The Impact of Subregional Integration on Bilateral Trade: The Case of UEMOA

By

Akoété Ega Agbodji
Faculté des Sciences Economiques et de Gestion
University of Lomé, Togo

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Abstract

The aim of this study was to evaluate the impact of preferential trade agreements and the monetary union on bilateral trade between UEMOA member countries. With the use of a dynamic gravity model, it was possible to realize that membership in a common monetary zone and the implementation of common economic reforms had a significant effect on bilateral trade within the zone, although more in terms of diverting imports and exports than in terms of creating trade. Furthermore, economic policy distortions that foster informal transborder trade had a negative effect on trade within the region.

Acknowledgements

1. Background

The dynamics of international economic relations and the complementary nature of development activities at the international level, coupled with scarce resources on a worldwide scale, forced a large number of developing countries to look for ways and means of participating more effectively in the world economy. One way was to set up economic and monetary free-trade areas. The ultimate goal in creating such unions was to form regional and subregional blocs in order to better integrate into the world economy given the small size of their national economies. This explains why many regional groupings came into existence under various forms: economic, monetary and customs unions. One can mention, for the case of West Africa, the experiences of the West African Monetary Union (Union Monétaire Ouest Africaine – UMOA; established in 1963), Economic Community of West Africa (Communauté Économique de l'Afrique de l'Ouest – CEAO; 1973), Economic Community of West African States (ECOWAS, or Communauté Économique des États de l'Afrique de l'Ouest – CEEAO; 1975), and West African Economic and Monetary Union (Union Économique et Monétaire de l'Afrique de l'Ouest – UEMOA; 1994).[1] The economic justification for the creation of these subregional and regional unions was that the elimination of national trade barriers would increase intra-regional trade and, moreover, that the adoption of common economic policies and ultimately a customs union could be a catalyst for the expansion of trade within the union and with countries outside the union.

When UMOA specifically was created, it was assigned the mission of contributing to a rapid and harmonized growth of the economies of its member states on the basis of a common monetary policy and the principle of currency convertibility at a known and fixed parity. These provisions did not lead to a significant increase in trade between the member countries, which have suffered serious economic crises since the late 1970s. The disastrous consequences of these crises, notably macroeconomic imbalances, prompted agreements with the Bretton Woods institutions to implement structural adjustment measures in which each member state of the Union undertook a progressive trade liberalization process. The main reason for this was that the economic and financial difficulties the countries had been experiencing were caused by the protectionist policies they were following. The main objective of trade liberalization is to improve economic efficiency by creating a transparent and neutral incentive system that eliminates anti-export bias, direct obstacles to trade and economic distortions caused by the trading system (Oyejide et al., 1997). Thus, the unilateral trade liberalization reforms mainly involved dismantling import and export monopolies enjoyed by state companies, abolishing prohibitions and non-tariff barriers, rationalizing custom tariffs, and liberalizing commodity prices.

Faced with the low level of bilateral trade and persistent economic difficulties in the Union at the beginning of the 1990s, in a context of re-emerging trade and economic blocs, the member states decided to take the next step towards economic integration by replacing UMOA with the West African Economic and Monetary Union (UEMOA) in January 1994. In other words, UEMOA, whose objective is to consolidate the monetary Union and to relaunch the process of the subregion's economic integration, tends to reinforce the competitiveness of the economic and financial activities in the member states within the framework of an open and competitive market and a rationalized and harmonized legal environment. Among other things, the fiscal and customs reforms undertaken by UEMOA countries aimed to streamline customs taxes with a single import duty on the cost-insurance-freight (c.i.f.) value, and to introduce a preferential intra-regional customs tariff called the generalized preferential tariff for locally produced commodities. This tariff would be applied for all trade in products that were manufactured in the region and labelled as "products of controlled origin". The progressive implementation of the community tariff reforms began on 1 July 1996. For the first year (until 30 June 1997), all member states applied a 30% reduction in import duties on approved manufactured products. This reduction was raised to 60% between July 1997 and January 1999 and then to 80% between January 1999 and January 2000. Tariff dismantling became complete and effective for all approved products as of 1 January 2000 with the coming into force of the common external tariff (CET), which was set up to regulate the Union members' foreign trade.

The research problem

According to Oyejide et al. (1996) and Oyejide (1998), trade liberalization episodes in a number of sub-Saharan African (SSA) countries were characterized by several types of stimulus that could be classified as unilateral and multilateral mechanisms. The least significant stimulus for this trade liberalization in many SSA countries was their joining a regional integration framework. That said, all these unilateral and community provisions, which turn out to be complementary (Collier and Gunning, 1993), are likely to foster intra-regional trade. In a world where there are many regional trade agreements, it is difficult to characterize them as "exceptions". Given current developments, it has become more and more important to understand not only the rationale behind these arrangements but also their effects, particularly on member countries.[2]

In the light of studies carried out on the subregional integration undertaken by developing countries, it transpires that many integration schemes have not yet achieved their objectives and that significant economic advantages have seldom been those concerned with export diversification, increase in international competitiveness, efficient resource allocation of means, or significant stimulation of production and investment in the region (Yeats, 1999; Foroutan, 1993; Nogues and Quintanilla, 1993; Lyakurwa et al., 1997; Oyejide and Njinkeu, 2003). For the specific case of SSA countries, recent empirical studies suggest that the establishment of preferential trade systems between countries had no impact on trade creation on the subcontinent (Ariyo and Raheem, 1991; de Melo et al., 1992). Foroutan and Pritchett (1993) show that the level of intra-SSA trade is not as low as revealed by these studies, but is higher than anticipated.

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And what about UEMOA? It can be observed from Table 1 that in the UEMOA zone, intra-regional exports not only reached comparatively non-negligible levels (14.3% in 2001 against 9.6% in 1980), but also that they have been on an upward trend since 1995, as opposed to the downward trend that can be observed for the ECOWAS zone. This improvement can be attributed to the formation of an economic union in 1994 alongside the monetary union created in 1963. It thus can be observed that the implementation of economic reforms within the UEMOA framework has given bilateral trade inside the zone a bit of a boost. This means that the effect of trade creation and diversion of exports and imports has been more significant than during the period of monetary union.

Table 1: Evolution of intra-regional exports as a percentage of total exports

	1980	1985	1995	1997	1998	1999	2000	2001
UEMOA	9.6	8.7	10.3	11.8	11.0	13.1	13.1	14.3
ECOWAS	10.1	5.2	9.0	8.6	10.7	10.4	9.5	9.6

Sources: World Bank's World Development Indicators (2004); UEMOA Commission (2000).

The aim of this study, therefore, is to isolate the impact of both the monetary and the economic unions on bilateral trade in the UEMOA zone. This was all the more necessary since, as has been well known since Viner's (1950) original work, trade creation brings about wellbeing while trade diversion reduces it. Besides, trade creation and trade diversion have different implications in terms of wellbeing and development depending on whether they are brought about by a monetary union or by preferential agreements in the framework of a free trade zone. Following studies such as Krugman (1993) and Krugman and Venables (1996), among others, it is accepted that a common currency eliminates obstacles to trade and encourages economies of scale. Indeed, monetary union reinforces trade among member countries because of the resulting low costs of transactions. Similarly, preferential agreements promote trade given the reduction in tariff and non-tariff barriers. However, diverting trade as a result of monetary union does not bring about as much wellbeing as preferential trade agreements. Since Viner's (1950) work, one of the key questions about preferential trade agreements has been to know whether the benefits of creating trade exceed the cost of diverting trade.

Since 1994, the West African countries belonging to the Franc Zone – which already had a common currency and a common monetary policy – have had the distinctive feature of belonging to two forms of groupings: one monetary and one economic. Ten years after the implementation of preferential agreements within the monetary zone that had been previously established, and knowing the respective impact of either union on the trade between member countries, there is a good reason to question the additional impact of economic integration on bilateral trade within UEMOA. In other words:

• Has there been a stronger trade creation between the UEMOA countries since the economic union?

• Has the diversion of trade been more visible on the import side than on the export side since the economic union was set up?

Research objectives and hypotheses

In general, the objective of this study is to capture the respective impact of the monetary union and the economic union in the UEMOA countries on the trade flows of the member states. The specific objectives are:

• To model and estimate the economic and institutional determinants of internal trade flows between the countries.

• To establish whether there are effects of trade creation and diversion of imports and exports in accordance with the institutional evolution the zone has experienced.

There are two research hypotheses for this study:

• **H1**: The indicators of economic policies have a more significant effect on intra-regional trade during preferential reforms carried out as part of economic integration than during unilateral reforms implemented within the framework of structural adjustment programmes (SAPs).

• **H2**: The intra-regional trade has been stronger within the framework of the economic and monetary union than within that of the monetary union.

2. Economic integration and its expected impact

After three decades of monetary integration in the West African zone, the UMOA countries decided to reinforce their association through economic integration in 1994. The creation of UEMOA in January of that year meant the unification of the national economies of UMOA members primarily to reinforce their economic and financial competitiveness within the framework of an open and competitive market.

Mechanisms for economic integration

In coming together as an economic union, UEMOA essentially created a common market. This market rests on the abolition of tariff and non-tariff barriers in the trade between member states and the establishment of the CET.

These objectives were achieved progressively. The first stage, from July 1996, consisted basically of the total tariff dismantling for all local products and traditional handicraft products, as well as other agreed products. Since 2000, the CET has extended to member countries' foreign trade. The CET has several components: a customs duty applicable in four rates according to the category of the product; a statistical fee of 1% levied on all products except on those enjoying diplomatic privileges and those imported using external funding; a community solidarity levy (PCS) of 1%; and the regressive protection tax. The adoption of the CET led to a generalized reduction in customs duties on all products irrespective of their origin, a streamlining of tariff systems and the opening up of the Union to the rest of the world.

The mechanism for setting the CET rests on the following: categorization, permanent duties and taxes, and temporary duties and taxes. The rates of permanent duties and taxes by category that have been in force since 1 January 2000 are given in Table 2. In total, products are classified in four categories:
- Category 0: Basic convenience goods from a closed list.
- Category 1: Basic necessities, basic raw materials, capital goods, specific inputs.
- Category 2: Intermediate inputs and products.
- Category 3: End consumption goods and all products not mentioned elsewhere.

In order to promote goods produced in the Union and at the same time make them more competitive, several instruments were put in place. Among these are the following:
- The regressive protection tax, which was instituted by Regulation No. 03/99 of 29 March 1999 to temporarily compensate for an important fall in tariff protection related to the introduction of the CET.

Table 2: Rates of permanent duties and taxes

Category	Customs duties	Statistical fee	Community solidarity levy
0	0%	1%	1%
1	5%	1%	1%
2	10%	1%	1%
3	20%	1%	1%

Source: UEMOA.

- The import economic circumstances related tax (TCI), which was instituted by Regulation No. 06/99 of 17 September 1999 to protect the products produced in the Union from the instability of international prices for certain products and against unfair trade practices.
- The additional protocol No. III/2001 instituting the rules of origin.

Expected effects of economic integration mechanisms

Adoption of the CET and the additional protocol instituting the rules of origin was expected to result in a decrease in imports from outside the Union and an increase in intra-union imports. Indeed, at an equal price, economic operators from member countries of the Union increased the volume of supplies from the market in the Union countries. The anticipated effect of levying a customs duty on imports from the rest of the world while at the same time allowing duty-free imports from Union members was not only trade creation but also diversion of trade to the advantage of member countries. Similarly, the rules of origin were instituted to ensure free movement of goods within the Union through the elimination of customs duties and taxes likely to have an effect on transactions. The application of the protocol on free movement of goods inside the Union was also expected to reduce smuggling since it would be possible to make a significant part of the traffic of imports official.

In practice, the application of the CET led to a tariff strengthening for certain countries (Togo, Benin) and a tariff dismantling for others (like Senegal). For the Union as a whole, however, it led to a reduction in the average non-weighted tariff, which fell from 19% in 1997 to 12% in 2000 (van den Boogaerde and Tsangarides, 2005).

On the whole, then, the application of the CET and the additional protocol instituting the rules of origin is not satisfactory. Indeed, when the CET is applied, the tariffs of certain countries always have lines other than those of the CET. Furthermore, it has also been observed that obstacles to tariffs persist, such as certain taxes levied only on products imported from Union members, while counterpart products manufactured locally are exempt from taxation. Besides, the free movement of goods and people is not always a reality. The current state of affairs is that the objective of free movement of goods within the Union has not yet been achieved, notably because of the persistence of recurrent problems such as the levying of illicit taxes on trade corridors, the multiplication of roadblocks and the use of excessive controls. Similarly, it has been observed that non-tariff hindrances persist in the form of technical norms instituted to prevent the import of products from the Union, as well as a requirement to tax authorized local manufactured products even when these are accompanied by genuine certificates of origin.

3. A brief review of the literature

Bilateral trade between countries in sub-Saharan Africa (SSA) and the countries' efforts towards regional integration have for a long time attracted the interest of researchers. From a simple analytical framework, some of this research has borne on the impact of non registered trade between neighbouring countries on regional integration in SSA (for example, Barad, 1990). Other studies have looked into trade between neighbouring countries having different exchange rate systems (Azam, 1990). Relatively few studies applied a gravity model to identify the main determinants of bilateral trade between SSA countries. Generally mentioned among such studies are Foroutan and Pritchett (1993), Elbadawi (1997), Ogunkola (1998), Longo and Sekkat (2004), Carrère (2004), and Musila (2005).

The gravity model: Genesis and scope

Viner (1950) demonstrated the existence of the effects of trade creation and diversion inside customs unions and concluded that such regional trade arrangements do not necessarily lead to a net benefit.

Tinbergen (1962) was then the first researcher to draw inspiration from the gravity model to analyse bilateral trade flows. The specification of Tinbergen's model is the following:

$$A_{ij} = a^0 . Y_i^{a^1} . Y_j^{a^2} / d_{ij}^{a^3} \tag{1}$$

where a^0, a^1, a^2 and a^3 are partial elasticities. This equation says that trade in product A between two countries i and j (A_{ij}) depends at the same time on the GDP of the exporting country (Y_i), the GDP of the importing country (Y_j) and the distance between the two countries.

Since Tinbergen (1962), the gravity model has become a popular instrument for empirical analysis of foreign trade. According to Martinez-Zarzoso and Nowak-Lehmann (2003), however, the theoretical research foundation of this model was originally weak and it was not until the middle of the 1970s that numerous developments emerged in the theoretical foundation of the gravity model. The first attempt at such an explanation was by Anderson (1979), who derived the equation of the gravity model that assumes the differentiation of products. Other studies both strengthened and extended the theoretical framework. Chief among these were Bergstrand (1985, 1989), Helpman (1987), Oguledo and MacPhee (1994), Deardorff (1995), Hummels and Levinsohn (1995), Anderson and

Van Wincoop (2001), and Evenett and Keller (2002). What these authors did was to take into account the two main determinants that characterize models of the new theory of trade: economies of scale combined with the distinction of products, and transport costs.

Various other studies also contributed to the refinement of the gravity model, taking into account other explanatory variables. Early among these works was Linneman (1966), which expanded the gravity model by including the population variable to capture economies of scale and used the gross national product as an explanatory variable for the propensity to import. Aitken (1973) introduced a dummy variable to measure the effects of trade creation and diversion. Similarly, Geraci and Prewo (1977) used distance as a proxy for the total cost of transactions, while Wang and Winters (1991) included in the gravity model the dummy variables that characterize the cultural aspects of partner countries.

Other authors, like Bergstrand (1985), Bayoumi and Eichengreen (1997), Wei (1996), Frankel (1997), Bougheas et al. (1999), Limao and Venables (2001), and Soloaga and Winters (2001), also contributed to improving the gravity model by introducing new explanatory variables such as stock of public physical capital and density of infrastructure, and dummy variables to capture the effects of trade creation or trade diversion.

Empirical studies related to bilateral trade analysis in SSA

A comparatively small number of studies used the gravity model to explore empirically the determinants of intra-regional trade among countries in SSA, on the one hand, and between the countries of regional groupings, on the other hand. On the whole, these studies yielded mixed results concerning the impact of regional groupings on bilateral trade in member countries. Indeed, while some studies revealed that regional agreements produced significant positive effects on bilateral trade, others found non-significant effects.

Among the studies concluding that bilateral trade is positively influenced by regional groupings is Foroutan and Pritchett (1993). These authors were the first to use an augmented version of the model for SSA countries to quantify the level of potential intra-SSA trade and to compare it with the current level. The results of their study confirm that in general, the observed (current) intra-SSA trade is somewhat weaker than expected. Indeed, a look at the imports of the 19 countries studied showed an average of 3.5% for current imports from African countries against an expected average of 3.6%. In the case of exports, for 11 out of 19 countries the observed average share turned out to be bigger than envisaged: 4.6% against an expected 2.7%.

Similarly, considering the period 1962–1996 within the framework of an augmented gravity model, Carrère (2004) used the Hausman–Taylor (1981) approach and showed that African regional trade agreements generated a significant trade growth between member countries. For the particular case of the Franc Zone, the study revealed that monetary unions (UEMOA and CEMAC) have largely reinforced the positive effect of the preferential trade agreements on intra-regional trade. Musila (2005) used the gravity model to estimate the intensity of trade creation or trade diversion in COMESA, CEEAC and ECOWAS. Using annual data for the years 1991 to 1998, this study found that the

intensity of trade creation or trade diversion varied from region to region and from period to period. Indeed, empirical results showed that the intensity of trade creation was the strongest in ECOWAS countries, followed by those in the COMESA area. The effect of trade creation in the CEEAC area was not empirically corroborated. The estimated results also suggest that the effects of trade diversion were weak in the three regional organizations.

Among studies whose results indicated non-significant effects of regional preferential agreements on intra-regional trade are Elbadawi (1997), Ogunkola (1998), Longo and Sekkat (2004), and Avom (2005). For example, from a sample of 28 countries in SSA and 62 other countries as their trade partners over two subperiods (1980–1984 and 1986–1990), Elbadawi (1997) observed that the experiences of regional integration in SSA had been a failure just like those of other developing regions (notably Latin America). He also concluded that the two monetary unions, CEAO and UDEAC, and especially CEAO, experienced extremes of performance given that the effects of the trade integration scheme on intra- and inter-regional trade were positive during the first subperiod but negative during the second. In the case of ECOWAS, Ogunkola (1998) carried out a comparative analysis of the determinants of subregional trade by considering a pre-integration period (1970–1972) and a post-integration period (1978–1980). It transpires from the study's estimation results that the intra-ECOWAS trade remained very weak in spite of the integration efforts in the subregion during the two periods considered. Similar results were obtained by Longo and Sekkat (2004), who revealed that the different integration schemes did not produce effects of trade creation or trade diversion and therefore were not able to lead to a growth in intra-African trade. Finally, Avom (2005) found that the impact of monetary union on trade inside CEMAC was not significant.

It transpires from the literature review that at the current stage of research analysing the effects of bilateral trade exchanges in the UEMOA subregion, very few studies carried out specifically on the UEMOA zone sought to isolate the respective impact of the use of a common currency and of the implementation of preferential agreements on bilateral trade in member countries. This study attempts to fill that gap.

4. Methodology

Recent studies using panel data have aimed at improving the performance of the estimation of the gravity equation. Among these studies are Mátyás (1997, 1998), Breuss and Egger (1999), Egger (2000, 2002), Egger and Pfaffermayr (2003), and Baltagi et al. (2003). These authors pointed out the different types of bias in the coefficients estimated using the traditional methods of estimation, notably the ordinary least squares method. This bias arises from not taking into account specificities of the countries considered and from the possible endogeneity of some regressors. That is why the new estimation techniques apply panel data in consideration of trade as a dynamic process; the dynamic panel estimator generally used is that proposed by Arellano and Bond (1991).

The theoretical model of the gravity equation

A theoretical basis recently developed by Baier and Bergstrand (2002) underlies the gravity model. The analytical framework rests on the maximization of benefits made by trade companies in monopolistic competition and of utility by the consumers in reference to the Dixit–Stiglitz preferences.

According to Carrère (2006), Baier and Bergstrand (2002) start from a model where the trade companies of country j sell their products on the market of country i at the price of $p_{ij} = p_j \, q_{ij}$; they obtain the following balanced trade flow for every product produced by the trade company in country j selling on market i:

$$M_{ij} = \left[\frac{\gamma}{\varphi(1-\sigma)} \right] \frac{Y_j}{P_j} Y_i \left[\frac{P_j \theta_{ij}}{p_j} \right]^{1-\sigma} \left[s_j (1+t_i)(1+t_{ij})^{-\sigma} \right] \tag{2}$$

where:

M_{ij} is the cost-insurance-freight value of the flow of goods imported by country i from country j.

σ is the substitution elasticity between goods (Dixit–Stiglitz).

φ is the fixed cost that each firm faces.

$Y_{i(j)}$ is the GDP of country $i(j)$.

P_j is the level of the price in country j of the representative product.

P_{ij} is the price of the product from country j in country i.

θ_{ij} is a function of the barriers at the border between i and j.
P_i is a measure of how far country i is, such that:

$$P_i = \left[\sum_{k=1}^{N} n_k \left[p_k \theta_{ik} \left(1 + t_{ik} \right) \right]^{1-\sigma} \right]^{1/1-\sigma} \tag{3}$$

where n_j is the number of the varieties of goods manufactured in country j, t_{ij} is the ad valorem tariff rate imposed by country i on the good produced in country j, s_j is the share of goods in the national product of country j, and t_i is the share of the tariff revenue in the total revenue.

Equation 2 is accepted as the theoretical foundation of the gravity equation in relation to transport costs and tariffs. As Anderson and Van Wincoop (2003) show, the solution to equations 2 and 3, assuming that $t_{ij} = t_{ji}$ and $\theta_{ij} = \theta_{ji}$, is:

$$P_j^* = \left(\frac{s_j Y_j}{n_j Y_w} \right)^{1/1-\sigma} P_j^{-1} \tag{4}$$

By substituting P^*_j in Equation 2 and assuming that $t_i = 0$ (since for most countries the tariff revenue is a trivial share of the GDP), we have:

$$M_{ij} = \left[\frac{\gamma}{\varphi(1-\sigma)} \right] \frac{1}{Y_w} s_j Y_i Y_j \theta_{ij}^{1-\sigma} \left(1 + t_{ij} \right)^{-\sigma} \left[P_i P_j \right]^{\sigma-1} \tag{5}$$

where Y_w is the world goods product.

Equation 5 is close to the gravity model found in empirical literature. The equation suggests that the specification proper would include:

- The logarithm of the product of the GDP of countries i and j;
- The per capita GDP as a proxy for the capital endowment ratio; this determines the endogenous share of the national product (i.e., s_j);
- A proxy for the term $\theta_{ij\dagger}$; and
- The product of the term of multilateral resistance between two countries.

Following Limao and Venables (2001), θ_{ij} can be modelled as follows:

$$\theta_{ij} = \left(D_{ij} \right)^{\delta_1} \left(I_i \right)^{\delta_2} \left(I_j \right)^{\delta_3} \left[e^{\delta_4 L_{ij} + \delta_5 E_i + \delta_6 E_j} \right] \tag{6}$$

where D_{ij} is the distance between the two countries i and j; $L_{ij} = 1$ if countries i and j border each other and 0 if they do not; $E_{i(j)} = 1$ if the country i (j) is an island and 0 if not; and $I_{i(j)}$ is the state of the infrastructure of country i (j). Regarding the modelling of $[P_i P_j]$, Rose and Van Wincoop (2001) and Feenstra (2003) suggested using terms related to the fixed effects of countries as a proxy.

The gravity model can be used for an evaluation of the actual impact of regional agreements on bilateral trade. After all, the gravity model entails a "normal" level of bilateral trade and, by introducing dummy variables related to regional agreements, captures the "atypical" levels of trade resulting from regional agreements. Therefore, to isolate the effects of trade creation and diversion of exports and imports, Soloaga and Winters (2001) introduced three dummy variables. These are: $D_{TC} = 1$ if both partners belong to the same integration zone and 0 if they do not (thus capturing intra-bloc trade); $D_M = 1$ if the importer is a member of the zone and the exporter of the rest of the world and 0 if otherwise (thus capturing the bloc's imports from the rest of the world); and $D_X = 1$ if exporter j belongs to the zone and importer i to the rest of the world (thus capturing the bloc's exports to the rest of the world).

From the foregoing, then, a reduced form of the gravity equation is expressed in its logarithmic form as:

$$\ln M_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln N_i + \beta_4 \ln N_j + \beta_5 \ln D_{ij} + \beta_6 \ln L_{ij} + \beta_7 \ln E_i$$

$$+ \beta_8 \ln E_j + \beta_9 \ln I_i + \beta_{10} \ln I_j + \beta_{11} D_{TC} + \beta_{12} D_M + \beta_{13} D_X + u_{ij} + v_{ij} \qquad (7)$$

where $[\gamma/\varphi(1-\sigma)]1/Y_w$ is contained in the constant term, μ_{ij} is the error term that is representative of the specific bilateral effect, and v_{ij} is the habitual symmetrical error term. The expected signs are:

$\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 = (1-\sigma)\delta_1 < 0$, $\beta_6 = (1-\sigma)\delta_4 > 0$, $\beta_7 = (1-\sigma)\delta_5 < 0$, $\beta_8 = (1-\sigma)\delta_6 < 0$, $\beta_9 = (1-\sigma)\delta_2 > 0$, $\beta_{10} = (1-\sigma)\delta_3 > 0$, $\beta_{11} > 0$, $\beta_{12} > 0$ or < 0, and $\beta_{13} > 0$ or < 0.

The empirical model

From the theoretical model developed above, the empirical model is the gravity model augmented by adding to the standard model other variables relating to factors of resistance or promotion of trade such as the nominal bilateral exchange rate. Moreover, following Bayoumi and Eichengreen (1997), Frankel (1997), and Soloaga and Winters (2001), the model used here adds a number of dummy variables to explore the effect of regional agreements on trade creation and diversion of imports and exports within the UEMOA zone and two other integration zones (ECOWAS and Association of South East Asian Nations (ASEAN), for the purposes of comparison). The dummy variables relating to regional agreements are:

*   *UEMOA1, ECOWAS1* and *ASEAN1* are equal to 1 if both countries are members of UEMOA, ECOWAS or ASEAN, respectively, and equal to 0 if they are not.
*   *UEMOA2, ECOWAS2* and *ASEAN2* are equal to 1 if the importing country is a member of UEMOA, ECOWAS or ASEAN, respectively, and the exporting country is from the rest of the world, and equal to 0 if otherwise;
*   *UEMOA3, ECOWAS3* and *ASEAN3* are equal to 1 if the exporting country is a member of UEMOA, ECOWAS or ASEAN, respectively, and the importing country is from the rest of the world, and equal to 0 if otherwise.

Moreover, one must acknowledge that given its importance, unrecorded trade in SSA countries is a particular challenge in estimating the potential trade to be compared with

current trade. Indeed, while the volume of official inter-African trade between SSA countries represented only 6% of the total trade in the region in the 1980s (Banque mondiale [World Bank], 1989: 188–9), it is estimated that unofficial inter-African trade represented 30–50% of the sale of agricultural export produce in some countries and millions of dollars of annual trade in food crops, minerals and consumer goods (Amselle and Grégoire, 1988; Chazan, 1988; Green, 1981, 1989). Meagher (2003) demonstrates that unregistered trade is trade organized in networks of illegal exports that enable those involved to obtain foreign currency to import other goods illegally (May, 1985; Singh, 1986; Azam and Besley, 1989). This type of trade essentially involves smuggling activities revolving around the arbitrage of the prices of primary export products, or of goods imported from the rest of the world, between countries whose macroeconomic policies are divergent. This is the case of the UEMOA countries, for example, since they border countries that are not members of the Franc Zone. While the members benefit from the convertibility of their currency in their trade relations with non-UEMOA countries, the non members respond to the problems of the balance of payments through quantitative restrictions and exchange rate controls in order to limit their imports (Azam, 1991). Such restrictions often lead to thriving parallel markets, which have been found to help to improve the supply of goods to the populations (Azam and Besley, 1989).

Thus, in order to take into account the unofficial and unrecorded trade in the model, proxy variables have been identified that can explain the existence and the extent of the informal border trade phenomenon. Indeed, according to economic literature,[3] one can identify four main factors that may be the cause of informal border trade (Pohit and Taneja, 2003). These are: the high rate of customs duties and non-tariff barriers; distortions arising from domestic economic policies; the inefficiency of public institutions, notably the customs department; and the existence of efficient frameworks that support informal trade as well as historical and ethnic[4] links that constitute a kind of payment guarantee for the players in the sector. For reasons of data availability, two variables are separately considered in the model as being capable of capturing the effect of informal cross-border trade on bilateral transactions. The two variables are: exchange rate premium and tax pressure. Historical and cultural links are considered here as specific bilateral effects included in the composite error term.

With that, the expression of the gravity model to estimate is the following:

$$Ln\ M = \beta_0 + \beta_1\ ln\ PIB_{it} + \beta_2\ ln\ PIB_{jt} + \beta_3\ ln\ POP_{it} + \beta_4\ ln\ POP_{jt} + \beta_5\ ln\ D_{ijt}$$

$$+ \beta_6\ ln\ L_{ij} + \beta_7\ ln\ E_i + \beta_8\ ln\ E_j + \beta_9\ ln\ I_{it} + \beta_{10}\ ln\ I_{jt} + \beta_{11}\ ln\ TCR_{ijt}$$

$$+ \beta_{12}\ ln\ CINF_{it} + \beta_{13}\ UEMOA_1 + \beta_{14}\ UEMOA_2 + \beta_{15}\ UEMOA_3$$

$$+ \beta_{16}\ ECOWAS_1 + \beta_{17}\ ECOWAS_2 + \beta_{18}\ ECOWAS_3 + \beta_{19}\ ASEAN_1$$

$$+ \beta_{20}\ ASEAN_2 + \beta_{21}\ ASEAN_3 + \mu_{ij} + \nu_{ij} \qquad (8)$$

where:
- M_{ijt} indicates the amount of imports of country *i* from country *j*. Although Elbadawi (1995) points out that in principle bilateral trade flows (exports or imports) would be

influenced by the same factors, in this study imports are chosen rather than exports. The choice can basically be explained by the fact that imports are better measured in the country of arrival because countries tend to monitor their imports more than their exports given that taxes are levied on the imports. Since the gravity model refers to the trade volume, the study deflates the value of the current imports measured in US dollars by using the US Consumer Price Index (CPI).

- GDP_i and GDP_j represent the GDP in constant values (US dollar) of country i and country j, respectively. Given that the GDP is a variable that is indicative of the size of the economy, one expects $\beta_1 > 0$ and $\beta_2 > 0$ to confirm that the bigger the economy, the more significant trade becomes.

- POP_i and POP_j are the size of the population of countries i and j, respectively. The impact of the size of the population on bilateral trade can be positive or negative depending on whether the absorption effect is bigger than the economies of scale effect, which is equally related to the population. On the one hand, a big population can be synonymous with a big domestic market and a significant endowment in resources so that the high-absorption effect leads to less dependence on international trade; in this case, a negative coefficient would be expected. A large domestic market, in contrast, enables the gains of economies of scale to be fully realized, especially in terms of trade opportunities with foreign partners covering a variety of goods; this would justify a positive coefficient. The assumption then is that $\beta_3 > 0$ or < 0 and $\beta_4 > 0$ or < 0.

- D_{ij} measures geographical distance between country i and country j. The greater the distance between the two countries, the more transport costs tend to rise, consequently reducing the volume of trade; hence, it is expected that $\beta_5 < 0$.

- L_{ij} is the dummy variable relating to whether the two trading countries border each other; it takes the value 1 if the two are neighbouring countries and 0 otherwise. For neighbouring countries, trade is expected to be intensive; this assumes that $\beta_6 > 0$.

- $E_{i(j)}$ is a dummy variable equal to 1 if the country i (j) is an island and 0 otherwise. It is expected that $\beta_7 > 0$ and $\beta_8 > 0$.

- $I_{i(j)t}$ is a variable that indicates the infrastructure index, which is constructed from three variables: the number of kilometres of roads and of railways and the number of telephone lines per capita. Following Limao and Venables (2001) and Carrère (2004), every variable, measured in density, is standardized to have the same average to be equal to 1. The index thus corresponds to the arithmetic mean of standardized variables. Considering that more developed infrastructure is likely to foster the movement of bilateral trade, it is expected that $\beta_9 > 0$ and $\beta_{10} > 0$.

- TCR_{ijt} is the real bilateral exchange rate between country i and country j at time t measured by the following formula: $TCR_{ijt} = (TCN_{i/\$} \,/\, TCN_{j/\$}) \times (CPI_j \,/\, CPI_i)$, where TCN is the nominal exchange rate vis-à-vis the dollar and CPI is the price

index, notably the GDP deflator. The negative impact of the real bilateral exchange rate will be reflected in $\beta_{11} < 0$. Moreover, in addition to the real bilateral exchange rate, this study includes a variable representing the volatility of the bilateral nominal exchange rate in order to capture the respective impact of the preferential trade agreements and monetary union on intra-regional trade. Indeed, the use of such a variable, compared with not including it, brings to light the share of the additional intra-regional trade attributed to preferential agreements within the framework of economic integration, on the one hand, and to monetary union, on the other hand. Following Rose (2000), this study measures volatility by the standard deviation of the primary difference of the monthly bilateral nominal exchange rate (in logarithm) of the previous year.

- $CINF_{i(j)t}$ is a variable introduced into the model to indicate the incentives for conducting unregistred trade. Its coefficient will thus reflect the impact of unrecorded trade on official bilateral trade. It is separately represented in the model by two variables. The first variable is the parallel market exchange rate premium, which is considered here as a proxy for distortions resulting from economic policies implemented in a given country. In various studies carried out on growth, the black market premium has often been used to show the severity of restrictions to trade (Harrison, 1996; Edwards, 1998; Sala-i-Martin, 1997). Rodriguez and Rodrik (2001) supported the idea of the existence of a strong correlation between the black market premium and a certain number of bad macroeconomic policies, such as inflation, an increase in foreign debt, a high level of corruption and bureaucratic cumbersomeness. This variable was also introduced into a gravity model by Longo and Sekkat (2004). Following Easterly and Sewadeh (2000), this study measures the rate of variation between the exchange rate on the parallel market and the official exchange rate, that is: *[((exchange rate on the parallel market/official exchange rate) – 1) * 100]*. So, the higher the exchange rate premium is, the more the importers will go to look for foreign currency on the parallel market in order to conduct informal trade and, as a result, the weaker the registered trade will be. Hence, the expected sign will be: $\beta_{12} < 0$. The second variable is the tax pressure, measured as the ratio of the tax pressure of country *i* to that of country *j*. According to the literature, the higher the tax pressure is, the more the importers will tend to engage in unregistred trade to avoid paying taxes. This will result in the decline in official bilateral trade flows. In such a state of affairs, the coefficient β_{12} is also expected to have a negative sign.

- $UEMOA_1$ is a dummy variable indicating membership in UEMOA; it is equal to 1 if both countries are members and 0 if they are not. Similarly, $UEMOA_2$ takes the value 1 if the importing country is a member of UEMOA and the exporting country is from the rest of the world; it takes the value 0 if otherwise. As for $UEMOA_3$, it takes the value 1 if the exporting country is a member of UEMOA and the importing country is from the rest of the world, and 0 if otherwise. The signs of coefficients relating to the UEMOA variables will be useful to verify if there is trade creation and import and export diversion within the integration zone. After all, it is known that there is trade creation when intra-regional trade increases without a reduction in imports from the rest of the world, which means that $\beta_{13} > 0$ and $\beta_{14} >= 0$. When the

tendency to import from the rest of the world reduces while the overall tendency to trade with other members of the Union increases, there is diversion of imports; in this case $\beta_{13} > 0$ and $\beta_{14} < 0$. The diversion of exports takes place when the propensity to export to the rest of the world reduces while the overall tendency to trade with other members of the Union increases; that is, $\beta_{13} > 0$ and $\beta_{15} < 0$.

- $ECOWAS_1$ is a dummy variable indicating the membership in ECOWAS; it is equal to 1 if both countries are members of ECOWAS and 0 if they are not. Likewise, $ECOWAS_2$ takes the value of 1 if the importing country is a member of ECOWAS and the exporting country is from the rest of the world, and 0 if otherwise. $ECOWAS_3$ takes the value 1 if the exporting country is a member of ECOWAS and the importing country is from the rest of the world, and 0 if otherwise.

- $ASEAN_1$ is a dummy variable indicating membership in ASEAN; it is equal to 1 if both countries are members of ASEAN and 0 if otherwise. $ASEAN_2$ takes the value 1 if the importing country is member of ASEAN and the exporting country is from the rest of the world, and 0 if otherwise. As for $ASEAN_2$, it takes the value 1 if the exporting country is a member of ASEAN and the importing country is from the rest of the world, and 0 if otherwise.

Except for the dummy variables, all the other variables are expressed in natural logarithm. It follows that the estimated coefficients of these variables are directly interpreted as elasticities. On the other hand, the elasticities of the qualitative variables are given as the exponential of the estimated coefficients. Moreover, the estimation of Equation 8 with the data about all the importing countries (countries of UEMOA and other countries from SSA and Southeast Asia) will enable us to obtain the coefficients estimated on the UEMOA variable in order to appreciate whether the unilateral and preferential reforms implemented in these countries have had an impact on intra-UEMOA trade.

Methods of estimation

Several methods of estimating the gravity method can be found in the literature. According to Egger (2002) and Greenaway and Milner (2002), for example, the choice of the method of estimation or the estimator, which is an important issue for the interpretation of the coefficients of the model, depends on the underlying advantages of each estimator. Recent studies of different methods of estimating a gravity model favoured the use of panel data. Some studies followed the static approach to the model and used estimation techniques such as the within-estimators, or the generalized least squares, or the Hausman–Taylor (1981) method. This is the case of Hummels and Levinsohn (1995), Mátyás (1997, 1998), Breuss and Egger (1999), Egger (2000 and 2002), Glick and Rose (2002), Egger and Pfaffermayr (2003), and Baltagi et al. (2003).

Other studies, notably de Grauwe and Skudelny (2000), Jakab et al. (2001), de Nardis and Vicarelli (2003), Badinger and Breuss (2004), and Péridy (2005a/b), emphasize the dynamic approach to the gravity model, and thus used an estimator put forward by

Arellano and Bond (1991). As noted earlier, this study makes the same choice, which can be justified by the fact that trade is a dynamic process, and because some explanatory variables may turn out to be not only non-stationary but also endogenous. Indeed, the current level of trade between two given countries can be a result of the level attained during the previous period, given consumer habits vis-à-vis the products from the partner country, for example, or the existence of distribution and service networks and service between the two countries. Using the generalized method of moments (GMM) of the Arellano and Bond (1991) type is likely to correct these insufficiencies. The validity of the orthogonality conditions, that is of the instrumental variables, will be tested using the Sargan test.

Nature and sources of data

The study covers a sample of 25 importing countries, of which 16 are in SSA, and 40 partner countries. As in Foroutan and Pritchett (1993) and Elbadawi (1997), the sample of importing countries has been restricted to include only those that are not in SSA and whose per capita GDP is lower than US\$3,000.[5] The aim of this restriction was to ensure that only countries with similar economic characteristics are used. The data on the countries concerned cover the period from 1981 to 2000. These are principally secondary data gathered from different sources according to the variable. Thus:

- The data on trade flows come from International Monetary Fund (IMF) statistics (Directorate of International Trade, especially the DOTS CD-ROM). The IMF's financial statistics are the source of data on the nominal exchange rates and the GDP deflator.
- The data on GDP, per capita GDP, population numbers, surface area, and ratios between the exchange rate on the parallel market and the official exchange rate of the countries concerned are drawn from World Bank databases, notably the Africa database 2004 CD-ROM and the World Development Indicators 2004 CD-ROM.
- The distance between two trading countries is a straight line distance obtained from the website: www.indo.com/cgi-bin/dist

5. Estimation and results

The econometric estimation of the gravity model by the Arellano–Bond (1991) method was validated using Sargan's over-identification test and the first-order and second-order self-correlation error tests. In short, the instrumental variables are valid. This enables us to use and interpret the estimated coefficients.

The impact of economic characteristics on bilateral trade

Generally, it transpires from the results that in most cases the traditional variables of the gravity model have the expected signs, but with varying levels of statistical significance. For example, the significance of the coefficient of the delayed dependent variable reveals that the volume of imports for the previous period has a significant positive effect on the current volume. The estimated coefficient indicates that an increase of 1% in the imports of the previous year leads to an increase of 0.4% in the current imports, which confirms that bilateral trade is a dynamic process. Similarly, the coefficient of the variable relating to trading partner countries sharing a border is positive and significant. So, trade becomes more intensive between neighbouring countries than those that do not share a border. The estimated coefficient indicates that trade between neighbouring countries is 1.4 times more than what is predicted by the model.

The distance variable has a significant negative coefficient at the 10% threshold and confirms the existence of an inverse relationship between distance and bilateral trade. Regarding the impact of the income variable on bilateral trade, the estimated coefficients show that an increase of 1% in the importing country's GDP produces a 0.3% increase in the volume of imports. However, the variations in the GDP of the partner country do not seem to significantly explain the variations in the volume of imports. Moreover, the negative incidence, albeit non-significant, of the real interest rate on trade suggests that a depreciation of the importing country's currency vis-à-vis that of the partner country has the effect of reducing its imports from the trading partner. The same applies to the infrastructure variables.

The negative and significant sign of the two variables (parallel market premium and tax pressure) representing the incentives to unregistred trade shows that the distortions arising from economic policies are likely to reduce bilateral trade significantly. In other words, the economic policy distortions represented by these variables foster unrecorded cross-border trade. Indeed, the results indicate that any increase of 1% in the parallel market premium leads to a 0.01% reduction in the official imports between countries. This observation can be explained by the fact that traders in the importing country, thanks

to the existence of a parallel market premium, can resort to informal channels of payment to obtain foreign currency and so import the merchandise without a registration. The result is the reduction of formal trade. Likewise, the negative and significant sign of the coefficient of the tax pressure variable points to the existence of an inverse relationship between the tax pressure difference observed between two countries and their bilateral trade. Here, any variation of 1% of this difference brings about an inverse variation of 0.03% in bilateral trade. This shows that a high level of taxes, in particular indirect taxes such as taxation on trade, may divert importers from official channels in their transactions in order to avoid heavy taxation. As the results in tables 3 and 4 show, the negative effects of the parallel market premium and tax pressure variables are much more serious when the two trading countries have a common border.

The impact of regional agreements within UEMOA on bilateral trade

Results for the whole period from 1981 to 2000 indicate that the regional agreements governing trade inside the West African subregion have led to gains in bilateral trade within that zone. Nevertheless, these gains remained comparatively less important than expected, especially in terms of trade creation. But in terms of diverting imports and exports, the gains were significant.

Regional agreements within UEMOA and trade creation
For the specific case of the UEMOA countries, the coefficient related to the intra-UEMOA trade, although positive, is not significantly different from zero. This suggests that the trade between Union members is commensurate with the level of their economic and other characteristics, as predicted by the gravity model. That is why the trade creation effect was not significant after all. This means that over the period studied, intra-regional trade did not increase significantly without a corresponding decline in imports from the rest of the world.

Adding the volatility variable to the model to isolate the effect of economic reforms on bilateral trade in the Union does not change the performance achieved. It can be inferred from this that the impact of the use of the common currency on bilateral trade inside UEMOA is not significant at all.[6] Such findings are similar to those reported in Persson (2001), Rose (2000), and Pakko and Wall (2001), all of which also came up with negative or non-significant effects of a monetary union on bilateral trade. Rose (2000) justified such findings by the small size of the sample and concluded that the impact is actually positive and statistically significant for big samples. In the same vein, the author revealed that the size of the effect varies with the technique of the estimate chosen. On the other hand, the findings presented here are contrary to those of Rose and Van Wincoop (2001), Frankel and Rose (2002), and Glick and Rose (2002), among others, who found empirical evidence of a positive effect of monetary unions on trade. It should be noted, however, that these studies considered monetary union membership as exogenous, or used all monetary unions as a single variable (Glick and Rose, 2002), or estimated the model by using the ordinary least squares (OLS) method (Frankel and Rose, 2002).

Table 3: Summary of the results of econometric estimations (Case 1: The effect of the absence of a common border)

Variables	Equation 1		Equation 2		Equation 3		Equation 4	
	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat
Constant	0.869	2.25**	0.868	2.24	0.818	2.13**	0.394	4.94***
Imports$_{ijt-1}$	0.401	5.00***	0.400	4.99***	0.395	4.94***	0.312	1.68*
GDP of country i	0.335	1.79*	-0.334	1.80*	0.311	1.67*	-0.044	-0.68
GDP of country j	-0.033	-0.51	-0.036	-0.55	-0.041	-0.64	0.069	0.30
Population of country i	0.132	0.57	0.118	0.50	0.084	0.36	0.023	0.44
Population of country j	0.013	0.27	0.015	0.29	0.022	0.42	-0.031	-1.34
Real bilateral exchange rate ij	-0.034	-1.45	-0.034	-1.44	-0.031	-1.35	0.317	1.78*
Island i	0.353	1.98**	0.348	1.95**	0.323	1.81*	0.021	0.18
Island j	0.041	0.36	0.044	0.48	0.019	0.16	-0.073	-1.53
Distance	-0.081	-1.69*	-0.081	-1.68*	-0.073	-1.54	0.352	2.11**
Border between i and j	0.385	2.31**	0.383	2.30**	0.354	2.12**	0.299	1.37
Infrastructure in country i	0.284	1.29	0.295	1.34	0.289	1.32	-0.005	-0.03
Infrastructure in country j	0.012	0.06	0.024	0.12	-0.014	-0.07	-0.702	-0.74
Volatility of nominal exchange rate ij			-0.823	-0.86				
Parallel market exchange rate premium	-0.008	-1.55	-0.009	-1.65*				
Tax pressure					-0.033	-2.68***	-0.033	-2.71***
Intra-UEMOA trade	0.095	0.84	0.097	0.85	0.111	0.98	0.133	0.99
UEMOA imports from ROW	-0.122	-1.68*	-1.22	-1.68*	-0.147	-2.03**	-0.147	-2.03**
UEMOA exports to ROW	-0.139	-1.78*	-0.139	-1.78*	-0.146	-1.86*	-0.145	-1.86*
Intra-ECOWAS trade	-0.142	-1.77*	-0.139	-1.74*	-0.133	-1.66	-0.131	-1.61
Intra-ASEAN trade	-0.345	-1.62	0.351	1.64*	-0.278	-1.29	-0.282	-1.31
Number of observations	1,367		1,367		1,367		1,367	
Relative bilateral trade	568		568		568		568	
Sargan test	Chi²(5) =4.8; Prob>Chi2=0.44		Chi²(5) =4.9; Prob>Chi2=0.4		Chi²(5) = 4.9; Prob>Chi²=0.43		Chi²(5)=5.0; Prob>Chi²=0.41	
Arellano–Bond test self-correl.1	z = -6.07; Prob > z = 0.0		z = -6.08; Prob > z = 0.0		z = -6.16; Prob > z = 0.0		z = -6.17; Prob > z = 0.0	
Arellano–Bond test self-correl.2	z = -0.30; Prob > z = 0.8		z = -0.28; Prob > z = 0.77		z = -0.17; Prob > z = 0.86		z = -0.15; Prob > z = 0.88	

Note: Absolute value of z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Summary of results of the econometric estimations (Case 2: The effect of the presence of a common border)

Variables	Equation 1		Equation 2		Equation 3		Equation 4	
	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat	Coefficient	z-stat
Constant	0.884	2.27**	0.881	2.27**	0.876	2.26**	0.874	2.25**
Imports$_{ij\,t-1}$	0.415	5.05***	0.414	5.05***	0.412	5.04***	0.412	5.03***
GDP of country i	0.327	1.74*	0.329	1.75*	0.323	1.72*	0.324	1.73*
GDP of country j	-0.041	-0.63	-0.044	-0.68	-0.37	-0.57	-0.039	-0.61
Population of country i	0.086	0.37	0.069	0.30	0.091	0.89	0.077	0.33
Population of country j	0.021	0.41	0.023	0.44	0.019	0.38	0.021	0.40
Real bilateral exchange rate ij	-0.033	-1.42	-0.033	-1.41	-0.032	-1.38	-0.032	-1.38
Island i	0.351	1.96**	0.345	1.92**	0.348	1.94	0.343	1.91*
Island j	0.036	0.30	0.037	0.32	0.032	0.27	0.034	0.29
Distance	-0.082	-1.70*	-0.082	-1.70*	-0.082	-1.70*	-0.082	-1.70*
Border between i and j	0.275	1.61	0.269	1.58	0.322	1.89**	0.320	1.88*
Infrastructure in country i	0.296	1.34	0.307	1.39	0.285	1.29	0.294	1.33
Infrastructure in country j	0.003	0.02	0.014	0.07	0.009	0.05	0.19	0.09
Volatility of nominal exchange rate ij			-0.799	-0.83			-0.682	-0.71
Parallel market exchange rate premium* Border between i and j								
Tax pressure*Border between i and j	-0.169	-2.16**	-0.173	-2.21**	-0.036	-1.90*	-0.037	-1.92**
Intra-UEMOA trade	0.112	0.98	0.114	1.00	0.103	0.90	0.104	0.91
UEMOA imports from ROW	-0.126	-1.72*	-0.125	1.72*	-0.117	-1.60	-0.117	-1.60
UEMOA exports to ROW	-0.138	1.75*	-0.138	-1.75*	-0.137	-1.74*	-0.137	-1.73*
Intra-ECOWAS trade	-0.127	-1.56	-0.124	-1.53	-0.127	-1.57	-0.125	-1.54
Intra-ASEAN trade	-0.312	-1.45	-0.316	-1.47	-0.426	-1.94*	-0.431	-1.96*
Number of observations	1,367		1,367		1,367		1,367	
Relative bilateral trade	568		568		568		568	
Sargan test	Chi²(5) = 4.3; Prob>Chi2=0.5		Chi²(5) = 5.0; Prob>Chi²=0.41		Chi²(5) = 4.5; Prob>Chi²=0.48		Chi²(5) = 4.6; Prob>Chi²=0.5	
Arellano–Bond test self-correl.1	z = -6.17; Prob > z = 0.0		z = -6.17; Prob > z = 0.0		z = -6.10; Prob > z = 0.0		z = -6.11; Prob > z = 0.0	
Arellano–Bond test self-correl.2	z = -0.10; Prob > z = 0.92		z = -0.29; Prob > z = 0.7		z = -0.20; Prob > z = 0.93		z = -0.19; Prob > z = 0.85	

Note: Absolute value of z statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

The lack of intensification or significant revival of trade inside the West African subregion resulting from institutions such as UEMOA and ECOWAS is not unique in Africa. For example, a number of studies,[7] including Foroutan and Pritchett (1993), Elbadawi (1997), Ogunkola (1998), and Longo and Sekkat (2004), present empirical evidence suggesting that regional integration agreements had little or no impact on intra-regional trade. The low level of intra-Union integration can also be accounted for by poor infrastructure, which causes high transport costs, and by the similar nature of production structures. Besides, intra-UEMOA trade is dominated by a small number of countries that sell a small range of products. As for products exported from one UEMOA country to other member countries, they mainly consist of primary products, especially livestock, maize, cocoa, fresh fish, vegetables and sugar. Manufactured products represent less than 10% of the trade. The big exporting countries in this intra-UEMOA trade are Côte d'Ivoire and Senegal, which exported 11% and 6.5%, respectively, of their total exports to the zone between 1990 and 2003 (van den Boogaerde and Tsangarides, 2005). The two countries are thus by far the biggest suppliers of manufactured goods in the zone, supplying 74% and 14%, respectively, of intra-zone exports. Togo and Benin are basically transit countries for the Sahel countries, notably Niger, Burkina Faso and Mali. Moreover, trade inside the UEMOA zone remains dominated by trade with Nigeria.

Regional agreements within UEMOA and diversion of imports

With regard to trade between UEMOA and the rest of the world, the results show that over the period studied, members' imports from the rest of the world decreased slightly. Nevertheless, the decrease is estimated to be 12% below the level expected. This tends to show that there was trade diversion to the advantage of the Union's members. The coefficient does not vary when one tries to isolate the effect of economic reforms on trade by introducing the volatility variable into the model: the trade remains at 12% below the predicted level. Consequently, it can be deduced that the economic reforms within the Union have not produced an additional effect of diverting imports, compared with the effect observed during the period of the monetary union.

Regional agreements within UEMOA and diversion of exports

For UEMOA member countries' exports to the rest of the world, the coefficient is significantly different from zero at the 10% threshold. Indeed, the Union members' exports to the rest of the world represented 86% of the level predicted by the model. The negative and significant sign of the coefficient for exports to outside UEMOA indicates that the exports of UEMOA countries to the rest of the world were less than those of the non-UEMOA countries. It can thus be deduced that during the period studied the Union's members exported less and less to the rest of the world and more between themselves. This means that there was a diversion of exports to within UEMOA.

Obstacles to intra-regional trade within UEMOA

L ike other regional blocs in Africa, UEMOA suffers from numerous bottlenecks that hinder its performance, notably concerning intra-regional trade. Among these constraints and obstacles are the following:

- *The low level of complementarity of the economies of the countries in the Union:* Indeed, apart from transit goods and re-exports, which weigh heavily on bilateral trade within the Union, there is actually very little organized trade. In addition, an analysis of the structure of UEMOA countries' imports shows a state of continuous dependency of these countries on the rest of the world for manufactured products (more than 60%) and food and energy supplies. Regional integration thus faces the difficulty of creating markets within the Union, given the low capacity of the manufacturing sector and the lack of product diversification, coupled with the strong similarity of the structure of manufactured goods.

- *Legal and institutional impediments:* Among these are the absence of – or difficulty in implementing – the coordination and harmonization of production and marketing policies, as well as shortcomings in the application of laws and the existence of non-tariff barriers. This state of affairs has arisen from the negative effects of the import-substitution strategy applied for a long time by members of the Union (Oyejide et al., 1997). Moreover, the legal and regulatory environment related to the promotion of trade suffers from a number of imperfections, especially with regard to administrative and contract procedures. At the institutional level, the implementation of measures taken within the Union is hindered not only by the multiplicity of objectives of a regional nature and the absence of a supra-national institution, but also by the member states' determination not to relinquish their national interests. The absence of political will on the part of member countries can be attributed to the difficulty in effectively implementing compensation mechanisms provided for in subregional groupings. These mechanisms are deemed to be rigid and it is not clear how to calculate the income to be compensated.

- *Inadequate communication and transport infrastructure:* This makes the cost of transport more expensive, notably in Africa where, according to Collier and Gunning (1999), such costs are unusually high. As a matter of fact, inadequate port facilities and underdeveloped communication systems are likely to be obstacles to the expansion of intra-regional trade.

6. Conclusion and economic policy implications

U sing an augmented gravity model, this study analysed the determinants of bilateral trade, as well as the effects of trade creation and diversion of imports and exports, inside UEMOA before and after regional integration. The econometric estimations were based on the Arellano–Bond (1991) estimation method. From the results it emerges that:

- The traditional variables of the gravity model produced the expected signs. Thus, the real bilateral exchange rate, the distance and the volatility of the nominal exchange rate all had a negative impact on bilateral trade. On the other hand, the importing country's GDP, the sharing of a common border and the quality of infrastructure had a positive effect on intra-regional trade.

- Membership in a common monetary zone, UEMOA, and the implementation of economic reforms aimed at economic integration had significant effects on bilateral trade within the zone, mainly in terms of diversion of imports and exports. However, the level of intra-Union trade represented the standard predicted by the model. In other words, although imports from and exports to the rest of the world saw a significant decline, this did not lead to trade creation inside the UEMOA zone. There are several reasons for the poor performance, specifically with regard to formal trade. As shown by the model, among these factors is the persistence of a flourishing unrecorded cross-border trade, fostered by the existence of a parallel market exchange rate premium.

- Trade within ECOWAS turned out to be at a much lower level than that predicted and lower than trade within UEMOA.

    From these results, the following recommendations can be formulated:
- Economic reforms within the Union must be pursued.
- The macroeconomic environment in every member country must be cleaned up.
- Non-tariff barriers in Union member countries must be effectively eliminated.
- Transport and communication infrastructure within the Union must be developed.
- Efforts must continue to harmonize national policies.

Notes

1. See Appendix A for the lists of member countries of the subregional groupings mentioned in the text.

2. In this connection, Gunning (2001) argues for and against the commercial blocs with a particular emphasis on possible differences in the views of economists and policy makers.

3. Different studies have directly dealt with smuggling between neighbouring countries. One can mention Azam (1990), Wang (1994), and Pohit and Teneja (2003), among others.

4. The Banque mondiale (1989: 158) agrees with this point of view, by presenting parallel trade as an economic phenomenon that is efficient and conducive to the wellbeing of populations, and one that is deep-rooted in the history and traditional organization of African societies.

5. See the details about the countries concerned in Appendix B.

6. One must acknowledge that in terms of the impact of the monetary union, the share attributable to the low level of transaction costs has been underestimated. This may be because the low transaction costs are a constant feature of bilateral trade between member countries and it happens that this feature is captured by the bilateral specific effects introduced into the model.

7. A direct comparison between the findings of these studies and those of the present one is complex given the differences in terms of the sample used, the period studied and the estimation techniques used.

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Appendix A: Subregional unions and their membership

Acronym	Definition	Member countries
CEAO	Economic Community of West Africa (Communauté Économique de l'Afrique de l'Ouest)	Benin, Burkina Faso, Côte d'Ivoire, Mali, Mauritania, Niger, Senegal
ECOWAS (CEDEAO)	Economic Community of West African States (Communauté Économique des Etats de l'Afrique de l'Ouest)	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo
CEMAC	Economic and Monetary Community of Central Africa (Communauté Économique et Monétaire d'Afrique Centrale)	Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea, Chad
UMOA	West African Monetary Union (Union Monétaire Ouest Africaine)	Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, Togo
UEMOA	West African Economic and Monetary Union (Union Économique et Monétaire de l'Afrique de l'Ouest)	Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo
COMESA	Common Market for Eastern and Southern Africa	Angola, Burundi, Comoros, Congo (DRC), Botswana, Djibouti, Ethiopia, Kenya, Madagascar, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Seychelles, Swaziland, Tanzania, Zambia, Zimbabwe
SADC	Southern African Development Community	Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Tanzania, Zambia, Zimbabwe
ASEAN	Association of South East Asian Nations	Indonesia, Malaysia, Philippines, Singapore, Thailand

Appendix B: List of reporting countries and partner countries

Reporting countries	Partner countries
Sub-Saharan African countries	**Sub-Saharan African countries**
1. Benin	1. Benin
2. Burkina Faso	2. Burkina Faso
3. Côte d'Ivoire	3. Côte d'Ivoire
4. Mali	4. Mali
5. Mauritania	5. Mauritania
6. Niger	6. Niger
7. Senegal	7. Senegal
8. Guinea	8. Guinea
9. Liberia	9. Liberia
10. Sierra Leone	10. Sierra Leone
11. Cape-Verde	11. Cape Verde
12. Gambia	12. Gambia
13. Ghana	13. Ghana
14. Guinea-Bissau	14. Guinea-Bissau
15. Nigeria	15. Nigeria
16. Togo	16. Togo
Asian countries	17. Cameroon
17. Indonesia	18. Central African Republic
18. Malaysia	19. Democratic Republic of Congo
19. Philippines	20. Ethiopia
20. Singapore	21. Gabon
21. Thailand	22. Kenya
22. China	23. Uganda
23. Hong Kong	**North African countries**
24. India	24. Egypt
25. Korea	25. Libya
	26. Morocco
	27. Sudan
	28. Tunisia
	Asian countries
	29. Indonesia
	30. Malaysia
	31. Philippines
	32. Singapore
	33. Thailand
	34. China
	35. Hong Kong
	36. India
	37. Korea
	Latin American countries
	38. Brazil
	39. Argentina
	40. Colombia

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