice of exchange rate regime? This question can be addressed from two angles:

1. by analyzing the Zone as a fixed exchange rate arrangement and demonstrating the relationship between the Zone's problems and their choice of exchange rate regime; and/or
2. by analyzing the Zone in the context of a monetary union to determine to what extent it is succeeding as a monetary union.

The first part of the issue can be addressed by using a simple model of an open small economy (Alexander, 1952; Johnson, 1958). In this model, it is assumed that domestic saving depends positively on the level of income while investment spending is exogenous. Therefore domestic macroeconomic equilibrium occurs when investment (injection) equals savings (leakage). When the economy is open to international trade, it is assumed that imports from abroad depend positively on income while exports abroad are exogenous. In this open economy, imports (like savings) are a leakage of expenditures from the local economy while exports (like investments) are an injection of spending into the local economy. The condition for equilibrium income under these circumstances is that total leakages equal total

injections; thus there will be internal and external balance.

Given the relationship between savings and income (the marginal propensity to save), and the relationship between imports and income (the marginal propensity to import), changes in investment spending, exports and government expenditures will set off a chain reaction in the local economy that results in greater levels of spending so that income increases by some multiple of the changes in spending. This is called the multiplier effect of changes in spending.

Implications of the Foreign Trade Multiplier for Commitment by Authorities in CFA Countries to Maintain a Fixed Exchange Rate

Starting from equilibrium, let us say foreigners increase their purchases of coffee and/or cocoa from a (CFA) country. If nothing else changes, this will lead to a net surplus in the trade account. But what if starting from equilibrium, there is an exogenous increase in spending (by local businesses, consumers or government)? What effect will this have on the trade balance? Through the multiplier effect, domestic income will rise by more than the change in spending. This increase in income will stimulate imports since imports depend on income (i.e., there is a marginal propensity to import). The direct result will be a trade

deficit. In contrast to the previous situation in which the increase in income was export-led, it can be seen that an exogenous increase in domestic spending will increase domestic income but this will lead to a balance of payments deficit assuming a small country and thus an insignificant role for the capital account and the foreign repercussions effect.

Adjustment to Balance of Payments Disequilibrium

If there is a balance of payments deficit and the country is committed to the maintenance of a fixed exchange rate (as is the case in the franc zone), and to the maintenance of the union's overall balance of payments objectives (as is the case in the West and Central African Monetary unions), the above simple Keynesian model of an open economy suggests that there will be a conflict between the domestic (i.e., full employment) objectives of a CFA zone country and its commitment to the union's objectives. The main problem with the franc zone arrangement is that under a system of fixed exchange rates, and given the union's commitment to a fixed exchange rate and to maintenance of external balance for the whole group, adjustments to external disequilibrium tend to be automatic. To function smoothly and efficiently, the adjustment mechanism requires that each country forgo the use of monetary policy to pursue full employment objectives. Each country must therefore be willing to accept deflation

or inflation if the union's balance of payments situation requires it. Therein lies the predicament of the CFA countries; for if a country is experiencing a balance of payments deficit, for income adjustment to reverse the deficit, the authorities must allow a reduction in domestic income by not undertaking policies to offset its decline. This tantamounts to an abdication of monetary policy. In today's world where unemployment tends to be the rule rather than the exception, giving up the use of monetary policy in this way and the use of the exchange rate which is fixed, means that each CFA country makes internal sacrifices for the sake of attaining the union's desire for external equilibrium. Otherwise, there is increased exchange control which tends to be undermined by underground exchange markets and smuggling of goods, both of which distort efficiency within the economy, and lower the tax base of the economy. The government deficit consequently increases due to a shortfall in revenues. It is likely that this deficit will flow into the external deficit calling for more restrictions for the union's sake, and putting the countries in a vicious circle.

Incentives To Cheat

As is to be expected, when the objectives of the individual (such as a CFA country) is in conflict with the objectives of the group (such as the union), there is an incentive to beat the system. In the case of the monetary unions, as demonstrated by an earlier passage from Vallée,

to avoid the discipline required to maintain union external balance through monetary control, the countries avoid such control by creative accounting practices in the books of the central banks. This tendency to scale credit limits imposed by union central banks can be attributed to the restrictive or conservative posture of the banks in credit matters. Here is how a Cameroonian critic (Bruno Bekolo-Ebe) of the functioning of the monetary unions and the franc zone sees it (Vallée, 1989):

> The management of the currency in this area is based on the gold principle though the currency is backed almost entirely by foreign exchange receipts rather than by gold. It is thus a victory of the Currency School (which believes in money being fully backed by the amount of specie) over the Banking School (which holds that money should be sensitive to economic activity and which today finds expression in the willingness to use the power of money creation to respond to the commercial and productive needs of the economy. The (union's) commitment and the rigor with which it seeks external equilibrium is matched by an equal fervor and rigor in managing credit. Monetary practices in matters of credit reflect the quantity theory (especially the link between the money stock and the price level), and the neutrality of money. Credit policy under such circumstances is such that the contribution of the banking system to the economy is reduced to that of satisfying its transaction needs. Thus the monetary system's activities are restricted to that of discounting short term assets linked to financing agricultural campaigns, and associated advances to banks. Medium term credit is in the range of 20% to 30% of union central bank assets while long term credit is virtually non-existent. The nonbank financial institutions are characterized by an inability to adapt to the credit needs of the economies by their failure to harness domestic savings and use them in a manner that would be more responsive to the needs of the economy than the banks which are always worrying about credit risk (p. 152) (my translation).

With such rigidity, it is not surprizing that national governments, faced with the need to promote development and macroeconomic objectives, seek creative ways of scaling the obstacles erected by union membership. This inevitably leads to government deficits that far exceed the maximum considered safe (20% of previous year's tax revenues) for attaining the external constraint of the union. These fiscal deficits get reflected in the trade account deficits in the manner described in the open economy model above. Without a viable monetary tool and without an exchange rate tool to use for adjustment to the trade deficit, these countries are censured for "unruly" behavior, told to cut back their government spending (i.e., reduce their deficit), and tighter credit measures are undertaken. This leads them from solving one problem (external imbalance) to inheriting another (internal imbalance). In the theory of economic policy, it is said that successful economic policy requires one tool for one economic problem. In the case of the CFA zone, the institutional constraint on the countries leaves each one with only fiscal policy to be used in addressing the two problems of internal and external balance. For these countries, it is a no-win situation. Most suffer from high unemployment rates coupled with persistent external deficits. In such a situation, the policy recommendation is that, to the extent that such unemployment is due to demand factors, expenditure-switching and expenditure-changing tools can be used in a complementary fashion so that the two

goals of external and internal balance need not be in conflict. Thus a trade deficit/unemployment problem can be handled with devaluation to switch demand to domestic goods and expansionary fiscal and/or monetary policy to reduce unemployment, if need be.

This presupposes the availability and unrestricted use of fiscal, monetary, and exchange rate tools; i.e., autonomy in the use of these tools. As has already been shown, of these policy tools, the CFA countries can only use fiscal policy albeit to a limited degree within the context of the union. This means recurrent problems of adjustment will continue to plague and threaten the stability of the franc zone in its present structure.

There is also doubt about the usefulness of the franc zone in France. According to Vallée (1989), there is a debate in France on the desirability of the CFA zone to France. Followers of the (Raymond) "Cartier doctrine" see the aid and budgetary subsidies that are dished out by France to maintain the zone as yielding no return. To them, the zone is nothing more than "an imperial arrangement that has outlived its usefulness." By contrast, others like Xavier de Fournière, see the zone as "a source of wealth" (a bullionist view) for France.

In the zone itself, a clear indication that there is dissatisfaction with the zone's structure and constraints is given in a 1984 report of the Cameroonian Economic and Social Council. Referring to the problems encountered by

membership in the zone, the report complains about the tight credit ceilings placed by the zone central bank and the tendency to lower them.

The report calls for decentralization of the control of credit, more consideration for personal collateral and viable business projects. Also the bank should actively promote short term loans to the economy. The report claims that these are all aspects that are neglected by the expatriate-owned banks which tend to grant loans to politicians or to branches of multinational corporations. In short, the shortcoming of the union central banks, and thus a weakness of the zone, is that they do not respond to the true development needs of the economies of its member countries. The issues raised in this report are strikingly similar to those raised by the sterling countries.

Apart from the fixed exchange rate issue, another way to examine the CFA zone is to look at how it has succeeded as a true monetary union. The zone is a common currency area which by definition (Rivera-Batiz, 1985) is a monetary union in which member countries adopt a common currency while monetary policy is under the control of a joint agency or bank which coordinates policy.

If a currency area works well, the microeconomic and macroeconomic advantages can be considerable. Johnson (1969) makes the following points:

1. maximize the objective of attaining price stability, full employment, growth and balance of payments equilibrium;
2. reduce the risk of destabilizing currency speculation by completely eliminating the possibility of exchange rate changes within the area;
3. lower the probability of a breakdown of the international monetary system and the resulting return to barter and bilateral trading;
4. impose a discipline on government policy to restore internal and external balance in the absence of automatic adjustment;
5. make easier economic calculations by consumers and producers and thus promote exchange through competition;
6. promote the integration of the economies; and
7. permit maximum possible freedom of transactions and allow exploitation of economies of scale, specialization and division of labor, thus promoting economic efficiency and growth.

For these advantages to become reality, however, certain conditions (some of them stringent) have to be met. The first requirement is that of perfect factor mobility. Mundell's theory stressed this condition as a substitute for exchange rate changes and viewed it as conducive to a common currency (i.e., fixed exchange rate) area. Examined from the point of view of factor mobility, it is doubtful if the

CFA zone satisfies this assumption since there are many institutional obstacles to allow perfect factor mobility. The existence of immigration offices in most of these countries is an indication that there is a policy which is designed to prevent the free movement of labor.

Most of these countries also place restrictions on the amount of funds that can be taken out of the country, thus suggesting that there is not much freedom of capital movement either. The exceptions are usually the multinationals whose actions within the zone have led Ossa and Lapiquonne to accuse the governments of the zone members of fiscal laxity. By this they mean the tendency of these governments to grant generous tax concessions to attract multinationals which then use them to manipulate and pit the countries against each other to compete for investment funds. The problem with such behavior of the multinationals is that the distribution of investment funds in the zone might be the result of distortional fiscal policies rather than reflecting the real rate of return on investment in a particular country.

Natural and cultural factors also constitute barriers to the free movement of labor. Such immobility of labor can be due to psychic attachment of labor to their customary area of residence. Hence the sentimental value (i.e., psychic income) outweighs the returns from moving to another country or region where the wage rate and income might be higher.

Another factor casting doubt on the proper functioning of the CFA zone as a monetary union (Rivera-Batiz, 1985) is that when countries join under a single monetary authority (such as the union central banks):

> Complications might arise regarding the financing of fiscal deficits. The usual interaction between the country's central bank and treasury in the financing of government activities would have to be subordinated to the jurisdiction of the currency area's monetary authorities, something that might be objectionable to domestic policy makers (p. 545).

This means that the countries involved must have some common political interests, a willingness to adopt fiscal and monetary policies that are consistent with those of the other countries in the union or both. This implies similarity of political and economic interests. It is doubtful whether these interests converge for the various CFA countries. The economic philosophies of these countries vary considerably, ranging from the "market economy" of the Ivory Coast, the "planned liberalism" of Cameroon, to the "Marxist" philosophy of the Congo.

Not only that, as Vallée pointed out, the subordination of fiscal and monetary policies to the jurisdiction of the union central banks exists only on paper. In practice, there is hidden insubordination to meet national priorities which are as divergent as the countries themselves. This insubordination can be traced to a violation of another assumption of the optimal currency area theory; i.e., that a currency area is justifiable for countries with similar national propensities to inflation. General agreement on

the required level of unemployment may produce different rates of inflation among the countries given the differing nature of the Phillips curve from country to country, assuming such curves exist. Alternatively, the acceptable rate of inflation may be accomplished at the expense of varying levels of unemployment among countries and varying welfare costs.

The trade-off between inflation and unemployment presents governments with a policy choice. At any point in time, each government will have a preference for a particular combination of inflation and unemployment which will be determined in reference to the country's payments position and the trade-off between the two. If countries differ in their propensities to inflate, the currency area cannot function smoothly because the resulting differences in inflation rates will result in balance of payments difficulties, necessitating exchange rate changes for correction. The CFA countries have development plans with different growth rate targets. These require different policy mixes which imply different inflation rates. From this point of view, it can hardly be said that the CFA zone is a true monetary union.

In practical terms, the problem of achieving a true monetary union can be illustrated by the European Monetary Union and the defunct East African currency area. In the former, one finds that there has been great caution by interested parties in getting involved. The progress

towards monetary union in Europe has been hindered or slowed down by the lengthy negotiations necessary to resolve the conflicts that are inevitable in such a union. By contrast, in the CFA zone, not only was the union eased into from a basically colonial structure, but also the conflicts and real problems of forming a true monetary union were either not carefully considered, or everyone has learnt to live with the consequences and inconveniences of its operation. But given today's international monetary system, grinning and bearing it has had its painful side which is now surfacing as evidenced by the newspaper reports cited earlier. The CFA countries are now seeking a way out of their problems. This calls for them to take a serious look at the modus operandi of the franc zone and to recognize that in a union of unequals (France as opposed to the CFA countries), the outcome is bound to be in favor of the member with the stronger decision-making power. The institutional structure of the zone through its operations account gives France veto powers over money creation and exchange rate policy. It comes as no surprise therefore when Vallée, in referring to the need for reforms in the zone, talks about "the crisis of franco-African cooperation, manifested by fears of neocolonialism on the African side, criticism of the conformity imposed by the rules of the zone, threats of and eventual withdrawal of Mali, Mauritania and Madagascar ..." from the zone (Vallée, 1989).

A Cameroonian critique of the zone is reported (Vallée, 1989) as indicating that the exchange rate of the CFA franc does not reflect the real socioeconomic position of the countries, and is just another facet of the French franc circulating in the zone. The difficulties of the countries are attributed to dissimilarities of the economies, but also to the dominance of the French economy on these economies.

The upshot of all this is to show that a monetary union's stability depends on the similarities of the members' economies and how these affect the convergence of policies, and the extent to which the members are affected by the dominance of one member or a subgroup of them and how the other members relate to such dominance. If such dominance is viewed as exploitative, or leaving no room for individual maneuver, the union's survival will be shaky. If there are dissimilar and irreconcilable characteristics among the members, the union will disintegrate as was the case for the East African Currency area. As for the CFA countries, the evidence indicates that there are dissimilarities, some irreconcilable differences and dominance. The conclusion to draw from this is that unless there are radical reforms allowing members more room for maneuver in monetary and exchange rate policy, the CFA countries face increasing crises and the prospect of disintegration because the modus operandi of the zone is out of synch with conditions in the present international monetary system. Short of disintegration or appropriate adjustment to their prob-

lems, the union can only be maintained if France is willing to subsidize the financial inefficiencies of the zone. But then the subsidies will imply economic, monetary, commercial and financial opportunity costs to the CFA countries.

Zone Membership as an Impediment to Economic Adjustment by CFA Countries

Background

Before examining the adjustment problem of the CFA countries, it is instructive to trace the root cause of the tendency of these countries to encounter persistent trade deficits. Since independence, the CFA countries, like most developing countries, have pursued a policy of industrialization through import-substitution; export-promotion has been deemphasized because of the feeling that primary products have a low demand and supply elasticity. Import-substitution was viewed as a two-edged sword to achieve industrialization, and savings on foreign exchange (as hitherto imported goods are produced locally).

The direct result of relying on the import-substitution strategy was the adoption of policies that turned out to be counterproductive in terms of the trade balance. To begin with, the strategy usually starts with the erection of trade barriers such as tariffs, quotas and licences on the importation of certain goods. Then an import-competing industry is set up. This strategy results in a preference for dis-

placing imports to save foreign exchange rather than promoting exports to earn it; reliance on administrative controls rather than market forces to determine the allocation of resources; and favoring manufacturing industry at the expense of agriculture (Ranis & Cohen, 1971).

Generally speaking, import-substitution has been an unsuccessful strategy for several reasons (Todaro, 1977):

1. the main beneficiaries of this strategy have been the foreign firms (liberal tax incentives and repatriation of profits);
2. heavy government subsidization of imports of capital goods and of intermediate products, leading to capital-intensive industries being set up; these in turn raise the requirements in terms of imported capital and intermediate products and thus more foreign exchange demanded.
3. overvalued exchange rates which raise export prices in terms of foreign currency while lowering import prices in terms of domestic currency. In the context of import-substitution strategy, overvalued exchange rates encourage capital-intensive production methods still further because the price of imported capital goods is artificially lowered. At the same time, it penalizes the traditional primary commodity sector by artificially raising the price of these exportables in terms of foreign currencies. This makes local farmers to be less

competitive in world markets and deteriorates the balance of payments through the current account.

In short, import-substitution:

1. placed undue emphasis on consumer goods (i.e., import competing industries) in most countries;
2. gave insufficient attention to potential long run comparative advantage through resource endowments in agriculture; and
3. employed alien and unsuitable capital-intensive technologies unnecessarily; led to the creation of an inefficient industrial sector operating below capacity, creating very little employment, very little foreign exchange savings, and little prospect for further productivity growth.

This policy has combined with structural rigidities and social and institutional constraints to make balance of payments problems, debt problems, and macroeconomic problems a recurrent burden on the developing countries, including the CFA countries. The point of the background just given is to draw attention to the drawbacks of an import-substitution strategy and to bring to the forefront the potential of an export promotion strategy. This policy recognizes the constraint imposed by the inability to expand exports fast enough to meet imports thus contributing to external imbalance. It looks at the measures that can be taken to favor exports. Since the CFA countries are facing disequilibria,

it asks the questions, "How can they adjust?" and more important in terms of this study, "Can they adjust?"

How Can CFA Countries Adjust?

This question can be answered by considering the process of balance of payments adjustment, given a disequilibrium such as the trade deficits of the CFA countries.

Faced with a deficit, the CFA countries can finance it out of their international reserves or by attracting investment from their trading partners. However, their capacity to cover a trade deficit is limited by their stocks of international reserves and by the willingness of their trading partners to invest in these countries.

To adjust to disequilibrium, the CFA countries can:

1. allow automatic adjustment mechanisms to reestablish equilibrium;
    a. fully flexible exchange rates: this policy allows the free market to determine exchange rates so that a trade deficit can be removed through depreciation of the CFA franc. Its effect would be to reduce imports and the demand for foreign exchange and increase exports and the supply of foreign exchange.
    b. automatic adjustment mechanism under a fixed exchange rate: since the exchange rate is fixed, adjustment by the CFA countries to a trade deficit calls for selling foreign ex-

> change from their stock of international reserves. This is only a short-term solution, given the limited availability of foreign exchange. Nonetheless, the sale of foreign currency, if not sterilized or if only partially sterilized, reduces the money supply. Assuming the quantity theory holds, the decrease in the money supply reduces the price level. The lower price level then works through relative prices to remove the trade deficit as the lower price in the CFA countries makes their exportables more competitive and attractive to both foreign and domestic consumers. This is the so-called price-specie flow mechanism first expounded by Hume.

Also, as the money supply falls, aggregate demand falls, income falls, and reduces income-induced imports, thus improving the trade balance. This is the Keynesian adjustment mechanism.

The third possibility (whose effect might not be so significant in the CFA countries as in any other developing country) is the asset market mechanism. A reduction in the money supply, as foreign exchange is sold in response to an excess demand for foreign exchange due to a trade deficit, raises the interest rate. Domestic financial assets become an attractive alternative of investment to foreigners and

domestic (CFA) citizens. The effect is to improve the capital account and thus the balance of payments.

The conclusion is that under a fixed exchange rate, the adjustment to a trade deficit occurs automatically through the monetary mechanism. However, the removal of the trade deficit results in lower real income and employment. Thus the price of attaining external balance is internal imbalance. Fiscal policy cannot be counted on in this situation to remove the internal imbalance. This is because an expansionary fiscal policy will raise income and imports, deteriorating the trade account. Besides, if the policy is instituted near full employment, its inflationary effects will make CFA exportables less competitive, further deteriorating the trade account. Thus fiscal policy cannot be used to offset the automatic monetary mechanism without getting the CFA countries back to external imbalance.

2. Discretionary Policy to Restore Equilibrium: Rather than relying on the automatic monetary adjustment mechanism, the CFA countries can influence economic transactions with foreigners through exchange rate management. Under a fixed exchange rate, currency devaluation can be used to remove a trade deficit. The effect of devaluation is to raise the price of imports in terms of domestic currency, reducing the demand for imports and foreign exchange. It also decreases the price of exports in terms of foreign currency, increasing

> the demand for exports and the supply of foreign exchange. Devaluation thus removes a trade deficit by switching foreign and domestic expenditures to the domestic (CFA) economies through its effects on relative prices.

As net exports increase following the devaluation, aggregate demand increases and income and employment increase if there are idle resources. But if devaluation occurs when the CFA economies are near full employment or bottlenecks in the economies make production to lag behind demand, then prices will rise. The resulting inflation will offset the effects of devaluation through loss of international competitiveness by the CFA countries. This suggests that devaluation by itself may not be enough to attain external balance. Thus to prevent domestic inflation from eroding the gain in competitiveness due to devaluation, it might be necessary to combine it with deflationary policy.

The above arguments can be demonstrated with a simple algebraic model found in most international economics textbooks (i.e., see Chapter 5 in Rivera-Batiz, 1985).

$$X-M = Y-A$$

where

X = exports

M = imports

Y = income (production)

A = absorption (aggregate expenditures)

The equation says the current account is the difference between domestic production (income) and absorption (aggregate expenditures). If the demand for tradables is sufficiently elastic, devaluation reduces the trade deficit by increasing income relative to absorption. Income increases because of the effect of an increase in net exports on aggregate demand and output. As income increases, absortion increases but the net effect is a reduction in the trade deficit. Now, if income is fixed (i.e., $Y = \overline{Y}$), the above equation shows that absorption must fall if the trade deficit is to be reduced. Devaluation itself reduces absorption through its effect on consumption expenditures (on imports). But it may need to be reinforced with a reduction in government spending and/or money supply.

How Economic Adjustment is Hindered by Certain Institutional Constraints in the CFA Countries

We have answered the question of how adjustment to a trade deficit in the CFA countries can take place under a fixed exchange rate. We now look at how economic adjustment to a trade deficit is impeded by certain institutional features of the CFA zone.

To begin with, we observe that in the present international monetary system, temporary trade deficits are financed but persistent trade deficits, like those currently faced by the CFA countries, call for adjustment (Table II).

TABLE II

TRADE DEFICITS OF SOME CFA COUNTRIES
(IN MILLIONS OF US DOLLARS)

Country	1981	1982	1983	1984	1985	1986	1987	1988
Cameroon	-481	-397	-417	-183	-586	-567	-893	na
Ivory Coast	-141	-102	-931	-580	-640	-138	-951	-110
Senegal	-462	-267	-289	-274	-322	-271	-257	-268
CAR	-400	-490	-290	-340	-480	-870	na	na

Source: IMF: International Financial Statistics: various issues
na = not available

Table II shows that trade deficits are persistent. Thus adjustment, rather than financing, is called for.

Newspaper reports, especially in Jeune Afrique and the Economist, have made frequent references to meetings and talks within CFA circles to discuss the feasibility of devaluation of the CFA franc contemplated by some CFA countries (Ivory Coast, Senegal, Cameroon) and recommended as part of a structural adjustment package by the International Monetary Fund (IMF) which considers the CFA franc overvalued. An overvalued currency works to hurt the international competitiveness of the CFA countries in real terms. The international competitiveness of the CFA countries can be expressed in terms of the real exchange rate. This is a price-adjusted exchange rate. The real exchange rate is the

nominal exchange rate times the ratio of the foreign price level to the domestic price level of the CFA countries. Let

$$E_r = E_{df}\left(\frac{p^f}{p^d}\right)$$

where

E_r = the real exchange rate

E_{df} = the CFA franc price of foreign currency

p^f = the foreign price level

p^d = the price level in the CFA zone.

The real exchange rate expresses the prices of foreign goods and CFA goods in CFA francs. A rise in the real exchange rate, as defined above, means the CFA countries are more competitive relative to the foreign country and vice versa. If interest lies in the competitiveness of the CFA countries relative to more than one trading partner, a real effective exchange rate is used. This is the nominal effective exchange rate times an appropriate price index for the trading partners and divided by the price index for the CFA countries (see Table III).

A persistent trade deficit for the CFA zone implies an overvalued exchange rate for the CFA franc. Alternatively, an overvalued CFA franc is a source of persistent trade deficits. This is because foreign goods are made cheaper than domestic goods. In other words, the CFA countries lose international competitiveness. This is why structural adjustment to persistent current account deficits calls for real exchange rate devaluation.

TABLE III

REAL EXCHANGE RATES FOR SOME CFA COUNTRIES

	Ivory Coast	Cameroon	Senegal
1970	100	na	100
1971	92	na	98
1972	88	123.85	99
1973	92	116.90	105
1974	93	129.52	105
1975	95	106.25	127
1976	96	108.43	116
1977	109	104.28	115
1978	113	95.07	109
1979	120	97.61	109
1980	124	100.00	105
1981	115	111.83	96
1982	108	119.84	98
1983	102	119.60	99
1984	97	na	102
1985	94	na	110
1986	98	na	116
1987	102	na	110

Source: Vallée (1989), p. 222 for Côte d'Ivoire and Senegal
na = not available
Note: Vallée defines the real exchange rate as $1/E_{df}(P^d/P^f)$. Thus, an increase is a loss in competitiveness. As can be seen, the years of increasing values for the real exchange rate dominate the years of decreasing values. There is therefore a need for adjustment policies to regain competitiveness.

Given this explanation of the real exchange rate, it is clear that the CFA countries can increase E_r (and thus gain international competitiveness) in two ways:

1. through an increase in E_{df} (i.e., through a devaluation of the CFA franc in nominal terms); and/or

2. through a reduction in P^d (i.e., through reducing the domestic price level). The latter policy points to a deflationary fiscal and/or monetary policy.

These two approaches to adjustment enable us to highlight the major impediments to adjustment imposed by certain features of the institutional arrangement of the CFA zone.

The Pegging Constraint

The currency arrangement between the CFA zone and France calls for maintenance of a fixed parity through the operations account. Therefore the CFA countries cannot affect the nominal exchange rate--it is fixed and has been so since 1948. Thus exchange rate policy is abdicated. International competitiveness cannot be gained through exchange rate management.

The Monetary Union Constraint

Due to monetary union, member countries have surrendered independent monetary policy to the two union central banks (the West African Central Bank and the Central African Central Bank). Due to the currency ties of the unions to the French franc through the operations account, the CFA franc is acceptable internationally (convertibility), since it can always be redeemed for French francs--a hard currency. Therefore France is concerned with the possibility of overissue of CFA francs by the CFA countries. As a

result, the overall balance of payments situation of the two union central banks in the franc zone relative to non-franc zone countries are closely monitored to prevent the over-issue of CFA francs. To this end, given the peg of the CFA franc to the French franc and the objective of overall payments balance for the zone, the institutional mechanism in place for adjustment is akin to the automatic monetary adjustment mechanism. When there is an undesired overall deficit for a union area, statutes call for restraining credit to member countries. This is just another way of saying the money supply is reduced. Monetary policy is thus geared towards attaining external balance and cannot be used actively for domestic macroeconomic purposes. This is the so-called monetary discipline argument for single pegging. But, as Table IV shows, no such discipline exists in the CFA zone.

TABLE IV

AVERAGE YEARLY GROWTH RATES OF MONEY
FOR SELECTED CFA COUNTRIES
(PERCENTAGES)

	Ivory Coast	Mali	Niger	Senegal	Togo
1968-1973	16.8	6.7	11.9	12.3	14.7
1974-1978	31.5	24.8	28.4	24.8	32.5
1979-1981	3.2	7.8	20.2	10.9	15.7
1982-1985	10.1	14.5	3.5	8.4	9.2
1986	2.7	6.0	11.9	11.1	15.5

Source: adapted from Vallée (1989), p. 223: BCEAO Original source

Besides the monetary indiscipline problem, the CFA countries have not been successful in containing inflation so that the P^d term in the real exchange rate above can fall. On the contrary, there has been domestic inflation in all CFA countries which only appreciates the real exchange rate and overvalues the CFA franc in real terms. This impairs competition and worsens the trade balance and balance of payments (see Table V).

TABLE V

YEARLY GROWTH RATES OF INFLATION IN SOME CFA COUNTRIES

	Cameroon	CAR	Ivory Coast	Senegal
1971	4.1	8.7	-1.5	3.9
1972	8.2	7.2	0.3	6.3
1973	10.2	5.6	11.0	11.1
1974	17.2	9.7	17.5	16.6
1975	13.6	15.9	11.5	31.8
1976	10.0	10.6	11.8	11.6
1977	14.6	9.7	27.5	11.4
1978	12.5	11.6	13.0	3.3
1979	6.5	9.5	16.6	9.8
1980	9.9	17.1	14.7	8.7
1981	10.6	12.6	8.8	5.9
1982	12.3	13.2	7.3	17.3
1983	16.8	13.3	5.9	11.7
1984	11.3	12.0	4.3	12.2
1985	3.1	11.0	1.8	13.3
1986	3.0	8.8	5.8	10.5

Source: Adapted from Vallée (1989), p. 214

What emerges from Table V is that the CFA countries are prone to inflation, a contributory factor to loss of international competitiveness (i.e., an overvalued exchange rate in real terms).

The Fiscal Policy Constraint

The CFA zone compels the member countries to abdicate monetary and exchange rate management. Thus they are left with only fiscal policy to be used to address the objectives of internal and external balance. However, besides the theoretical limits associated with using one tool (fiscal policy) to address two objectives (internal and external balance), the statutes of the CFA zone limit each country's government borrowing to no more than 20 percent of its fiscal receipts for the previous year. Apparently, this measure is intended to avoid large public sector deficits which can easily flow into current account deficits, given the fixed exchange rate. This fiscal constraint, coupled with the abdication of monetary and exchange rate management, severely limits the ability of the CFA countries to adjust to economic problems.

The Commercial Policy Constraint

They are therefore left with only commercial policy as a significant tool of adjustment. Since they cannot devalue, they have to resort to exchange control by restricting imports and/or subsidizing exports. The result

can be more inflation and loss of international competitiveness because import restrictions create shortages and export subsidies increase domestic aggregate demand through an increase in exports, however large or small. Import shortages lead to black markets and smuggling calling for more control. As these activities erode the tax base, the governments are faced with revenue shortfalls which lead to higher deficits and a worsening balance of payments, which calls for devaluation (impeded by zone constraints). Thus, still more control is called for--and the CFA countries find themselves in a vicious circle.

As the above analysis has shown, the current economic problems of the CFA countries have to do with the particular features of the institutional structure which they have set up to achieve monetary union and to peg and maintain a fixed exchange rate. The conclusion to draw is that economic adjustment in the CFA countries could be made easier by the availability and unrestricted use of monetary, exchange rate and fiscal tools--and less exchange control (i.e., trade liberalization).

CHAPTER II

INTRODUCTION AND MOTIVATION

Objective of Study

The contemporary international monetary system is characterized by the float of the major currencies either freely or in a managed fashion. When it comes to the currencies of the developing countries, other arrangements prevail. For example, the CFA franc is pegged to the French franc. This pegging places several constraints, two of which are the subject matter of this dissertation. The first objective of this study is to investigate whether the French monetary authorities, operating through the European Monetary System (EMS) and the international financial markets, have been successful in stabilizing the value of the French franc on the foreign exchange market. This issue is of particular interest to the CFA countries because any instability of the French franc will be transmitted to the CFA franc through the fixed peg. If such instability exists, it is worthwhile to investigate whether the indirect connection of the CFA franc to the other major currencies, through the French franc, has impacted significantly on trade flows between the CFA countries and these countries. This is the second objective of this study. In

order to tackle these issues, a framework for analyzing the activities of the French authorities in the foreign exchange market is presented (Appendix). This can be referred to as joint floating, where changes in the value of the French franc are transmitted to the CFA franc. Then, a framework for studying the effects of the single peg regime on trade flows is presented. This can be referred to as the trade effects, encompassing the real effects on trade flows resulting from the influence of the French franc on the CFA franc through the peg. The study contributes to the literature on international trade flows by studying the export flows of the CFA countries during the era of managed float. A look at trade flows is essential because a low rate of export expansion limits the capacity to import investment goods. This can lead not only to export-constrained growth, but also to a worsening trade balance and increased trade deficits and debt service. Thus, adequate export performance is an important objective of economic policy for these countries. The export flows of the CFA countries will be assessed to determine if the choice of exchange rate regime and the behavior of the exchange rate have influenced their competitive position and export performance. The effect of changes in their competitive position will be reflected in changes in their market shares.

Motivation and Literature Review

The motivation for this study is the currency arrangement between France and her former colonies in Africa which consist of:

1. five countries in Central Africa: Cameroon, Central African Republic, Chad, Congo, Gabon.
2. six countries in West Africa: Benin, Burkina Fasso, Côte d'Ivoire, Niger, Togo, and Senegal.

These countries belong to two monetary unions--one grouping the Central African States with its headquarters in Yaounde (Cameroon), and the other grouping the West African States with its headquarters in Dakar (Senegal). They use a common currency, the CFA franc, which has been pegged to the French franc at the rate of 50 CFA francs per French franc since 1948. The peg has remained unchanged despite the breakdown of the Bretton Woods system of fixed but adjustable rates and the advent of generalized floating. For developing countries with currencies tied to a major currency, such as the CFA franc peg to the French franc (FF), generalized floating means that their currency moves jointly and simultaneously with the FF. Thus, if the latter appreciates, the effect on the developing country will be to stimulate imports while discouraging exports. To restore balance, the CFA franc needs to be devalued, an option not open due to the commitment to an unchanged peg. The recent experience of the CFA countries bears witness to these events. In 1987, West Africa Magazine (Aug 3, 1987)

reported that Côte d'Ivoire had announced it could not service its external debt due to a budgetary shortfall and was considering devaluing its currency. This had been recommended by the World Bank and the International Monetary Fund. But Côte d'Ivoire could not act on its intentions because such a move had to be approved by other member states of the CFA zone, and above all by the French authorities who guarantee the stability and convertibility of the CFA franc. This approval never materialized.

In the same vein, the Financial Times of London (May 24, 1989) reported that several of the CFA countries' economies are:

> Battling with balance of payments deficits caused by falling prices for their exports, the drought, and the heavy cost of servicing external debt and a host of other economic ills (p. 24).

The same article pointed out that:

> It is an open secret in francophone banking circles that some World Bank and International Monetary Fund analysts think the CFA franc is overvalued (p. 24).

A devaluation was necessary and, indeed, had been recommended. But objections were raised for political reasons. African politicians were concerned about the high import costs a devaluation might entail and its effects on the cost of living in urban areas. There were also economic objections from French business interests. According to Jeune Afrique (Sept. 18, 1989):

> The convertibility of the CFA franc protects those French businesses and banks that do business in the CFA zone against exchange risks (p. 40).

Single pegging as an exchange rate regime has been studied under the theory of optimal pegging which seeks to determine which of the three forms of pegging (single, basket, or SDR) is optimal in the sense of minimizing the variability of the real exchange rate. Studies by Black (1976), Lipchitz (1970), Lipchitz and Sundararajan (1980), and Branson and Katseli (1980) have differed only in terms of what they suggest as the weighting scheme to be used in calculating the effective exchange rate [see Williamson (1982) for a summary]. The main conclusion from the theoretical and empirical analyses of these writers is that the basket peg is preferable to the single peg in controlling real exchange rate variability and the SDR peg is best (Crockett and Nsouli, 1970).

The CFA-French Franc Peg in Perspective

Apart from the real exchange rate effects of the various pegs, the following studies have also been undertaken on the CFA franc as a single peg.

Garrity (1972) examined the effect of the 1969 devaluation of the French franc on the economy of Côte d'Ivoire and concluded that it was not beneficial because it occurred at a time when the economic situation did not call for a devaluation. As she points out:

> The August devaluation of the French franc was forced on that government (French) by a persistent balance-of-payments disequilibrium which was, to a large extent, related to the French political crisis of the previous year. Although the Ivory Coast's internal and external situation

> did not call for such a policy, as a member of the franc zone her currency was also devalued by the same percentage ... in order to keep unchanged the relationship of the CFA franc to the French franc. Like the other members of the currency zone, the Ivory Coast was not consulted prior to this devaluation. Throughout the 1960s, the Ivory Coast's balance of payments was characterized by large trade surpluses--the export/import ratio fluctuating between 113 and 137--and an overall (balance of payments) surplus, except in 1967. Her net foreign assets totalled 28.2 billion CFA francs at the end of 1969, representing 33 percent of the total value of imports for that year. Internal prices increased only moderately during the period under consideration.... (p. 628)

Bourcier de Carbon (1969) points out that, because the single peg occurs within a monetary union, it helps maintain economic equilibrium and it eases the process of modernization. His argument is based on the theory of optimum currency areas (Mundell, 1961; McKinnon, 1963). On the other hand, Kouadio (1983) argues that the CFA zone is far from a monetary union because it lacks the characteristics of a monetary union as defined by the theory of optimum currency areas. He claims that the union perpetuates commercial, financial and monetary dependence.

Alibert (1983) counters critics of the single peg by pointing out that they do not consider French aid to the CFA countries, the volume of preferential trade with them, and the guarantee of the CFA franc by France, which promotes confidence, trade with, and investment in the zone.

Ossa and Lapiquonne (1984), however, counter that such investments are only in extractive activities. Competition by CFA countries for foreign investments promotes fiscal laxity through generous fiscal provisions. The free trans-

fer of capital and generous conditions for the repatriation of funds makes it easy for funds to escape taxation. Their conclusion is that the peg adversely affects the zone countries financially, commercially, and monetarily. They see in the peg a disanchoring of monetary policy from the economies of the zone on account of it being de facto under the control of France, whose objectives and interests do not necessarily coincide with those of the African countries.

Nascimento's (1987) benefit-cost analysis of the single, basket, and SDR pegs for the CFA countries concludes that the basket peg is preferable to the single peg. Macedo (1984) shows that for the CFA countries, even though the monetary union achieved nominal effective exchange rate stability, this was at the expense of real effective exchange rate volatility which increased during the recent flexible exchange rate period. Finally, Devarajan and De Melo (1987) examine the question of whether the lack of autonomy of the CFA union central banks and the surrender of the exchange rate as a policy instrument has impeded member countries' growth. On a comparative basis, they conclude that:

> CFA countries grew significantly faster than comparator sub-saharan African countries but usually slower ... than the whole sample of developing countries (p. 483).

Critique of the Literature

A shortcoming of most these studies is that few, if any, are concerned with the demand for exports (i.e., the real side of trade flows). Even when they do, they are concerned with the demand for exports as a whole. Especially lacking are estimates relating to products which are classified by Standard International Trade Classification (SITC) categories. Even when such estimates exist, few involve estimates of relevance to the African setting. The major weakness of all the studies that have looked at trade flows is their tendency to apply a common elasticity figure to all commodity groups, which need not necessarily be the case for individual SITC categories. As an example, if an African government wishes to know the effect of a given policy measure on the incomes of its coffee and/or cocoa growers, it will find direct elasticities more relevant than an elasticity estimate for primary commodity exports as a whole. Thus a disaggregated analysis is, for some purposes, preferable to an aggregate analysis.

This study uses a disaggregated approach by employing share analysis to examine the impact of exchange rate regime and exchange rate behavior on these shares. Share analysis is closely connected to elasticities of substitution, whereas most studies of developing country trade functions have dwelt on import demand elasticity. The concern has been with "elasticity pessimism," according to which a devaluation of the domestic currency will not

improve the trade balance. While aggregate elasticity estimates are of particular importance to LDCs, of equal importance is each country's share in foreign markets.

CHAPTER III

FRENCH INTERVENTION IN THE FOREIGN EXCHANGE MARKET

The first part of this study is concerned with whether, through foreign exchange market intervention, the French monetary authorities have been successful in stabilizing the value of the French franc. It is well-known that since the collapse of the Bretton Woods System in 1973, countries have intervened in the foreign exchange market for various reasons (Argy, 1982; Quirk, 1977). Such intervention involves the monetary authorities buying or selling foreign exchange to partially offset short run fluctuations in exchange rates (i.e., lean against the wind) for the purpose of promoting orderly market conditions or influencing long-term trends in the exchange rate. The exercise might also be intended to speed up exchange rate adjustments rather than rely on the market.

In this part of the study, the focus is on the success or failure of intervention by the French authorities in stabilizing the French franc. Of specific importance to this study is the pegging of the CFA franc to the French franc. In the current system, as the French franc floats against

other major currencies, such fluctuations are transmitted to the CFA franc. In other words, both currencies float jointly against the other major currencies. As a result, the CFA franc will be subject to arbitrary devaluations or revaluations. This can have repercussions on the trade flows of the CFA countries which are not the results of deliberate policy. The latter issue constitutes the object of the second part of this study.

To understand the ramifications of the CFA franc peg to the French franc, it is instructive to look at the effect of the peg on the stability of the real exchange rate of the CFA franc and therefore on the CFA countries' ability to compete. In a world of floating exchange rates, the real effective exchange rate of the CFA franc can be defined as a weighted average of the bilateral real exchange rate between the CFA franc and the currencies of their trading partners. Hence:

$$E_{rZ} = \sum_{j=1}^{n} \omega_j E_{rj} \qquad (1)$$

where

E_{rz} = the real effective exchange rate of the CFA franc, and Z stands for the CFA zone or countries

ω_j = weights which sum to one

E_{rj} = the real effective exchange rate relative to a particular trading partner and is defined as:

$$E_{rj} = E_{zj} \quad (P_j/P_z) \tag{2}$$

where

P_j = the price level of trading partner j

P_z = is the price level in the CFA zone

E_{zj} = the CFA franc price of currency j, and can be decomposed into the CFA franc price of the numeraire currency (French franc, E_{zF}) and the numeraire currency price of currency j (E_{Fj}) or

$$E_{zj} = E_{zF}(E_{Fj}) \tag{3}$$

Through substitution of (2) and (3) into (1), the latter can be written as:

$$E_{rZ} = \omega_F E_{rZF} + \sum_{\substack{j=1 \\ j \neq F}}^{n} \omega_j E_{rFj} \tag{4}$$

where E_{rZF} is the real exchange rate of the zone relative to the French franc, E_{rFj} is the real exchange rate of the numeraire relative to other currencies j.

Equation (4) shows that real exchange rate changes of the CFA franc are composed of two parts: one arising from changes with the numeraire country (France), and the other from changes between the French franc and other currencies.

Thus, even if pegging to the French franc eliminates one source of disturbance (the first expression on the right hand side), changes between the French franc and other currencies will affect the real exchange rate of the CFA franc. It is thus clear why the CFA countries would be interested in the stability of the French franc internationally.

In order to investigate this question, a simultaneous equation model of the exchange rate, and intervention policy is presented. In this model, the exchange rate depends on central bank intervention, and other explanatory variables derived from Frankel's (1979) real interest differential model. Intervention is a function of exchange rate changes, deviations of the exchange rate from a target rate determined by relative French and German prices(a proxy for deviations from PPP), and unanticipated depreciation of the exchange rate (a proxy for "news").

PPP is used to model the desired rate, rather than as a theory of determination of exchange rates, an issue subject to enormous controversy. Argy (1982) argues that:

> The target approach to intervention involves two steps: first, the determination of a target zone and the establishment of rules for intervention in relation to it. The best-known proposal for determining a target exchange rate is based on purchasing power parity, PPP. It suggests that the target be determined by trends in domestic prices relative to foreign prices, according to the Commission of the European Countries' OPTICA Report, 1976 (p. 27).

The use of the PPP norm is further supported by Artus (1978) who stresses the need of countries in a managed floating regime for "methods of assessing the appro-

priateness of their exchange rates and for guiding their rate management policies." Arguing for the use of the PPP norm, Artus (1978) states:

> ... the asset market view of exchange rate determination is fully consistent with the large exchange rate fluctuations observed since 1973. It also implies that in the absence of active exchange rate management policies, such fluctuations will continue as long as short run real and monetary developments in the various countries are not fully harmonized. As to the evolution of the exchange rate in the longer run, however, the asset market view is fully consistent with the traditional view that it is essentially determined by the purchasing power of the currency in the goods markets. The long run adjustment comes through arbitrage in the goods market and through the influence of long run expectations (p. 283).

The Appendix presents a model which draws on Frankel's (1979) study and modifies Genberg's (1978) model to allow for the determination of the nominal exchange rate (rather than the real exchange rate as does Genberg), and its long run equilibrium value (without recourse to price indices for PPP purposes).

In the model, it has been assumed that the French authorities pursue a policy of leaning against the wind, based on PPP, in order to resist exchange rate fluctuations. Intervention may be due to a variety of reasons which have been alluded to already. But whatever the motive, an active exchange rate management policy is by no means sufficient to ensure exchange rate stability. Active exchange rate policies can, and quite often, lead to increased exchange rate instability. In other words, in intervening to stabilize

the exchange rate of the French franc, the French authorities may contribute to its instability.

Two different intervention models are used to evaluate the impact of French intervention in the foreign exchange market. The model is presented in the Appendix. The estimating equations, using the Artus method, are:

$$E1_t = \beta_o + \beta_1(m-m^*)_t + \beta_2(y-y^*)_t + \beta_3(r-r^*)_t + \beta_4(\pi-\pi^*)_t + \beta_5 I_t + \epsilon_1 \quad (5)$$

$$I_t = \alpha_o + \alpha_1(E1_t - E1_t^*) + \alpha_2(E1_t - E1_{t-1}) + \alpha_3 UD_t + \alpha_4 UD_{t-1} + \epsilon_2 \quad (6)$$

$$E1_t^* = \alpha_o + \alpha_1(P_t - P_t^*) + \epsilon_3 \quad (6a)$$

The estimating equations, using Argy's method, are:

$$E1_t = \beta_o + \beta_1(m-m^*)_t + \beta_2(y-y^*)_t + \beta_3(r-r^*)_t + \beta_4(\pi-\pi^*)_t + \beta_5 I_t + \epsilon_1 \quad (7)$$

$$I_t = \alpha_o + \alpha_1(E1_t - E1_{t-1}) + \alpha_2 I_{t-1} + \alpha_3 UD_t + \alpha_4 UD_{t-1} + \epsilon_4 \quad (8)$$

where

I_t = intervention variable

I_{t-1} = lagged value of I_t

$E1_t$ = log of the franc/mark exchange rate [International Monetary Fund: Financial Statistics (IFS), various issues]

$E1_t^*$ = log of the predicted (target) exchange rate

$E1_{t-1}$ = lag of the log of the exchange rate

M^F and M^G = French and German money supplies (in log form) respectively, proxied by money supplies narrowly defined (i.e., M1 [Organization for Economic Cooperation and Development (OECD): Main Economic Indicators, various issues])

P_t^* = log of German CPI

P_t = log of French CPI

$y-y^*$ = income differential (in log form), proxied by the industrial production index (OECD)

$r-r^*$ = nominal interest differential using call money rates (IFS)

$\pi-\pi^*$ = expected inflation differential, proxied by the long term government bond rates (OECD). The data are monthly and the model is estimated for the period January 1973 to December 1984.

UD_t = current unanticipated depreciation

UD_{t-1} = lagged unanticipated depreciation (the reason for including UD_t and UD_{t-1} are empirical (improved results) and theoretical (Dornbusch; Appendix)

A priori, for the Artus method:

$\alpha_1<0$: French authorities smooth fluctuations from a target level

$\alpha_2<0$: French authorities lean against the wind

$\alpha_3<0$: cyclical and current account "news" elicits intervention activity

$\alpha_4<0$: delayed response to "news" in previous periods

A priori for the Argy method:

$\alpha_1<0$: French authorities lean against the wind

$\alpha_2<0$: lagged effects of intervention on present intervention actions

$\alpha_3<0$: cyclical and current account "news" elicits intervention

$\alpha_4>0$: delayed effects of news on current intervention

A priori, $\beta_1>0$; $\beta_2<0$; $\beta_3<0$ according to Frankel (though it could be positive according to the Bilson-Frankel (Chicago School)) hypothesis; $\beta_4>0$; $\beta_5>0$ if intervention is to be stabilizing. If β_5 is positive, it implies that an increase in intervention (i.e., a DM purchase through a sale of French francs) leads to French franc depreciation or sale of DM leads to FF appreciation. If $\beta_5<0$, then it implies a destabilizing intervention policy. In this case, reserves are accumulated (or DMs are purchased through a sale of French francs) when the deustche mark is strong, thus making it even stronger.

According to Quirk (1977), IMF guidelines to intervention recommend that, in intervening:

> ... the member should not normally act aggressively with respect to the exchange value of its currency i.e. should not so act as to depress that value when it is falling or to enhance that value when it is rising (p. 646).

In other words, authorities should not weaken a depreciating currency or strengthen an appreciating currency, thus destabilizing the exchange rate. Thus, β_5 is not expected to be negative.

These two simultaneous equations reflect the works of Frankel (1979), Argy (1982), Artus (1978), Quirk (1977), Genberg (1978) and Frenkel (1978). Equations (6) and (8) reflect the usual assumption that the authorities base their intervention policy on developments in the foreign exchange market. Hence the exchange rate and other economic considerations are the explanatory variables. Based on Argy (1982), both examine whether French authorities pursued a policy of leaning against the wind through intervention.

Intervention should be inversely related to the exchange rate in Equations (6) and (8) due to leaning against the wind. Thus, if we let E_{ij} stand for the French franc price of the mark, when the domestic currency depreciates (E_{ij} rises), there is a decumulation of reserves as it is bought to lower E_{ij}; when it appreciates (E_{ij} falls), there is an accumulation of reserves, as it is sold to raise E_{ij}. Intervention therefore moves negatively with respect to the exchange rate. Thus if α_1 is negative, it will confirm that a policy of leaning against the wind was being pursued.

Equations (5) and (7) reflect Argy's (1982) claim that "causation could run the opposite way from intervention to the exchange rate" (p. 69). Artus (1976) and Quirk (1977)

have also suggested that intervention and the exchange rate are jointly determined in the foreign exchange market through a policy of leaning against the wind. This equation suggests that policy actions in the market could be a source of instability through their effects on the exchange rate.

The parameter of particular interest in this study is the coefficient of the intervention variable (β_5). A priori, it is expected to be positive, indicating that a sale of foreign exchange (reserve decumulation) leads to appreciation of the French franc (i.e., intervention achieves its objective). If it is not, then intervention is destabilizing (i.e., foreign exchange is being purchased at a time when it should be sold). That is, the monetary authority intervenes "pro-cyclically" rather than "counter-cyclically" in an attempt to influence the exchange rate. This can be caused by mistimed measures due to recognition, administrative, action and impact lags. This would reinforce exchange rate movements rather than offsetting them, contrary to the recommendation of the Committee on Reform of the International Monetary System and Related Issues cited above.

The first of these objectives, whether intervention was stabilizing or destabilizing, is studied using a two equation simultaneous model of the foreign exchange market. In the estimation, an equation for the determination of the French money supply is included because it is endogenously determined. Intervention in the foreign exchange market by

the French monetary authorities (unless sterilized) will alter the French monetary base and thus the French money supply. The equations are estimated structurally using two-stage least squares.

The results (Table VI), for both Artus and Argy, indicate that the French authorities pursued a policy of leaning against the wind, as the coefficient of the exchange rate in the reaction function is negative and significant.

If foreign exchange market intervention is destabilizing, it will be reflected in a negative effect of the intervention variable (β_5) on the exchange rate. Thus, a priori, a positive sign is hypothesized for intervention if it was stabilizing. Otherwise, it was destabilizing. The results in Table VI negate this hypothesis and indicate that intervention (β_5) negatively affected the exchange rate, but the coefficient was insignificant. As can be seen from the intervention results, the coefficient of intervention is negative in the Artus equation but insignificant, suggesting that foreign exchange was purchased at a time when it should have been sold. In the Argy equation, it is positive but insignificant, suggesting that even when intervention was in the right direction, not enough was being done to achieve French franc stability.

The implication is that French franc management through intervention contributed to nominal exchange rate instability and uncertainty. Through the peg, the CFA franc would

TABLE VI

RESULTS: FRENCH INTERVENTION POLICY
IN THE FOREIGN EXCHANGE MARKET

$$El_t = \beta_o + \beta_1(m-m^*)_t + \beta_2(y-y^*)_t + \beta_3(r-r^*)_t + \beta_4(\pi-\pi^*)_t + \beta_5 I_t + \epsilon_1 \quad (5)$$

$$I_t = \alpha_o + \alpha_1(El_t - \overset{*}{El_t}) + \alpha_2(El_t - El_{t-1}) + \alpha_3 UD_t + \alpha_4 UD_{t-1} + \epsilon_2 \quad (6)$$

$$\overset{*}{El_t} = \alpha_o + \alpha_1(P_t - \overset{*}{P_t}) + \epsilon_3 \quad (6a)$$

Eqn. 5: Artus' Equations (see Appendix: Eqns. 51a and 51c

β_o	β_1	β_2	β_3	β_4	β_5
**	**	*	*	**	
-0.277	0.995	-0.293	-0.654	0.020	-0.000
(3.486)	(11.162)	(2.293)	(1.645)	(4.316)	(0.694)

R-SQUARE = .8226

Eqn. 6

α_o	α_1	α_2	α_3	α_4
*	*			*
-573.560	-17442	646.648	1420.593	9348.398
(1.606)	(1.699)	(0.180)	(0.180)	(0.610)

R-SQUARE = .1009

TABLE VI (Continued)

Eqn. 7: Argy's Equations (see Appendix: Eqns. 52b and 52a

β_o	β_1	β_2	β_3	β_4	β_5
**	**	*		*	
-0.643	1.423	-0.228	0.240	0.009	0.000
(5.847)	(11.396)	(1.517)	(0.511)	(1.631)	(0.077)

R-SQUARE = .7860

Eqn. 8: $I_t = \alpha_o + \alpha_1(El_t - El_{t-1}) + \alpha_2 I_{t-1} + \alpha_3 UD_t + \alpha_4 UD_{t-1} + \epsilon_4$

α_o	α_1	α_2	α_3	α_4
*	*			*
-557.878	-16131	0.042	787.245	9702.759
(1.620)	(1.569)	(0.504)	(0.097)	(1.686)

R-SQUARE = .1024

Note: The number in parentheses below each coefficient is the t-ratio statistic
** Significant at .01 level
* Significant at .05 level

be unstable, affect the real exchange rate of the CFA countries, and impair their competitiveness.

It therefore comes as no surprise that the CFA countries have been experiencing external (and internal) imbalance problems as reported in various issues of Jeune Afrique, a francophone news magazine. These reports have cited the CFA franc peg to the French franc as one of the major causes of the economic problems faced by the CFA countries. The Economist (July 21, 1990) quotes the French foreign Minister as recognizing "structural problems" within Africa's franc zone. One solution most economists agree on is to devalue the CFA franc. And the Economist wonders:

> ... Mr Mitterand's rejection of a CFA devaluation last month makes little economic sense, given that the zone's payments deficit is running at nearly $4 billion a year (p. 82).

The intervention results support the monetary (asset market) view of exchange rate determination in which the relative demand for and supply of money determine the exchange rate. The coefficients of money supplies are of the expected signs and significant. They are not significantly different from one (as shown in the following t-test). Thus the neutrality hypothesis is supported by the data. The null hypothesis is $H_o: \hat{\beta}_1 = \hat{\beta}_2 = 1$.

For Artus:

$$t_{stat} = \frac{0.994462-1}{.089096} = -.0622$$

For Argy:

$$t_{stat} = \frac{1.423234-1}{.124888} = 3.389$$

The critical t-value (.01, df=137) is 2.576. The absolute value of the t-statistic for Artus is statistically insignificant, while that for Argy is statistically significant. Artus' result supports the neutrality hypothesis, whereas Argy's does not. Hence, the results are mixed.

The sign on the relative income term ($y-y^*$) is negative as expected and significant.

The sign on the interest rate differential is negative, confirming Frankel's hypothesis (see Frankel, 1979, p. 614). This result means that an increase in French interest rates (ceteris paribus) decreases the exchange rate (i.e., appreciates the French franc).

The coefficient of the expected long run inflation ($\pi-\pi^*$), proxied by the long term government bond interest differential, is of the expected positive sign and is significant. These long term rates are important because they are one of the alternative costs of holding money, besides serving as a proxy for anticipated inflation differentials. A rise in this variable leads to a reduction in real money demand and thus to higher prices and depreciation.

The results confirm that the French authorities pursued a policy of leaning against the wind. The coefficient of the exchange rate (α_1) is negative and significant in both (the Artus and Argy) intervention equations. The authori-

ties also pursued a target exchange rate as the coefficient of the target rate (α_2 in the Artus equation) is positive.

News affected the foreign exchange market behavior of the French. They reacted positively to past and current news (α_4 and α_5) are both positive as in Dornbusch.

In summary, the results of this part of the study have established that the Real Interest Differential theory explains well the behavior of the French franc exchange rate. Its fluctuations were affected by the relative demand and supply of money. Attempts by the French monetary authorities to influence the exchange rate of the French franc were unsuccessful, and sometimes even perverse (i.e., contributed to fluctuations, making the French franc unstable). The implication of this finding is that French franc fluctuations and instability were transmitted to the CFA franc through to the peg.

CHAPTER IV

THE TRADE-SHARES MODEL

The second part of this study looks at the effect of the peg on the trade flows of the CFA countries. The objective is to examine the collective pegging by the CFA countries of their currency, the CFA franc, to the French franc and its effects on their trade performance. In particular, the study looks at the competitive aspects of this type of exchange rate regime. An important issue and the focus of the research is the export performance and the pattern of trade of the CFA countries, and the role played by their choice of exchange rate regime in this process. Of interest is whether such an exchange rate regime could be a source of trade diversion, rather than trade creation, and thus a source of welfare loss for the CFA countries.

Methodology

This study employs market share analysis of developing countries in developed markets. The export performance of the CFA countries and their competitors depends on developments within given markets, and on changes in their competitive strength relative to that of other exporting countries. While a country's market share depends on such factors as

changes in tastes and import restrictions in the importing country, the objective here is to analyse how import demand changes in the market for coffee and cocoa is reflected in the export shares of the exporting countries and the impact of the choice of exchange rate regime on the behavior of these shares. In this study, export shares are the main indicator of the CFA countries' competitiveness. It is a disaggregated study of export commodities (coffee and cocoa) that are the principal sources of foreign exchange earnings for the countries under consideration.

The analytical approach is demand-oriented and is based on the Armington (1969) model. Exports of different countries can be considered as products, differentiated by country of origin. This gives rise to less than infinitely elastic demand curves for the products. It contrasts with previous studies which assume that the demand for exports of developing countries is infinitely elastic, especially if the exports are primary commodities. Based on Armington's framework, primary commodity exports might at first sight seem to be homogeneous but, on closer examination, they are in fact differentiated. This type of differentiation is referred to as horizontal differentiation (Lord, 1989). Commodities are horizontally differentiated when importers differ in their choice of the geographic region of the good as a result of attributes related to the export of a product, despite the possible absence of price or quality variations from country to country. Perceived differences in commodity exports can result from the manner in which they

are sold or from relationships which have been established between trading partners. For instance, adjustment costs are involved in switching from one supplier to another, such as the loss of preferential terms offered by exporters to established importers and to trading partners having historical and political ties with them. There is also the risk of unreliable alternative foreign supply sources. In general, importers would prefer to diversify among supply sources either because they have a preference for a variety of attributes offered by different exporters, or because they would like to reduce the risk of supply disturbances associated with dependence on a few foreign supply sources (i.e., vulnerability to supply disruptions from foreign suppliers). In summary, even though coffee and cocoa are traded in international markets, making exporters face exogenously determined prices, they can be treated as goods that are subject to product differentiation. Therefore, ceteris paribus, if an export good is differentiated in the eyes of the importer (whether the difference is imagined or real (i.e., if there is horizontal differentiation), an exporter's share in a given market will be a function of such differences. In this study, the focus is on the impact of exchange rate regime and relative prices on export market competitiveness.

Demand Theory and the Model of Import Allocation

The model used to study the impact of the CFA-French franc peg on the competitive position and export performance of the CFA countries and their competitors is based on the work of Armington (1969a), Hickman (1969), Hickman and Lau (1973), Thursby and Thursby (1987), and Thursby, Johnson and Grennes (1986). Export performance, as reflected in a country's market share, is examined via export demand equations where market shares are the result of import allocation according to prices. In Armington's model, total import demand for a good is first determined and is subsequently independently allocated among competing sources of supply based on relative prices so as to minimize cost.

This method, referred to as the two-stage maximization or budgeting procedure, is based on the Hicksian model where there are m traded goods and n countries. If each good is supplied by a different country, then there would be mxn products which enter international trade. Thus, X is a vector of goods:

$X = (X_1, \ldots, X_r, \ldots, X_m)$, where for each $r(r=1, \ldots, m)$,

$X_r = (X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr})$.

The product vector or elementary variables can therefore be written as:

$$X = (X_{11}, \ldots, X_{1n1}, X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr}, X_{m1}, \ldots, X_{mnm})$$

$$X_r = (X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr}) \quad (9)$$

The price vector corresponding to this product vector is given by

$$P = (P_{11}, \ldots, P_{1n1}, P_{r1}, \ldots, P_{rk}, \ldots, P_{rnr}, P_{m1}, \ldots, P_{mnm})$$

Based on Hicksian demand analysis, an index of importer's utility can be expressed as a function of all products entering international trade thus:

$$U = U(X) \quad (10)$$

Given the price vector and national income, E, ex ante demand functions for each product can be derived by maximizing U(X) subject to the budget constraint E = PX. The implied product demand functions are

$$X^c_{rk} = X^c_{rk}(E, P_{11}, \ldots, P_{1n1}; P_{r1}, \ldots, P^c_{rk}, \ldots, P_{rnr}, P_{m1}, \ldots, P_{mnm}) \quad (11)$$

for all r, k and j, j≠k. That is X^c_{rk} (with associated price P^c_{rk}) is exporter k's product in group r which is exported to country c. For example, if r = automobiles, c = any import market, k = any exporting country, then X^c_{rk} is exporter k's export of automobiles (r) to import market c.

Each of these demand functions would involve mn prices. To simplify analysis, Armington suggests writing U(X) as

$$U = f(X_{11}, \ldots, X_{1n1}, \ldots, X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr}, \ldots, X_{m1}, \ldots, X_{mnm}) \quad (12)$$

$$U = F(X_1, \ldots, X_r, \ldots, X_m) \mid X_r = (X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr}) \quad (13)$$

where

$$X_r = f_r(X_{r1}, \ldots, X_{r1}, \ldots, X_{rnr}), \; r = 1, \ldots, m. \quad (14)$$

In other words, X_r can be expressed as a quantity-index of $(X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr})$ and all combinations of $(X_{r1}, \ldots, X_{rk}, \ldots, X_{rnr})$ which yield the same amount of X provide consumers with the same level of satisfaction. The first task is to seek the conditions under which (12) may be written as (13) and (14). Equation (12) implies that the function f assigns a unique value of U to each combination of values of the products or ungrouped variables. We seek the conditions under which there exist functions $f_r (r=1, \ldots, m)$ which assign unique values of X_r to given values of $X_{r1}, \ldots, X_{rk}$, and a function F which assigns a unique value of U to given values of $X_1, \ldots, X_m$, so that

$$f(X_{11}, \ldots, X_{rk}, \ldots, X_{mnm}) = F(X_1, \ldots, X_m)$$
$$= F[X_1(X_{11}, \ldots, X_{1n1}), \ldots, X_r(X_{r1}, \ldots, X_{rnr}), \ldots, X_m(X_{m1}, \ldots, X_{mnm})]. \quad (15)$$

A necessary condition for the existence of such functions is that all possible changes in the variables X_{rk} lead to equal

changes in the values of the functions f and F (i.e., dU = df ≡ dF). Thus

$$df = \sum_{r=1}^{m} \sum_{k=1}^{n_r} \frac{\partial f}{\partial x_{rk}} dX_{rk} = dF \equiv \sum_{r=1}^{m} \frac{\partial F}{\partial X_r} dX_r$$

$$= \sum_{r=1}^{m} \sum_{k=1}^{n_r} \frac{\partial F}{\partial X_r} \frac{\partial X_r}{\partial_{rk}} dX_{rk} \qquad (16)$$

Hence for all r, j, k(r=1, ..., m; j, k=1, ..., n_r),

$$\frac{\partial f}{\partial X_{rj}} = \frac{\partial F}{\partial X_r} \frac{\partial X_r}{\partial X_{rj}} ; \frac{\partial f}{\partial X_{rk}} = \frac{\partial F}{\partial X_r} \frac{\partial X_r}{\partial X_{rk}} \text{ , so that}$$

$$\frac{\partial f}{\partial X_{rj}} \Big/ \frac{\partial f}{\partial X_{rk}} = \frac{\partial X_r}{\partial X_{rj}} \Big/ \frac{\partial X_r}{\partial X_{rk}} \qquad (17)$$

Since X_r is only a function of the variables X_{r1} ,..., X_{rnr}, its partial derivatives and the ratios of its partial derivatives are also a function of the same variables. It follows therefore that:

$$\frac{\partial f}{\partial X_{rj}} \Big/ \frac{\partial f}{\partial X_{rk}} = f_{r.jk}(X_{r1} , \ldots, X_{rnr})$$

for all r, j, k(r=1 ,..., m; j, k=1 ,..., n_r) (18)

Equation (18) can be stated alternatively as:

$$\frac{\partial}{\partial X_{qi}} \left(\frac{\partial f}{\partial X_{rj}} \Big/ \frac{\partial f}{\partial X_{rk}} \right) = 0,$$

for all q, r, i, j k(q,r=1,...,m;q≠r)
(i=1,...,n_q;j,k=1,...,n_r) (19)

Equation (19) says that for (12) to be expressed in the form of (13) and (14), and thus permit the grouping of variables, the necessary and sufficient condition is that the marginal rate of substitution between any two variables in one group shall be a function only of variables in that group, and therefore independent of the value of any variable in any other group. This is what Armington (1969a) refers to as the assumption of independence. This assumption is one of the cornerstones of the two-stage budgeting procedure, according to which variables in a utility function are grouped and, for each group, a price index is defined as a function of prices of members of the group. First, the optimal distribution of a given total expenditure among the groups is determined by reference to price indices alone. Then the expenditure thus allocated to each group is distributed among the members of the group on the basis of their individual prices. Moreover, the quantity of each ungrouped variable in the utility function determined by this two-stage procedure is identical with the amount which would have been purchased if utility, based on the ungrouped variables, had been maximized with reference to all the individual prices without any grouping. Aggregation of ungrouped variables into groups, according to this procedure, is said to be consistent (Green, 1962).

Another requirement for the consistency of the two-stage maximization procedure is that the product of each group quantity-index and price-index be equal to group expenditure. That is there must exist a set of price-

indices, $P_1, \ldots, P_m$, where $P_r = P_r(P_{r1}, \ldots, P_{rnr})$, such that group expenditure E_r is a function only of total expenditure E and the values of the price-indices. Thus it is necessary to determine the conditions under which, if the prices of one group remain unchanged, a change in the price or prices in a second group affects quantities in the first group only by changing expenditure in the first group.

The necessary and sufficient condition for the existence of a function permitting both the consistency of the two-stage maximization procedure and the existence for each group of a quantity-index X_r and a price-index P_r such that group expenditure $E_r = P_r X_r (r = 1, \ldots, m)$, is that each quantity-index be a linear homogeneous function of the ungrouped variables. To understand this, let

$$X_r = f_r(X_{r1}, \ldots, X_{rnr}) \tag{20a}$$

$$P_r = Pr(P_{r1}, \ldots, P_{rnr}) \tag{20b}$$

$$E_r = P_r X_r = \sum_{k=1}^{n_r} P_{rk} X_{rk} \tag{20c}$$

If all X_{rk} are changed by the same proportion α, with each P_{rk} held constant, then $E_r = P_r X_r$ must change by α. But with each P_{rk} constant, P_r does not change. Hence X_r must change by α, and f_r is homogeneous of degree one. This property is necessary to ensure that the product of group quantity-indices and group price-indices equal group expenditure. To ensure the existence of a price-index P_r such that $P_r X_r = E_r$, it is necessary that P_r be a function only

of $P_{r1}, \ldots, P_{rnr}$. To show this, define $P_r = E_r/X_r$. Given any set of prices, E_r is changed by α. Since the function f_r is homogeneous, the group Engel curves or expansion paths are straight lines so that each X_{rk} and therefore also X_r will change by α. Therefore, P_r does not change and is a function of $P_{r1}, \ldots, P_{rnr}$.

Finally, it is shown that if each quantity-index is homogeneous of degree one (a property also known as homogeneous functional separability of the utility function), then the two-stage maximization procedure is consistent as defined above.

In the first stage, $U = F(X_1, \ldots, X_m)$ is maximized subject to:

$$\sum_{r=1}^{m} P_r X_r = E.$$

For all $q, r = 1, \ldots, m$, this yields:

$$\frac{\partial U/\partial X_q}{\partial U/\partial X_r} = \frac{P_q}{P_r} \tag{21}$$

In the second stage, $X_r = f_r(X_{r1}, \ldots, X_{rnr})$ is maximized subject to:

$$\sum_{k=1}^{n_r} P_r X_r = E_r$$

For all $j, k = 1, \ldots, n_r$, this yields:

$$\frac{\partial X_r/\partial X_{rj}}{\partial X_r/\partial X_{rk}} = \frac{P_{rj}}{P_{rk}} \tag{22}$$

The following conditions must be satisfied for all q, r, j, k:

$$\frac{\partial U/\partial X_{qj}}{\partial U/\partial X_{rk}} = \frac{P_{qj}}{P_{rk}} \tag{23}$$

a) If q=r, (i.e., within the same group),

$$\frac{\partial U/\partial X_{qj}}{\partial U/\partial X_{qk}} = \frac{\partial U/\partial X_q(\partial X_q/\partial X_{qj})}{\partial U/\partial X_q(\partial X_q/\partial X_{qk})} = \frac{P_{qj}}{P_{qk}}$$

b) If q≠r, (i.e., between groups),

$$\frac{\partial U/\partial X_{qj}}{\partial U/\partial X_{rk}} = \frac{\partial U/\partial X_q(\partial X_q/\partial X_{qj})}{\partial U/\partial X_r(\partial X_r/\partial X_{rk})} = \frac{P_q(\partial X_q/\partial X_{qj})}{P_r(\partial X_r/\partial X_{rk})}$$

c) If $P_q(\partial X_q/\partial X_{qj}) = P_{qj}$, and $P_r(\partial X_r/\partial X_{rk}) = P_{rk}$,

our requirements are satisfied. To show this, recall that the necessmmmary conditions for maximization of X_r subject to:

$$\sum_{k=1}^{n_r} P_{rk}X_{rk} = E_r$$

are that for all k = 1, ..., n_r,

$$\partial X_r \partial X_{rk} = \lambda P_{rk} \tag{24}$$

where λ is a Lagrange multiplier. If we multiply both sides of Equation (24) by X_{rk} and sum, we obtain:

$$\sum_{k=1}^{n_r} x_{rk}(\partial X_r/\partial X_{rk}) = \lambda \sum_{k=1}^{n_r} P_{rk}X_{rk} = \lambda P_r X_r.$$

But in (20), it has already been shown that X_r is linear homogeneous in the X_{rk}'s; by using Euler's theorem, we have $X_r = \lambda P_r X_r$; from which we get $\lambda = 1/P_r$. By substituting for λ in (24), we have $P_r(\partial X/\partial X_{rk} = P_{rk}$, as required.

To render the above framework operational (in a form which can be estimated), a functional form for the quantity index, X_r^c (the import of good r into country c), satisfying the previously-mentioned assumptions, is necessary. The Constant Elasticity of Substitution (CES) functional form satisfies these assumptions. Hereafter, to simplify notation, X_{rk}^c will be written as X_k^c, and P_{rk}^c as P_k^c.

According to this framework, X_r^c can be written as:

$$X_r^c = X_r^c\,(X_1^c,\ldots,X_k^c,\ldots,X_{nr}^c)$$

$$= \left(b_1 X_1^{\rho_r^c} + b_2 X_2^{\rho_r^c} + \ldots + b_n X_{nr}^{\rho_r^c} \right)^{-1/\rho_r^c} \qquad (25)$$

where

$\sum_{k=1}^{n_r} b_k^c = 1$ and ρ_r^c is a constant greater than -1.

The cost-minimizing product demand functions take the form:

$$X_k^c = (b_k)^{\sigma_r^c} X_r^c \left(P_k^c/P_r^c \right)^{-\sigma_r^c} \qquad (26)$$

where = $\sigma_r^c = 1/(1+\sigma_r^c)$ is the elasticity of substitution.

Equation (26) postulates that importer c's demand for a product k of commodity class r, X_k^c , can be expressed as a constant share of the demand for the commodity class, X_r^c, and a single relative price term: the ratio of the price of the product to the price of the composite commodity in the importing country. It is a market share (or import allocation) equation which can be rewritten in the form of an export demand equation as follows:

$$X_k^c = \beta_o(P_k^c/P_r^c)^{-\sigma_r^c} X_r^c \qquad (27)$$

where P_k^c is the price of country k's export of commodity r to importing country c, P_r^c is an index of the price of the composite commodity (X_r^c) imported into country c. Because this export demand has been derived from a CES utility function (based on intersectoral substitution between commodity imports and all other goods; and on intrasectoral substitution among alternative export sources (i.e., based on the two-stage budgeting procedure), it is characterised by a unitary elasticity with respect to the level of import demand. This is theoretically consistent since a change in the level of demand by the importing country will, ceteris paribus, lead to a proportional change in the demand for exports of all supplying countries to that market. In (27), the responsiveness of export demand to relative price changes is given by the value of σ_r^c which lies between 0 and

$-\infty$. The constant β_o measures the exporter's market share irrespective of relative price.

As mentioned previously, horizontal differentiation implies trade flows between countries are influenced by historical, political, geographical or other consideration. Thus, even though exports to a given importing country might be homogeneous (as is the case for primary commodities), the export functions of competing exporters to given export markets can still be expected to be different. Such differences can be captured by the introducton of dummy variables. One issue of concern is the exchange rate regime adopted by each country following the breakdown of Bretton Woods system and the adoption of a variety of exchange regimes (flexible, single peg, SDR, or composite peg) by developing countries. Therefore, a dummy variable D_j is added to (27) to reflect differences in exchange rate arrangement between the exporters. It is introduced as follows:

$$X_k^c = \beta_o \left(P_k^c / P_r^c \right)^{-\sigma_r^c} (X_r^c)^{\xi} \left(\exp (D_j) \right)^{\delta_j} v^{\gamma} \qquad (28)$$

where D_j is the dummy variable for exchange rate regime.

In addition to the variable representing the choice of exchange rate regime, we introduce a measure of real exchange rate variability to proxy for uncertainty in international transactions. The role of real exchange rate variability is controvertial. It has been argued [see e.g. IMF (1984) and Willet (1986) for surveys of the literature] that

real exchange variability has been detrimental to trade flows. The empirical literature has, however, yielded conflicting results. Medhora (1990) examined the impact of nominal exchange rate variability on CFA zone imports and found that it exerted no detrimental effect on real imports.

Several studies have also looked at the link between exchange rate variability and international trade flows. Estimating export supply equations for five developing countries, Gupta [cited in Kenen and Rodrik (1986)] found a statistically significant and negative relationship between export supply and short term volatility in the nominal exchange rate. A study by Coes (1980) of Brazil's adoption of a crawling peg in 1968 found that the subsequent reduction of real exchange rate uncertainty had large positive effects on exports. Rana (also cited in Kenen and Rodrik) found that volatility had negative effects on the imports of South Korea, Taiwan, and the Philippines.

Studies on the relationship between uncertainty and trade flows focusing on the industrial countries include Hooper and Kohlhagen (1978) who examined the bilateral trade of the U.S. and of Germany and other industrial countries and found no significant impact on the volume of trade. Cushman (1983) followed up on Hooper and Kohlhagen's study and found that volatility had a significant negative effect on trade flows. These contrasting results were due to differences in measuring uncertainty. For Hooper and Kohlhagen, nominal exchange risk (uncertainty) was proxied by mean weekly absolute differences between current spot exchange

rates and past forward rates. Cushman used standard deviations of quarterly changes in real exchange rates. Akhtar and Hilton (1983) found that nominal exchange rate volatility had statistically significant effects on the exports of the U.S. and Germany.

In order to estimate the above equation, it is necessary to define relative prices and link these to the exchange rate. In the present international monetary system, movements in the rates of exchange of a currency can influence the value of another currency and this will have repercussions on bilateral or multilateral trade flows through their effects on export and import prices. Thus relative prices are defined as:

$$P_k^c = (P_k^s)(R_{ck}) \tag{29}$$

where P_k^c is the supply price of exporter k to market c; P_k^s is the supply price of exporter k in k's currency; $R_{ck} = R_{ck}$ (i.e., bilateral exhange value of a unit of the exporter's currency), k, in terms of the importer's currency, c, (if non-CFA exporter), and $R_{ck} = (R_{FF})(R_{FFo})$ (i.e., indirect bilateral rate due to the influence of the French franc on the CFA through the peg (if CFA exporter)); R_{FF} is the CFA franc price of the numeraire (French franc: fixed at 50 CFA francs in exchange for one French franc); R_{FF} is the numeraire currency price of a third currency.

Theoretically, currency changes will affect transaction prices which will in turn induce a redirection of purchases

and sales. As an example, we examine the CFA franc zone. Specifically, importers of CFA countries' goods are expected to shift their purchases towards CFA products if the CFA franc depreciates or is devalued. In the price Equation, (29), the exchange rate term, R_{ck}, shows how changes in the value of the CFA franc can occur. Since the CFA franc is pegged to the French franc, as the latter floats against other currencies, such fluctuations impact on the CFA franc. That is both currencies float jointly against other currencies. As a result, any fluctuations in the French franc is automatically transmitted to the CFA franc. Through its effects on transaction prices, this can have repercussions on the trade flows of the CFA countries. These effects need not be the result of deliberate policy in those countries.

To appreciate the ramifications of the CFA franc peg to the French franc, it is instructive to look at the effect of the peg on the stability of the real exchange rate of the CFA franc and therefore on their ability to compete. In a world of floating exchange rates, the real exchange rate of the CFA franc is a weighted average of the bilateral real exchange rate between the CFA franc and the currencies of their trading partners, due to multilateral currency linkages between those currencies and the CFA franc. That is,

$$E_{rz} = \sum_{j=1}^{n} x_j E_{rj} \qquad (30)$$

where

E_{rz} = the multilateral real exchange rate of the CFA franc

z = the CFA zone or countries

w_j = weights which sum to one

E_{rj} = the real exchange rate relative to a particular trading partner and is defined as:

$$E_{rj} = E_{zj}\left(P_j/P_z\right) \tag{31}$$

P_j = the price level of trading partner j

P_z = the price level in the CFA zone

E_{zj} = the CFA franc price of currency j, and can be broken into the CFA franc price of the numeraire currency (French franc), and the numeraire currency price of currency j; i.e.

$$E_{zj} = E_{zF}\left(E_{Fj}\right) \tag{32}$$

Through substitution of the above equations into (32), the latter can be written as:

$$E_{rz} = \gamma_F E_{rzF} + \sum_{\substack{j=1 \\ j\neq F}}^{n} \gamma_j E_{Fj} \tag{33}$$

where

E_{rzf} = the real exchange rate of the zone relative to the French franc

E_{Fj} = the real exchange rate of the numeraire relative to other currencies j

Equation (33) shows that the real exchange rate changes of the CFA franc consist of the part arising from changes in the numeraire country (France), and the part arising from changes between the numeraire and other trading partners. Thus even if pegging to the French franc eliminates one source of disturbance (the first expression on the right hand side), changes and variations between the French franc and other currencies will affect the real exchange rate of the CFA franc. Such real exchange rate disturbances will have real effects which are reflected in the trade flows of the CFA countries.

CHAPTER V

EMPIRICAL RESULTS

This study investigates the impact of the CFA franc peg to the French franc on the export share in two commodities of critical importance to the CFA countries, namely coffee and cocoa. Estimation combines annual time-series for the period 1973-1984 for a cross-section of cocoa and coffee exporting nations. It is assumed that the relation between export shares and the explanatory variables (relative price, import volume, and exchange rate variability, a proxy for uncertainty and risk, and a dummy variable for choice of exchange rate regime) is linear and the variance of the error term for different exporters is the same. The estimating equation is of the form:

$$X^c_{kt} = \beta_o \left(P^c_k / P^c_r \right)^{-\sigma^c_r} (X_{rt})^{\xi} (V)^{\gamma} \left(\exp (D_{jt}) \right) \epsilon_t \quad ,k=1,\ldots,N \quad (34)$$

X^c_k = the bilateral exports (quantity) from k to c (Source: United Nations: Yearbook of International Trade Statistics: Vol II: Commodity Trade Matrices: 1973-1984)

P^c_k = the export price of k's export into c (which equals k's export price in domestic currency, P^s_k,

multiplied by the value of k's currency in terms of c, R_{ck}) (i.e., $P_k^c = P_k^s (R_{ck})$.

P_k^s = the export price in k's currency: proxied by the per unit export price (= the dollar value of exports declared by the exporter divided by the quantity of exports) converted into domestic currency using IFS conversion factors (Source: ibid)

V = stands for variability (a proxy for uncertainty and risk)

R_k^c = bilateral exchange rate computed from IFS sources as: $C_k/C_c = (C_k/\$)/(C_c/\$)$ which yields R_{kc}. Then $R_{ck} = 1/R_{kc}$. (Source: IMF: International Financial Statistics (IFS): Supplement on Exchange Rates, 1985)

D_j = a dummy variable to classify exporting countries according to French franc (and non-French franc) peggers

P_r^c = an index of competitors' export prices in c computed as:

$$P_r^c = \sum_{k=1}^{N} \omega_k P_k^c,$$

where weights ω_k sum to unity and are given by an exporter's share in a given market; i.e.,

$$\omega_k = X_k^c / \Sigma X_k^c \quad .$$

The estimating equation in log-linear form can be expressed as:

$$\ln X_{kt}^{c} = \ln\beta_o - \sigma_r^{c}\ln\left(P_k^{c}/P_r^{c}\right)_t + \xi\ln X_{rt}^{c} + \gamma\ln V + \delta_j D_j + \epsilon_t \qquad (35)$$

or

$$\ln X_{kt}^{c} = \delta_o - \sigma_r^{c}\ln\left(P_k^{c}/P_r^{c}\right)_t + \xi\ln X_{rt}^{c} + \gamma\ln V + \delta_j D_j + \epsilon_t \qquad (36)$$

where $\delta_o = \ln\beta_o$.

The expected sign of the coefficient of the relative price term, which measures the elasticity of substitution (δ_r^{c}) between two exporters in a given export market, is negative. This means that for the CFA countries, their export share can be affected by factors that influence the price they charge in their export market. This is important because by being pegged to the French franc, changes in the latter automatically and simultaneously affect the CFA currency and (through the price equation) their export price. The effect of this on the relative price of CFA exports will therefore be influenced in a rather exogenous way by the behavior of the French franc.

The sign of the coefficient of the variable (X_r^{c}), the total import of a commodity, is expected to be positive. This is because an increase in the level of imports will, ceteris paribus, lead to a proportional increase in the exports of each exporting country to a given market. Since a CES utility function is assumed, the coefficient of the

total import term, X_r^c, is expected to be equal to one.

The coefficient of V, the risk term, is expected to be negative if variability of the real exchange rate introduces uncertainty and inhibits trade.

The dummy variable representing French franc peggers could be positive or negative reflecting institutional arrangements. For example, it can be positive for exports to countries such as France and/or EC member countries due to preferential treatment or if supply disturbances elsewhere cause a shift of trade to the CFA countries. One important question is whether export functions differ by export market. That is, is there an export demand function unique to each export market or is there one overall export demand function for all the export markets? Thus, we test whether pooling all export functions into a single one is appropriate. This is the hypothesis of homogeneity of export functions across export markets. If the hypothesis is rejected by the data, then separate export-shares equations need to be estimated for each market. The testing for homogeneity of export functions across export markets is performed as follows:

1) A regression is run for each export market separately to obtain its residual sums of squares SSE_i ($i = 1, \ldots, N$). This gives the residual sums of squares of the unrestricted model under the hypothesis that each export market has its own unique export function.

2) A regression is then run for all export markets together to obtain the residual sums of squares of the pooled model, SSE_p. This yields the restricted residual sums of squares under the hypothesis that there is one export function common to all export markets.

3) An F test on the equality of coefficients across export markets is then performed using the F statistic,

$$F_{cal} = \frac{SSE_P - \left((SSE_1+SSE_2+....+SSE_N)\right)/k}{SSE_1+SSE_2+....+SSE_N) \;/\; n_1+n_2+...+n_N - 2k} \qquad (37)$$

which is distributed $F(k, n_1 + n_2 +....+ n_N - 2k)$, and k is the number of parameters estimated including the intercept, while n_1, n_2, ... n_N are the observations for each export market (i = 1, 2, ..., N).

4) The F statistic, F_{cal}, is then checked against the F value from the tables to conduct the test. If the test does not reject the hypothesis of equality of coefficients, then the data can be pooled.

The calculated values of the F-test are 324.30 and 89.95 for the coffee and cocoa markets respectively. The hypothesis of equality of coefficients across export markets is rejected in both cases at the .01 level. Thus a separate export demand function should be estimated for each export market.

Another issue of importance is whether, in a given export market, the export function of the CFA countries, by reason of their being pegged to the French franc, is different from that of their competitors. Thus it is necessary to test whether the two CFA countries (Cameroon and Côte d'Ivoire) and their (non-CFA) competitors can be pooled or regressions need to be run as two separate groups. To carry out this test, one regression is run for Côte d'Ivoire and Cameroon to obtain their sum of squared residuals (SSE_1). A second regression is run for the remaining exporting countries to obtain theirs (SSE_2). Then a third (pooled) regression is run for all countries together to get the sum of squared residuals for the combined sample (SSE_c). The F statistic is given by:

$$F_{cal} = \frac{[SSE_c - (SSE_1 + SSE_2)] / k}{SSE_1 + SSE_2 / (n_1 + n_2 - 2k)} \qquad (38)$$

where k is the number of parameters estimated, and n_1 and n_2 are the number of observations. This F statistic is distributed $F(k, n_1 + n_2 - 2k)$.

The results on Table VII indicate generally that the hypothesis of equality of regression coefficients according to CFA and non-CFA groupings cannot be rejected. Thus pooling of the CFA and non CFA countries into one estimating equation is appropriate.

TABLE VII

RESULTS: TEST FOR GROUPING ACCORDING TO CFA AND NON-CFA

Country	F-cal
COCOA	
France	32.86
Italy	0.87
Netherlands	16.82
United States	4.29
West Germany	2.57
Belgium	0.53
United Kingdom	2.80
COFFEE	
France	19.50
Italy	6.65
United States	2.47
West Germany	2.31
Belgium	2.11
United Kingdom	1.34
Denmark	1.24
Netherlands	1.43
Japan	0.24

Note: The 95% critical level of the F test for cocoa results are 2.74.

The 95% critical level of the F test for coffee results is 2.60.

Equation (36) is estimated using cross-section and time-series data from several coffee and cocoa exporting countries for the period 1973-1984. The results are shown in Tables VIII and IX.

There are several methods for pooling cross-section and time-series data (e.g., Judge et al, 1982, Ch. 11 and 16; Judge et al, 1980, Ch. 6 and 8; Kmenta, 1986, Ch. 12). The Fuller and Battese method (or error components model) avoids the use of dummy variable regression. It analyzes time-series and cross-section data under the assumption of a variance component error structure similar to the common two-way random effects model with covariates. The variance components are estimated by the fitting of constants method; then the regression parameters are obtained through generalized least squares. Park's method allows for contemporaneously correlated and autoregressive error structures. Methodologically, it is akin to the method of Seemingly Unrelated Regressions (Zellner, 1962), except that it allows for an autoregressive error structure.

The results in Tables VIII and IX are in general agreement with those of Lord (1989). His estimates of the short run relative price elasticity of export demand for coffee range between -0.34 and -2.76. The coefficients for coffee in this study range between -0.42 and -0.75. His estimates for cocoa range between -0.22 and -0.34, while the coefficients in this study range between -0.47 and -0.87. Lord's

TABLE VIII

COFFEE: EXPORT SHARES EQUATIONS

Regressors	Importing Country								
	Germany	Japan	USA	UK	Italy	Nether-lands	France	Denmark	Belgium
	**	**	**	**		**	**	*	**
Intercept	-0.205	1.871	-18112	-1.406	0.455	1.181	-1.254	-0.200	1.832
	(2.881)	(13.510)	(3.791)	(4.295)	(1.410)	(8.824)	(9.736)	(1.950)	(5.445)
	**	**	**	**	**	**	**	**	**
Relative Price	-0.424	-0.488	-0.136	-0.754	-0.468	-0.679	-0.520	-0.742	-0.613
	(49.458)	(51.100)	(8.080)	(66.510)	(37.700)	(98.220)	(30.340)	(149.120)	(30.790)
	**	**	**	**	**	**	**	**	**
Import Volume	0.922	0.913	0.885	0.993	1.046	0.870	1.044	1.039	0.938
	(231.850)	(111.700)	(26.630)	(38.140)	(53.400)	(95.460)	(196.300)	(153.140)	(34.070)
Real									
Exchange	**		**		*	**	**	**	
Rate Var-	-1.759	-0.263	-0.736	-0.562	-0.447	-2.805	-0.941	-1.197	-0.763
abililty	(8.651)	(1.756)	(3.518)	(1.410)	(1.740)	(12.190)	(3.836)	(6.880)	(1.674)
	**	**			**	**	**	**	*
Dummy for CFA/ non-CFA	-0.442	0.550	0.131	0.017	0.845	0.419	0.959	-0.158	-0.217
	(10.483)	(4.228)	(0.446)	(0.147)	(19.900)	(8.815)	(11.390)	(7.458)	(2.424)
Number of Observers	132	132	132	132	132	132	132	132	132
MSE	1.020	1.026	1.072	0.961	2.913	0.985	0.899	0.100	0.922

Note: The numbers in parenthesis below each coefficient are the t-ratio statistics

** Significant at the .01 level

* Significant at the .05 level

TABLE IX

COCOA: EXPORT SHARES EQUATION

	Importing Country						
Regressors	Germany	UK	Netherlands	Italy	Belgium	USA	France
Intercept	1.028	-24.505**	-1.040	-.281	1.270	-21.210**	-9.933**
	(0.699)	(2.350)	(0.784)	(0.539)	(3.374)	(4.824	(3.112)
Relative Price	-0.474**	-0.877**	-0.546**	-0.682**	-0.728**	-0.715**	-0.549**
	(22.250)	(28.340)	(18.070)	(23.400)	(25.580)	(17.910)	(19.566)
Import Volume	0.858**	3.000**	1.040**	1.060**	0.870**	2.611**	1.816**
	(6.679)	(3.320)	(10.000)	(21.210)	(22.273)	(7.372)	(6.377)
Real Exchange Rate Var-abililty	-0.015	-0.653*	-0.112	-0.921**	-0.321	-0.890*	-0.265
	(0.058)	(2.020)	(0.711)	(5.087)	(1.454)	(2.529)	(1.670)
Dummy for CFA/ non-CFA	2.119**	0.639**	3.015**	2.788**	3.211**	-0.191**	3.448**
	(15.210)	(3.690)	(18.200)	(13.390)	(12.001)	(1.863)	(26.610)
Number of Observers	72	72	72	72	72	72	72
MSE	1.042	1.022	0.907	0.882	0.834	0.900	0.924

Note: The numbers in parenthesis below each cofficient are the t-ratio statistics
** Significant at the .01 level
* Significant at the .05 level

import demand elasticity for coffee ranges between -0.01 and 2.70, as compared to 0.91 and 1.05 here. For cocoa, Lord's import demand elasticity ranges between -2.35 and .24, while our range is between .90 and 3.00.

Next, we test whether import demand elasticity is not significantly different from one, a conclusion following from the CES utility function. The t-test statistic for this purpose is given by:

$$\frac{\hat{\beta}-1}{s(\hat{\beta})}$$

where $\hat{\beta}$ is the estimated import demand elasticity coefficient and $s(\hat{\beta})$ is the standard error of the estimated coefficient. The results are shown in Table X. They indicate that the hypothesis that the elasticity of import demand is unity (1) cannot be rejected in about half of the export markets. This finding is consistent with the import demand elasticity of one implied by the assumption of a CES utility function.

Lord (1989) indicates that the weighted and trade-weighted average price elasticity of export demand is -0.5. Most of the elasticity coefficients in this study in all export markets studied are close to this value. A statistical test is conducted to determine if the estimated relative price elasticities are significantly different from -.5. The results are presented in Table XI. In about half of the cases, the results are consistent with Lord's

TABLE X

RESULTS: TEST OF IMPORT DEMAND ELASTICITY OF UNITY

Country	t-stat
COFFEE	
West Germany	19.60
Japan	10.62
United States	7.56
United Kingdom	0.27
Italy	1.80
Netherlands	14.24
France	8.30
Denmark	5.74
Belgium	2.26
COCOA	
West Germany	1.10
United Kingdom	2.21
Netherlands	0.38
Italy	1.20
Belgium	0.26
United States	4.55
France	2.87

Note: The 95% critical values for the t-test are 1.98 for coffee and 2.00 for cocoa.

TABLE XI

RESULTS: TEST OF ELASTICITY OF SUBSTITUTION OF -.5

Country	t-stat
COFFEE	
Germany	8.87
Japan	1.31
United States	0.06
United Kingdom	22.47
Italy	0.26
Netherlands	25.81
France	4.88
Belgium	5.65
Denmark	48.20
COCOA	
France	1.74
Germany	1.21
Italy	6.24
Netherlands	1.52
United Kingdom	12.20
United States	5.39
Belgium	1.98

Note: The 95% critical t-values are 1.98 for coffee and 2.00 for cocoa.

weighted and trade weighted price elasticity of export demand of -0.5.

The results indicate that horizontal differentiation by exchange rate regime is an important determinant of export flows. Most, if not all relative price coefficients, are negative and significant. In addition, the dummy variable which has been added to capture pegging of the CFA franc is also significant in most cases. Thus the joint float of the CFA franc with the French franc has real effects on their export flows.

On the whole, pegging to the French franc has positive and significant effects on the exports of the CFA countries. It is worth pointing out here that the export markets in which pegging to the French franc has a significant negative effect on trade flows are Germany (for the cocoa markets) and U.S., Germany, Belgium, and Denmark (for the coffee markets). It is noteworthy that two of these markets (U.S., Germany) are the two most important international markets.

Moreover, the dummy variable is positive and highly significant in the case of coffee and cocoa exports to France. This lends support to the claim that single pegging inhibits efforts to diversify trade to non-numeraire trading partners. Also, because of historical and/or institutional arrangements, CFA exports to the major non-numeraire countries are hampered, while the CFA zone arrangements encourage exports to France. A positive sign is registered for exports to Japan and other European export markets (except

Belgium and Denmark, even though they are part of the EC). The positive sign on the other European countries can be explained by the fact that, being tied directly or indirectly to the EC, trade agreements with the latter tend to be favorable to the CFA countries.

Critics of the franc zone claim that the institutional arrangement which maintains the CFA-French franc peg perpetuates monetary, financial and commercial dependence. Tradewise, or commercially, it is claimed that the arrangement guarantees France a closed market. A test is thus conducted to determine whether the CFA-French franc peg makes the CFA zone a closed market for France with respect to CFA exports.

Using the test procedure under Equation (38), the research question is whether CFA countries' export function in the French market is significantly different from that in non-French markets taken together. If the peg does not close the CFA zone as a French market, then the CFA export function to France will not be statistically different from that to non-French markets taken together.

The results obtained yielded the F-statistics 9.0345 (cocoa exports) and 14.6352 (coffee exports). The F value from the tables for the .01 level of significance was 3.02. Thus for both cocoa and coffee exports, the results are statistically different, indicating that the institutional arrangement which maintains the CFA-French franc peg closes the CFA zone as a French market.

Our results indicate that exchange rate variability hampers bilateral commodity flows. The variability term is, in most cases, negative and significant. Increased risk due to exchange rate variability causes uncertainty in traders, casting doubts on the profitability of some of their international engagements, thus reducing the amount of trade below that which would otherwise have been possible.

Even if forward cover were available, exchange rate variability (hence risk and uncertainty) would still lead to a reduction in trade because, as Medhora (1990) points out:

> ... First, the transaction costs of buying cover increase the costs of trade. Second, the forward rate is a poor predictor of the future spot rate. Third, trading firms cannot always plan the magnitude or timing of all their foreign exchange transactions. Fourth, forward markets in foreign exchange are incomplete in both length of cover offered, and location--this being a particular problem for the smaller less developed countries. Thus hedging is both an imperfect and costly method of avoiding exchange risk (p. 314).

These arguments notwithstanding, Medhora points out that "the weight of empirical evidence to date shows little effect of exchange rate variability on trade." About these studies, he argues that most were "pre-73" while early "post-73" results were "preliminary" and "tentative" because "contracts and trading relationships are made over a number of years, and will not be broken or changed right after a new regime begins." This "inertia" effect may then result in understating the true costs of exchange rate variability on trade. This will lead to the erroneous conclusion that variability has no effect on trade flows.

When it comes to empirically measuring exchange rate variability, a number of different measurements exist [see Kenen and Rodrik (1984) and Medhora (1990)]. The most common measure of exchange rate variability used as a proxy for risk is the standard deviation. In this study, the standard deviation (an index of variability) of the change in the logarithm of the real effective exchange rate is used. A country's real exchange rate is a price-adjusted nominal exchange rate (i.e., the nominal exchange rate times the ratio of the foreign price level to the domestic price level). To measure a country's competitiveness relative to its major trading partners, the real effective exchange rate is used; and it is calculated as the nominal effective exchange rate times the ratio of a suitable price index for its major trading partners to its own price index. The real effective exchange rate used in this dissertation is calculated for the ten most important trading partners and the weights used are total trade volume (i.e., exports plus imports).

For each year of the period studied (1973-1984), the variance is based on annual real effective exchange rate (REER) observations of the twelve preceding years. For example, the variability measure for 1973 is based on the years 1960-1972; for 1974, it is based on the years 1961-1973, and so on. Besides the study by Lord, there are few studies dealing with disaggregated exports of coffee and cocoa. Lovasy and Boissenneault (1961) obtained a relative price

elasticity of export demand for Colombian coffee of -1.59; for "other Latin Coffees" of -2.76; and for "Robusta Coffee" (from all sources) of -0.98.

In a more recent study, Marian Bond (1987), summarizing results of coffee/cocoa export demand and supply elasticities, quoted Askari and Cummings as having obtained a value of -.4 for the short run price elasticity, and .4 for the income elasticity of demand for coffee.

The results of the shares equation reported in Tables VIII and IX constitute a general test of competitiveness and variability and do not differentiate between CFA and non-CFA effects on export functions. To do this, interaction terms are introduced to test for the effect of CFA membership on export functions.

Two issues are of interest here:

(1) whether pegging affects the competitiveness of CFA countries;

(2) whether pegging exposes CFA countries to real exchange rate variability and impacts on their trade flows. The model can therefore be written as:

$$\ln X_{kt} = \ln\beta_0 - \sigma^c_r \ln\left(\frac{P^c_k}{P^c_r}\right) + \xi \ln X^c_r + \gamma \ln V$$

$$+ \delta_o D^* \ln \left(\frac{P_k^c}{P_r^c} \right) + \delta_2 D^* \ln V + \epsilon_t \qquad (39)$$

where D is the dummy variable representing CFA exporters and is interacted with the relative price and variability terms for the purpose of addressing the two issues just raised.

If D=1, then (39) gives the expected export share of the CFA countries as:

$$\ln X_{kt} = (\ln \beta_0 + \delta_o) + (\delta_1 - \sigma_r^c) \ln \left(\frac{P_k^c}{P_r^c} \right)$$

$$+ \epsilon \ln X_r^c + (\delta_2 + \gamma) \ln V \qquad (40)$$

If membership in the Franc zone has important implications for competitiveness and variability, the coefficients $\delta_1 - \sigma_r^c$ and $\delta_2 + \gamma$ should be significantly different from zero. Hence, CFA export functions are affected by the peg of the CFA franc to the French franc.

The estimation results are given in Tables XII and XIII. With respect to Equation (31), the interaction coefficients δ_1 and δ_2 yield respectively the marginal effect (additional effect) of relative prices (P_k^c/P_r^c) and variability of exchange rate (V) for the CFA countries. To determine the impact of the effect for the CFA countries, the coefficients are added as indicated in Equation (40) and a t-test of their significance is conducted. To do this, the variance of the sum of the coefficients is needed. For

TABLE XII

EXPORT SHARES EQUATION: INTERACTION EFFECTS ON COFFEE

Regressors	Importing Country								
	Germany	Japan	USA	UK	Italy	Nether-lands	France	Denmark	Belgium
	*	**	**	**	**	**	**	*	**
Intercept	-0.210	1.586	-1.970	-1.290	0.706	0.945	-1.341	-0.133	1.284
	(2.591)	(15.839)	(4.234)	((26.670)	(3.615)	(6.992)	(8.436)	(0.646)	(6.554)
Relative	**	**	**	**	**	**	**	**	**
Price	-0.410	-0.487	-0.136	-0.695	-0.447	-0.668	-0.594	-0.713	-0.525
	(41.949)	(57.464)	(7.293)	(250.800)	(28.660)	(82.790)	(26.490)	(53.880)	(31.870)
Import	**	**	**	**	**	**	**	**	**
Volume	0.914	0.938	0.898	8.960	1.007	0.886	1.049	1.018	0.940
	(207.770)	(154.940)	(28.160)	(258.200)	(175.700)	(94.320)	(269.900)	(65.550)	(71.260)
Real									
Exchange	**	**	**	**		**	**	**	**
Rate Var-	-1.530	-0.295	-0.833	-0.222	-0.168	-2.790	-1.381	-1.102	-1.239
ability	(7.413)	(2.234)	(3.565)	(2.862)	(0.886)	(8.105)	(3.826)	(2.737)	(3.611)
Dummy	**	**	*	**	**	**	**	**	**
for CFA/	3.011	5.060	0.957	0.582	4.728	1.400	2.230	2.012	3.048
non-CFA	(41.617)	(30.726)	(2.384)	(46.940)	(27.030)	(19.990)	(14.460)	(18.460)	(24.630)
Interaction									
of Dummy	**	**	**	**	**	**	**	**	**
with	-0.667	-0.483	0.193	-0.311	-0.482	-0.265	-0.332	-0.284	-0.450
relative	(44.300)	(22.860)	(2.912)	(116.900)	(28.190)	(27.180)	(14.460)	(20.945)	(26.721)
price									

TABLE XII (Continued)

Regressors	Importing Country								
	Germany	Japan	USA	UK	Italy	Nether-lands	France	Denmark	Belgium
Interaction of Dummy with Real Exchange Rate Vari-ability	** -4.026 (11.826)	** -8.534 (8.472)	-2.281 (0.947)	** 4.262 (35.770)	** 8.452 (23.300)	0.059 (0.095)	0.238 (0.588)	* -1.041 (1.810)	** -1.333 (2.666)
Number of Observers	132	132	132	132	132	132	132	132	132
MSE	1.031	0.988	0.994	1.022	1.016	0.987	0.929	1.029	0.975

Note: The number in parenthesis below each coefficient is the t-ratio statistic
** Significant at the .01 level (critical t-value = 2.617)
* Significant at the .05 level (critical t-value = 1.980)

TABLE XIII

EXPORT SHARES EQUATIONS: INTERACTION EFFECTS ON COCOA

Regressors	Importing Country						
	France	Italy	USA	Belgium	Germany	UK	Netherlands
Intercept	** -13.862 (4.767)	-0.111 (1.167)	** -11.710 (4.069)	0.480 (1.469)	** 6.333 (4.080)	** -31.880 (3.922)	* -1.310 (1.854)
Relative Price	** -0.533 (18.450)	** -0.706 (18.160)	** -0.333 (8.352)	** -0.455 (11.930)	** -0.350 (23.710)	** -0.851 (25.180)	** -0.534 (17.850)
Import Volume	** 2.167 (8.419)	** 1.036 (16.460)	** 1.810 (7.760)	** 0.830 (7.670)	** 0.359 (2.660)	** 3.620 (5.130)	** 1.060 (8.750)
Real Exchange Rate Var-abililty	** -0.318 (2.246)	** -0.604 (2.859)	** -0.803 (3.884)	-0.166 (1.014)	** 0.449 (3.834)	-0.228 (0.775)	-0.127 (0.779)
Dummy for CFA/ non-CFA	** 5.106 (7.389)	** 4.927 (9.476)	** 2.520 (7.423)	** 6.230 (12.020)	** 6.499 (25.690)	** 3.740 (6.900)	* 1.080 (1.933)
Interaction of Dummy with relative prices	-0.111 (1.258)	** -0.248 (3.978)	** -0.634 (13.130)	** -0.530 (9.622)	** -0.688 (20.350)	** -0.197 (3.750)	0.241 (1.442)

TABLE XIII (Continued)

Regressors	Importing Country						
	France	Italy	USA	Belgium	Germany	UK	Netherlands
Interaction of Dummy with Real Exchange Rate Variability	** -11.297 (2.594)	-0.543 (0.249)	** -24.780 (6.394)	0.666 (0.224)	-0.884 (0.398)	** -27.010 (4.930)	3.676 (1.027)
Number of Observers	72	72	72	72	72	72	72
MSE	0.931	0.698	1.027	0.870	1.049	0.972	0.946

Note: The number in parentheses below each cofficient is the t-ratio statistic
** Significant at the .01 level (critical t-value = 2.66)
* Significant at the .05 level (critical t-value = 2.00)

example, in Equation (40), $var(\gamma+\delta_2) = var(\gamma) + var(\delta_2) + 2cov(\gamma,\delta_2)$. Estimates for the variances and covariances are obtained from the variance-covariance matrix. The results for the t-ratio test are shown in Tables XIV and XV.

In both coffee and cocoa regressions, the results indicate that in the majority of cases, the joint float of the CFA franc with the French franc significantly affected bilateral coffee and cocoa exports, increasing the negative impact of real exchange rate variability and the elasticity of substitution on their trade flows.

TABLE XIV

CFA VARIABILITY INTERACTION: EFFECTS ON COFFEE/COCOA MARKET SHARES

Market	t-stat
COFFEE	
Denmark	5.127
Japan	8.052
United States	3.506
Belgium	7.326
United Kingdom	29.171
Netherlands	5.990
Italy	26.704
France	9.755
Germany	18.142
COCOA	
France	2.678
Belgium	2.604
Germany	3.491
Netherlands	2.131
Italy	2.218
United Kingdom	5.001
United States	6.623

Note: The 95% critical t-values are 1.98 for coffee and 2.00 for cocoa.

TABLE XV

CFA RELATIVE PRICE INTERACTION: EFFECTS ON COFFEE/COCOA MARKET SHARES

Market	t-stat
COFFEE	
France	621.476
Japan	49.262
Netherlands	175.932
Denmark	351.440
United States	1.784
Belgium	198.332
United Kingdom	186.234
Italy	107.398
Germany	96.867
COCOA	
Belgium	30.523
France	6.998
Germany	34.119
Netherlands	1.800
Italy	17.816
United Kingdom	23.622
United States	33.399

Note: The 95% critical level are 1.98 for coffee and 2.00 for cocoa.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Empirical Findings

The motivation for this dissertation has been the joint float of the French and CFA francs against other major currencies. Joint floating is an issue of importance in the contemporary international monetary system because, by pegging the CFA franc to the French franc, its international value is determined by the value of the French franc relative to the other major currencies. Hence, any instability in its value will be transmitted to the CFA franc through the peg. Consequently, the CFA franc will be subject to arbitrary devaluations or revaluations. These will affect its real exchange rate and therefore impact on the ability of the CFA countries to compete internationally.

The main question investigated is whether the peg of the CFA franc to the French franc has exposed the CFA countries to real exchange rate variability (brought about by instability in the French franc), thus inhibiting their trade flows, especially their efforts to diversify their trade to non-French markets. It has also been the objective of the dissertation to see if the peg has affected the

competitiveness of the CFA countries and thus their market share.

To this end, the focus of the dissertation has been, as a first step, to investigate whether the French monetary authorities have been successful in stabilizing the value of the French franc in the international financial markets. Then, as a second step, it has focused on whether the indirect connection of the CFA franc to other major currencies through the French franc, has had a significant impact on trade flows between the CFA countries and those countries.

The finding of the first objective (i.e., determining whether French intervention policy was stabilizing or destabilizing) is that, in pursuing a policy of leaning against the wind, the French authorities destabilized the French franc.

The implication of this finding is that, as the French franc floats against other major currencies, such fluctuations are transmitted to the CFA franc through the peg. As a result, the CFA franc will be exposed to arbitrary devaluations and revaluations which will impact on the trade flows of the CFA countries for reasons not connected to deliberate policy on their part.

If such effects are undesirable, it would be necessary to counteract them. For example, if the peg results in an overvalued or unstable CFA franc (hence in trade deficits or inhibition of trade respectively), the CFA currency should be devalued and/or other exchange rate regime that can over-

come variability should be adopted. The institutional arrangement of the franc zone prevents this from happening, making it an unresponsive and inefficient institutional arrangement.

The second objective of this study was to investigate whether, by pegging the CFA franc to the French franc and exposing it to the instability of the French franc, the competitiveness and trade of the CFA countries were significantly affected due to the exogenous effects of the French franc on the CFA franc through the peg. To investigate this question, a model that is applicable to disaggregated commodities, such as coffee and cocoa that are studied in this research, was needed. Such a model should also allow one to address the question: given that a country's market share (an indicator of competitiveness, export performance and trade patterns) depend on such factors as changes in tastes and import restrictions in the importing countries, how are changes in import demand for coffee and cocoa reflected in the export shares of the CFA countries?

The model that allows this question to be addressed is Armington's (1969). Originally conceived to be applied to aggregate merchandise trade, this demand-oriented model can, under certain qualifications (Thursby, Johnson, and Grennes, 1986; Lord, 1989), be applied to highly disaggregated data such as coffee and cocoa. Even though highly disaggregated commodities (especially primary commodities) might be considered homogeneous so that intraindustry trade theory and

analysis would be inapplicable due to the law of one price, "horizontal differentiation" importers (Lord, 1989) and heterogeneity through "product quality or characteristic of contracts with particular countries" (Thursby, Johnson and Grennes, 1986), account for why primary commodities (e.g., coffee and cocoa, are subject to product differentiation). Granted, an exporter's market share in any export market will be affected by real or imagined differences. In this research, the focus was on differentiation of coffee and cocoa exporters by exchange rate regime (French franc or non-French franc pegger). The market share was modelled according to Armington.

Based on several assumptions, an exporter's market share was expressed as a function of the market size of a given category, and the price of an exporter's product in an export market relative to a composite price of competitors' exports in the market. This approach allowed one to focus on the role of relative prices (competitive effects), variability (risk and uncertainty) and "horizontal differentiation" on market shares.

Specifically, the model permitted a focus on the effects of the relative prices of CFA coffee and cocoa exports, their real exchange rate variability and horizontal differentiation through choice of exchange rate regime, on their market shares. The research question was whether the CFA-French franc peg is a significant factor in determining the CFA countries' market share. The test of hypotheses

implied by this question was performed using a series of F tests.

The results of pooling using Park's method are given in Tables VIII (coffee) and IX (cocoa). These results provide answers to tests of the impact of competitiveness, variability on market shares for all exporters without isolating the effect of being pegged to the French franc on such factors.

To differentiate between CFA and non-CFA factors on export functions, interaction terms were introduced to test for the effect of pegging to the French franc (i.e., CFA membership) on export functions (Tables XII and XIII). Two issues were addressed: whether pegging affected CFA countries' competitiveness, and whether pegging subjected the CFA countries to variability and uncertainty, thus inhibiting their trade flows. The results are presented in Tables XIV and VX. Most, if not all, of the interaction terms for competitiveness and variability are significant.

These results indicate that the joint float of the CFA and French francs against other major currencies exposed the CFA countries to real exchange rate variability (thus inhibiting their trade), and it also significantly affected the relative price of their exports (thus impairing their international competitiveness).

Economic Implications of Empirical Findings

The traditional argument in favor of pegging is that it avoids exchange rate variability and uncertainty with the currency to which it is pegged and therefore encourages more exchange transactions between both parties. It is also said to promote monetary discipline and, through convertibility of the minor currency, fosters international confidence in its value, thereby attracting foreign investments for development. The trade of the CFA countries has diversified considerably since independence. Thus by pegging just to the French franc, which fluctuates against the major currencies, only one source of variability is eliminated. Other effects, due to the impact of other currencies on the French franc, will persist and affect exogenously the variability of the CFA franc, inhibiting their trade flows. This argument is confirmed by the finding that the interaction of the dummy variable with the variability term is statistically significant (Tables XII and XIII).

Besides this finding, the literature on optimal pegging (Williamson, 1982) has demonstrated that pegging to one major currency, in the present managed floating system, is inefficient if the pegging country is engaged in diversified trade. To avoid the exogenous variability factor that characterizes the single peg, more efficient regimes such as the basket or SDR pegs are recommended.

In addition to the finding, just discussed, that the peg exposes the CFA countries to exogenously imposed variability through the French franc, another finding of this study which has economic implications is that the institutional arrangements of the franc zone has resulted in rigidities which not only cause economic problems for the CFA countries, but also hinder economic adjustment. Due to institutional arrangements, the peg has been characterized by a fixed parity of 50 CFA francs to the French franc since 1948. If the exchange rate, defined as the domestic currency price of a unit of foreign exchange, is pegged below its equilibrium value, then it is overvalued. This makes foreign goods cheaper to locals, and makes domestic goods more expensive to foreigners. Thus the demand for foreign exchange is greater than the supply. A trade accounts deficit is often the result.

If the nominal exchange rate as defined is adjusted by the ratio of a suitable foreign price index to a suitable domestic price index, the result is the real exchange rate. This variable is usually used as an indicator of a country's ability to compete internationally. It plays an important role in this research because it is used to examine whether the choice of the CFA countries to peg to the French franc has affected their competitiveness and export trade. If it does, then if the CFA countries are experiencing a trade deficit due to an overvalued real exchange rate, then the policy recommendation is that the real exchange rate should

be devalued. This presupposes the ability of the CFA countries to alter the exchange rate.

In their case, this is not possible due to the peg. This aspect of their exchange rate arrangement has come under criticism (see, for example, Financial Times, May 24, 1989, p. 24; West Africa Magazine, Aug. 3, 1987, p. 1471; Economist, July 21, 1990, p. 82; Jeune Afrique No. 1498, Sept. 18, 1989, p. 40; and Vallée (1989), p. 38). Both the IMF and the World Bank, cited in some of these references, have considered the CFA franc "overvalued."

This issue of an overvalued CFA franc hurting their competitiveness and deteriorating their trade has been analyzed in this research. Examined was whether the peg affected the competitiveness and market share of the CFA countries. The F test results (Table IX) indicate indeed that the peg, by affecting their competitiveness (significant relative price interaction effects), had an impact on their export demand function.

What this result implies is that the persistent trade deficits experienced by the CFA countries could be addressed through policies designed to affect the real exchange rate. With prices slow to change, real exchange rate changes can be achieved more quickly through nominal exchange rate devaluation. The CFA countries have a tool to address their trade problems but they cannot use it because the CFA franc is rigidly maintained at parity by institutional arrangements that prevent its being used for adjustment purposes.

Therefore, for these countries, economic disequilibria (both external and internal) will continue until relative price adjustments (rather than the more common and popular adjustments through fiscal, quantitative and administrative controls) are put into effect. Again, this presupposes control of the exchange rate as a policy tool. This calls for a reconsideration of the peg in its present format.

Concluding Statement

As pointed out earlier in the critique of the literature, few studies exist on disaggregated analysis of exports by SITC categories, especially for primary commodities such as coffee and cocoa that are the main source of foreign exchange earnings for most developing countries. For these countries, relative price elasticities of export demand with respect to specific commodities are of more proximate concern for short run (i.e., agricultural cycle or yearly) policy decisions than the long run view of J-curve policy decisions based on absolute price elasticities of (aggregate) export demand. Our study is a contribution to this short run aspect of policy analysis, which has been done by focusing on the CFA countries and examining how their choice to peg their currency to the French franc has affected their competitiveness relative to other coffee and cocoa exporters in various export markets.

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APPENDIX

FRENCH INTERVENTION IN THE FOREIGN EXCHANGE MARKET

Framework to Investigate the Intervention Policy of the French Authorities

The framework used to study the intervention of the French monetary authorities in the foreign exchange market draws on the work of Victor Argy (1982), Jacob Frenkel (1978), Peter Quirk (1977), Hans Genberg (1978), and Jacques Artus (1976, 1978).

These authors have used the concept of purchasing power parity (PPP) either as a determinant of the exchange rate (Frenkel, 1978; Genberg, 1978; Argy, 1982), or as a method for assessing the effect of intervention on the exchange rate (Argy, 1982; Quirk, 1977; Artus, 1976, 1978). While PPP remains controversial as a theory of exchange rate behavior, it nevertheless remains popular and is frequently used among economists. The Economist (April 15, 1989), also using the PPP concept to model the desired exchange rate, noted "We launched it (i.e., the hamburger standard of PPP) ... as a ready reckoner of whether currencies are at their correct exchange rates" (p. 86) This study uses PPP to

model the desired exchange rate because of its resilience and popularity.

Purchasing Power Parity (PPP) is an essential building block in the monetary or asset market approach to exchange rate determination. The advent of the float in 1973 led to renewed interest in PPP due to the belief that, under certain conditions, the equilibrium exchange rate is determined by the PPP relation. Thus, if left to float freely, the exchange rate will tend to the equilibrium rate that maintains purchasing power parity.

There are two versions of PPP:

1. The absolute version which states that the equilibrium exchange rate between domestic and foreign currencies equals the ratio between domestic and foreign prices; and
2. The relative version relates equilibrium changes in the exchange rate to changes in the ratio between domestic and foreign prices.

PPP is based on commodity arbitrage ensuring that exchange rates will not deviate from their parity level. If commodity prices deviated from their parity level, this would result in an international price discrepancy. Agents seeking the least expensive source for their purchases, would switch to the market where their buying power was the highest. In an internationally integrated market, commodity arbitrage would ensure that the price of homogeneous goods would be equalized in all countries.

In a fixed exchange rate regime, the PPP theory implies that a country's price level is pegged to the world price level and must move rigidly in line with it. In a floating exchange rate regime, as agents switch to the market where they can secure the highest purchasing power for their money, they increase their demand for the currency of that market, thereby raising the exchange value of that currency until it is brought in line with its parity level.

In modeling the behavior of the French monetary authorities, it is assumed that a purchasing power parity-based rule for official intervention is followed and that the objective of the authorities is to resist exchange rate changes relative to PPP by leaning against the wind.

The intervention currency of the French authorities is the deutsche mark (DM). In the European Monetary System (EMS), members peg their currencies against each other and float jointly against the dollar. The intervention currency is most often the DM. Dean Taylor (1982) points out that the French authorities attempt to "stabilize the franc relative to the mark and other European currencies ..." because "... the pattern of intervention suggests that the French monetary authorities have given priority to franc/mark stabilization" (p. 61).

The model used is the Frankel (1979) Real Interest Differential theory. It allows the nominal exchange rate and deviations from PPP to be determined by monetary and real variables and by expectations. This model is then combined

with a reaction function based on leaning against the wind (Quirk, 1977; Argy, 1982; Frenkel, 1978; Artus, 1978) to determine if foreign exchange market intervention by the French authorities was stabilizing or destabilizing.

Since the objective in this study is not exchange rate prediction, as such, but the nature of intervention policy, this model captures the essential forces at work in the foreign exchange market that affect the behavior of the nominal exchange rate.

The Frankel model follows the asset market approach to exchange rate determination. According to this approach, the exchange rate moves to balance the international demand for stocks of assets rather than the international demand for goods, according to the traditional view. The model yields a theory of exchange rate determination in which the spot exchange rate is expressed as a function of the relative money supplies, relative income levels, the nominal interest differential and the expected long run inflation differential. This theory distinguishes between the Chicago (Bilson-Frenkel) hypothesis and the Dornbusch hypothesis and shows how these are special cases of the Frankel (Real Interest Differential) model.

The Frankel model is based on exchange rate expectations and perfect bond substitutability. According to the model:

$$d = r - r^* \qquad (41)$$

where

d = forward discount if covered interest parity;

= the expected rate of depreciation if uncovered interest parity.

In addition,

$$d = -\phi(e - \bar{e} + \pi - \pi^*) \tag{42}$$

where π and π^* are the current rates of expected long run inflation at home and abroad; $\bar{e}$ is the equilibrium exchange rate and e is the spot rate.

Equation (42) shows that, in the short run, the exchange rate is expected to return to its equilibrium value at a rate which is proportional to the gap between the current and long run equilibrium value of the exchange rate. In the long run, the exchange rate is expected to depreciate according to the expected inflation differential.

Equations (41) and (42) yield:

$$e - \bar{e} = -\frac{1}{\phi}\left[(r-\pi)-(r^*-\pi^*)\right] \tag{43}$$

Equation (43) expresses deviations of the spot exchange rate from the equilibrium rate as a function of the real interest rate differential. From this equation, it follows that when $e = \bar{e}$, $\bar{r}-\bar{r}^* = \pi-\pi^*$; where $\bar{r}$ and $\bar{r}^*$ denote the long run equilibrium interest rates. The equation says long run equality between the nominal interest rate differential and the expected inflation differential follows from interest rate parity which ensures equality between the interest

rate differential and expected depreciation, and long run purchasing power parity ensures equality between expected depreciation and the inflation differential. Alternatively, it can be argued that in the long run, international investment flows ensure that real interest rates are equal across countries (i.e., $\bar{r}-\pi = \bar{r}^*-\pi^*$).

If the expression in brackets in Equation (43) is written as $[(r-r^*)-(\bar{r}-\bar{r}^*)]$, it shows that if the nominal interest differential rises above its long run level, then the exchange rate (units of domestic currency per unit of foreign currency) will rise proportionately above its equilibrium level due to capital inflow. Hence, a positive relationship is expected between the exchange rate and nominal interest differential (the Keyneisian-Dornbusch hypothesis).

To complete the equation of exchange rate determination and account for the Chicago long run (expectations) hypothesis, it remains to explain $\bar{e}$, the equilibrium exchange rate. Assume that purchasing power parity (PPP) holds in the long run so that:

$$\bar{e} = \bar{p}-\bar{p}^* \qquad (44)$$

where p and p^* are, respectively, the equilibrium price level at home and abroad.

Assume a conventional money demand equation

$$m = p + \phi y - \lambda r \qquad (45)$$

where m, p, and y are logs of money supply, price level, and income respectively and r is the interest rate. The equivalent foreign money demand equation is:

$$m^* = p^* + \phi y^* - \lambda r^* \tag{46}$$

Subtract (46) from (45) to get:

$$m-m^* = p-p^* + \phi(y-y^*) - \lambda(r-r^*) \tag{47}$$

It follows that:

$$\bar{e} = \bar{p}-\bar{p}^* = \bar{m}-\bar{m}^* - \phi(\bar{y}-\bar{y}^*) + \lambda(\pi-\pi^*) \tag{48}$$

where bars denote equilibrium values and use has been made of the fact that when $e = \bar{e}$, then $\bar{r}-\bar{r}^* = p-p^*$. Equation (48) yields the monetary theory of the exchange rate which is shown to be determined by the relative money supplies. It hypothesizes that given initial equilibrium, a given increase in the domestic money supply relative to the foreign money supply yields equiproportional depreciation of the domestic currency. Also, a given increase in domestic income raises the demand for money and leads to domestic currency appreciation. A fall in the expected rate of inflation raises the demand for money and also appreciates the domestic currency.

Substitute (48) into (43) and assume the current equilibrium money supplies and income levels are equal to their current levels. Then this yields a complete equation of exchange rate determination based on PPP as follows:

$$e = m-m^* - \phi(y-y^*) - \alpha(r-r^*) + \beta(\pi-\pi^*) \qquad (49)$$

where $\alpha = \frac{1}{\phi}$ and $\beta = (\frac{1}{\phi} + \lambda)$.

Equation (49) is the Frankel equation for exchange rate determination. This equation is used here for the purpose of evaluating the intervention policy of the French authorities.

Frenkel (1978), Argy (1982), Quirk (1977) and MacDonald (1988) have shown that most industrial nations pursue a policy of leaning against the wind by regressing a proxy for intervention against changes in the exchange rate. In his study of Germany, Japan and the United Kingdom, Argy (1982) has hinted at the possibility that the activity of government in the foreign exchange market can affect the exchange rate. Also, Quirk (1977), in his case study of Japan and its policy of leaning against the wind, examined the role of Japanese intervention in the foreign exchange market and concluded that "Estimation ... did not establish any systematic role for the intervention variable in determining changes in the exchange rate."

Artus (1978) expressed the theoretical possibility that the activity of government in the foreign exchange market could be a source of variation in the exchange rate:

> ... Active exchange rate policies can be and often have been such as to lead ultimately to a great deal of exchange rate instability (p. 279).

With this background, an attempt is made to examine the scope, extent and impact of French intervention in affecting the exchange rate, thus indirectly contributing to deviations from PPP. Our objective is to determine whether the effects of intervention have been stabilizing or perverse.

To this end, an intervention variable, I_t, is added to Equation (49). Thus,

$$e_t = \beta_o + \beta_1(m-m^*) + \beta_2(y-y^*) + \beta_3(r-r^*) + \beta_4(\pi-\pi^*) + \beta_5 I_t + \epsilon_t \quad (50)$$

A priori, $\beta_1>0$; $\beta_2<0$; $\beta_3<0$, according to Frankel (1979), though it could be positive (ibid, p. 610); $\beta_4>0$; $\beta_5>0$ if intervention is to be stabilizing. If it is negative, intervention is destabilizing.

In Equation (50), intervention is a determinant of the nominal exchange rate. At the same time, government intervention is determined by exchange rate developments. The government intervenes to influence the exchange rate through a policy of "leaning against the wind" in order to moderate fluctuations. It can also be argued that besides leaning against the wind (in which the behavior of the nominal exchange rate determines intervention response), intervention in the foreign exchange market is motivated by other considerations. It might also be concerned with deviations of the exchange rate from a target rate compatible with desired real rates for international competitiveness.

Use is made here of models of intervention developed by Artus and Argy [see Almekinders and Eijffinger (1991) for summary]. Two equations are estimated by the Artus model--the intervention equation and the target value equation. In this study, additional equations are estimated since account is being taken of the joint determination. The complete model to be estimated is as follows:

$$I_t = \alpha_o + \alpha_1(El_t - El_t^*) + \alpha_2(El_t - El_{t-1}) + \epsilon_1 \qquad (51a)$$

$$El_t^* = \gamma_o + \gamma_1(\ln P_t^G - \ln P_t^F) + \epsilon_2 \qquad (51b)$$

$$El_t = \beta_o + \beta_1(\ln M_t^F - \ln M_t^G) + \beta 2(\ln Y_t^F - \ln Y_t^G) + \beta_3(r_t^F - r_t^G) + \beta 4(\pi_t^{eF} - \pi_t^{eG}) + \beta_5 I_t + \epsilon_3 \qquad (51c)$$

$$\ln M_t^F = \lambda_o + \lambda_1 I_t + \epsilon_4 \qquad (51d)$$

I_t = Intervention

F = France

G = Germany

El_t = log of nominal exchange rate (FF/DM) = e_t in equation (50)

El_t^* = log of trend (or target) exchange rate

El_{t-1} = lag value of El

P_t^F = price level in France

P_t^G = price level in Germany

M_t^F = money supply in France (in logs)

M_t^G = money supply in Germany (in logs)

Y_t^F = income in France (in logs)

Y_t^G = income in Germany (in logs)

r_t^F = nominal interest rates in France

r_t^G = nominal interest rates in Germany

π_t^{eF} = expected inflation in France

π_t^{eG} = expected inflation in Germany

Equation (51a) is the central bank intervention reaction function estimated by Artus (1978), in which intervention depends on deviations of the nominal exchange rate from target ($El_t - El_t^*$) and the change in the nominal exchange rate ($El_t - El_{t-1}$).

Equation (51b) is the target value of the nominal exchange rate which depends on relative prices ($\ln P_t^G - \ln P_t^F$).

Equation (51c) is the equation for the determination of the nominal exchange rate based on the Frankel Real Interest Differential model (50).

Equation (51d) is the equation for the determination of the French money supply and it is necessary because the French money supply (M_t^F) is endogenously determined. Intervention in the foreign exchange market by the French monetary authorities (unless sterilized) will alter the French monetary base and thus the French money supply.

Hence, the French money supply ($\ln M_t^F$) is endogenously determined.

This is a system with three endogenous variables (I_t, El_t, $\ln M_t^F$) and three equations. In the empirical section, first (51b) is estimated to get the predicted value of the exchange rate (El^*) to serve as the target value of the nominal exchange rate. Then two-stage least squares is applied to the three equations. The instruments are $\ln M_t^G$, $(\ln Y_t^F - Y_t^G)$, $(r_t^F - r_t^G)$, $\pi_t^{eF} - \pi_t^{eG})$, El^*, El_{t-1}. Restrictions are placed on the coefficients of El_t^*, the lagged value (El_{t-1}) of the nominal exchange rate, and the current exchange rate (El_t) so that all three sum to zero--same for the coefficients of money supplies in Equation (51c).

A priori, it is expected that α_1 and α_2 are both negative. To see this, the exchange rate has been defined as French francs per DM (FF/DM). Thus, an increase in this rate [$(El - El_{t-1})$ is positive] means the French franc has depreciated. To prevent further depreciation (lean against the wind), the French monetary authority (Banque de France) intervenes by buying French francs (selling DMs); foreign exchange reserves decrease. Therefore, α_2 should be negative. As for α_1, if the French franc depreciates above its target value [$(El-\ln El^*)$ is positive], then the French monetary authority should sell DMs (buy French francs) to move the exchange rate towards its target value; i.e., $\alpha_1<0$.

The coefficients of the exchange rate Equation (51c) are expected to be as suggested by Frankel. The coefficient

of intervention, I_t, will give the impact of intervention on the value of the exchange rate; i.e., whether intervention tends to stabilize or destabilize the French franc. If $\beta_5>0$, then if Banque de France buys DMs (sells French francs), the French franc depreciates implying that intervention is stabilizing. If $\beta_5<0$, intervention is destabilizing since DMs are sold when they should be bought. This can result from mistimed intervention due to lags in recognition, administrative and implementation lags.

An intervention reaction function by Argy (1982) [and Quirk (1977), Kearney & MacDonald (1986) cited in Almekinders and Eijffinger (1991)] is also estimated in this study.

The model is as follows:

$$I_t = \alpha_o + \alpha_1(El_t - El_{t-1}) + \alpha_2 I_{t-1}) + \epsilon_1 \qquad (52a)$$

$$El_t = \beta_o + \beta_1(\ln M_t^F - \ln M_t^G) + \beta_2(\ln Y_t^F - \ln Y_t^G)$$

$$+ \beta_3(r_t^F - r_t^G) + \beta_4(\pi_t^F - \pi_t^G) + \beta_5 I_t + \epsilon_2 \qquad (52b)$$

Here again there are three endogenous variables (El_t, $\ln M_t^F$, I_t) and three equations.

In the empirical section (Chapter III), unanticipated depreciation (UD_t) and its lagged value (UD_{t-1}) are added to Equations (51a) and (52a) on theoretical grounds. Hence, Equations (51a) and (52a) become respectively:

$$I_t = \alpha_o + \alpha_1(El_t - El_t^*) + \alpha_2(El_t - El_{t-1}) +$$
$$\alpha_3 UD_t + \alpha_4 UD_{t-1} + \mu_1 \qquad (51a')$$

$$I_t = \alpha_o + \alpha_1(El_t - El_{t-1}) + \alpha_2 I_{t-1} + \alpha_3 UD_t + \alpha_4 UD_{t-1} + \mu_2 \quad (52a')$$

Unanticipated depreciation (UD) is defined by Dornbusch (1980) as "the difference between actual depreciation and interest differentials."

Dornbusch identifies three kinds of news that are important determinants of the exchange rate: news about the current account, cyclical or demand factors and interest rates. His conclusion is that:

> ... The empirical analysis confirms that unanticipated real and financial market disturbances bring about unexpected movements in the exchange rate (p. 56).

The importance of Dornbusch's finding in this study is that French monetary authorities will intervene as a result of unanticipated changes in the French franc exchange rate relative to the German Mark.

In summary, Argy's observation that causation in the foreign exchange market runs from exchange rate to intervention (the usual assumption) is reflected by Equations (51a) and (52a), while his observation that it could run "the opposite way" (Argy, 1982) from intervention to the exchange rate is reflected by Equations (51c) and (52b) which show the effect of intervention on the exchange rate. These equations constitute a simultaneous equation system for foreign exchange market intervention and exchange rate determination. These two equations from the framework for examining the appropriateness of French intervention in the

foreign exchange market. This is part of the broader question of looking at the implications of pegging the CFA franc to the French franc on the trade performance and pattern of the CFA countries.

Of particular interest is the estimation of Equations (51c) and (52b) which are used to test the effect of French intervention policy, the parameter of interest being β_5, the coefficient of the intervention variable. This variable has been included because it is claimed that intervention in the foreign exchange market impacts on the value of the currency. By pursuing a policy of leaning against the wind (through Equations (51a) and (52a) to offset movements of the exchange rate, francs will be bought when it is depreciating, meaning that intervention is negative or that reserves are being decumulated, and vice versa when it is appreciating. The effect is an excess demand for francs in the foreign exchange market which will drive up its exchange value in terms of the reference currency, the deutsche mark.

The sign of β_5 is important in determining the appropriateness of intervention:

1. If positive, it implies that an increase in intervention, I (i.e., reserve accumulation or a purchase of DM), leads to the appreciation of the DM (i.e., an increase in the French franc/DM exchange rate), and therefore a stabilizing policy.
2. If negative, it implies a destabilizing policy. Thus an appreciation (or depreciation) of the ref-

erence currency (DM) in the foreign exchange market is met with an accumulation (or decumulation) of reserves which in effect is perverse or destabilizing.

The necessary data for calculating the variables are as follows:

E_{ij} = exchange value of the deutsche mark (DM) in terms of the French franc obtained by dividing the francs-dollar (FF/$) rate by the deutsche mark-dollar (DM/$) rate. (Source: IMF:"IFS: Supplement on Exchange Rates, 1985)

P_j = German CIP (Source: IFS: Supplement on Price Statistics, 1985)

P_i = French CPI (ibid)

E_r = Real exchange rate = $E_{ij}(P_j/P_i)$

i = French call money rate of interest (IFS: Yearbook: various issues)

i^* = German call money rate of interest (ibid)

RDIFF = $i_G - i_F(i^* - i)$:

$\ln M^F$ and $\ln M^G$ = log of French and German money supplies, marrow definition (Source: OECD various issues)

$\pi(\pi^*)$ = French (German) expected inflation proxied by long term government bond rates (ibid)

I_t = Intervention variable: data for this variable are obtained from sources of the monetary base, given in the annual report of the National Credit Coun-

cil (Conseil National du Crédit), which reflect the intervention activities of the French Exchange Stabilization Fund (FSC).

The flow form (changes in levels of reserves) is obtained as:

Gold - Revaluation component of gold - Current account of FSC

+ Foreign exchange reserves (i.e., changes in net foreign assets)

+ Advances to the FSC (= Fonds de Stabilisation des Changes)

+ Liability of FECOM (= European Monetary Cooperation Fund)

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