

# THE IMPACT OF CURRENCY UNIONS ON TRADE: LESSONS FROM CFA FRANC ZONE AND IMPLICATIONS FOR PROPOSED AFRICAN MONETARY UNIONS

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## Abstract

*In this paper we explore whether the two existing currency unions in CFA Franc zone have a significant increase in trade between members. Furthermore, the impact of regional agreements which are only based on preferential trade (ECOWAS, COMESA, and SADC) is also analysed. Using panel techniques for 35 countries in Africa on the period 1980-2005, our empirical results strongly support that existing currency unions in CFA zone enhance significantly the trade between members. However, the Rose effect is more substantial in UEMOA than in CEMAC. Our results show that during their implementation the regional agreements which are only based on preferential trade (ECOWAS for example) have generated a little increase in trade compared to countries in currency unions. These results are highly interesting and have some policy implications for the proposed monetary unions in Africa.*

**JEL classification:** F15, F33.

**Keywords:** CFA Franc Zone, gravity model, bilateral trade, currency union, fixed effect model.

## 1. INTRODUCTION

Since the successful launch of the euro zone, there has been a more intensive interest in developing-country monetary unions, particularly in Africa. Although the efforts to achieve integration within Africa are nothing new, the recent implementation of the African Union (UA) and its proposition to

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create a single currency by approximately 2021 (Masson and Patillo, 2004) are the manifestations of this renewed impetus. The proposed creation of the African common currency union relies on plans for creating regional monetary unions from existing regional economic communities (ECOWAS, COMESA, SADC...).

It is generally admitted since Mundell (1961) that the feasibility of a monetary union is done by focusing on the symmetry of the underlying shocks across the member economies as a precondition for forming an optimal currency area (OCA). However, the OCA approach to the cost-benefit analysis of monetary unions has been considered by Frankel and Rose (1998) as *ex ante*. Indeed, Frankel and Rose (1998) show that a country's suitability for monetary union entry depends on the intensity of trade with its members and the extent to which its business cycles are correlated with those of other members.

In the same vein, Rose (2000) started the debate on the effect of common currency on international trade. He pointed out that countries in a currency union traded 3 times more each other than one would expect. Rose's paper generated an increasing criticism concerning the size of the common currency effect. In fact, most critiques turned on the omitted variables or model misspecification. However, beyond these critiques, most of the subsequent literature on the Rose effect recognized that currency union enhances trade.

In Africa, the impetus for monetary union has been to strengthen the regional solidarity and to foster the intra-regional trade (Masson and Patillo, 2004). If the objective of monetary union seems well founded in Africa, and given the existing currency unions in CFA Zone (UEMOA and CEMAC), the main question is "what is the effect of these currency unions on intraregional trade"?

Although this question is highly interesting, there is however a scarcity of empirical work on the CFA Zone. Nitsch (2002) employs a gravity model to explore whether the two existing multilateral currency unions- the CFA franc zone in West and Central Africa and the Eastern Caribbean Currency union- have a measurable affect on intraregional trade in the period 1970-1995. He finds that membership in a monetary union has little effect on bilateral trade.

Using the conventional gravity model of international trade to Africa without distinction, Masson and Patillo (2004) found that currency unions in Africa have promoted significant trade among its members.

The most advanced analysis is that of Carrère (2004). She assesses the impact of regional agreements on members' trade in Sub-Saharan Africa and compares the respective effect of the preferential trade agreements and currency unions in the period 1962-1996. A gravity model is estimated in panel

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with bilateral specific effect. The results show that during their implementation, the African regional trade agreements have generated a significant increase in trade between members. In the two agreements of the CFA zone, currency unions have largely reinforced this positive effect.

The aim of this paper is to assess the impact of currency unions in particular CFA zone franc on intraregional trade. We use a data set that covers a large number of countries in Africa over the period 1980-2005 and panel techniques to estimate a gravity model of trade. Both fixed and random effects estimators are extensively used. It allows us to exploit time series dimension of the data.

The rest of the paper is structured as follows: section 2 introduces the empirical methodology and data, section 3 provides results of gravity model while section 4 concludes and gives some policy implications.

## 2. METHODOLOGY AND DATA

### 2.1 Gravity methodology

Our estimation strategy is based on the empirical gravity model developed by Glick and Rose (2002). This model explains bilateral trade flows between countries not just in terms of the conventional Newtonian factors of economic mass and distance, but also a number of extra controls. The estimated equation is therefore

$$\ln(X_{ijt}) = \beta_0 + \beta_1 \ln(Y_i Y_j)_t + \beta_2 \ln(Y_i Y_j / Pop_i Pop_j) + \beta_3 \ln D_{ij} + \beta_4 Lang_{ij} + \beta_5 Bord_{ij} + \beta_6 RTA_{ijt} + \beta_7 ComCol + \gamma CU_{ijt} + \varepsilon_{ijt} \quad (1)$$

where  $i$  and  $j$  denote countries,  $t$  denotes time, and the variables are defined as:

$X_{ijt}$	denotes the average value of real bilateral trade between countries $i$ and $j$ at time $t$ ,
$Y$	is real GDP,
$Pop$	is the population,
$D$	is the distance between $i$ and $j$
$Lang$	is a binary variable which is unity if $i$ and $j$ have a common language,
$Bord$	is a binary variable which is unity if $i$ and $j$ share a land border,
$RTA$	is a binary variable which is unity if $i$ and $j$ belong to same regional trade agreement,

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- ComCOL* is a binary variable which is unity if *i* and *j* were ever colonies after 1945 with the same colonizer,
- CU* is a binary variable which is unit if *i* and *j* use the same currency at time *t*
- $\varepsilon$  represents the myriad other influences on bilateral trade, assumed to be well behaved.

The coefficient of interest to us is  $\gamma$ , the effect of a currency union on trade.

This paper exploits a large panel data set. First, it estimates the model with ordinary least squares (OLS). Second, the panel data technique is considered.

When estimated on panel data, the parameter estimates can be seriously biased. Three potential sources of bias are relevant. The first arises from the use of constant price trade data. In keeping with much of the literature in this area, trade flows is measured in constant US dollars, but as Baldwin (2005) notes, any trend in US inflation will generate an omitted variable bias in the parameter estimates.

The second problem arises when zero bilateral trade are omitted in the model based on *log trade*. Alésia, Barro and Tenreyro (2003) pointed out this problem in their study. Our paper departs from Glick and Rose (2002) and Rose (2000) by including those countries with zero bilateral trade. So, our dependent variable is as follows:  $\log(X_{ijt} + 100)$ .

The third potential problem arises if the omitted variables are positively correlated to currency union. The estimated trade impact will be upward biased. The size of this bias is quite difficult to judge since it stems from factors that are unobservable to the econometrician.

To solve the problem the model is estimated in panel with bilateral specific effects to isolate the non-observable characteristics of each pair of countries. Both fixed and random effects estimators are used. However, the paper relies on the robust fixed effect "Within" estimator, which essentially adds a set of country-pair specific intercepts to the equation, and thus exploits only the time series dimension of the data set around country-pair.

To assess the relative effectiveness of currency unions and preferential trade agreements for boosting regional trade, two kinds of analyses are done. First, no distinction is made between monetary unions in CFA zone and trade agreement arrangements in Africa. Second, an alternative approach tries to compare the impact of monetary unions (UEMOA and CEMAC respectively) and regional agreements which are only based on preferential tariffs (ECOWAS, COMESA, and SADC) on trade as in Carrère (2006). For that purpose, the equation (1) will be modified.

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## 2.2 Data

The bilateral trade data is taken from the IMF Direction of Trade (DoT) data set. The DoT data set covers bilateral trade between 35 countries in Africa between 1980 and 2005. Bilateral trade on FOB exports and CIF imports are recorded in American dollars. Bilateral trade is deflated by American CPI<sup>3</sup>. Our Sample consists of 35 countries in Africa (14 countries in CFA Franc Zone and 21 other remaining), yielding a total of 595 (=35(34)/2) observations per country.

The World Economic Outlook (WEO) and the CIA World Factbook were used to obtain much of the remaining data. The WEO provided real GDP and population data while the CIA's "World Factbook" for a number of country-specific variables is used. This includes information on location in order to calculate the great-circle distance, border, language, colonizers and dates of independence. Information on regional trade arrangement and currency unions are taken from a variety of sources. The website of the World Trade Organization (WTO) is used, following Glick and Rose (2002). A number of other sources like Masson and Patillo (2004), Carrère (2004) are added. Concerning the currency union, it is interesting to consider two kinds of analyses. First, by currency union we mean that money was interchangeable between the two countries at a 1:1 par for an extended period of time. Then, a distinction UEMOA versus CEMAC is applied.

## 3. GRAVITY BASED ESTIMATES OF THE EFFECT OF CURRENCY UNIONS ON TRADE

### *3.1 Estimation results without making difference between currency unions in CFA Zone and regional trade arrangements in Africa*

As mentioned above, two kinds of analyses are done. In this part, difference is not made between currency unions in CFA Zone (UEMOA versus CEMAC) and regional trade arrangements in Africa as a whole are considered (Nitsch, 2002). The analysis begins by estimating the gravity equation using conventional OLS. Furthermore, and most importantly, fixed and random effect estimators are used. Results are presented in table 1.

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<sup>3</sup> An average value of bilateral trade between a pair of countries is created by averaging all of the four possible measures potentially available.

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**Table 1: OLS and pooled panel estimates**

	OLS	Fixed effects (Within)	Random effects (GLS)
Currency Union	0.956 (9.08)***	0.691 (13.45)***	0.781 (8.77)***
Log Product Real GDPs	0.230 (10.99)***	0.152 (15.55)***	0.123 (16.85)***
Log Product Real GDP/capita	0.115 (8.03)***	0.170 (7.67)***	-0.113 (6.12)***
Log Distance	-1.337 (10.40)***		-0.88 (8.79)**
Language	-0.014 (0.65)		0.000 (0.01)
Border	0.422 (5.99)***		0.09 (1.91)*
Regional Trade Agreement	0.387 (4.87)***	0.272 (21.12)***	0.431 (20.17)***
Colonizer	0.186 (3.91)***		0.06 (3.21)**
Observations	15470	15470	15470
R <sup>2</sup>	0.19	0.15	
Hausman Test			103.62

Note: Column 1 indicates OLS estimates with White heteroskedastic-consistent standard errors in parentheses. Columns (2) and (3) show the estimates with Fixed and Random estimators.

\* indicates significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level

Table 1 shows the results of the gravity regressions. The first column presents the estimation results of OLS regression. The coefficients on the standard controls work reasonably well, with the theory with cross-border trade increasing in the log-product of GDP and decreasing the log of distance between countries. Gravity coefficients are economically and statistically significant, with the exception of the coefficient of language.

The main variable of interest is, however, the estimated coefficient on the currency union dummy. This coefficient is positive and statically significant. The magnitude is 0.956, an estimate that is close to that of Masson and Patillo (2004). This value implies that countries of the CFA zone trade on average about 2.60 times ( $\exp(0.956)$ ) as much with each other than they do with other countries in Africa. These findings confirm that currency union en-

hances trade. Our results are consistent with the findings of Masson and Patillo (2004) but contrast with those of Nitsch (2002).

The second variable of interest concerns the estimate on the regional trade arrangement (RTA) dummy. The coefficient is positive and statically significant but smaller (0.387) than the estimate of currency union. While the CFA Zone trade on average about 2.60 times, the RTA in Africa enhances trade on average about 1.47 (exp (0.387)).

However, this paper considers less the results of gravity equation using conventional OLS. Its main advantage rests in employing panel data techniques. We depart from Glick and Rose (2002) and use both fixed and random effect estimators. It allows us the possibility of estimating time-variant factors and selecting the appropriate model.

Estimated results are in columns 2 and 3 of table 1. Column 2 presents the results of fixed effects estimates. The estimates for the selected variables work reasonable well. Coefficients for traditional gravity variables are all significant at 1% level. The fixed effects estimate delivers a  $\gamma$  (coefficient of currency union) smaller than the OLS estimates. However, the coefficient remains higher. The estimate implies that sharing a common currency in Zone Franc CFA allows countries to trade almost 2.00 times (exp (0.691)) more between themselves, while the regional agreement arrangements in Africa allows countries to trade only 1.30 times (exp (0.272)).

The random effects estimates are tabulated using a generalised least squares (GLS) estimator assuming Gaussian disturbances that are uncorrelated with the random effects. Column 3 shows that the estimated coefficient of currency union is 0.781 and all coefficients are significant except language and GDP per capita. However, it is natural to choose the appropriate model from the perspectives of policy implications. The Hausman test in this case is helpful since it allows arbitrating between two estimators. Under the null hypothesis, random errors are assumed to be uncorrelated with the vector of included variables. Both random and fixed are consistent and unbiased under this assumption but the random effects estimator is BLUE. Under the alternative hypothesis, only the fixed effects estimator is consistent and unbiased.

The realisation of Hausman test shows that the value is 103.62 far higher than the critical value of 15.51, therefore the null hypothesis is rejected. The model with fixed effects is preferred to random effect model.

### ***3.2 Estimation results taking into account the impact of each currency union (UEMOA, CEMAC) and preferential trade (ECOWAS, COMESA, SADC).***

This section tries to capture the impact of each monetary agreement, UE-

MOA and CEMAC, and those of preferential trade (ECOWAS, COMESA, and SADC) on its members in terms of creation of trade. The estimated equation (1) is perturbed in a number of different ways. Instead of using currency union in CFA Zone as a whole, CEMAC versus UEMOA are distinguished. Furthermore, we consider following preferential trade (ECOWAS, COMESA, and SADC). Estimation results are reported in columns 1 and 2 of Table 2.

**Table 2: Pooled panel estimates**

	Fixed effects (Within)	Random effects (GLS)
UEMOA	0.842 (8.45)***	0.916 (8.77)***
CEMAC	0.537 (7.55)***	0.551 (8.87)***
ECOWAS	0.270 (5.67)**	0.349 (4.12)**
COMESA	0.353 (3.53)*	0.286 (8.79)**
SADC	0.414 (0.426)**	0.623 (3.91)**
Log Product Real GDPs	0.372 (21.12)***	0.221 (10.17)***
Log Product Real GDP/capita	0.136*** (0.447)	0.05 (0.51)
Log Distance		-0.881 (7.17)***
Border		0.431 (11.27)***
Language		0.101 (1.17)
Colonizer		0.181 (4.01)**
Observations	15470	15470
R <sup>2</sup>	0.19	
Test Hausman		122.44

Note: Columns (2) and (3) show the estimates with Fixed and Random estimators.

\* indicates significance at the 10%, \*\* at the 5%, \*\*\* at the 1% level



The estimates for the selected variables work reasonably well. Coefficients for traditional gravity variables are economically and statistically significant, the exception being the common language and GDP per capita variables (for random effects estimates). Since a Hausman test based on differences between fixed and random effects shows that the value is 122.44 far higher than the critical value 19.67, the model with fixed effects is preferred to the random effects model.

The fixed effects estimates show that coefficients reflecting intra-regional trade are significantly more positive for monetary union (UEMOA, CEMAC) than preferential trade (ECOWAS, COMESA, SADC). However, the coefficients on monetary union are higher. For example, the coefficient for UEMOA (CEMAC) trade indicates that members traded 2.3 (1.7) times more among themselves, over the period 1980-2005. These results confirm the findings that a single currency enhances trade. However, concerning the CEMAC, our results contrast with the research by Carrère (2004) which found that members traded 3.25 times more among themselves.

Concerning the preferential agreements (ECOWAS, COMESA and SADC), the coefficients are slightly smaller than having a single currency. The coefficients are respectively 0.27, 0.35, and 0.41. Since  $e^{0.27} = 1.30$ , the estimation implies that having a preferential agreement in ECOWAS leads bilateral trade to rise about 30%. However, in COMESA and SADC, the effects of preferential agreement on trade are respectively 42% ( $e^{0.35}-1$ ) and 51% ( $e^{0.41}-1$ ).

#### 4. CONCLUSION AND POLICY IMPLICATIONS

This paper aims to analyze the impact of monetary unions on trade. In particular, the aim is to explore whether the two existing currency unions (the CFA franc Zone in West and Central Africa) have a measurable effect on intra-regional trade. It also compares the impact of regional agreements which are only based on preferential agreements (ECOWAS, COMESA, and SADC). Using OLS and panel techniques on the period 1980-2005, our empirical results strongly support that existing currency unions in CFA zone enhance trade. The results indicate that members of UEMOA traded 2.3 times more among themselves while in CEMAC the value is 1.7. The Rose (2000) effect is more substantial in UEMOA than in CEMAC. When the findings obtained by the CFA zone are compared with regional agreements based only on preferential agreements, we notice that this last delivers a smaller value.

These results are highly interesting and have some policy implications for

the proposed monetary unions in Africa. Of course, the implementation of a monetary union in Europe was preceded by deep structural integration and the creation of a common market. The situation in Africa is different. Given the context of instability of exchange rate and inconvertible currencies in most parts of Africa and the interesting results of CFA zone in terms of creation of trade, we think that a monetary union can precede a common market in Africa. Our results show that the countries which have opted for only preferential agreement in a context of currency instability have not boosted enough trade (example ECOWAS).

The proposition of African Union to implement monetary unions in the principal regional economic communities (RECs) is well founded. Currency union may in itself stimulate an increase in trade. However, to achieve a two-speed regional monetary zone, the non-CFA zone countries would have to harmonize their policies to a level that could sustain a viable monetary zone among them (COMESA, SADC, and ECOWAS).

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## Appendix

### 1. Abbreviations

- CEMAC: Communauté Economique et monétaire en Afrique Centrale. Comprises Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon, and Republic of the Congo. Use the CFA franc issued by their central bank, BEAC
- UEMOA: Union Economique et Monétaire Ouest-Afrique. Members (Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo) use the CFA franc issued by their central bank, BCEAO.
- COMESA: Common Market for Eastern and Southern Africa.
- ECOWAS: Economic Community of West African States.
- SADC: Southern African Development Community.
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## 2. *Countries in sample (35 countries)*

Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Equatorial Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Uganda, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Zambia, Zimbabwe.

### **Résumé**

Cet article tente d'évaluer empiriquement l'impact des unions monétaires existantes en Afrique sur le commerce en prenant appui sur la zone Franc CFA. Il s'intéresse aussi à l'impact des accords régionaux fondés seulement sur le libre-échange (CE-DEAO, COMESA et SADC). A l'aide d'un modèle gravitationnel du commerce et d'une analyse en panel sur un échantillon de 35 pays en Afrique sur la période 1980-2005, on montre que les unions monétaires régionales existantes en Afrique ont renforcé les liens commerciaux entre les pays membres. Les résultats suggèrent aussi que l'effet Rose est plus grand dans la zone UEMOA que dans la CEMAC. Par contre, il semble que les accords régionaux fondés seulement sur le libre-échange n'ont pas amélioré significativement le commerce comparé aux pays dans les unions monétaires. Au total, ces résultats sont très intéressants en termes de recommandations de politiques économiques.