Determinant factors of trade dynamic within the West African Economic and Monetary Union:

A dynamic panel data approach

Presented by

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January 2011

1. Introduction

For the last four decades, international trade is characterized by the proliferation of regional blocks having similar goals. The signing of the Yaoundé Agreement in 1963, later on reinforced by Lomé and Cotonou Agreements of 1975 and 2000 respectively is found within this frame as far as the African-Caribbean and Pacific (ACP) countries are concerned. Though, criticized by advocates of integral free exchange, who consider it to be a form of protectionism, the formation of zones of integration is noting a speedy growth. According to the latter, free exchange, which implies suppression of barriers to exchanges should be translated by best allocation of resources, a reduction of disparities in terms of revenues, in short, a convergence of economies whereby countries with low revenues shall recoup or catch up those with elevated revenues.

Beside the theoretical consideration and the effects of the integral free exchange as extolled by its advocates, African countries, those of WAEMU in particular, shall pay the price for a liberalization refered to as "tout azimuth" by the end of the 1970^s. In effect, after independence, the GDP of the WAMU (West African and Monetary Union) is on a growth of almost 3% per year. The sectorial distribution of the GDP brings to the forefront a 42% of the contribution of agriculture. Unfortunately, the two oil chocks that occurred in the 1970^s dived good number world economies in a serious crisis. The WAEMU countries were not left untouched.

This crisis shall be felt within the union by the drop of prices of primary materials, principal source of revenues from exports and the real appreciation of Francs CFA followed by an increase in the French Franc and the reduction of exchange rate of neighboring countries non

members of the franc zone. The deterioration of the main indicators registered within this era led the countries of WAMU into an acute crisis. The launching of the structural adjustment programs (SAP) as solution to this crisis shall not achieve the expected result.

Worse even, the annual growth rate of the GDP per capita shall even become negative reaching -1.7% in 1989. It is thus in this context of crisis that emerge the urgency for WAMU countries to add an economic dimension to the union by the creation of a free exchange zone. This solution seems optimum for two reasons:

Firstly, the experiences of European integration since the signing of the 1957 Rome treaty brought favorable results. Moreover, the creation of MERCOSUR had a positive impact on the volume exchange of Brazil and Argentina. The assessment of Marcelo and Pablo illustrated that the exchanges of Argentina as well as those of Brazil tripled between 1987 and 1994. The joint market of the south noticed a drop as far as the interior tariffs are concerned. Since 1995, they put in place a free circulation of goods within the union with a common exterior tariff. The latter, according to section XXIV of the GATT (General Agreement on Tariff and Trade), does not going beyond the level of tariffs of member countries before the signing of the treaty, but relatively remains elevated. In these conditions, a wonderful creation of trade took place within the MERCOSUR: the share of the intra-zone within the total exchanges of members states passed from 9% in 1990 to 20% in 1996.

Secondly, it was a real opportunity to be seized by these countries for a better insertion within the world economy whose train is speeding very fast (Ngaresseum, 2003); given that these economies up till this time represented only a tiny part of world exchanges.

The challenge was thus great and strategic in thus that the treaty instituting the launching of WAEMU saw it appearance in January 10, 1994 and whose main goal is the reinforcing of economic integration between member states. But however, since the signing of this treaty and the putting at work of the common exterior tariff on January first 2000, the evolution of intra-WAEMUs trade remained weak. We might think that this weak volume of intra-WAEMUs exchanges is linked to the issue of deadline of the putting at work of these reforms. But however, seven years after the entering into force of the common exterior tariff, this volume of exchange still remains marginal to extent that emerge the question of knowing what are effectively the factors determining the dynamism of trade within the WAEMU?

The global goal of this paper is to identify the factors explaining the dynamism of trade within the WAEMU.

Henceforth, this paper is structured as follows: section 2 presents the literature review relative to this topic, section 3 brings out the model used, section 4 presents the variables used and different sources of the latter. The results of valuation are object of section 5. Lastly, section 6 concludes this paper.

2. Methodology

This work gives privilege to the gravity equation model. The gravity method presents several advantages in the measurement of bilateral trade between partner states on one hand and the determination of factors responsible for the dynamism of trade between states on the otherhand. In effect, this model permits us to evaluate the effects of regional agreement (RA) while precising what could have been the state of bilateral trade in their absence. Moreover, the introduction of silent variable in this model permits us to directly qualify the creation and diversion of traffic thanks to the putting in place of an agreement. Accordingly, it is possible to isolate the non respected characteristics of a couple of studies that can influence bilateral trade (such as the sharing of a common language, historical links, ect). This impact was pastly captured in previous studies (Frankel, 1997), Eichengreen and Bayoumi(1995) or Faroutan an Pritchet (1993), by variables relatives to regional agreements (RA). It can lastly help in evaluating the degree of diversion of exchanges.

2.1 Specification of the model

Several specifications are envisaged to explain the dynamism of trade within the Economic and Monetary Union of West African States. This work gives privilege to the specification put in place by Limao and Venable (2001). Accordingly, the theoretical model can take the following form:

$$X_{ijt} = \delta_0 PIB_{it}^{\delta_1} PIB_{jt}^{\delta_2} POP_{it}^{\delta_3} POP_{jt}^{\delta_4} Dist_{ijt}^{\delta_5} \left[e^{\delta_6 Front_{ij} + \delta_7 Ouv_i + \delta_9 Ouv_j + \mu_{ij} + \varepsilon_{ijt}} \right]$$

Where X_{ijt} measures imports of country i coming from country j on the date t; Pib_{it}, and Pib_{jt} which represents the GDP of country i(respectively j) on the date t; Pop_{it} and Pop_{jt} represent the population of country i(respectively j) on the date t ; $Dist_{ij}$ the distance between countries i and j ; $Front_{ij}$ is an indicating variable which takes the value 1 if countries i and j share the same boundaries and 0 if not; Ouv_i and Ouv_j are two indicating variables taking the value 1 if the sail country is having an opening to the sea and 0 if not ; μ_{ij} is a term of mistake representing the specific bilateral effect and ε_{ijt} is the term of the symmetrical instance. This work further takes into consideration the institutional aspect in the measurement of the dynamism of intra zone trade. It is thus that it introduced variables such as bureaucracy, democracy and corruption but equally the Ivorian crisis which might modify the degree of intensification of intra zone exchanges. Accordingly, the empirical model after making a specification in logarithm is presented as follows:

$$\begin{aligned} LnX_{ijt} =\ & \beta_0 + \beta_1 LnX_{ijt-1} + \beta_2 LnPib_{it} + \beta_3 LnPib_{jt} + \beta_4 LnPop_{it} + \beta_5 LnPop_{it} \\ & + \beta_6 LnDist_{ij} + \beta_7 Front_{ij} + \beta_8 Ouv_i + \beta_9 Ouv_j + \beta_{11} LnBureauc_{it} \\ & + \beta_{12} LnBureauc_{jt} + \beta_{13} LnDemoc_{it} + \beta_{14} LnDemoc_{jt} + \beta_{15} LnCorrupt_{it} \\ & + \beta_{16} LnCorrupt_{jt} + \beta_{17} Uemoa_{2000} + \beta_{18} Crise_{Ivoire} + \mu_{ij} + \varepsilon_{ijt} \end{aligned}$$

In the measure where it might happen that at a given moment the imports of a country is null, a specification in logarithm thus render this observation indefinitive. Some methods can be envisaged in this case in view of resolving this problem. In a first place, if the percentage of appearance of values considered to be null is inferior to 5%, it is thus possible to suppress

them from the base and to procede to a linear regression. On the otherhand, of this percentage superior to 5%, we shall thus resort to a technic of non linear estimation such as the TOBIT which knows the null values of the variable to be explained while normalizing the distribution of mistakes. But however, considering in this work the form of the specified model by Venable, the choice of the latent variable becomes very delicate. To bypass this problem, we transform the data as follows: $X'_{ijt} = |Min(X_{ijt})| + 1$.

Concerning the resolution of the model proper, in reality, a good number of phenomenons are found in dynamic process. It is for this reason however that and to be logical with the dynamic aspect of this work that it was introduced as one of the explaining variables of the delayed endogenous variable.

The first stage in the study of panel data consists to a test of poolability. In otherworlds, it is question of carrying out a test of homogeneity before stating if yes or no, the defined model can be applied to all countries. In effect, the structure of the panel relies on the hypothesis according to which the coefficients of the regression on each individual are all identificial to a given constancy (Hsiao, 1986).

The second stage of this study might have studied the stationnarity of the series and the possibility of a relationship of cointegration between the different variables of the model.

2.2 The robustness of the model

The model as previously specified shall not be estimated throughout the period at once. To verify if the coefficient of the model do not considerably vary from one sub period to another, we decided to implement the previous model for the period 1990-1998. Furthermore, for the period 1999-2006 and we shall proceed by comparing the estimations under these two sub period. The choice of these two sub period is not fortuitous. This choice is done to demonstrate that the coup d'Etat of 1999 in Ivory Coast had a significant impact on the exchanges of the sub region given that this giant is the principal engine of this integration zone. The robustness of the model here shall be measured by making estimation on the two sub periods. In a first place, the basic gravity model, followed by the increased gravity model which shall take into account variables being characteristics to institutional constraints which shall permit to verify whether the signs of the coefficients are modified or whether they have remain constant. As such, under the first sub period, the estimated model is presented thus:

Model 1 :

$$
\begin{aligned}
LnX_{ijt} = {}& \beta_0 + \beta_1 LnX_{ijt-1} + \beta_2 LnPib_{it} + \beta_3 LnPib_{jt} + \beta_4 LnPop_{it} + \beta_5 LnPop_{it} + \beta_6 LnDist_{ij} \\
& + \beta_7 Front_{ij} + \beta_8 Ouv_i + \beta_9 Ouv_j + \beta_{10} Lang_{ij} + \beta_{11} LnBureauc_{it} \\
& + \beta_{12} LnBureauc_{jt} + \beta_{13} LnDemoc_{it} + \beta_{14} LnDemoc_{jt} + \beta_{15} LnCorrupt_{it} \\
& + \beta_{16} LnCorrupt_{jt} + \beta_{17} Uemoa + \mu_{ij} + \varepsilon_{ijt}
\end{aligned}
$$

And under the second sub period, the model is specified thus:

<u>Model 2</u>

$$LnX_{ijt} = \beta_0 + \beta_1 LnX_{ijt-1} + \beta_2 LnPib_{it} + \beta_3 LnPib_{jt} + \beta_4 LnPop_{it} + \beta_5 LnPop_{it} + \beta_6 LnDist_{ij}$$
$$+ \beta_7 Front_{ij} + \beta_8 Ouv_i + \beta_9 Ouv_j + \beta_{10} Lang_{ij} + \beta_{11} LnBureauc_{it}$$
$$+ \beta_{12} LnBureauc_{jt} + \beta_{13} LnDemoc_{it} + \beta_{14} LnDemoc_{jt} + \beta_{15} LnCorrupt_{it}$$
$$+ \beta_{16} LnCorrupt_{jt} + \beta_{17} Uemoa_{2000} + \beta_{18} Crise_{Ivoire} + \beta_{19} Uemoa + \mu_{ij} + \varepsilon_{ijt}$$

Definitely, the test of stability of coefficient shall be done on each sub period that which shall permit to state if yes or no the coefficient obtained from the regression are stable or not.

2.3 Source of data

This work treats a sample of seven countries excluding Bissau Guinea. The choice of countries is principally done on the base of exchanges between member countries of the West African Economic and Monetary Union (WAEMU). In fact, the variable to be explained here being bilateral imports, this study retains countries partners to imports of countries of the zone. The data on bilateral imports is the work of Barbieri, Katherine, Omar Keshk, and Brian Pollins. 2008. Correlates of War Project Trade Data Set Codebook, Version 2.01. Online: **http://www.correlatesofwar.org.** These data are in millions of dollar in current prices. In view of measuring the real evolution of exchanges, we shall to the deflation of this series by using the GDP deflators on the basical constant price 2000 of the export country. The series of deflators had been obtained from the CD-ROM of the World Bank Development Indicator 2007. The data on the GDP and its populations equally comes from the CD-ROM of the World Bank Development Indicator 2007. The information on distances was obtained from the web site: **www.cepii.fr.** Concerning variables of bureaucracy, corruption and democracy, informations are obtained from the website: **http://www.prsgroup.com.**

Analysis of results

From the results of the estimation, the following can be drawn:
Concerning the period 1990-1998, that is, model 1, we notice that most of variables of the basic gravity model bear the awaited sign in the exception of the variable "Front" which measures the volume of exchanges between bordering third party countries and the GDP$_i$ variable. However, the most important here remains the interpretation of coefficients of the increased gravity model which is much more interesting. It is thus that we can note that: just as the basic gravity model, most coefficients keep the same sign with a variable significance. Concerning the delayed endogenous variable, an increase in imports of 1% of a previous year is translated by an increase of 0.592% of imports of the current year; this confirms that the dynamic of the evolution of imports of the sub region WAEMU is found within the dynamic process. This value is not very far from that obtained by Agbodji whose findings results to about 0.4%. Concerning the variable "Pop" relative to size of the sub regional market, this model shows that the latter instead positively influence bilateral exchanges between these countries within this sub period. In the meantime, the reinforcing of growth at the level of the importing state is expressed by a show down in its imports. A significant result is the influence of transport costs which is measured by the variable of distance. It is well-known that an increase of transport costs by 1% expresses a drop in intra community imports between partners in order of almost 0.281% during the period that which seem much for a sub region which claims to be the model of

integration in sub Saharan Africa. Another remark is that compared to countries not having an opening to the sea, those opened to the sea expert almost more than 2.21 times ie (exp(0.794)). On the contrary, the creation of the WAEMU hasn't got an effect on the volume of exchanges that which can be explained by the existence of distortions which obstructs the smooth functioning of the market. Lastly, an amelioration of democracy of 1% is expressed by an increase in exports towards the partner countries of almost 0.34%.

Concerning the sub period 1999-2006, the results of the basic gravity model illustrate that most variables have the awaited sign save for the variable "front" which is however not significant. As far as the increased gravity model is concerned, we notice that under this sub period, the coefficient of the delayed endogenous variable keeps the same sign like in the first sub period with however a slight increase. Accordingly, an increase of imports of country i during the previous period of 1% is translated by an increase of current imports in an order of 0.635%. What changes in this second model is the sign of the variable "$lpop_i$" which leaves from positive to negative while remaining significant. We can thus say that compared to the first period, an increase in the population of the importing country by 1% is translated by a drop in its imports in an order of 1.78%. Moreover, the growth of these countries had a significant effect on the dynamism of their exchanges. It is thus that concerning the importing country, an increase of its growth by one percent is translated by 1.157% and as far as the exporting country is concerned, an increase in its growth by 1% is translated by an increase in its exports in order of 0.1%. Another important result equally is the non significativity of the variable "Front", that which implies that the fact of sharing a joint boundary has no effect on the volume of exchanges between border countries. We can thus confronted to all these ask the question of knowing if Ivory Coast and Burkina Fasso can really carry out exchanges if they produce closely similar products? The model also shows that transport costs had by quiet important under this sub period just like in the first. Concerning the Ivorian crisis, the results shows that the latter had not reduced in a significant manner the volume of bilateral exchanges within the WAEMU. Moreso, the put at work of the common exterior tariff (CET) since 2000 had not increase in a significant manner the volume of exchanges between these countries (see table 5 below).

Table 1 : Results of estimations

	Model 1		Model 2	
	Basical gravity model	Augmented gravity model	Basical gravity model	Augmented gravity model
limportijt-1	0.602	0.592	0.476	0.635
	(9.37)***	(10.35)***	(4.66)***	(9.50)***
lpopi	0.660	1.010	-0.901	-1.780
	(1.64)	(2.43)**	(0.66)	(2.92)***
lpopj	0.969	0.943	0.845	0.290
	(5.51)***	(4.78)***	(3.00)***	(1.72)*
lpibi	-0.314	-0.455	0.531	1.157
	(1.46)	(2.12)**	(0.68)	(3.33)***
lpibj	0.051	0.055	0.063	0.100
	(3.13)***	(3.20)***	(0.64)	(2.12)**
Ldistij	-0.212	-0.281	-0.496	-0.278
	(2.05)**	(3.16)***	(1.22)	(1.72)*
Frontij	-0.063	0.114	-0.758	0.035
	(0.47)	(0.90)	(1.53)	(0.11)
ouvj	0.803	0.794	1.407	0.861
	(6.38)***	(6.33)***	(3.37)***	(4.47)***
ouvi	0.106	0.332	-1.069	-1.102
	(0.47)	(1.48)	(1.36)	(3.54)***

Uemoa	0.061	0.117		
	(0.93)	(1.77)*		
ldemogi		0.120		0.322
		(0.88)		(0.85)
ldemogj		0.374		-0.644
		(3.12)***		(1.88)*
lbureauci		-0.036		-0.383
		(0.29)		(1.79)*
lbureaucj		0.037		0.322
		(0.37)		(1.40)
lcorrupti		-0.008		-0.393
		(0.12)		(1.35)
lcorruptj		-0.013		0.190
				(0.93)
crise_ivoire				0.080
				(1.00)
uemoa2000				-3.116
				(1.66)
Observations	336	336	294	294
Number of individus	42	42	42	42

Source: authors. Robust t statistics in parentheses
 * Significant at 10%; ** significant at 5%; *** significant at 1%

6. Conclusion

Definitely, the goal of this work was to identify the factors determining the dynamism of regional trade within the WAEMU. Accordingly, concluding this work, we can say that these determining factors are of several orders. In effect, the results of this work raise the issue of an influence of transport costs on the volume of bilateral trade. Factors linked to geographical proximity, notably nearness to the sea, is an advantage in the measure where compared to countries which are not, those having a corridor to the sea import three times more. In the meantime, political instabilities crystallized here by the Ivorian crisis had not gotten a significant effect on the dynamism of trade between these countries. Concerning variables link to the quality of institutions, it should however be retained that a redefinition of democracy, bureaucracy and the fight against corruption shall be beneficial to these countries despite the fact that its influence is tiny for their impact on trade is indirect thus leading to other variables to be identified.
The creation of the West African Economic and Monetary Union though expresses an increase in bilateral exchanges had not lead to a fall in exports of countries of the union towards partners outside the zone. On the contrary, these countries have continued maintaining good commercial links with partners outside the zone notably the European Union, Asia and Nigeria. Is this extra community dependence not correlative to the production structure of these countries? Is the time not ripe for countries of the sub region to envisage a real mutation or transformation of their industrial tissue?

Reference
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