United Nations University

WIDER

World Institute for Development Economics Research

Research Paper No. 2004/14

The Costs and Benefits Analysis of CFA Membership

The Choice of an Exchange Rate Regime for the CFA Countries Zone

Mireille Linjouom*

February 2004

Abstract

The paper determines an analytical framework defining the choice of an optimal exchange rate regime for a typical CFA country. The policymakers behave strategically to decide to adopt alternative exchange rate regime by minimizing their loss function under specific constraints like economic characteristics and political consideration. One concludes a CFA economy with less inflationary propensity and greater external shocks volatility will tend to select a flexible exchange rate regime. Moreover, the model suggests that a CFA country with a more unstable political system and a higher propensity to apply inflationary policies will prefer a flexible arrangement than a fixed one.

Keywords: CFA franc zone, exchange rate regime choice, political instability

JEL classification: E61, F31, F33

* University of Paris-Dauphine.

This study has been prepared within the UNU-WIDER project on 'Long-Term Development in the CFA-zone Countries of Sub-Saharan Africa', directed by David Fielding.

UNU-WIDER gratefully acknowledges the financial contribution to the project by the Finnish Ministry for Foreign Affairs.

UNU-WIDER also acknowledges the financial contributions to the research programme by the governments of Denmark (Royal Ministry of Foreign Affairs), Norway (Royal Ministry of Foreign Affairs), Sweden (Swedish International Development Cooperation Agency – Sida) and the United Kingdom (Department for International Development).

ISSN 1810-2611 ISBN 92-9190-593-3 (internet version)

Acknowledgements

I am grateful to participants at a UNU-WIDER workshop and to an anonymous referee for comments on an earlier draft of this paper. All remaining errors are mine.

UNU World Institute for Development Economics Research (UNU-WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Janis Vehmaan-Kreula at UNU-WIDER
Printed at UNU-WIDER, Helsinki

Introduction

An individual country's decision to adopt a particular exchange rate arrangement depends on many considerations. Following the collapse of the Bretton Woods System of fixed exchange rates in 1973, most developing countries continued to peg the value of their currency to the currency of their main trading partner. Since then, most of them have moved towards greater flexibility, particularly in the form of managed exchange rates. According to the IMF's *International Financial Statistics*, the number of developing countries with a pegged exchange rate decreased from 81 per cent in 1976 to 43 per cent in 1998. Exchange rate flexibility is often now adopted in a world economy undergoing increasing international integration and, in some respects, increased instability. Despite this trend, the economies of the CFA zone have continued to maintain the pegged exchange rate regime first adopted in 1948, with a single devaluation in 1994.

The CFA zone comprises 14 sub-Saharan African countries, of which 12 are former French colonies. Formally, they are divided into two currency unions, each with a single currency (both of which have the same acronym, CFA franc) issued by two regional central banks, one in Dakar (Senegal) and one in Yaounde (Cameroon). The two currencies are pegged to the French franc and thus now to the Euro. The CFA zone is unique in the world as a monetary union with a fixed exchange rate to the anchor currency country, France, guaranteeing convertibility of the CFA Franc with the Euro. France participates in the executive boards of the two regional central banks, and provides extensive financial and technical assistance to the member countries of the zone.

After more than 40 years of stability, the 50 per cent devaluation of the CFA franc in January 1994, as well as factors such as the formation of the European Monetary Union, affect the performance of the CFA zone. Moreover, the member countries are confronted with a series of external disturbances including changes in international interest rates, adverse terms of trade movements and the debt crisis. In view of this situation, one might wonder whether the CFA countries should abandon the current pegged exchange rate arrangement and adopt a more flexible regime. The trade-off between fixed and flexible exchange rates depends on both external factors and internal ones (for example, domestic inflationary pressures resulting from budget deficits and leading to an overvalued domestic currency).

There is an extensive theoretical literature on the optimum choice of an exchange rate regime. The first approach is based on the theory of the optimal currency areas, and focuses on a country's structural characteristics. Mundell (1961) focused on the optimal exchange rate regime to maintain external balance, while McKinnon (1963) emphasized maintenance of price stability. The main conclusions of that literature are that a small open economy is better served by a fixed exchange rate. However, the more diversified is a country's production and export structure and the less geographically concentrated its trade, the stronger is the case for the flexible exchange rate regime. This arrangement is also attractive when there is relatively low factor mobility, higher divergence of domestic inflation from that of the main trading partner and a higher level of economic and financial development.

The second approach examines the optimal choice of an exchange regime in a world subject to different types of shocks. The basic conclusion of these studies is that the

optimal choice of an exchange regime depends on the nature and size of these shocks as well as the structure of the economy (see for example Fisher 1977, Turnovsky 1976, Flood 1979, Frenkel and Aizenman 1982). If the disturbances are real shocks, such as a shift in the demand for domestic goods, or even foreign nominal shocks, a greater degree of flexibility is preferable. But when the country experiences domestic nominal shocks, exchange rate adjustment is not necessary.

A third approach emphasizes the role of credibility and political factors in the process of selecting an exchange rate regime. See for example Aghevli *et al*. (1991), Edwards and Tabellini (1994), Collins (1996), Edwards (1996), Agénor and Montiel (1996). The main point of this literature is to stress that it may be politically more costly to adjust a pegged exchange rate than to allow the nominal exchange rate to fluctuate. In a flexible exchange rate regime, a variation in the nominal rate might not be noticed or might not be linked to government policy in people's minds, as would be the case if the currency was devalued. This implies that the decision to adopt flexible exchange rate is partly taken to 'de-politicize' exchange rate adjustments.

The bottom line is that the process of selecting an exchange regime for a developing country depends on the structural characteristics of the economy, the nature and source of the shocks and political considerations. This paper develops an analytical framework allowing us to determine the size of costs and benefits of CFA membership for member states. Indeed, the experience of this zone illustrates the main trade-off involved in the choice of an exchange rate regime. Despite the 1994 devaluation, the member countries continue to commit themselves to a fixed exchange rate regime, to anchor their price levels and to maintain inflation close to the rate experienced in Europe. Such a policy has resulted in a weakening of their ability to adjust to external shocks to the domestic economy. Indeed by selecting a flexible regime, they would have been able to limit the damage caused by the volatility of their export prices and of the international interest rate.

The paper is organized as follows. Section 1 analyzes briefly the link between the economic performance of the CFA countries and the exchange rate system. Section 2 describes a typical CFA country as a small open developing country which produces tradable as well as semi-tradables goods, and which is affected by external shocks. Section 3 considers the preferences of policy makers who behave strategically to decide whether to adopt an irrevocably fixed or a flexible exchange rate regime. The model assumes that the authorities minimize a quadratic loss function that captures the trade-off between inflation and real growth in the tradable sector. The authorities' decision process takes into account the expected value of a quadratic loss function under alternative exchange rate regimes. Section 4 extends the model by considering political factors. As a pegged exchange rate is not irrevocably fixed, the policy makers have to choose between intermediate exchange rate arrangements such as a fixed but adjustable exchange rate and a flexible managed exchange rate. The last section offers some concluding remarks.

1 Economic performance and the exchange rate system: the CFA zone

The objective of this section is to analyze the costs and benefits of CFA membership for member states through the analysis of the relationship between the economic performance of the CFA zone countries and the zone's institutional arrangements.

The CFA arrangement differs from usual currency boards in several respects. First, CFA countries have to keep at least 65 per cent of their foreign exchange reserves with the French Treasury. The latter provides an overdraft facility which is unbounded in principle but not in practice since monetary policies have to be tightened when the reserve position deteriorates. Second, with 14 countries sharing one of two same currencies, devaluation is a complex operation requiring the consensus of many Heads of State. Third, when the devaluation occurred in 1994, CFA countries decided to harmonize their economic policies and monetary unions became economic and monetary unions.

The benefits of the exchange rate as an anchor can be assessed by comparing CFA economic performance to that of other African countries with a flexible exchange rate regime. Performance might be measured in terms of inflation, economic growth and the balance of payments. The other African countries have much in common with CFA zone members regarding economic development, diversity and the effects of terms of trade shocks. The link between the exchange rate regime and the economic performance shows that there are three benefits and three major potential costs of the CFA Franc as a monetary standard.

The first advantage of the exchange rate regime is the monetary discipline stemming from adherence to an external monetary standard. The clearest evidence for this discipline is that the CFA zone countries have performed relatively well in terms of price stability. As shown by the table below, there has been lower inflation in CFA zone countries in comparison with the non-CFA countries.

However as Boughton (1993) has noted, the discipline argument should not be oversold, as a country's exchange rate arrangements may promote but not guarantee discipline. Financial pressures in the 1980s led to a banking crisis in Cameroon and increases in tariff and non-tariff barriers (with negative effects on growth) in the Ivory Coast. The overall growth record of the CFA zone countries was sufficiently strong in the 1980s to suggest that the benefit of price stability was more than an illusion. GDP growth was higher in the CFA up to the beginning of the 1970s, with an average of 3.9 per cent annual growth, and remained strong in the oil-producing countries of the BEAC during 1973-85, with 12.2 per cent annual growth: nearly twice that of other sub-Saharan African countries. But average inflation picked up substantially, from an average of 4 per cent before 1973 to an average of 11.6 per cent during 1973-85. When the terms of trade deteriorated in the second half of the 1980s, the parity with the French franc remained unchanged and the CFA Franc became overvalued. This led to the erosion of the competitive position of the zone, and the 1986-93 depression was more severe in CFA than non-CFA countries. GDP growth decreased to less than 1 per cent in the CFA, in contrast to other sub-Saharan countries where GDP growth amounted to 2.4 per cent during that period. CFA countries were then penalized by the delay in adjusting the value of the currency. During the post-devaluation recovery period (1994-2001), GDP growth amounted to 3.8 per cent, only slightly higher than in the non-CFA countries.

Economic performance in the CFA and non-CFA countries in sub-Saharan Africa [1/]
(Annual average, in per cent)

	1960-73		1973-85		1986-93		1994-2001	
	CFA	non CFA	CFA	non CFA	CFA	non CFA	CFA	non CFA [2/]
Inflation	3.9	4.2	11.6	18.6	6.2	31.9	7.7	18.0
GDP Growth	3.9	4.0	7.3	2.2	0.4	2.4	3.8	3.0
Gross investment/GDP	14.7	14.4	22.2	16.3	17.3	18.3	20.3	19.0
Overall fiscal balance/GDP	-1.3	-2.0	-5.1	-5.9	-7.4	-4.6	-2.0	-3.8
External current account balance/GDP	n.a.	-1.0	-6.0	-8.8	-6.5	-7.1	-4.9	-11.1

Source: International Financial Statistics, World Development Indicators, Banque de France
[1/] Burundi, Cape Verde, Comoros, Congo Dem. Rep., Eritrea, Ethiopia, Gambia, Guinea-Bissau, Liberia, Madagascar, Malawi, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Sao Tome and Principe, Seychelles, Sierra Leone, Somalia, Sudan, Zambia, Zimbabwe.
[2/] Excluding Congo Dem. Rep. and Guinea-Bissau

The second positive aspect of the CFA zone currency arrangement relates to the credibility of a multinational institutional structure. Agénor and Montiel (1996) developed a theoretical framework for developing countries in which joining a currency union was one form of reputation-enhancing policy. The particularly good fiscal performance recorded in the CFA zone until 1973 resulted from strict compliance with the rules of the central banks and conservative monetary policies restricting lending to governments to statutory limits. However, after 1973 fiscal performance deteriorated because rules for a minimum level of foreign reserves and a limit to central bank lending to governments were broken (Fielding 2002). The average CFA budget deficit, which averaged 1.3 per cent of GDP during 1960-73, dropped to 5 per cent of GDP during 1973-85 then to 7.4 per cent of GDP during the recession period. After the 1994 devaluation, the budget deficit was reduced to 1.9 per cent of GDP on average in 1994-2001. It has become increasingly difficult to argue that participation in the unions has served as an effective constraint on member states.

The final positive factor, which may be the most important for the membership of the CFA zone, is the access to France and to Europe which has taken several forms and has generated the growth of trade and output. First of all, roughly two-thirds of the total international trade of the CFA countries is with France or with European Union countries. It should be stressed that the trade relations of the CFA countries with the European Union countries other than France are fairly significant. Moreover, the importance of France as a trading partner has tended to decline over time, from nearly half of all international trade of the CFA countries in the middle of the 1960s to 30 per cent at the end of the 1990s. During 1990-96, European Union countries absorbed 50 per cent of the exports from, and provided 53 per cent of the imports to the CFA countries. So the main economic risk would be a potential appreciation of the real exchange rate of the CFA countries due to a strong and volatile euro which might weaken the external competitiveness of CFA countries.

However, full currency convertibility and an absence of restrictions on capital movements provides the countries of the zone with access to European finance. Finally, the CFA countries have benefitted from important official financial support from

France. An external deficit for a member country will result in a loss of reserves and a fall in the balance held by the regional central bank on behalf of the country in the Operations Account at the French Treasury.

There are three drawbacks of CFA membership. The two major potential costs of the system are the loss of the exchange rate as a policy instrument and the risk of overvaluation. Before 1973, the investment ratio of the CFA zone members (was about 14.7 per cent of GDP) was close to that of other sub-Saharan African countries. But thereafter the investment ratio of the non-CFA countries continued to increase, while it decreased in the CFA zone as a result of significant reduction of private investment and cuts in public investment after 1985. However, after the 1994 devaluation, the investment ratio in the CFA zone increased, peaking at nearly 20.3 per cent of GDP during 1994-2001. This is consistent with the conjecture that the exchange rate system contributed to some cyclicality in key economic variables.

The third potential weaknesses of the CFA zone is that it contributes to a lack of intra-regional trade. Intra-regional trade accounts for less than 10 per cent of the international trade of the CFA zone, whereas it amounts to more than half of the international trade of the European Union countries. Price and wage flexibility have been limited. Across the CFA zone countries, there is a diversity of production and trade structure, and the impact of terms of trade shocks has varied widely. As reported Boughton (1993), the implication of this diversity is that if the exchange rate were to be changed in an attempt to adjust to movements in the terms of trade, the required magnitude of the devaluation would, in all likelihood, not be uniform across countries.

2 The theoretical model

This section presents a simple static log-linear model of a country of the CFA zone as a small open economy which will serve as the basis for discussion of alternative exchange rate regimes. This simple model constitutes the basic framework used for the analytical discussions assessing the costs of CFA membership.

2.1 The supply side

The model is based on the dependent economy model of Swan (1963). This is a simple model of a small open economy which produces both tradable and semi-tradable goods. This production structure relaxes the fixed-price constraint that is imposed by a small country assumption. Owing to its relatively small size the country is a price-taker in the world market of tradable goods and the export sector is the traditional, price-taking sector. The rest of the economy produces a semi-tradable good which is imperfectly substitutable with the imported commodity (Devarajan and De Melo 1987).

The whole country's production is assumed to cover the two sectors:

$$y = y_T + y_{ST} \qquad (1)$$

where y is the logarithm of the output, y_T is the logarithm of the production of tradable goods and y_{ST} is the logarithm of the production of semi-tradable goods.

Following the models in Barro and Gordon (1983), Devarajan and Rodrik (1992) and Edwards (1996), the equation for the output level in the tradable sector, y_T, is expressed as follows:

$$y_T = \bar{y}_T + \lambda(\pi_T - \pi_{ST}) + \mu (x - \bar{x}) \quad (2)$$

where $\bar{y}_T$ is the logarithm of the natural level of tradable output, π_T and π_{ST} are the rates of increase in the price of tradables and semi-tradables. (π_T-π_{ST}) stands for the change in the real exchange rate. x is a composite variable encompassing the logarithm of the terms of trade and world interest shocks, reflecting the existence of an income effect. $\bar{x}$ is the mean level of x, assumed to have a variance equal to σ^2. The parameters λ and μ are positive.

Similarly total output y is determined by two variables, the change in the real exchange rate (π_T-π_{ST}) and the composite variable x:

$$y = \bar{y} + \gamma(\pi_T - \pi_{ST}) + \phi(x - \bar{x}) \quad (3)$$

where $\bar{y}$ is the natural level of output and the parameters γ and ϕ are positive. In equations (2) and (3), an increase in the price of tradables, π_{ST} relative to the rate of increase in the tradables price, π_T, implies a decrease in real exchange rate. This real appreciation reflects an increase in the domestic cost of producing tradable goods and lowers both total and traded output, as do values of x were below the mean $\bar{x}$.

2.2 The demand side

As in Minford (1998), demand is composed of the demand of tradable goods, D_T and the demand of semi-tradable goods, D_{ST}

$$D = D_T + D_{ST} \quad (4)$$

The demand curve for tradable goods is determined by two variables, the demand in real terms for traded goods, τD and the change in the real exchange rate (π_T-π_{ST}):

$$D_T = \tau D + \eta(\pi_T - \pi_{ST}) \quad (5)$$

where η is positive, $\tau = \bar{y}_T / \bar{y}$ is a parameter representing the share of the traded output in total output with $0 < \tau < 1$.

Equation (4) states that the demand in the semi-tradables sector is the difference between the total demand for goods and the demand for tradable goods:

$$D_{ST} = D - D_T$$

Equilibrium in the semi-tradables market is given by:

$$D_{ST} = y_{ST} \quad (6)$$

Equation (7) equates the implied demand for semi-tradables with supply.

Table 1. A simple small open economy

$$y = y_T + y_{ST} \quad (1)$$

$$y_T = \bar{y_T} + \lambda(\pi_T - \pi_{ST}) + \mu(x - \bar{x}) \quad (2)$$

$$y = \bar{y} + \gamma(\pi_T - \pi_{ST}) + \phi(x - \bar{x}) \quad (3)$$

$$D = D_{ST} + D_T \quad (4)$$

$$D_T = \tau D + \eta(\pi_T - \pi_{ST}) \quad (5)$$

$$D_{ST} = D - D_T \quad (6)$$

$$D = y \quad (7)$$

Where: y=output (in log); $\bar{y}$($\bar{y_T}$)= natural level of output (traded output); $D(D_{ST})$ = demand in real terms (in semi-tradeables sector); with parameters $\gamma \geq 0$, $\phi \geq 0$, $\alpha \geq 0$, $\beta \geq 0$, $\eta \geq 0$ and τ(= $\bar{y_T}/\bar{y}$), natural share of traded output in the total output, $0 < \tau < 1$; in logarithm: $\pi_T - \pi_{ST}$ = change in real exchange rate; x = random variable reflecting external shocks received by the economy; $\bar{x}$ = the mean level of external shocks.

3 The model of the choice of an exchange rate regime

This section develops a simple theoretical model with policy makers behaving strategically under alternative exchange rate regimes in a country of the CFA zone. This approach relies on the existence of a trade-off between *credibility* provided by *rules* that govern economy policy and *flexibility* allowing the governments to apply *discretionary* policy after evaluating the situation. It should be made clear that the authorities use *discretion* to alter the nominal exchange rate. To establish credibility the authorities must convince the public that they are committed to defend the parity which has been clearly defined and stop implementing previously announced policies which would lead to time-inconsistency problems (for a survey on this literature, see for example Barro and Gordon (1983), Persson and Tabellini (1990), Agénor and Montiel (1996)).

A pegged exchange system is assumed to allow the policy makers to resolve, (if only partially) the time inconsistency problem. It has been argued that the adoption of a fixed exchange rate will constrain the ability of governments to surprise the public through unexpected devaluations.

The authorities' loss function

Consider the case of a small economy in a developing-country context whose policy makers behave strategically to decide whether to adopt a (permanently) pegged or a flexible exchange rate regime. The authorities' decision process takes into account and compares the expected value of a quadratic loss function under alternative exchange rate regimes.

The authorities are assumed to be interested in minimizing an objective function in both nominal and real variables. The real variable could be the current account, output, or the growth rate. The nominal variable could be the price level or inflation. A zero inflation rate is not an equilibrium. It would never be rational for people to anticipate a zero inflation rate. If they did so, the government would always have an incentive to set a

positive inflation rate. The model assumes that what matters most to policy makers is inflation and the competitiveness in the tradable sector. The policy makers' preferences are formalized as follow:

$$L = E\left[\ (\pi - \pi^*)^2 + \varphi(y_T - y_T^*)^2\ \right],\ \varphi > 0 \qquad (3.1)$$

where E is an expectations operator, L, the loss function which depends on squared deviations of inflation from a socially optimal target value, π^* and on squared deviations of level of output in the tradable sector from a desired target level y_T^*.

The structural economic constraints

The authorities' behaviour is subject to the constraints imposed by the economy's structural characteristics and its susceptibility to external shocks. In section 2, the level of output in the tradables sector has been set as a function of the magnitude of fluctuation in the real exchange rate (π_T-π_{ST}) and the external disturbances in terms of trade and world interest shocks, x:

$$y_T = \bar{y}_T + \alpha(\pi_T - \pi_{ST}) + \beta\,(x - \bar{x}) \qquad (3.2)$$

Following Kydland and Prescott (1977), it is assumed that the natural rate of (traded) output, $\bar{y}_T$, is lower than the socially optimal level, y_T^*:

$$y_T^* > \bar{y}_T \qquad (3.3)$$

where $y_T^* = \tau y^*$ (y^* is the target level of total output and $\tau = \bar{y}_T / \bar{y}$ represents the natural share of traded output in total output). Equation (3.3) assumes that the target level of traded output exceeds its natural level. The sub-optimality of the natural level of traded output could be due to pre-existing rigidities in labour market or to various distortions in taxation (Devarajan and Rodrik 1992). The determinants of changes in domestic prices have to be specified to close the model. It is assumed that the domestic price setters are rational and forward-looking. The price in the semi-traded sector is set so as to protect their position relative to the traded sector and to respond to the exogenous disturbances. The foreign-currency price of traded goods is determined on the world market. Domestic inflation, π, is given by:

$$\pi = \lambda\pi_{ST} + (1-\lambda)\pi_T \qquad (3.4)$$

where domestic inflation is a weighted average of the increases in the prices of semi-tradables and tradables and (1-δ) is the degree of openness. The domestic price of the tradable sector takes the following form:

$$\pi_T = d + \pi_T^e \qquad (3.5)$$

where d represents the rate of devaluation of the nominal exchange rate and π_T^e the rate of increase in the foreign currency price of tradable goods. As in Dornbusch (1980), it is

assumed for simplicity that the foreign price is set at one, and $\pi_T^e = 0$. Equation (3.5) becomes:

$$\pi_T = d \tag{3.6}$$

Since domestic price setters are rational and forward-looking, they set prices in the semi-tradable sector in reaction to fluctuations in the expected domestic price of tradable goods, and to exogenous shocks in their sector, X_N, which occur at the beginning of the period. Following Agénor and Montiel (1996), the domestic price setters' objective is to minimize their loss function, taken to be:

$$\text{Min } L_P = \left[\pi_{ST} - (d^a + \pi_T^e) - \psi X_N \right]^2 / 2 \ , \ \psi > 0 \tag{3.a}$$

where d^a denotes the expected rate of depreciation of the exchange rate.

After some manipulation the first order condition gives:

$$\frac{\partial L^P}{\partial \pi_{ST}} = 0 \ \Leftrightarrow \ \pi_{ST} - (d^a + \pi_T^e) - \psi X_N = 0 \tag{3.b}$$

The optimal rate of inflation in the semi-tradable sector is:

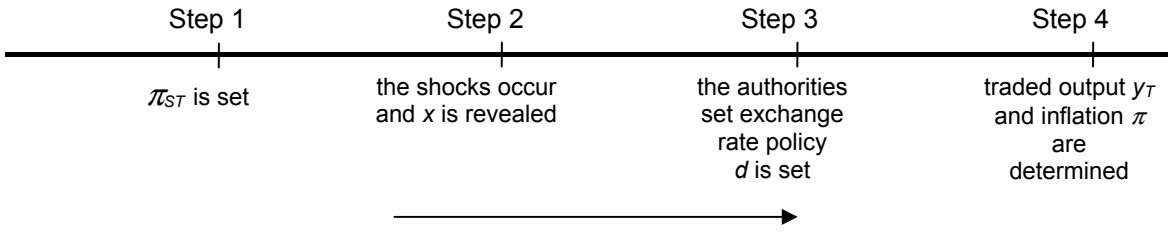
$$\pi_{ST} = d^a + \psi X_N \tag{3.c}$$

Under rational expectations, the agents take into account the expected relative price behaviour and the expected external disturbances:

$$\pi_{ST} = E(d) - \delta E(x - \bar{x}) \tag{3.7}$$

with $d^a = E(d)$ and $X_N = E(x - \bar{x})$. The timing therefore supposes that external shocks occur after the expected changes in domestic prices have been set (Figure 1).

Figure 1. Timing of events



The sequence of the actions influences the model's solution. Initially, the agents form rational expectations of the change in prices in the semi-tradables sector before they observe x, d, π and y_T. The policy makers determine exchange rate policy once both π_{ST} and x have been revealed. The authorities' objective is to set the exchange rate system to minimize the expected value of the loss function given by (3.1).

Table 2. Optimization programme

$$\min_{d} L = L[\pi(d), y_T(d)]$$

under

$$y_T = \bar{y}_T + \alpha(\pi_T - \pi_{ST}) + \beta(x - \bar{x}) \quad (3.2)$$

$$y_T^* > \bar{y}_T \quad (3.3)$$

$$\pi = \lambda\pi_{ST} + (1-\lambda)d \quad (3.4)$$

$$\pi_T = d + \pi_T^e \quad \text{with } \pi_T^e = 0 \quad (3.6)$$

$$\pi_{ST} = E(d) + \delta E(x - \bar{x}) \quad (3.7)$$

with L = quadratic loss function; (π, y_T) = inflation rate and traded output ; (π^*, y_T^*) = inflation rate and socially optimal traded output; $\bar{y}_T$ = natural traded output; $(\pi_T - \pi_{ST})$ = change in real exchange rate; π_T (π_{ST}) = inflation rate in the tradable sector (semi-tradable sector); d = rate of depreciation; π_T^e = foreign inflation rate; x = random variable reflecting external shocks received by the economy; $\bar{x}$ = the mean level of external shocks.
$E(x) = \bar{x}$ and $V(x) = \sigma^2$; parameters : $\varphi>0$, $\alpha>0$, $\beta>0$, $\delta>0$, $0<\lambda<1$.

3.1 The credibility of the pegged regime as a rule

The objective in this sub-section is to measure the welfare cost derived from the policy makers' commitment to a fixed exchange rate and not to adjust it in the context of adverse external shock.

In this case, no surprise change in parity can be expected when the authorities are deciding an optimal rule. Thus, under rational expectations, $E(d)=d$ and equation (3.7) becomes:

$$\pi = E(d) = d \quad (3.d)$$

Substituting (3.6) and (3.7) in (3.4) yields $\pi = \pi_{ST} = d$ (note that $E(x - \bar{x}) = 0$) and the optimal policy for the government is provided by the first order condition:

$$\frac{\partial L}{\partial \pi} = 0 \Rightarrow 2(\pi - \pi^*) = 0$$

This gives:

$$\pi^{Peg} = \pi^* = \pi_{ST} = d \quad (3.8)$$

The inflation stays on target with the socially optimal value that is implicit in equation (3.2), taking the form:

$$y_T^{Peg} = \overline{y_T} + \beta(x - \overline{x}) \quad (3.9)$$

Equation (3.9) is the equilibrium level of traded output. By plugging (3.8) and (3.9) in (3.1), the expected value of the loss function is expressed:

$$L^{Peg} = \varphi((\overline{y_T} - y_T^*)^2 + \beta^2\sigma^2) \tag{3.10}$$

In this case, where the policy makers are pursuing a fixed exchange rate and agents know that the public will not be subjected to an inflationary policy, the loss function is positive. In order to compare this exchange rate system with the situation that would arise if the government implemented a flexible exchange system, the social loss under discretionary policy will now be calculated.

3.2 The discretionary policy under flexible exchange rate regime

Consider the case of flexible exchange rate management whereby authorities and agents under rational expectations define the equilibrium value of inflation and the level of traded production. The authorities know the rate of inflation set in the semi-tradable sector. Following the impact of the external shocks on the domestic economy the policy makers set *d* as an optimal rate of adjustment of the nominal exchange rate.

Equation (3.1) in terms of *d*, π_{ST}, *x* gives:

$$L(d,\pi_{ST},x) = E\left[(\lambda\pi_{ST} + (1-d) - \pi^*)^2 + \varphi\left(\ (\overline{y}_T + \alpha(d-\pi_{ST}) + \beta(x-\overline{x}) - y_T^*\ \right)^2\right] \tag{3.11}$$

The corresponding first condition is:

$$\frac{\partial L}{\partial d} = 0 \Rightarrow d(1-\lambda)^2 + (1-\lambda)(\lambda\pi_{ST} - \pi^*) + \varphi\left[\alpha^2 d - \alpha^2\pi_{ST} + \alpha(\overline{y}_T - ty^*) + \beta(x-\overline{x})\right] = 0$$

(3.e)

By re-arranging this expression the final solution for *d*, the optimal exchange rate adjustment rule, is given as follows:

$$d = \left(\alpha^2\varphi + (1-\lambda)^2\right)^{-1}\left\{\left(\alpha^2\varphi - \lambda(1-\lambda)\right)\pi_{ST} + (1-\lambda)\pi^* + \alpha\varphi(y_T^* - \overline{y}_T) - \alpha\beta\varphi(x-\overline{x})\right\} \tag{3.12}$$

Equation (3.12) represents the authorities' reaction function where *d* is related to price changes in the semi-tradable sector, to the nominal and real objectives followed by the government, and external shocks received by the economy.

Assume that the authorities place sufficient importance on the real target so as to allow that $\Delta=(\alpha^2\varphi+(1-\lambda)^2)^{-1}>0$. Should the rate of inflation increase in the semi-tradable sector, the government will accelerate the depreciation rate of the currency. However, this effect will be mitigated if devaluation makes the semi-tradable goods cheaper than the tradable goods:

$$0 < \frac{\partial d}{\partial \pi_{ST}} = \Delta(\alpha^2\varphi - \lambda(1-\lambda)) < 1 \tag{3.f}$$

Then price change in the semi-tradable good induced by the change in demand tends to reduce the desirability of more flexible exchange rates.

When adverse external shocks occur, the government will force a depreciation of the domestic currency:

$$\frac{\partial d}{\partial x} = -\Delta\alpha\beta\varphi < 0 \tag{3.g}$$

This is the main advantage of the flexible exchange rate regime that protects the domestic economy from negative external shocks, especially for CFA countries with a price-taking external sector subject to world commodity price volatility.

The reduction of the target value of inflation calls for an appreciation of the domestic currency:

$$\frac{\partial d}{\partial \pi^*} = \Delta(1-\lambda) > 0 \tag{3.h}$$

Considering the policy makers' target for tradable output, assuming that $y_T^* > \bar{y}_T$, the government is always tempted to boost economic activity by implementing an inflationary policy:

$$\frac{\partial d}{\partial (y_T^* - \bar{y}_T)} = \Delta\alpha\varphi > 0 \tag{3.i}$$

The rate of devaluation increases, allowing the government to gain political support.

To find out the equilibrium inflation rate under a flexible exchange rate system, agents in the private sector with rational expectations take into account the optimal exchange rate adjustment rule (3.12).

By taking the expectation of (3.12):

$$\begin{aligned} &E(d) = \left(\alpha^2\varphi + (1-\lambda)^2\right)^{-1} \\ &\left\{\left(\alpha^2\varphi - \lambda(1-\lambda)\right)E(d) + (1-\lambda)E(\pi^*) + \alpha\varphi E(y_T^* - \bar{y}_T) - \alpha\beta\varphi E(x - \bar{x})\right\} \end{aligned} \tag{3.13}$$

Assuming that $\pi_{ST} = E(d) = d$, $E(y_T^* - \bar{y}_T) = y_T^* - \bar{y}_T$ and noting that $E(\pi^*) = \pi^*$ and $E(x - \bar{x}) = 0$, we have:

$$(1-\lambda)E(d) = \lambda E(d) + \pi^* + \frac{\alpha\varphi}{1-\lambda}(y_T^* - \bar{y}_T) \tag{3.j}$$

The expected change in the exchange rate and the subsequent price change in semi-tradable goods is:

$$\pi_{ST} = E(d) = d = \pi^* + \frac{\alpha\varphi}{1-\lambda}(y_T^* - \bar{y}_T) \tag{3.k}$$

Substituting equation (3.k) into equation (3.13) gives:

$$d = \Delta\left\{\left(\alpha^2\varphi - \lambda(1-\lambda)\right)\left(\pi^* + \frac{\alpha\varphi}{1-\lambda}(y_T^* - \bar{y}_T)\right) + (1-\lambda)\pi^* + \alpha\varphi(y_T^* - \bar{y}_T) - \alpha\beta\varphi(x-\bar{x})\right\} \tag{3.l}$$

After some simplification, the equilibrium level of the exchange rate depreciation can be expressed as:

$$d = \pi^* + \left(\frac{\alpha\varphi}{1-\lambda}\right)(y_T^* - \bar{y}_T) - \alpha\beta\varphi\Delta(x-\bar{x}) \tag{3.14}$$

The equilibrium level of inflation under flexible exchange rates is given by substituting equation (3.l) and (3.14) into equation (3.4):

$$\pi^{Flex} = \lambda\left(\pi^* + \frac{\alpha\varphi}{1-\lambda}(y_T^* - \bar{y}_T)\right) + (1-\lambda)\left(\pi^* + \frac{\alpha\varphi}{1-\lambda}(y_T^* - \bar{y}_T) - \alpha\beta\varphi\Delta(x-\bar{x})\right) \tag{3.m}$$

Simplifying, and noting that $\pi^{Peg} = \pi^*$:

$$\pi^{Flex} = \pi^{Peg} + \left(\frac{\alpha\varphi}{1-\lambda}\right)(y_T^* - \bar{y}_T) - \alpha\beta\varphi(1-\lambda)\Delta(x-\bar{x}) \tag{3.15}$$

Equation (3.15) gives the level of domestic inflation under flexible exchange rates. For a given real objective, it appears that inflation is higher under a flexible exchange rate regime as compared to the pegged one. The expansionary policy represented by the discrepancy (y_T^*- $\bar{y}_T$) is inflationary, notwithstanding the fact that such discretionary policy facilitates adjustment of the real exchange rate when external disturbances occur.

Indeed, by substituting equations (3.6) and (3.7) into equation (3.2), and noting that $E(x-\bar{x}) = 0$ and that d is given by (3.14), the equilibrium of the traded output can be expressed as follows:

$$y_T^{Flex} = \bar{y}_T + (1-\lambda)^2\Delta\beta(x-\bar{x}) \tag{3.16}$$

with $\Delta = (\alpha^2\varphi + (1-\lambda)^2)^{-1}$. Equation (3.16) shows that since $(1-\lambda)^2\Delta < 1$, discretionary exchange rate adjustment allows the level of traded output to be less sensitive to the adverse external shocks as compared to the fixed exchange rate case where $y_T^{Peg} = \bar{y}_T + \beta(x-\bar{x})$. Moreover:

$$y_T^{Flex} = y_T^{Peg} - \alpha^2\varphi\Delta\beta(x-\bar{x}) \tag{3.17}$$

Equation (3.17) establishes that due to the target set in the real sector, traded output is higher (lower) under flexible rates than under fixed rates in case of negative (positive)

external shocks. Consider the variance of traded output in the alternative exchange rate regime:

$$\sigma^2_{y}{}^{Peg} = \overline{y_T}^2 + \beta^2\sigma^2 \text{ and } \sigma^2_{y}{}^{Flex} = \overline{y_T}^2 + (1-\lambda)^4\beta^2\sigma^2 \Rightarrow \sigma^2_{y}{}^{Peg} > \sigma^2_{y}{}^{Flex} \qquad (3.n)$$

Expression (3.n) shows that the variance is higher under a pegged regime than under a flexible exchange rate system. This means that a flexible exchange system, despite an inflationary bias caused by (y_T*- $\overline{y_T}$), allows a reduction in traded output variability.

Given π_T^{Flex} and y_T^{Flex}, the expected value of the loss function under discretion is obtained by plugging (3.15) and (3.16) into (3.1) to get (after some simplification):

$$L^{Flex} = (\alpha^2\varphi^2/(1-\lambda)^2 + \varphi)(y_T^* - \overline{y_T})^2 + \varphi\beta^2(1-\lambda)^2\Delta\sigma^2 \qquad (3.18)$$

Expression (3.18) is also positive, and in order to evaluate alternative exchange rate regimes the authorities have to compare the expected value of the loss function under both cases.

3.3 Welfare comparison of the two exchange rate regime

The optimal exchange rate regime is the one that minimizes the expected value of the authorities' loss function. The determination of the best exchange system relies on the following criterion:

$$K = \{L^{Flex} - L^{Peg}\} \qquad (3.19)$$

If $K<0$ then a flexible exchange rate regime is preferable

If $K>0$ then a fixed exchange rate regime is preferable

By incorporating equations (3.10) and (3.18) into equation (3.19) and after some manipulation, equation (3.10) can be rewritten as:

$$K = \alpha^2\varphi^2[(y_T^* - \overline{y_T})^2/(1-\lambda)^2 - \beta^2\Delta\sigma^2] \qquad (3.20)$$

This expression means that in order for K to be positive, allowing the fixed exchange rate to be preferred, the differential $(y_T^* - \overline{y_T})$ that measures the government ambition to develop the profitability of the tradable sector has to be relatively high:

$$\frac{\partial K}{\partial(y_T^* - \overline{y_T})} > 0$$

The higher the gap between the socially optimal traded output and the natural rate of traded output, the more intense the government's aversion is to an expansionary policy that overheats the economy and depreciates the currency. In this case, the fixed exchange system will be preferred.

Note specifically, $(y_T^* - \overline{y_T})$ should exceed the variance of the external shocks σ^2.

However, the more weight is placed on the real target φ, the more preferable is the fixed exchange rate regime to the flexible one: $\frac{\partial K}{\partial \varphi} > 0$

This seems quite paradoxical since the advantage of a fixed exchange rate system lies in a low inflation rate at the expense of the real target. If the authorities give much more importance to the real target (in order to develop the profitability of the tradable sector) than to reducing inflation, they will have the temptation to abuse their discretionary power to alter the nominal exchange rate, leading to inflationary costs.

However, in case of a small open economy, the higher its susceptibility to external shocks, the more a flexible exchange arrangement is preferred: $\frac{\partial K}{\partial \beta} < 0$. In addition the higher the variance of these external shocks σ^2, the better a flexible exchange rate will be to mitigate the consequences of adverse external shocks: $\frac{\partial K}{\partial \sigma^2} < 0$.

Finally the model suggests that a developing economy with less inflationary propensity will be better off by adopting a flexible exchange rate regime in order to protect the profitability of the tradable sector and to reduce traded output variability. Furthermore, the more a small open developing economy is susceptible to the volatility caused by external shocks, the more it will be tempted to select a flexible exchange rate regime.

4 Fixed but adjustable versus flexible exchange rate regime

This extension of the exchange regime choice model tries to capture some real world features important for a developing country. First, a fixed exchange rate is rarely irrevocably fixed: in practice, pegs are frequently adjusted. Next, 'flexible' exchange rate regimes typically involve extensive bureaucratic management. So when the authorities clearly commit themselves to defend the established parity, the incentives to move away from the pegged currency could depend on the country's prevailing political and institutional characteristics. The model will try to formalize the role of external political factors, such as the special relationship with France and also the internal ones derived, from the institutional rules and political cycles that must be considered when choosing an exchange rate regime.

4.1 Sources and measures of political instability

In most developing countries, four sources of political instability can be identified: lack of administrative capacity, overzealous government rules and regulations, rent-seeking behaviour and inefficient political cycles. (For extensive reviews and discussion see Nordhaus 1975, North 1990, Cukierman *et al*. 1992, and Persson and Tabellini 1994).

A state is weak when the sources of political instability are numerous and widespread, a situation that can be found in both democratic and dictatorial political systems. The degree of political instability can be measured by the probability ρ for a government at the beginning of the period t of losing an election rather than surviving in office to the next period t+1. Following Baudasse *et al*. (1994), the degree of instability, ρ varies according to the degree of weakness or strength of the state, the external and domestic

political pressures to which it is subject, and the replacement frequency of the head of the state:

$$\rho = ((1-\varpi)\kappa)^{\frac{1}{\chi}} \qquad \text{with } 0<\kappa<1 \tag{3.21}$$

where ϖ measure the strength or the weakness state during the period and: if ϖ=0 then government is weak and its relations with the private sector are not satisfactory. The political system is weak where rent seeking is rampant. In such a case it is likely to reject fixed exchange rate commitment.

If ϖ *=1* then the government is strong. The public sector operates under strict commercial principles and macroeconomic performance is superior.

κ represents political external and domestic pressures. On the international side, a government that has an incentive not to honour its commitments, even if the situation is one of a fixed exchange rate, incurs a loss of credibility. In this case the government is weak and conveys bad signals about its ability to implement reform programmes. Internally, when facing forthcoming elections, the government seeking re-election has short-run incentives to renounce a fixed exchange rate to pursue an inflationary policy.

χ represents the instability of the political system in terms of replacements of the head of the state. The lower is $1/\chi$, the more the government instability there is and hence the higher is ρ and also the higher the possibility of losing an election.

The decision to 'tie one's hand' when joining a fixed-exchange rate arrangement is not irrevocable (Obstfeld 1994). The decision is a political decision. Some types of political instability weaken the exchange rate system (Eichengreen and Simmons 1993). According to Edwards (1996), a government can decide *ex ante* to adopt a flexible exchange rate arrangement in order to avoid the political cost induced by exchange rate depreciation. So the political costs can be measured as follows:

$$C = C(\rho) \text{ with } C'>0 \tag{4.1}$$

where the extent of the costs following reneging on the fix parity depend on the political system (democratic or not), the degree of stability and the nature of the state (weak or strong). This is the reason why generally devaluation occurs in the governments' very early stages when its degree of popularity is higher. Klein and Marion (1994) show that the probability of a devaluation increases immediately after a replacement of the head of the state. Furthermore, the degree of political instability has an influence on the government's time preference through the discount factor θ defined as follows:

$$\theta = \theta(\rho) \text{ with } \theta' <0 \tag{4.2}$$

The weaker the probability of the policymakers in an unstable system being re-elected at the beginning of the next period (ρ higher), the more political decisions will favour short term action (the discount factor θ is small) and the more the temptation to devalue.

4.2 The loss function under flexible and fixed but-adjustable exchange rate regimes

The preceding analysis assumes a fixed exchange rate regime with rules in place to prevent any alteration of the exchange rate. However, for a small developing country, there are costs associated with surrendering the use of the exchange rate as a policy instrument, particularly in the presence of large external shocks (Agénor and Montiel 1996). In practice, exchange rate arrangements involving a peg typically incorporate an 'escape clause' or a contingency mechanism that allows deviation from the declared parity under exceptional circumstances (Flood and Isard 1989).

Assume, in the context of the model above, that developing countries are faced with external shocks, and the authorities can maintain a fixed parity when the external shocks are small but are allowed to alter the fixed exchange rate discretionarily if the foreign shocks are large. The probability that the escape clause will be invoked and a discretionary policy followed is:

$$q = Prob(|x| \leq \mu), \quad \text{with } 0 \leq q \leq 1,\ 0 < \mu \leq c \tag{4.3}$$

where x is the composite external shocks variable having a uniform distribution over the interval $(0, c)$, c representing a given threshold. The agents form expectations before the realization of the external shocks.

We can introduce the possibility of this fixed but adjustable exchange rate regime as an alternative to a flexible exchange rate regime. Consider two periods, t and t+1, where under a pegged regime there is a positive probability q that the peg will be abandoned at the end of the first period t. Denote the discount factor by $\theta(\rho)$ and assume that the authorities incur a political cost $C(\rho)$ if the peg is abandoned. In this two-period economy, the loss function is expressed as follows:

$$L = L_t + \theta L_{t+1} \tag{4.4}$$

As in the preceding analysis, the authorities have a distaste for inflation and for output deviations from a target level in the initial period t:

$$L_t = \gamma(\pi_t - \pi^*)^2 + \varphi(y_{T_t} - y^*)^2 \tag{4.5}$$

where γ represent the weight attached to the distaste for inflation and φ the weight attached to the real target.

The loss function under flexible exchange rate regime is denoted:

$$L^{Flex} = L_t^{Flex} + \theta L_{t+1}^{Flex} \tag{4.6}$$

which can also be expressed as:

$$L^{Flex} = \gamma(\pi_t^{Flex} - \pi^*)^2 + \varphi(y_{T_t}^{Flex} - y_T^*)^2 + \theta\left[\ \gamma(\pi_{t+1}^{Flex} - \pi^*)^2 + \varphi(y_{T_{t+1}}^{Flex} - y_T^*)^2\ \right] \tag{4.7}$$

Equation (4.7) indicates that social costs increase with squared deviations of inflation from a socially optimal target value, π^* and on squared deviations of the level of output in the tradable sector from a desired target level y_T^* in the two periods t and $t+1$.

Under the fixed but adjustable regime the loss function is expressed as follows:

$$L^{Peg} = L_t^{Peg} + \theta L_{t+1}^{Peg} \tag{4.8}$$

At the end of the period t, the agents expect that with a probability (1-q) the authorities will maintain a pegged regime, and that with probability q the peg will be abandoned with a political cost equal to C. When the escape clause is exercised the country is assumed to move into a flexible system with probability q and to keep a fixed parity with probability (1-q), so that during the second period $t+1$, the loss function is as follows:

$$L_{t+1}^{Fixe} = \beta\left\{(1-q)(\gamma(\pi_{t+1}^{Fixe} - \pi^*)^2 + \varphi(y_{T_{t+1}}^{Peg} - y_T^*)^2) + q(\gamma(\pi_{t+1}^{D} - \pi^*)^2 + \varphi(y_{T_{t+1}}^{D} - y_T^*)^2) + qC\right\} \tag{4.9}$$

where $\pi^D{}_{t+1}$ and $y^D{}_{t+1}$ denote the value of inflation and traded output in the second period, $t+1$, under the devaluation scenario. This means that once the peg is abandoned they will be determined as under the flexible system: $\pi_{t+1}^{D} = \pi_{t+1}^{Flex}$ and $y_{T\,t+1}^{D} = y_{T\,t+1}^{Flex}$.

So the loss function under the pegged regime in the two-period economy is:

$$L^{Peg} = \gamma(\pi_t^{Peg} - \pi^*)^2 + \varphi(y_{T\,t}^{Peg} - y_T^*)^2 + \theta\left\{(1-q)(\gamma(\pi_{t+1}^{Peg} - \pi^*)^2 + \varphi(y_{T\,t+1}^{Peg} - y_T^*)^2)\right.$$

$$\left. + q(\gamma(\pi_{t+1}^{Flex} - \pi^*)^2 + \varphi(y_{T\,t+1}^{Flex} - y_T^*)^2) + qC \;\right\} \tag{4.10}$$

Equation (4.10) indicates that the social loss increases with both the authorities' time preference and the probability q of abandoning the pegged regime, and also with the deviations of inflation and traded output from their socially optimal levels.

Assume that the country can choose *ex ante* between these two possible exchange rate regimes: flexible nominal rates or fixed but adjustable rates. The regime choice will be based on a comparison of the appropriate expected loss functions.

4.3 Decisions rules applied to the selection process of an exchange rate regime

As in the preceding analysis, the authorities compare the expected value of the loss function under both exchange rate systems. The optimal exchange rate regime is the one minimizing the expected value of the authorities' loss function. The determination of the best exchange system depends on the following criterion:

$$K = E\{L^{Flex} - L^{Peg}\} \tag{4.11}$$

If $K<0$ then a flexible exchange rate regime is preferable

If $K>0$ then a fixed exchange rate regime is preferable

By substitution of expressions (4.7) and (4.8) in (4.9), expression (4.11) becomes:

$$K = E\{\ \gamma(\pi_t^{Flex} - \pi^*)^2 + \varphi(y_t^{Flex} - y^*)^2 + \theta[\ \gamma(\pi_{t+1}^{Flex} - \pi^*)^2 + \varphi(y_{t+1}^{Flex} - y^*)^2\ ] -$$
$$\gamma(\pi_t Peg - \pi^*)^2 - \varphi(y_t^{Peg} - y^*)^2$$
$$-\theta\{(1-q)(\gamma(\pi_{t+1}^{Peg} - \pi^*)^2 + \varphi(y_{t+1}^{Peg} - y^*)^2)$$
$$+ q(\gamma(\pi_{t+1}^{Flex} - \pi^*)^2 + \varphi(y_{t+1}^{Flex} - y^*)^2) + qC\ \}\ \} \qquad (4.12)$$

By plugging (3.8), (3.9), (3.15) and (3.16) into expression (4.10), and in addition assuming for simplicity that $\pi^{Peg} = \pi_{t+1}^{Peg}$, $y_t^{Flex} = y_{t+1}^{Flex}$, $y_t^{Peg} = y_{t+1}^{Peg}$, K becomes:

$$K = \gamma(\pi^{Flex} - \pi^*)^2 + \theta\gamma(1-q)(\pi_{t+1}^{Flex} - \pi^*)^2 + \varphi\beta^{2^2}\sigma^2[\ 1 + \theta(1-q))((1-\lambda)^4\Delta^2 - 1)\ ] - \theta qC \qquad (4.13)$$

The sign of K is indeterminate; but considering first order conditions will shed light on the likelihood of choosing between fixed but adjustable ($K > 0$) and flexible exchange rate ($K < 0$) regime.

From equation (4.13), it is possible to derive a number of hypotheses regarding the likelihood that a country will choose the fixed but adjustable exchange rate regime.

Consider the changes in prices under flexible rates:

$$K_{\pi_t^{Peg}} = \frac{\partial K}{\partial \pi^{Flex}} = 2\gamma(\pi_t^{Peg} - \pi^*) > 0 \qquad (4.13a)$$

$$\text{and } K_{\pi_{t+1}^{Peg}} = \frac{\partial K}{\partial \pi_{t+1}^{Peg}} = 2\beta\gamma(1-q)(\pi_{t+1}^{Peg} - \pi^*) > 0 \qquad (4.13b)$$

In either period a higher rate of inflation under flexible rates increases the probability *ex ante* of the policymaker choosing a pegged regime.

Moreover a higher distaste for inflation (γ) will also increase the likelihood of choosing the pegged regime:

$$K\gamma = \frac{\partial K}{\partial \gamma} = (\pi_t^{Flex} - \pi^*)^2 + \beta(1\text{-}q)(\pi_{t+1}^{Flex} - \pi^*)^2 > 0 \qquad (4.14)$$

The higher is the government weight attached to fighting against inflation, the more a fixed system will be chosen *ex ante* to favour monetary discipline and reduce inflationary pressures.

We can consider political factors, and particularly the authorities' time preference, in the selection process of an exchange rate regime:

$$K_\theta = \frac{\partial K}{\partial \theta} = \gamma(1-q)(\pi_{t+1}^{Flex} - \pi^*)^2 + \beta^2\sigma^2\varphi(1\text{-}q)(1-\lambda)^4\Delta^2 - 1) - qC \qquad (4.15)$$

The first term is positive, the second and the third terms are negative, and the sign of K_θ is indeterminate, depending on the degree of political instability ρ. The lower ρ (the

more politically stable the country), the higher is θ and then $K_\theta > 0$. When θ large, the temptation to devalue is low once a commitment to defend the parity is clearly established, because the costs resulting from devaluation expectations are large. So the probability of selecting a flexible system is low ($K_\theta > 0$).

From equation (4.13), it is possible to derive a number of hypotheses regarding the likelihood that a country will choose a flexible exchange rate regime. A higher variance of external shocks, σ^2 that raises traded output volatility under a pegged exchange rate regime will increase the likelihood that a flexible exchange rate is selected:

$$K_{\sigma^2} = \frac{\partial K}{\partial \sigma^2} = \varphi\beta^2(1+\theta(1\text{-q})(1-\lambda)^4\Delta^2 - 1) < 0 \tag{4.16}$$

The larger is the weight on the real target, the higher is the probability of choosing a flexible exchange rate regime:

$$K_{\varphi} = \frac{\partial K}{\partial \varphi} = \beta^2\sigma^2(1+\theta(1\text{-q})(1-\lambda)^4\Delta^2 - 1) < 0 \tag{4.17}$$

Devarajan and Rodrik (1992) note that countries where economic policy is highly politicized, and where the central bank lacks autonomy generally, put a higher weight on the real target φ relative to the weight on price stability. In view of the objective of being re-elected, the policymakers create a temporary economic expansion:

$$K_C = \frac{\partial K}{\partial C} = -q\theta < 0 \tag{4.18}$$

This means that political uncertainties with respect to being re-elected increase the costs of abandoning the commitment to a fixed exchange rate and so increase the likelihood of selecting a flexible exchange rate regime.

On the other hand, a higher probability of abandoning the peg q makes the exchange rate regime more likely to be selected:

$$Kq = \frac{\partial K}{\partial q} = -\theta\gamma(\pi_{t+1}^{Peg} - \pi^*)^2 - \theta\varphi\beta^2\sigma^2((1-\lambda)^4\Delta^2 - 1) - \theta C < 0 \tag{4.19}$$

Note that the first term is negative and the second term is positive. There are two offsetting effects:

$$K_\rho = \frac{\partial K}{\partial \rho} = -\theta q C' + \theta'' K_\theta \tag{4.20}$$

The first term is negative, meaning the higher is the political instability, the larger are the costs of abandoning the peg and the higher is the probability of adopting a flexible exchange rate regime. However, the second term is indeterminate. This indeterminacy cannot be resolved analytically.

Finally, the sources of political instability have no direct impact on the ongoing process of selecting an exchange rate regime. These factors do not necessarily impinge directly

on the choice of an exchange rate system (K_ρ is indeterminate) but rather on the government's natural time preference over the present and the future, and on the political costs associated with reneging on commitments to defend the parity. However, a country with a more unstable political system that has a higher propensity to follow inflationary policies will be more likely to select a flexible arrangement than to choose a fixed one. This is because the lack of policymaker commitment is politically costlier.

Conclusion

The main objective of this paper has been to define an analytical framework allowing the determination of an optimal exchange rate regime for a typical country of the CFA zone.

An important characteristic of this approach is that the choice of an exchange rate regime is an integral part of a general optimization process. It calls therefore for an explicit specification of the objective function as a prerequisite to the analysis. The authorities are assumed to prefer a lower rate of inflation and a higher level of tradables output. The optimal exchange rate regime is the one that minimizes the expected value of the authorities' loss function.

The model of exchange rate regime choice shows that the advantage of a fixed exchange rate system lies in a lower inflation rate and not a higher level of production. If the authorities place much more weight on the real target to develop the profitability of the tradable sector, they will be tempted to abuse the discretionary power to alter the nominal exchange rate, which leads to inflationary costs. However, the model of exchange rate regime choice suggests that a developing economy with less inflationary propensity will be better off by adopting a flexible exchange rate regime in order to protect the profitability of the tradable sector and to reduce traded output variability. Furthermore, the more volatile its external shocks, the more this small open developing economy will be tempted to select a flexible exchange rate regime.

This model of optimal exchange regime choice considers only the structural characteristics of an economy subjected to external disturbances, and confines the analysis to the adjustment of the nominal exchange rate. So section 4 extends the analysis to the case where there is an option of a pegged but adjustable exchange rate regime. This is to take into account the fact that fixed exchange rates are rarely irrevocably fixed, but can and often are adjusted. Regimes classified as 'flexible' typically involve extensive management.

Furthermore, the political characteristics of a country are considered in the process of choosing an exchange rate regime. Political instability is related to weakness of administrative capacity and the cascading of government rules and regulations, to inefficient political cycles and external political pressures (from the special relationship between France and the CFA countries zone). These factors do not necessarily impinge directly on the choice of an exchange rate system (K_ρ is indeterminate) but rather on the government's natural time preference over the present and the future, and on the political costs associated with reneging on a commitment to defend the parity. However, countries with a more unstable political system, ones that have a higher propensity to

follow inflationary policies, will be tempted to select a flexible arrangement rather than a fixed one. This is because the lack of policymaker commitment is politically costlier.

Another important real world feature of developing countries which constitutes a limitation of the analysis is the lack of an explicit distinction between the informal and formal sector in the model. This is an interesting point to include in future theoretical research.

Finally, there are no ready-made answers to the question of exchange rate regime choice, since it depends on the authorities' macroeconomic objectives, the specificity of the country's structural characteristics and political considerations. This may call for the CFA zone countries (small, open, export oriented economies submitted to external shocks and some political instability) to evolve toward a greater flexibility that combines the advantages of both pegged and flexible arrangements. This could be an exchange regime with a nominal exchange rate allowed to fluctuate within margins. The centre of the band should be kept as the central rate in terms of Euro to impose monetary policy discipline and to preserve the credibility provided by the European currency as long as the countries of the CFA zone maintain fairly close trade links with the European Union. The width of the band system would represent the economic activity level of the whole CFA. Its effectiveness should be linked to a more independent regional central bank. This will help to stabilize exchange rate movements within credible margins.

This revised exchange regime with margins, by combining the advantages of both pegged and flexible arrangements, would impose monetary policy discipline while providing some flexibility for proper policy responses to external shocks. It would limit exchange rate volatility, stop currency over-valuation and introduce some uncertainty on the exchange rate path so as to limit foreign borrowing incentives. Finally, with central bank independence, the CFA countries evolving toward a greater flexible exchange arrangement should retain strong monetary and fiscal discipline.

References

Agénor, P. R. and P. Montiel (1996). *Development Macroeconomics*. Princeton, NJ: Princeton University Press.

Aghevli, B., M. Khan, and P. Montiel (1991). 'Exchange Rate Policy in Developing Countries: Some Analytical Issues'. *IMF Occasional Paper 78*. Washington, DC: International Monetary Fund.

Barro, R. and D. Gordon (1983). 'Rules, Discretion, and Reputation in a Model of Monetary Policy'. *Journal of Monetary Economics*, 12(1): 101-21.

Baudasse, T., J. Desquilbet, and T. Montalieu (1994). '*Les facteurs de rupture dans les relations entre les pays en développement et institutions de Bretton Woods: les accords de confirmation du FMI'*. Economie internationale, 9-94/3/EI, Institut orléanaise de finance.

Boughton, J. M. (1993). 'The Economics of the CFA franc Zone', in P. R. Masson and M. P. Taylor (eds), *Policy issues in the Operation of Currency Unions*. Cambridge: Cambridge University Press.

Collins, S. M. (1996). 'On becoming more Flexible: Exchange Rate Regimes in Latin America and the Caribbean'. *Journal of Development Economics*, 51 (1): 117-138 (October).

Cukierman, E., S. Edwards, and G. Tabellini (1992). 'Seigniorage and Political Instability'. *American Economic Review*, 82 (4): 537-555 (September).

Devarajan, S. and J. De Melo (1987). 'Adjustment with a Fixed Exchange Rate, Cameroon, Ivory Coast and Senegal'. *The World Bank Economic Review*, 1 (3): 447-487.

Devarajan, S. and D. Rodrik (1992). 'Do the Benefit of Fixed Exchange Rate Outweigh Their Costs? The Franc Zone in Africa'. *Working Paper*. Washington, DC: World Bank.

Dornbusch, R. (1980). *Open Economy Macroeconomics*. New York: Basic Books.

Edwards, S. and G. Tabellini (1994). 'Political Instability, Political Weakness, and Inflation: An Empirical Analysis', in C. A. Sims (ed.) *Advances in Econometrics - Sixth World Congress - Vol. II.* Cambridge: Cambridge University Press.

Edwards, S. (1996). 'The Determinants of the Choice Between Fixed and Flexible Exchange Rate Regimes'. *NBER Working Paper 5756* (September). Cambridge, MA: NBER.

Eichengreen, B. and B. Simmons (1993). 'International Economics and Domestics Politics: Notes on the 1920s', in C. Feinstein (ed.), *Banking and Finance between the Wars*. Oxford: Oxford University Press.

Fielding, D. (2002). *The Macroeconomics of Monetary Unions, an Analysis of the CFA Franc Zone.* London: Routledge Studies in Development Economics.

Fisher, S. (1977). 'Stability and Exchange Rate System in a Monetarist Model of the Balance of Payments', in R. Z. Aliber (ed.), *The Political Economy of Monetary Reform.*

Flood, R. and P. Isard (1989). 'Monetary Policy Strategies'. *Staff Paper, Vol. 36.* Washington, DC: International Monetary Fund.

Flood, R. (1979). 'Capital Mobility and the Choice of Exchange Rate System', *International Economic Review*, 2 (2): 405-416 (June).

Frenkel, J. and J. Aizenman (1982). 'Aspects of the Optimal Management of Exchange Rates'. *Journal of International Economics*, 13 (3-4): 231-256.

Klein, N. and N. Marion (1994). 'Explaining the Duration of Exchange Rate Pegs', *NBER Working Paper*, 4651. Cambridge, MA: NBER.

Kydland, F. and E. Prescott (1977). 'Rules rather than Discretion: The Inconsistency of Optimal Plans' in T. Person and G. Tabellini (1994). *Monetary and Fiscal Policy: Credibility* – vol. I. Cambridge, MA: MIT.

McKinnon, R. (1963). 'Optimum Currency Areas'. *American Economic Review*, 53: 717-725.

Minford, P. (1998). 'The Political Economy of the Exchange Rate Mechanism' in S. Eiffinger and H. Huizinga (eds), *Positive Political Economy: Theory and Evidence.* Cambridge: Cambridge University Press.

Mundell, R. (1961). 'A Theory of Optimum Currency Areas'. *American Economic Review*, 51: 657-665.

Nordhaus, W. D. (1975). 'The Political Business Cycle'. *Review of Economic Studies*, 42 (2): 169-190.

North, D. C. (1990): 'Institutions and Credible Commitment'. *Journal of Institutional and Theoretical Economics*, 6 (3).

Obstfeld, M. (1994). 'The Logic of Currency Crises'. *NBER Working Paper*, No. 4640. Cambridge, MA: NBER.

Persson, T. and G. Tabellini (1990). *Macroeconomics Policy, Credibility and Politics*. Reading: Harwood Academic Publishers.

Persson, T. and G. Tabellini (1994). *Monetary and Fiscal Policy.* Cambridge, MA: MIT Press.

Swan, T. W. (1963). 'Longer Run Problem of the Balance of Payments', in W. M. Corden and H. W. Arndt (eds), *The Australian Economy. A volume of Readings*, Melbourne.

Turnovsky, S. (1976). 'The Relative Stability of Alternative Exchange Rate Systems in the Presence of Random Disturbances'. *Journal of Money, Credit and Banking*, 8 (1): 29-50.