REGIONAL INTEGRATION AND ECONOMIC DEVELOPMENT IN SUB-SAHARAN AFRICA: A STUDY OF THE DYNAMICS OF REGIONAL INTEGRATION UTILIZING LE UNION ECONOMIQUE ET MONETAIRE OUEST AFRICAINE

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Jonathan H. BeVille, B.A.
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University of Arkansas

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ABSTRACT

Regional integration of developing states and of states has been a prevalent topic in the academic and policy-making communities in recent years. This paper analyzes one such regional trade agreement, the *Union Économique et Monétaire Ouest Africaine,* for trade creation and trade diversion for the period of 1994-2002. This research suggests that the UEMOA has not been successful in generating welfare enhancing trade creation among member states, and that the conditions in these states are not sufficient to generate the economic growth needed to overcome stagnation at this time. This research shows that at present basic economic forces such as individual state GDP, and not regionalism, remain the driving factors behind trade. It suggests that while potential exists for regional trade agreements to promote economic growth in LDCs, states must first address their own viability in the global market through not only economic policies, but also through ensuring political stability. With respect to the later, this study also concludes that democracies perform better in RTAs than non-democratic states.

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Introduction

The establishment of the *Union Économique et Monétaire Ouest Africaine* (West African Economic and Monetary Union or UEOMA) came on the heals of the 1994 devaluation of Central African Franc, the common currency of the *Communauté Financière Africaine* (African Financial Community). This move, which reflected the first devaluation of the currency used by 16 West African states since the 1940s, was intended to jump-start the growth starved economies of the region. Throughout the preceding decades, agricultural products, which represent the mainstay of exports from the region, had suffered in the global market due to a vastly overvalued currency. The revaluation of the Central African Franc dropped its value from 100 C.A.F. = one French Franc to 50 C.A.F. =1 French Franc.[1]

The formation of the UEMOA sought to further reduce barriers to trade, this time on a regional level. With a common currency already in place, the establishment of the UEMOA led to an elimination of tariffs on trade among member states and established a common external tariff with respect to all non-members.

The creation of this regional or preferential trade agreement occurs at a time when such agreements were created and codified at an unprecedented rate. The expansion of regional trade agreements (RTAs), however, has not been limited to the developing world, but has encompassed states at all levels of economic activity. The integration of European economies and the formation of the European Union is perhaps the best example of this phenomenon with respect to advanced industrial economies. The

[1]The value of the French Franc had fluctuated significantly during the previous 50 years. Currently the value of the Central African Franc is pegged to the value of the Euro. 100C.A.F. = 0.15 Euro

formation of RTAs, however, has been particularly popular among developing countries, and Africa is home to more of these agreements than any other region of the world. There are several prevalent theories seeking to explain this surge of regional activity. Regional integration and unity, particularly among developing countries, may serve to give the world's smallest economies, through the power of collective bargaining, a greater voice in the rapidly growing global economy. It may also serve as an intermediary step in the transition from relative economic isolation to integration and participation in the multilateral trading system, in an effort to minimize or mitigate the potential short-term adverse effects of globalization[2] The United Nations Economic Commission of Africa (UNECA) has suggested that regional integration is a path toward economic growth and development. Yet, others suggest that regionalism isolates developing countries from the global economy and may in fact further inhibit their prospects for economic growth.

The many sides of this debate have resulted in a new wave of studies that seek to examine both the effects *and* effectiveness of regional integration with respect to economic growth. This study picks up that mantle in its examination of the UEMOA. Largely indebted to the work of Musila (2005), whose study represents a seminal contribution to the study of sub-Saharan African RTAs, this study uses a similar variation of the gravity model of trade to examine trade creation and trade diversion resulting from membership in the union. It also takes one additional step by examining the effects of state-level factors such as overall economic modernization and regime type on the performance of states within the union.

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[2] Louise Fawcett, "Explaining Regional Domains: A Comparative History of Regionalism" *International Affairs* 80, no. 3 (2004).

Trade among UEMOA member states has increased since the union was established, as has the volume of trade to non-member states. These gains, however, have been small in both instances, and thus the need to further understand the dynamics of this RTA is very real. This study demonstrates that the cumulative trade creating effects of the UEMOA have been relatively non-existent for the period of 1994-2002. The subsequent analyses of modernization and regime type, however, help to illuminate and elucidate a path by which these results may improve. Higher levels of economic modernization, measured in terms of per capita energy consumption are shown to have an effect on the level of trade within the region with respect to both intra-regional and extra-regional trade. The specific nature of this relationship, however, remains largely undefined as other variables not included in this study are perceived to have a strong effect on the overall performance of this variable. What this study has identified is the effect of regime type on trade and development, detailed in Chapter V. While there is still more to learn, and more variables to consider, there are relatively clear policy implications emerging from this study. Developing states in the region should target their efforts on the creation of energy consuming industry and infrastructure, since it is strongly correlated to an increase in GDP at this level of development. It is even more important, however, that the citizens of these states continue their quest for democracy and political stability, as these factors have the most profound impact on the performance of member states.

As this study nears completion, the citizens of Congo, a sub-Saharan state not included in the context of this study, have just concluded their first free elections in more than four decades; and, many of the UEMOA member states will hold new elections in

the next two years. In those UEMOA member states that remain fundamentally not free, i.e. Togo and Coté d'Ivoire, the citizens continue to press on in opposition to oppressive regimes. The frequency and degree of change currently occurring in sub-Saharan Africa will make it necessary for us to constantly revisit and reevaluate the findings of similar studies for the next several years if not decades.

Chapter I
Regionalism and the UEMOA

For nearly half a century, the states of the western Sub-Saharan African region have been embroiled in a constant battle to overcome economic stagnation and achieve substantive and lasting growth and development. Throughout this period, the states of the region have relied on foreign economic aid, and a myriad of other development strategies, most of which have met with limited, if any, success. Among the more recent approaches to overcoming the obstacle of economic stagnation is regional integration and cooperation, a strategy that has gained popularity across the globe and developmental spectrum, but seen some of its most intense proliferation among developing countries. Based on the numbers of regional trade agreements codified in recent years, this trend may have the most support among the developing states of Africa. Supporting this strategy is the adage that "trade, not aid" will be the only force to foster rapid economic development in those states where it is needed most[3].

With more than 12 currently active major regional trade groups, many of which have been codified in the past two decades, Africa is leading the wave of regional integration and cooperative efforts. On average, any given African state is party to four regional trade agreements.[4] The continent is also home to many of the least developed countries in the world, a fact that makes Africa ideal for studying the effects of regional agreements on economic development in least developed countries (LDCs). In his 2005 book, Nicolas van de Walle identifies 26 of the least developed states in the world as

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[3] Nicolas Van de Welle, *Overcoming Stagnation in Aid-Dependent Countries* (Washington D.C.: Center for Global Development, 2005)
[4] World Bank, *Global Economic Prospects 2005* (Washington, D.C.: World Bank 2004).

stagnant low-income states. Of these 26 states, found in Africa, Asia, and to a much lesser degree Latin America, 19 are located in Sub-Saharan Africa.

Africa, as a whole, experienced widespread economic decline in the 1980s. This downturn of worsening economic conditions continued into and through the 1990s for much of the continent. A 1992 article appearing in *Time* Magazine characterized the situation in the following way

> Much of the continent has turned into a battleground of contending dooms: AIDS and overpopulation, poverty, starvation, illiteracy, corruption, social breakdown, vanishing resources, overcrowded cities, drought, war and the homelessness of war's refugees. Africa has become the basket case of the planet, the "Third World of the Third World," a vast continent in free fall. In the face of political instability and disintegrating roads, airports and telephone networks, and other disincentives investors from Europe, America and Japan are withdrawing from sub-Saharan Africa and looking elsewhere; Africans too are pulling out their money. Why risk expropriation or failure in a continent with a weakness for one-party kleptocracy...where drainage by corruption often equals or exceeds the legitimate intake?[5]

During the past half-century, these states have received billions of dollars in aid from the industrialized West, however, few if any of these countries have seen any considerable economic growth and improvement during the past three decades. To make matters worse, official financial flows, and other sources of foreign aid have decreased significantly during the 1990s. This decrease, from already low levels, where the official flows of aid and capital total approximately 1.4 percent of GDP in the 1980s fell to 1 percent or less of GDP during the 1990s.[6] This decrease was the most severe during the latter years of the decade when economic conditions in Africa were at their worst.

The decrease in foreign aid and official, or state sponsored capital flows,

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[5] *Time Magazine,* "Africa: The Scramble for Survival," September 7, 1992 Vol. 140:10

[6] Nancy Birdsall and Liliana Rojas-Suarez, eds. *Financing Development: The Power of Regionalism* (Washington D.C.: Center for Global Development, 2004).

underscores the necessity of an indigenous source of growth and development, as LDCs cannot afford to rely on aid and the resources of developed countries to finance their own development agendas. According to Birdsall and Suarez (2004) the success of any economic development program is dependent on the ability of the state to finance said program. It takes money to make money. This leaves LDCs in a particularly disadvantageous state, in which they lack the resources necessary to set the process of realizing development objectives in motion.

The ability of states to meet this requirement is based in three fundamental principles:

"1. More stable and sustainable access to net capital inflows, including aid;

2. The buildup of domestic sources of finance through increased private saving and improved taxation systems;

3. The generation of stable net foreign revenues through increased exports and diversification of trade."[7]

These principles recognize that while indigenous, or domestically based programs are necessary for realizing the growth objectives of developing state economies, that net capital inflows, including aid, are a necessary part of the equation.

Regional trade, cooperative, and integrative agreements represent an effort towards achieving both the domestic needs and aid expectations of LDCs. By entering into these agreements, LDCs can move toward the creation and implementation of financial and trade policies better suited to achieving economic efficiency and trade creation, defined below (see page 9). Successfully implementing such policies satisfies

[7] Birdsall and Rojas-Suarez.

the second and third principles described above. However, are these agreements and arrangements successful in meeting the challenge at hand?

This study focuses on the Union Économique et Monétaire Ouest Africaine (West African Economic and Monetary Union-UEMOA/WAEMU)[8]. Comprised of eight sub-Saharan African states, five of its signatory states (Guinea-Bissau, Mali, Niger, Senegal, and Togo) make van de Walle's list of stagnant low-income states (SLIS). The three remaining UEMOA states are Benin, Burkina Faso, and Cote de Ivoire; though not considered SLIS economies per se, they remain among the poorest national economies in the world.

The results of this study demonstrate that while potentially beneficial to the cause of economic growth and development, RTAs, and specifically the UEMOA, are not a panacea to economic stagnation. Nor are they necessarily better for the welfare of state economies than full integration into the multilateral trading system. With respect to the UEMOA, gravity model analysis reveals a net effect of near zero on the economic growth of member states during the first nine years of its existence. This is because of both economic and socio-political factors influencing the effective performance of the RTA. This study suggests that levels of pre-integration economic development are indicative of the potential success of integration. The study clearly demonstrates that levels of democracy and political stability play a significant role in predicting the success of an RTA's growth generating potential

The central question, with respect to the present study, is has the UEMOA been effective in generating trade within the membership of the agreement during the first nine

[8] A complete listing and explanation of abbreviations used in this study is provided in Appendix A.

fiscal years of its existence. To answer this question this study first addresses the effectiveness of the UEMOA agreement in generating trade in the national economies of its member states. Toward this end, this study uses the gravity model of trade to address whether or not UEMOA membership leads to trade creation or trade diversion in member states.

Trade creation resulting from regional or preferential trade agreements occurs when a state party to the agreement switches from domestic production of a good to importing that good from another member of the agreement, the favored exporting state exhibiting a comparative advantage or more efficient method of production than the home economy. Viner (1950) showed that trade creation in this sense was welfare enhancing for both the importing (demand side) and the exporting state (supply side).[9] Benefits on the supply side of the equation are the result of the reallocation of resources away from protected industries and towards firms producing goods for the regional market. Demand side benefits accrue from the benefits of consumers who now face lower prices. Trade creation and trade diversion are, essentially, about efficiency. Trade creation in an RTA is deemed creation, because it leads to trade that did not exist before the RTA's enactment. This new trade is more efficient, in terms of price and resources for both the importing and exporting state, because it is more costly for the importing state to produce the good domestically. Trade diversion on the other hand occurs when the existence of the RTA does not favor efficiency in the same way.

Trade diversion takes place when a member switches from consumption of lower cost goods imported from outside the RTA to higher cost goods produced within the

[9] Jacob Viner, *The Customs Union Issue* (New York: Carnegie Endowment for International Peace, 1950).

region. Within regional trade agreements, these goods face lower tariffs after integration. Trade diversion, then, is generally welfare reducing, the loss resulting trade diversion stems from the reduction in government revenue as imports from outside the region (with high tariffs) are replaced by imports from within the region. The revenue lost from the loss of these tariffs can be particularly damaging to the fragile economies of developing countries and particularly LDCs. State revenue levels are not the only looser in this equation, as consumers are also more likely to loose in trade diverting agreements than in trade creating ones. This relates to the question of efficiency. Trade diversion is economically inefficient because it does not favor the lowest cost producer, who in this case is outside the scope of the RTA.

This is not to say that the effects of trade diversion are exclusively damaging to RTA member state economies. Individual consumers receive some benefits, as the price of goods often becomes lower, due to the lack of tariff or lower tariffs. However, these gains are limited to the short-term, as a portion of the price they pay effectively subsidizes producers in other member countries, rather than accruing to the government for reallocation within their own country. This cross-border subsidy represents an overall decrease in the aggregate economic welfare of the RTA

Unfortunately for the prospects of economic growth in the region, the present research demonstrates that regional integration of UEMOA states has thus far met with no cumulative success in generating economic growth, expressed as an increase in GDP, among its member states. Based on gravity model analyses of trade in the UEMOA from 1994-2002 this study concludes that regional integration, while potentially beneficial, is not in and of itself a sufficient strategy for attaining substantive and lasting economic

growth and development. During the period of study, we observe widely varied levels of exports between member states and periods of significant GDP growth and decline.

The present study, which examines the first nine years of trade under the UEMOA regime, finds little evidence that supports the notion that RTAs alone are the answer to economic stagnation in the region. These findings diverge slightly from those reported in Musila's 2005 study examining the intensity of trade creation among three other African Regional Trade Agreements (COMESA, ECCAS, and ECOWAS, the later of which includes all UEMOA member states).[10] The Musila study is one of the most recent and comprehensive examinations of the performance of Regional Trade Agreements (RTAs) in Africa and finds evidence supporting the notion that they are effective means of generating trade and development in state economies. This paper, however, favors the view of Radelet (1997), who questions the validity of the regional integration strategy as a primary vehicle for generating growth and development. History provides the most important basis for this hesitation. State-level development programs in developing countries have often relied on import substitution strategies, often criticized as a means of developing national economies. Regional integration among developing states in Sub-Saharan Africa creates a high likelihood that those states will adopt import substitution strategies on regional basis, thus isolating them further from the global trading system.

The results of the quantitative analysis for trade creation or trade diversion are subsequently evaluated in the context of regional-level conditions that may impede or

[10] The Musila study examined each RTA included for trade creation and trade diversion with respect to intra-union trade and extra union-trade and found that in many instances intra-union trade generated came at the expense of trade with non-members. The present study does not examine trade flows with the same degree of specificity, focusing instead on the net effect on the GDP member states and economic development.

enhance the likelihood of trade. These other regional factors, modernization levels and regime type, form the basis of the second part of this study. These factors are analyzed in the same manner by employing different variations of the gravity model of trade.

The two issues selected for consideration are levels of state economic modernization and regime type. The former of which compares modernization of individual UEMOA member states against that of other UEMOA members. The evidence demonstrates that while highly correlated with GDP, modernization levels play an important though muddied role in predicting the amount of trade within member state economies, as it is evident that modernization levels play a role in the trade equation, this role is often overshadowed by other factors such as regime type and stability.

The later of the issue studies, regime type, confronts a classic consideration of economic development, the relationship between democracy and economic development. Each of the UEMOA member states considered in this study is nominally a democratic state. However, recent contributions to the literature have attempted not only to qualify states as democratic or non-democratic (as nominally democratic states may in reality prove to be quite the opposite), but also to quantify the level of democracy within a state. Using regime type scores found in the Polity IV database, I compare the levels of democracy present across UEMOA member states.

Regional Integration and Sub-Saharan Africa

Numerous observers of the economic climate of sub-Saharan Africa have noted the high number of regional trade and regional integration efforts present on that continent. Nearly every state on the continent is now a member of one or more of the

Regional Integration Agreements (RIAs) or RTAs found there, of which the South African Customs Union (SACU), the East African Community (EAC), the Common Market of Eastern and Southern Africa (COMESA), the Economic Community of Western and Southern Africa (ECOWAS), the Economic Community of South African States (ECCAS), and UEMOA are just a few. There are also two common currency zones in the sub-Saharan African region. These are the CFA zones, where CFA refers to the Central African Franc. The two zones divided into east and west, with distinct issuing banks, are comprised of the member states of ECOWAS. The members of the east CFA Zone are the same as the member states of UEMOA, all of which are also members of ECOWAS. Radelet has observed that of the RIAs in sub-Saharan Africa, the CFA zones have experienced the greatest degree of success in the economic integration of state economies. However, the member states of this area have not experienced significant benefits in terms of economic growth and development along with this integration.

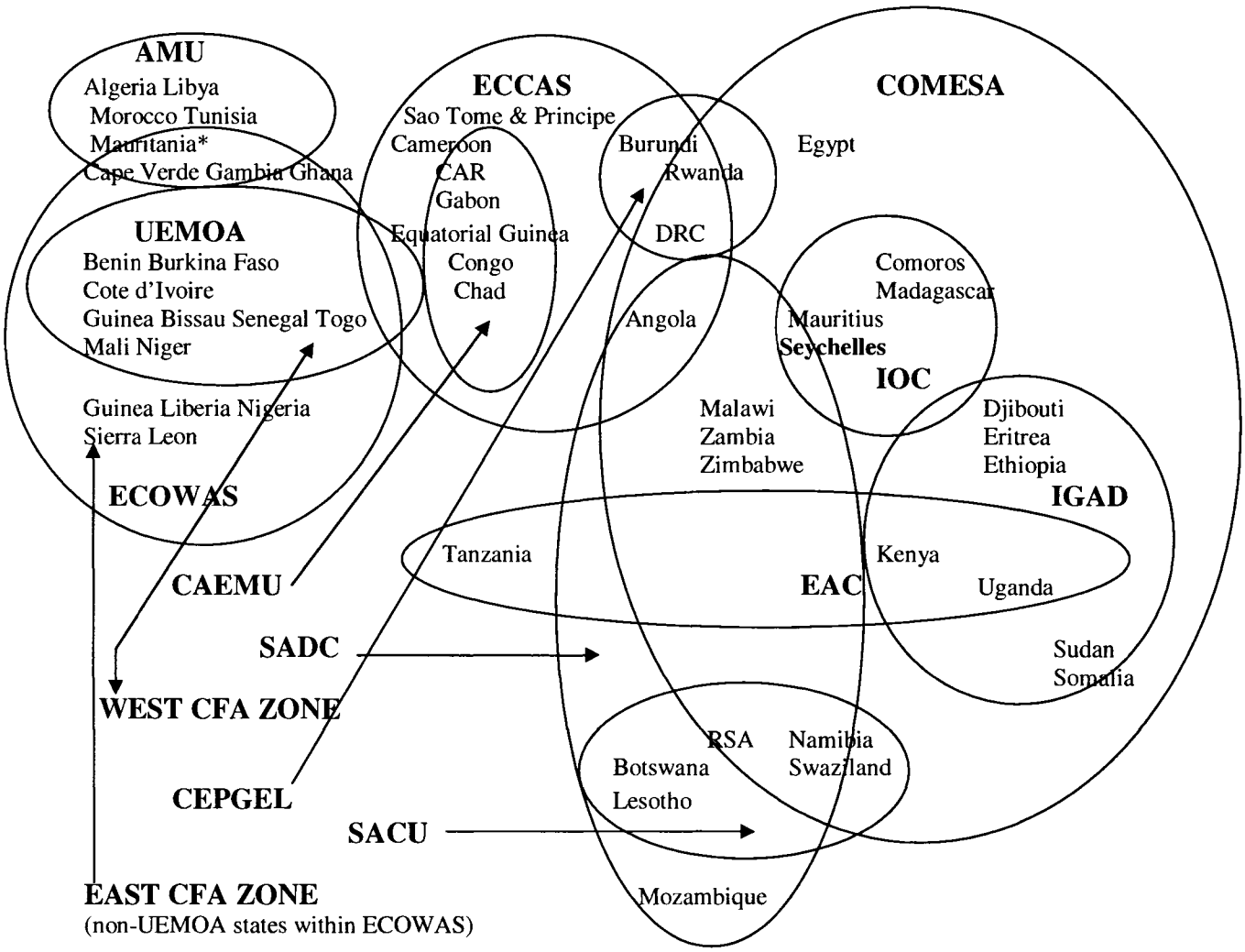
Regional integration and regional trade regimes are not only a factor in Africa, however, as the numbers of such agreements have increased worldwide. Many scholars of international economics have commented on the fact that regionalism is now the watchword of global economic policy.

In less developed regions of the world, such as sub-Saharan Africa, the region which is the focus of this paper, regional agreements are viewed as a means of fostering desperately needed levels of economic growth and development. There is, however, serious disagreement among scholars as to the effectiveness of regional agreements as a tactic for fostering economic development, some of them suggesting that a developed

economy is a prerequisite for the success of regional integration and cooperation. Some of these studies point to the European Union, which has become an often-championed example of regional integration and cooperation. Critics of sub-Saharan regionalism, such as the Center for Global Development's Steven Radelet, refer to the "fallacy of transposition," suggesting that it is faulty logic to assume that the lessons learned from European integration, where the original member states were all advanced industrialized economies, can be applied to the integration of less developed economies such as those of sub-Saharan Africa.[11]

[11] Steven Radelet, "Regional Integration and Cooperation in Sub-Saharan Africa: Are Formal Agreements the Right Strategy?" (Boston, Massachusetts: Harvard Institute for International Development 1997).

Figure 1: Regional Trade and Economic Agreements in Africa**



*Mauritania was a member of the AMU prior to 2000.
** See Appendix A for glossary of Regional Agreements
Source: Adapted from Kankwenda (2005)

A result of this existing controversy is that many in the academic community have turned their attention to examining the regional integration efforts in sub-Saharan Africa on a case-by-case basis. This paper focuses specifically on the case of UEMOA.

Established in 1994, UEMOA intends develop a competitive common market based on the free flow of persons, goods, services, and capital. Members share a common

currency, the CFA Franc, which is pegged to the Euro. Before the inception of that currency, the CFA Franc was pegged to the French Franc, a remnant of that country's colonial relationship with the members of UEMOA. The regional central bank is located in Dakar, Senegal and the regional development bank is located in Lome, Togo. In early 2000, UEMOA members adopted a customs union and common external tariff. Furthermore, a September 2002 IMF Survey cited the UEMOA as being "the furthest along the path toward integration," of all the regional groupings in Africa.[12]

As provided for in its charter, the UEMOA has five main objectives. First, increase the economic and financial competitiveness of member states. Second, ensure the convergence of macroeconomic performance and policy across member states. Third, create a common market for member states based on the free flow of people, goods, services and capital, the right of individuals to set up businesses within the area, a common eternal customs tariff and a common trade policy. Fourth, promote the coordination of a national sectoral policy for agriculture, environment, transport, infrastructure, telecommunications, human resources, energy, industry, mining and crafts. Fifth, wherever it may be necessary for the smooth operation of the common market, to harmonize legislation across member States, particularly in the fiscal system.[13]

As evidenced by the objectives put forth in the UEMOA charter, RTAs serve more purposes than generating trade among and between member states. Trade, however, remains the central vehicle for which the RTAs objectives are realized. In the case of the UEMOA the satisfaction of objectives one through three are dependent on trade.

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[12] Callisto Madavo et al, "Senegal: Poverty Reduction Strategy Assesment (Washington D.C.: World Bank, 2002).

[13] The Charter of the Union Économique et Monétaire Ouest Africaine is available at www.uemoa.int.

Therefore, the concern expressed here that RTAs, such as the UEMOA, are not necessarily trade creating is of crucial importance. So too are the hypotheses set forth in this study that seek to explain the economic and socio-political dynamics of regional integration programs.

Findings presented in Chapter III of this study suggests that the UEMOA has had no trade creating effects when considering the period of study in its entirety. The inclusion of the first case study concerning modernization levels across UEMOA membership relates to the fortunes, success or failure, of the first four objectives set forth in the charter.

Modernization issues are most directly linked to the fate of objective four, which seeks to promote the coordination of national sectoral policy for agriculture, environment, transport, infrastructure, telecommunications, human resources, energy, industry, mining and crafts. Where state modernization levels are scattered across a spectrum only those states with higher levels of modernization will be able to actively engage in regional participation. Low-end members on the other hand will experience frustration as regional integration fails to live up to its promise. This also underscores the value of regional project-based cooperation as a viable intermediary step to full economic integration as infrastructural coordination is part of UEMOA objective four. The satisfaction of this objective makes realization of objectives one through three more likely.

The second case study concerning regime type factors and levels of democracy across UEMOA membership concerns the fifth objective of the UEMOA charter. This goal to harmonize legislation across member States, particularly in the fiscal system, can

only be realized when UEMOA member states achieve a more homogenous level of democracy across the membership. While there is some significant variation in modernization levels across UEMOA membership, the fifth objective of harmonizing legislation is the one in the greatest danger of failing, as levels of democracy vary widely across membership. Senegal, for example, is among the most progressive of UEMOA member states in terms of regional politics. Togo, on the other hand, though nominally democratic, is the most authoritarian regime among UEMOA states.

The analysis of trade creation/diversion within the UEMOA is the focus of Chapter III of this study, and is accomplished by using a variation of the gravity model similar to the one employed by Musila in his 2005 study. The methodology employed in this section is discussed later in Chapter I and again in detail in Chapter III.

Chapter IV addresses the second question as to the political, social and economic determinants of successful regional economic integration. To accomplish this I use what I have termed issue studies, as each concept addressed is applied more broadly than the term case study would normally suggest. In this section, I have chosen economic modernization levels and regime type factors as the main issue studies. In the first, economic modernization levels, measured in terms of energy consumption per capita, are compared across the membership of the UEMOA and again to other RTAs both in the developed and developing world.

The second case study, concerning factors related to state regime type, is no stranger to the development and democratization literature. In this section state regime types are compared across the membership of the UEMOA and then compared to other RTAs both in the developed and developing world, in hopes that a pattern will emerge

indicating a preferential, if not ideal, level of democracy or other regime type most conducive to regional integration stimulated economic growth.

With respect to the analysis of comparative economic modernization the present study considers the following hypothesis:

H_1: The higher the average level of energy consumption per capita within an RTA the greater the degree of trade creation likely to be observed.

This hypothesis assumes that member states with higher and relatively equal levels of per capita energy consumption are more prepared to engage in trade and will thus benefit more from regional integration than pairings and groupings of states with dissimilar energy consumption statistics. This implies that the RTAs the member state economies of which perform or performed at roughly the same level prior to and during the agreement are more likely to experience the benefits of regional economic integration. Furthermore, this research recognizes that while economic modernization is represented here as a single score based on energy consumption, there are numerous factors that play into a state's modernization level. Some of these factors may be more or less represented in the energy consumption statistic, which is widely regarded as the most comprehensive of modernization measures. Therefore, this section also addresses and compares across memberships some other important sub-factors of economic modernization, the most important of which is infrastructural development.

The second case study addressed by this research deals with regime type and indirectly levels of democratization among members. This case study seeks to evaluate the hypothesis that:

H_2: States with higher regime type scores are more likely to engage in regional economic integration and cooperation than those with lower regime type scores.

Hypothesis two is observed by a simple scoring of state regime types within the UEMOA based on the data contained in the Polity IV Database. These results are then added to and subjected to the same gravity model analysis as in the previous to sections. The findings that result from that model suggest that regime type has a significant impact on the likelihood of states to trade, and the resulting economic growth. More importantly, it suggests that democratic regimes are more likely to reap the rewards of international trade than less democratic or autocratic regimes.

Naturally, these two hypotheses, plus the initial evaluation of UEMOA based trade creation/diversion call for the usage of several distinct methodologies. The first objective, analyzing trade creation, uses a variation of the gravity model of trade. The second objective, a comparative analysis of modernization levels within the UEMOA and other RTAs, uses energy consumption per capita as the barometer for evaluating state modernization.

The gravity model of trade has been used a means of measuring trade flows between two trading partners since its development by the Dutch economist Jan Tinbergen in 1962.[14] Based on the principles of the theory of gravity, the gravity model of trade in its simplest version relates the size of state economies to the distance between them. This model, however, has evolved to include other resistance (such as distance) and state (such as GDP) variables. Some of the other variables now associated with the gravity model of trade include the resistance variables of shared borders and language

[14] Jan Tinbergen, *Shaping the World Economy* (New York: The Twentieth Century, 1962).

affinity, as well as the state variable population. The relationship between state and resistance variables explained in detail in Chapter III.

The second objective of this thesis, which evaluates RTA effectiveness based on comparative levels of state economic modernization, utilizes two methods to draw conclusions. The first of these methods uses the standard indicator of economic modernization, energy consumption or electricity use per capita to measure modernization levels The analyses provided in these sections demonstrate that while regional integration may ultimately benefit developing countries in terms of economic development, it is not a sufficient force in and of itself. Rather, it shows that infrastructural improvement efforts, either state initiated or through regional cooperation programs may better serve the interests of economic development.

With respect to regional integration efforts, this study also demonstrates that the greater the economic homogeneity among RTA trading partners the greater the likelihood that that RTA will demonstrate trade creating results and economic growth development. With respect to democratization and levels of democracy across RTA membership, this research suggests that the more similar state levels of democracy are the more likely the RTA is to generate growth in member state economies. It also suggests that this phenomenon is stronger the greater the level of democracy within and among member states.

Chapter II
Literature Review

Regionalism represents the most recent strategy in a long series of efforts aimed at overcoming the developmental shortcomings of many of the world's poorest economies. Not only is regionalism among the most recent phenomenon seeking to address and improve the economic condition of LDCs, it is also among the strongest trends to date. Regional cooperation, integration and trade agreements continue to be codified at unprecedented rate, their numbers increasing dramatically during the 1990s and into the early years of the twenty-first century. Despite its popularity, however, the value of regionalism as a growth inducing strategy among LDCs remains hotly contested. This chapter highlights and identifies the salient details and seminal contributions to this discussion. Furthermore, it provides a picture of the conditions within the UEMOA, highlighting the successes and failures of economic progress during the pre-integration period.

Regionalism

Regional integration and cooperative agreements are well entrenched in the politics of Sub-Saharan Africa. Such agreements have been a part of the region's political and economic history since at least 1884, with the codification of the Congo Basin Treaty. In the ensuing century and beyond, Sub-Saharan Africa, and the continent as a whole, has grown to be home to numerous Regional Trade Agreements. Some of these accords, such as the South African Customs Union, which saw its genesis as the Customs Union Agreement in 1910, have experienced rebirth in recent decades; and the number of these agreements continues to grow. As Smith (2000) and the WTO remind

us, the more than thirty Regional Trade Agreements reported to the GATT/WTO between 1990-94 exceeds the number reported in any previous five-year period. [15]Moreover, as of 2002, the WTO reported more than 250 RTAs with no fewer than 130 having been created since 1995. The organization predicted that by the end of 2005 the number of RTAs would near 300.[16] Today, Africa is home to more RTAs than any other place in the world.

The debate over the wisdom and success of regionalism in Sub-Saharan Africa, however, is intense, and the discussion of this topic has resulted in a rapidly growing body of academic literature. Different sources of authority from both the policy making, institutional, and academic communities have all offered differing opinions on the wisdom and likelihood of success of these regional development programs. The Economic Commission of Africa for example is a proponent of regional integration programs suggesting that they "can help countries to diversify their economies and reverse deindustrialization and marginalization...and promote diversification and exports to regional markets that build experience before entering global markets."[17]

This final benefit suggested by the commission is somewhat contentious as proponents of the multilateral trading system and WTO argue that isolation from the global economy and the process of globalization is a faulty strategy that will only promote continued economic isolation and stagnation in the region. The debate between modern industrialized states and developing countries, however, is far from over. At the

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[15] James McCall Smith, "The Politics of Dispute Settlement Design: Explaining Legalism in Regional Trade Pacts" *International Organization* 54, no.1 pp137-180.
[16] World Trade Organization, WTO,
[17] Jacob Wanjala Musila, "The Intensity of Trade Creation and Trade Diversion in COMESA, ECCAS, and ECOWAS: A Comparative Analysis," *Journal of African Economies* 14, no.1 pp 117-141.

time that this study was prepared, Doha Round Negotiations in the WTO, which primarily concerned developing countries and developed countries agriculture subsidies, which the former views as detrimental to their participation in the global trading system collapsed with no solid resolution attained. While this debate is not the subject of this paper it is important to understand in terms of its influence as one of the driving forces behind regionalism in Africa, and the necessity of success for the development of member states.

The strength of and variation within the regionalism debate cannot be understated, as numerous well organized and orchestrated studies present contradictory evidence with regard to the phenomenon in general. On a more focused level studies examining regionalisms in different parts of the world or even different constituent members under similar circumstances often arrive at different results. For example, Prasad *et al* (2003) finds little evidence to support the notion that regional financial integration supports economic growth.[18] On the other hand, Collins (2004) suggests a strong relationship between integration and growth under certain conditions. Mansfield and Bronson (1997) suggest that regionalisms that are politically rather than economically motivated stand the greatest chance of increasing levels of trade and improving overall economic conditions of member states[19]. Radelet (1997) presents yet another view of regional integration in his suggestion that in order to be successful in achieving their own development goals LDCs, such as those in Sub-Saharan Africa should engage, first, in regional cooperation

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[18] E. Prasad, K. Rogoff, and M. Ayhan Kose, "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence," Internatioanal Monetary Fund Study (2003).

[19] Edward D. Mansfield and Rachel Bronson, "Alliances, Preferential Trading Arrangements, and International Trade," *American Political Science Review* 91, no. 1 (1997).

agreements and only later in actual integration programs. These theories and observations as to the efficacy of regional integration as a mechanism for growth in developing countries are discussed in greater detail below.

At this point, terminology becomes important. In the discussion of regionalism in Sub-Saharan Africa, or in any other part of the world, we speak of integration. Yet we also speak of increasing degrees of international financial integration when we discuss the concepts of globalization and global economic liberalism in general. In an increasingly globalized society the world is marked by increasing degrees of international financial integration. Therefore, it is necessary to be clear that while trade related regionalisms, in any part of the world, are always associated with integration, integration itself does not automatically correspond to the presence of a regional trade or preferential trade agreement. Prasad, et (2004) al aptly distinguish the concepts when applied on a global scale. They specify, "Financial globalization and financial integration are, in principle different concepts. Financial globalization is an aggregate concept that refers to rising global linkages through cross border financial flows. Financial integration refers to an individual country's linkages to international capital markets.[20]" This relationship holds true with respect to regionalism instead of globalization. In fact, the relationship between them is even deeper as many scholars contributing to an ever-growing body of literature have suggested that the rapidly increasing number of regional and preferential trade agreements, particularly among developing countries is a response to, or even rejection of, globalization itself.

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[20] E. Prasad, K. Rogoff, S.J. Wei, and M. Ayhan Kose, "Financial Globalization, Growth and Volatility in Developing Countries," International Monetary Fund (2004).

Nevertheless, it is important to differentiate between the two major indicators or classifications by which integration efforts and policies are measured. Collins (2004) identifies these as either *de jure* (policy based) or *de facto* (capital flow or practice based) indicators of integration.

While Collins (2005) maintains that considerations based on both *de jure* and *de facto* measurements of financial openness are important to consider, Prasad, et al (2004) suggest that when conducting cross country comparisons, even within the same region, the interpretation of *de jure* measurements is extremely difficult. Consequently, many extant studies, such as the present one, focus more explicitly on observations based on *de facto* measures of capital flow. The quantitative analysis employed in this study utilizes variables that measure actual results and practice rather than the policies supposedly responsible for initiating them. The reason for this is that analyses of integration based on *de jure* measurements may not accurately reflect the reality on the ground. A policy or program after all is only as good as its results. Prasad et al (2004) provide an example of this with respect to developing countries in both Latin America and Africa. Latin American countries, for example, score relatively poorly, with respect to *de jure* or policy based indicators of openness, but capture a high volume of the capital flowing across national borders into developing countries. Developing states in Africa on the other hand score comparatively higher than Latin American states with respect to *de jure* measurements, but the *de facto* reality of the matter reveals a far smaller percentage of developing country bound capital flowing into Africa.

This observation is echoed in the works of Collins (2004) and Quinn (1997) discussed below. This type of identification, then, and the identification of other terms

and conditions used to describe various regionalisms and integration efforts can help us better identify the exact nature of the RTA subject to the present discussion, the UEMOA. It does, however, suggest that other socio-political variables may be necessary to explain the vastly different experiences developing countries in Latin America and Africa. That discussion and comparison is beyond the scope of this paper, and the *de facto* reality of the situation in Africa remains an apt starting point.

We must then ask why the openness of and policies influencing capital flows are so central to the discussion of both regional and international economic integration and development. *De facto* measures supporting the free, or freer, flow of capital across international borders allow for a more efficient distribution of the elements of production and also the unimpeded flow of goods. Sustainable economic development, and indeed the smooth functioning of an economy in general, is dependent on this type of efficiency. Indeed, the third objective laid down in the charter of the UEMOA calls for the creation of "a common market for member states based on the free flow of people, goods, services and capital, the right of individuals to set up businesses within the area, a common external customs tariff and a common trade policy."[21]

Neither the necessity of economic efficiency for economic growth, nor strategies of economic integration as a means of achieving it are new concepts in history. A recent address (August 2006) given by U.S. Federal Reserve Chairman Benjamin Bernanke at the Federal Reserve Bank of Kansas City's Thirtieth Annual Economic Symposium, underscored this concept in his description of the workings of the economy of the Roman Empire. "Two-thousand years ago, the Romans unified their far-flung empire through an

[21] The Charter of the Union Économique et Monétaire Ouest Africaine is available at www.uemoa.int.

extensive transportation network, common language, legal system and currency...this unification promoted [increased levels of] trade and economic development."[22]

Globally speaking, international capital flows experienced a period of heightened activity during the 1990s. Perhaps what is most significant about this period of activity is that non-industrial/developing countries took part in the exchange (at the receiving end) at levels never before experienced (Birdsall & Suarez 2004). In spite of this flourish of activity, however, Sub-Saharan Africa remained largely isolated. During this period the entire continent of Africa received only 7.5% of capital flows destined for developing countries.[23] As a result, Sub-Saharan African states, such as those comprising the UEMOA have been faced by an even greater struggle to keep up with other developing countries and LDCs, located mainly in Asia and Latin America, to which greater amounts capital have been directed. It is this sense of isolation from the global economy that some observers have suggested has resulted in the strong push for regional integration in Africa in an attempt to create a form of collective bargaining seeking to strengthen the voice of developing countries in international economic negotiations in the WTO.

What makes matters worse is that the economies of these states have become increasingly closed to capital flows during the same period. Dennis Quinn (1997) has devised a methodology to score relative openness of an economy to foreign capital flows and FDI, and his results show Sub-Saharan African states growing more and more closed

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[22] United States Federal Reserve Board, "Remarks by Chairman Benjamin S. Bernanke At the Federal Reserve Bank of Kansas City's Thirtieth Annual Economic Symposium." Jackson Hole, Wyoming. August 25, 2006.

[23] Susan M. Collins "Comments on 'Financial Globalization, Growth, and Volatility in Developing Countries.'" Georgetown University and The Brookings Institution (2005).

during the latter half of the twentieth century. Throughout the course of the past four decades, Sub-Saharan states have scored consistently lower than any region of the world except for the Middle East, unfortunately for Africa, however, these states lack the natural commodity endowments, such as generous oil reserves that have allowed many Middle Eastern states, particularly those in the area of the Persian Gulf to self-sustain the strength of their economies.

Arguments pertaining to the flow of capital in either regional or global economic integration schemes represent only one part of the debate on regionalism. As mentioned above, significant disagreement exists as to the viability of regionally based integration programs themselves. As mentioned above, the Economic Commission of Africa has consistently been a proponent of regional integration among African States. Collins (2004) too supports the general notion of regionalization in Africa, but retains certain reservations. Collins (2004), Prasad et al (2003&2004) and Birdsall & Suarez (2004) all regard regionalism as a plausible, though not certain, vehicle for attaining economic growth and development. Birdsall[24] & Suarez (2004) go so far as to suggest that Africa has failed to take full advantage of the potential benefits of regional integration and that a more open and radical variety of regional integration is necessary to accomplish that aim. Radelet (1997) on the other hand presents a more pragmatic approach to regional integration in Africa suggesting cooperation before integration as the best path towards attaining sustainable economic growth and development in the region.

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[24] Nancy Birdsall is the founding president of the Center for Global Development in Washington D.C. Lillian Rojas-Suarez is a senior fellow at the center, as is Steven Radelet author of the 1997 study that presents an alternative view of regionalism in Sub-Saharan Africa. At the time the 1997 study was written Radelet served as an Associate at the Harvard Institute for International Development.

Regionalism, however, comes in differing varieties, and no two RTAs are identical. Naturally, support for regionalism, then, varies along with the nature of the program pursued. Radelet (1997) identifies four classic types of regionalism. These are free or preferential trade areas, customs unions, common markets and economic unions. Free, or preferential, trade areas are groupings of states in which member states "reduce or eliminate trade barriers between each other, while maintaining barriers for non-member countries." Customs unions take the preferential trade scheme one step farther as member states adopt a common external tariff towards non-members. A common market goes one step farther still by "reducing barriers to the movement of the factors of production," which include labor and capital. Lastly, economic unions exist when member states seek to "fully harmonize national economic policies, including exchange rate and monetary policies."[25] The UEMOA is an example of an economic union.

Beyond these forms of regionalism, Radelet identifies two additional forms of interest. These forms comprise what the author refers to as Regional Cooperative or Cooperation Agreements. A form of regionalism that Radelet views as a more viable mechanism for generating economic growth, and a good first step to precede other forms of regional integration discussed above. Regional cooperation agreements can come in two distinct forms, those agreements focusing on the harmonization of national policies, and those where participating states agree to pool resources for the creation of public goods, such as infrastructure, that serve the economic and trading needs of each participating state.

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[25] Radelet

Marco Ferroni (in Birdsall & Suarez 2004) suggests that regional public goods are particularly important with respect to developing countries. This need is clarified further in Chapter VI and Table 6.1. In these cases regional public goods include those goods and services "needed for development that neither the market nor national governments will provide [or be able to provide] in the absence of external assistance. These include regional health programs to control endemic diseases, coordination of transport infrastructure...and regional energy cooperation" (Birdsall & Suarez 2004). He suggests that existing and future regional development banks have a large role to play with respect to regional public goods.

Radelet, however, maintains that many African states, particularly those in Sub-Saharan Africa lack many of the qualities typically associated with successful regional integration and the realization of benefits in the form of economic growth. These factors include the level of intra-group trade prior to the establishment of the RTA (hereafter the pre-integration period); the level of tariffs during the pre-integration period; the smaller the elasticity of substitution; the aggregate economic mass of member states and the size of their share of global trade; the scope of sectoral coverage within the RTA, the costs of transportation and communication among member states; and, a history of relative political harmony among member states during the pre-integration period.[26] These concepts are defined in greater detail in the following paragraphs and applied to the case of UEMOA

The first qualification specified by Radelet is the level of intra-group trade among member states during the pre-integration period. This premise is based on the assumption

[26] Radelet

and observation that the stronger the level of trade that existed prior to the RTA, the less likely trade diversion will overshadow the benefits of trade creation (recall the definitions of trade creation and trade diversion provided in Chapter I: trade creation = welfare enhancing; trade diversion = increased potential for welfare depletion.). This is the case because the stronger the pre-integration trade ties, the less likely the RTA is to favor higher cost firms inside the membership contrary to economic efficiency. Trade creation favors and occurs where economic efficiency is allowed to flourish under the terms of the agreement. Where RTAs favor less than efficient policies and practices trade diversion is more likely to occur.

With respect to the member states of the UEMOA intra-group trading levels at the onset of the UEMOA trade regime in 1994 were strikingly low. Data used in this study indicate that in 1994 the value of intra-union exports were 0.001 ($U.S. 1995) for most dyads in the data set. Only Coté d'Ivoire, the state with the largest economic mass in the union, had consistently measurable exports to other UEMOA member states.

The second premise suggested by Radelet is that the higher the pre-integration tariffs between RTA member states the more likely the new agreement is to stimulate and create new trade within the member states. This essentially suggests that the greater the degree of economic liberalization at the onset of the agreement the greater the degree of trade creation likely to occur. Data presented later in this study support this position but suggest that while it may be a necessary component of RTA success, it is not in and of itself sufficient for sustainable economic growth within the confines of the agreement.

The third of the criteria mentioned above refers to the size of the elasticity of substitution[27] with the RTA member states. Elasticity of substitution is an economic principle that refers to the substitutability of products from one economy to those in another. As Radelet (1997) and Bhagwati (1992) observe if goods produced by member states in the new RTA are not close substitutes for goods produced by non-member trading partners, such as the ten additional states comprising the data set in this study, the more likely trade creation is to occur. Once again, the definitions of trade creation and diversion provided in Chapter I of this study serve to further explain the importance of the elasticity of substitution phenomenon. Because trade diversion occurs when member states switch from consumption of lower cost goods imported from outside the RTA to higher cost goods produced within the region, economic efficiency is minimized and the potential for gains resulting from trade creation are either lost or minimized.

The next qualification requiring examination in the context of this study is the aggregate economic mass of the member states comprising the UEMOA and their relative share of global trade. This concept is important as it sheds light on the not only the potential weaknesses of regional integration in the UEMOA but also on the potential weaknesses of regional integration as a means allowing developing countries community access into the global economy and multilateral trading system. It also highlights the relative successes and failures of RTAs of varying economic size, i.e. the experiences of the EU and APEC versus those RTAs comprised primarily or exclusively of developing countries. The rationale behind this purported qualification for successful (i.e. growth inducing) regional integration is that "the greater the scope for trade creation...the

[27] Specific values for CES (the coefficient of elasticity substitution) with respect to the economies comprising the UEMOA are not included in this study.

smaller the tendency for trade diversion (Langhammer, 1992, Robson, 1987, Radelet 1997). Essentially this argument too boils down to a question of efficiency. The more states included in a regional integration program (the larger its economic mass) the more likely the lowest cost producer of any given good is to be included within the scope of membership. The more likely the lowest cost producer is to be included in the RTA the less likely welfare depleting trade diversion is to occur. The problem with this criterion, where the UEMOA is concerned is the relative similarity among member states with respect to goods produced, as seven out of eight UEMOA states list agricultural products such as cotton, coffee and cocoa as major exports. Mali, Burkina Faso, and Niger are exporters of gold. Four states export petroleum-based products. The only state in the RTA with a totally unique export product is Niger, which exports Uranium ore. This high degree of similarity also limits the next criterion, which suggests that the broader the sectoral coverage, or the wider the range of industry present in the RTA, the more likely trade creation is to occur.

The states of Sub-Saharan Africa, including those comprising the UEMOA, are among the poorest national economies in the world. In his most recent book *Overcoming Stagnation in Aid-Dependent Countries,* Nicolas van de Welle addresses the failing economies of twenty-six low income states, and the inability of those states to respond to foreign aid. The twenty-six states in question, which the author identifies Stagnant Low Income States (SLIS), for their stagnant economic growth, though found in all corners of the world, and on nearly every continent, are most highly concentrated in Sub-Saharan Africa, with 20 of 26 states located there, making van de Welle's work particularly germane to my study of economic development and regional integration in that area. Of

the eight states comprising Le Union Économique et Monétaire Ouest Africaine (UEMOA) five states (Guinea-Bissau, Mali, Niger, Senegal and Togo) are identified as SLIS economies. The remaining UEMOA states, Benin, Burkina Faso, and Cote d'Ivoire, are not far from the SLIS threshold.

The factors used to classify states as SLIS economies are as follows. First, the state must have less than $500 GNI per capita. Second, the state should be able to be considered a non-war ravaged economy, as any economic development program would require peace first and foremost. Lastly, the state must have exhibited an average growth rate of less than 4.5 % per annum during the 1990's. This figure is less arbitrary than the other two, as a 4.5% growth rate combined with the average 2 % per annum growth in population is the minimum growth rate necessary to realize any increase in GDP.

In addition to addressing the degree of trade creation or diversion present in the UEMOA for the first nine years of its existence (1994-2002), the present study also uses two case studies to demonstrate the economic conditions and factors used to predict trade in the region. These case studies on economic modernization and regime type test the hypotheses put forth in Chapter I of this paper. The theoretical justifications for each and the supporting literature behind each case study issue are presented in Chapters IV and V.

Next, it has been suggested, that the lower the transportation and communication costs among RTA member states, the more likely the RTA is to be deemed successful in generating trade and economic development among members, This is sensible, because as suggested in Chapter I it is putting the cart before the horse to seek to expand trade before a means for doing so exists. This qualification also supports Radelet's (1997) argument that infrastructural-based cooperation agreements may serve as a better first

step for developing states in Sub-Saharan Africa. With respect to this premise, the infrastructural shortcomings of UEMOA member states are discussed with the results of this study.

In addition to the premises of the forms of regionalism identified by Radelet (1997), Birdsall & Suarez (2004) describe a more open and radical regionalism. The authors define this brand of regionalism as more aggressive, and driven to propel member states into the global economy, rather than to isolate them from it. C. Fred Bergsten of the Institute for International Economics has identified this form of regionalism as an attempt to "achieve compatibility between the explosion of regional trading agreements...and the global trading system as embodied in the World Trade Organization."[28] Part of this concept of radical regionalism includes the development of shared infrastructure within RTAs, a notion that suggests that though not radical or open regionalism; cooperative agreements may indeed be a viable first step as suggested by Radelet.

The remainder of this paper presents the quantitative analysis for trade creation or trade diversion in the UEMOA for the period of 1994-2002. The variables included in this study serve as an adequate means of testing the conditions described in the preceding pages. It also goes takes an additional step in examining the RTAs in the context of two additional variables, energy consumption per capita, and regime type.

[28] Fred C. Bergsten, "Working Paper 97-3: Open Regionalism" Washington D.C.: Institute for International Economics, 1997)

Chapter III
Methodology:
The Gravity Model and Results

This study employs several methodologies to demonstrate the dynamic range of factors influencing the success or failure of regional integration programs in generating trade and, consequently, economic growth within member state economies. These methods include a variation on the gravity model, similar to that used by Musila (2005), a comparative analysis of economic modernization based on energy consumption per capita, and an examination of regime-type factors, namely, levels of democracy, within the target RTA, UEMOA, and other regional integration programs around the world.

The gravity model, first developed by the Dutch economist Jan Tinbergen in the 1960s, serves as the primary methodology for this study, and it its results form the lens through which the remaining results are interpreted. Based on the principles of the Theory of Gravity as developed by Isaac Newton, the Gravity Model of Trade in its unaltered form seeks to predict the flow of trade between two economic entities. The primary components of the gravity model are the economic mass of entity (states *i* and *j* respectively), represented by the variable *M,* the distance between them, D_{ij}, and *G,* which represents a constant in the equation.

$$F_{ij} = G * \frac{M_i * M_j}{D_{ij}}$$

Operationalization of the gravity model in practice, however, often takes the form of the log linear equation that follows. This form allows the researcher to more easily identify, through positive or negative coefficients (β), which variables represent a greater benefit or hindrance to the flow of trade. "Typically, the log linear equation specifies that a flow from origin *i* to destination *j* can be explained by

$$PX_{ij} = \beta_0 (Y_i)^{\beta_1} (Y_j)^{\beta_2} (D_{ij})^{\beta_3} (A_{ij})^{\beta_4} u_{ij}$$

economic forces at the flow's origin, economic forces at the flow's destination, and economic forces either aiding or resisting the flow's movement from origin to destination."[29] In this standard variation of the model, which has been widely used in seminal contributions to the literature on a variety of trade related issues[30], the variable PX_{ij} represents the value of the trade flow expressed in U.S. dollars. For the purposes of the present study values are expressed in terms of 2004 U.S. dollars. The variable *Y* represents the value of the economic mass of each state expressed in terms of GDP. The variable *D* represents the distance between economic centers (often the capitol city) of each state. The variable *A* represents any other factor hypothesized to either aid or restrict the flow between states *i* and *j*. The remaining variable *u* is a log-normally distributed error term. This term, however, does not appear in all variations of the model.

While critics of the gravity model argue that it is too geographically or spatially oriented, placing emphasis on not only the size of economic entities, but also the distance between them, the very structure of the model presented above suggests that there are equally important variables to consider when analyzing trade flows. The inclusion of the variable *A*, which again represents any factor hypothesized to either aid or impede the flow of trade makes this model particularly apt for studying the dynamics of bilateral or regional trade. Consequently variations on the gravity model have come to a variety, and sometimes multiple variables in place of the standard variable *A*. Furthermore, the

[29] Jeffery H. Bergstrand, "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empiric Evidence," *The Re iew of Economics and Statistics* 67, no. 3 (1985).

[30] Major contributions using the gravity model include Poyhonen (1963), Pulliainen (1963), Geraci and Prewo (1977), Prewo (1978), and Abrams (1980).

model has been employed using additional variables to represent the economic mass of each state, the most common of which is population.

A simplified explanation of these variables divides them into two sets: state variables (S_{ij}) and resistance variables (R_{ij}). State variables include all factors contributing to the economic mass of the state, most commonly GDP (or GNP in some cases[31]), and population. The other set of variables are the resistance variables. These variables include all factors that either aid or impede the flow of trade between states.

$X_{ij} = f(S_{ij}, R_{ij})$ (Where X_{ij} represents the value of the trade flow from i to j)

Distance is always included as a resistance variable, but the set has also commonly included such variables as commonality of border, conflict, or any other factor a study seeks to examine. This study uses expanded versions of both state and resistance variable sets. In the present study set of state variables used includes both population (N) and nominal GDP (Y).

$$S_{ij} = [Y_i, Y_j, N_i, N_j]$$

Population estimates for this study, which were provided by the World Bank 2004 World Development Indicators and the U.S. Central Intelligence Agency, take into account the effects of excess mortality due to the extreme number of AIDS cases in the sub-Saharan African region. AIDS based excess mortality contributes to higher infant mortality and death rates, and changes in the distribution of population by age in ways not normally expected. The effects of AIDS may be numerous, as consequences of the

[31] The variation of the gravity model used by Musila (2005) uses GNP rather than GDP. It is also more likely that GNP will be a more valuable indicator of economic mass when the data set being analyzed includes more developed and/or industrialized countries.

epidemic, such as out of the ordinary age ratios within the population may have significant effects on the economic performance of the state as the most frequently afflicted individuals are those of working age. While this study does specifically focus on the economic consequences of such public health epidemics, it is noteworthy to mention it. There are, however, numerous studies which explore the nature of this relationship further.[32]

The resistance variables of distance, commonality of language, shared borders, and membership status is represented in

the following ways.

$$R_{ij} = [A_{ij}, D_{ij}, L_{ij}, U_{ij}]$$

A_{ij} is a dummy variable equal to 1 if countries *j and i* are adjacent to one another (or share a common border). D_{ij} is the variable that represents the distance in kilometers from the capital city of state *i* to the capital city of state *j*. The variable L_{ij} is the dummy variable for language affinity. L_{ij} equals one when both countries *(i and j)* share a common official language. All but one of the member states of the UEMOA share French as a common official language, Guinea-Bissau's official language is Portuguese, and that state is the only member of the union that was not once a colony of France. Morocco, despite holding Arabic as its official language is coded as 1 for language affinity with a majority of UEMOA member states, as French is the most prevalent language in the realm of business in the country. Otherwise, where states do share a common official language, the value of L_{ij} is zero. The variable *U* is the variable that codes for membership in the

[32] There are numerous studies conducted in the past several years that analyze the relationship between health (in many cases the AIDS epidemic) and economic development in Africa and elsewhere. See also Thomas and Straus (1998); Bloom and Sachs (1998); and Cuddington (1993).

UEMOA. It too is a dummy variable that is coded as one when a state is a UEMOA member, and zero when it is not. As the model evaluates both intra- and extra-union trade in terms of pairs of trading partners coding for this variable is either 1,0 for trade between a member state and a non-member state, or 1, 1 for trade between two UEMOA member states.

The resulting equation employed by this study is operationalized as follows:

$$X_{ij} = \beta(\log Y_i) + \beta(\log Y_j) + \beta(\log N_i) + \beta(\log N_j) + \beta(\log D_{ij}) + \beta A_{ij} + \beta L_{ij} + \beta U_{ij}$$

The data used in this portion of the study consist of 1,153 observations of trade among the UEMOA member states and nine randomly selected non-UEMOA states as trading partners. The UEMOA member states are Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The non-member states included in the study were chosen largely at random to create a representative sample of UEMOA member state trading partners across the globe. The states were selected from three groups, large trading partners, mid-range trading partners, and low-level trading partners. Three of the nine states selected were not chosen at random. These states are the United States, France and South Africa, each of which has been included in the non-member states included in this study due to its significance in either the global or regional economy. Any consideration of international trade would be amiss without inclusion of the United States in the data set due to that countries dominance in the global economy. Similarly, South Africa is included in the present data set due to its dominant position in the African continental economy. France is also granted automatic inclusion in consideration of its historic relationship with all but one of the UEMOA member states,

which were formerly colonial possessions of the European power. The remaining states included in the study are Morocco, Lebanon, Ghana, Brazil, and Turkey.

The import and export statistics for this study can be referenced in the IMF *Direction of Trade Statistics Yearbooks* for 2000 and 2005. Other major figures in the study, including nominal GDP and population were supplied by various publications of the World Bank and U.S. government. For the variables X_{ij}, GDP_i, GDP_j, N_i, and N_j the log of each was taken before the data was processed, and these numbers were used in the linear regression analysis. Some variables taken from the IMF *Direction of Trade Statistics Yearbook* were slightly altered when sufficient information was not available for the IMF to report. In these cases the Direction of Trade Statistics indicated that trade was either zero or less than one half of a significant digit (less than .005 million dollars). In these cases export figures (X_{ij}) were reported as .001. Data for this study was processed using SPSS.

Case Studies

In addition to the results of the gravity model test of trade creation/trade diversion, Chapter IV presents two subsequent issue studies that examine the data and the UEMOA in greater detail. The first issue study concerns the level of economic modernization within UEMOA member states. The second discusses regime-type factors influencing RTA performance. . The methodologies associated with these issues studies are presented in the following paragraphs.

The second portion of this study contains two issue case studies selected to illustrate the dynamic range of factors influencing the success of regional economic integration programs. The issues presented in these case studies concern levels of

economic modernization, measured in terms of energy consumption per capita, and regime-type factors, namely levels of democracy and democratization within the membership of the UEMOA. These case studies are used to support the hypotheses put forth in Chapter I of this study. The first two hypotheses restated below correspond to the case study on modernization. Hypotheses three and four relate to material presented in the regime-type/democratization case study. Quantitative methodologies used in the literature on modernization are frequently referred to in the sections below, but are not reproduced in the context of this paper.

H_1: RTAs in which the member states share a relatively equal level of energy consumption per capita are more likely to experience trade creation resulting from membership and subsequent economic growth and development.

H_2: The higher the average level of energy consumption per capita with an RTA the greater the degree of trade creation likely to observed.

H_3: States with higher regime-type scores are more likely to engage in regional economic integration and cooperation than those with lower regime type scores.

Results

Gravity model analysis of the data collected was performed in several phases. The first round of results stem from an analysis of the full data set measuring the net effects of UEMOA membership for the first nine years of its existence, 1994-2002. This analysis is based on 1,153 observations of bilateral trade conducted by member states. Supplemental rounds of analysis evaluate trade creation/trade diversion in the UEMOA for each of the years included in the period of study. Each individual year analysis is baaed on 129 observations of trade by trade by UEMOA member states.

The initial observation derived from the results of the gravity model test indicate that membership in the UEMOA has had no significant cumulative trade creating effect.

Trade creation resulting from membership is measured by the coefficient and significance of the U variable in the model. In the case of the 1994-2002 data set membership (U) returned a coefficient of -.007 with a significance of .853. These findings tell us that the cumulative effects of membership for this period actually resulted in negligible degree of trade diversion. While the coefficient of membership was far from significant at .853, this figure is still beneficial in terms of understanding the dynamics and effectiveness of the RTA. By examining not only the coefficients of the U variable, which tell us whether or not the years economic activity has been trade creating or trade diversion, the significance values tell us the degree to which trade creation or diversion ahs occurred. Furthermore, comparing the significance of the U variable to the significance levels of the other state and resistance variables included in the equation provides insight into the relative significance of membership as factor contributing to the flow of trade between and among UEMOA member states.

When evaluating the significance levels of each of the variables included in the model (GDP of states *i* and *j*, the population of each state, their distance from one another, commonality of border, and language affinity) the initial results show us that membership is the least significant factor included. The GDP of both the importing and exporting state displayed .000 significance, as did population of the exporting state, and the distance between themselves, indicating that these factors were the most influential of the included variables in terms of predicting UEMOA trade. The first of these two variables, GDP of each state pair, were the most influential factors supporting or aiding the flow of trade between states (whether both states were UEMOA members or not). Population of the exporting state and the distance between the states appear to be strong

factors inhibiting the flow of trade. This suggests that with respect to the UEMOA member states appearing in position *i* of each bilateral pairing that the greater the population of the exporting state (state *i*) the weaker the impetus to trade. While there is little available empirical evidence to support the argument that this inverse relationship between trade and population growth in the exporting state is to be expected, in the case of least developed countries (LDCs) and stagnant low income states (SLISs), such as many UEMOA members states it is nevertheless plausible. The observations made in other analyses of the economic behavior of the region, such as those made by Bloom and Sachs (1998), contribute to the credibility that this relationship does in fact exist.

Clearly there is a relationship between population and productivity, the latter of which strongly influences the material ability of a state to engage in trade. Sub-Saharan Africa, which includes the UEMOA, has experienced significant problems with each during recent decades. For much of the period considered in this study aggregate growth rates for Sub-Saharan Africa as a whole averaged –0.9 percent.[33] Furthermore, this region of the world boasts the world's highest youth dependency rates, highest fertility rates, and falling infant mortality rates. "High youth dependency ratios impose a substantial drag on African economies by reducing their productivity per capita...lower rates of savings and investment...and therefore slower economic growth."[34]

Results of this analysis also suggest that distance serves as a barrier of potential significance to the flow of trade. Language affinity, commonality of border and the

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[33] This period of negative economic growth throughout the region actually represented a slight improvement over the –1.2% regional economic growth rate experienced during the 1980's. Bloom, David E., and Jeffrey D. Sachs. (1998). "Geography, Demography, and Economic Growth in Africa." Harvard Institute for International Development. Harvard University.

[34] Bergstrand

population of the importing state, while important factors all appear less significant in the full 1994-2002 model.

TABLE 3.1: Coefficients Resulting from Gravity Model analysis of UEMOA Trade between 1994-2002.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.222	.622		-14.816	.000
	GDP State i	4.251	.209	1.053	20.360	.000
	GDP State J	.812	.088	.539	9.186	.000
	Population I	-3.431	.300	-.595	-11.432	.000
	Population J	.163	.147	.053	1.108	.268
	Distance	-1.738	.163	-.382	-10.693	.000
	Adjacency	-.210	.131	-.043	-1.607	.108
	Language Affinity	-.647	.100	-.175	-6.488	.000
	UEMOA Membership	-.027	.144	-.007	-.186	.853

a Dependent Variable: log Xij
b. Observations included in this model = 1,153

While the full 1994-2002 data set shows a negligible degree of trade diversion as the cumulative effect of membership for the period of study, analysis of individual years shows periods of both trade creation and trade diversion, some of which is more significant than others. A full view of the individual year analyses reveals two years of trade creation (1994 and 1995) followed by four years of trade diversion (1996-1999). During the year 2000 gravity model analysis reported neither trade creation nor trade diversion occurring with the UEMOA membership. The final two years of the study, 2001-2002, register mild degrees of trade creation for each. In each of the years examined, however, UEMOA membership, as identified by the U variable, is among the least significant of variables in the model in terms of its ability to predict to the flow of

trade between states, though its significance does vary widely from year to year. The full results of each of the models used in this study are available in the appendix following Chapter 6.

TABLE 3.2: Periods of Trade Creation and Trade Diversion in the UEMOA 1994-2002.

Full Data Set	---
1994*	+
1995	+
1996	---
1997	---
1998	---
1999**	---
2000+	+/--
2001	+
2002	+

+ = Period of trade creation (positive coefficient of the U variable)

-- = Period of trade diversion (negative coefficient of the U variable)

These indicators, plus or minus, do not mean to suggest economic growth or recession.

* 1994 represents the most significant period of trade creation displayed in the model
** 1999 results exhibited neither trade creation nor trade diversion with a coefficient of 0.00
+ 200 results demonstrate the most significant single year period of trade diversion in the model.

The significance of the U variable was at its greatest, .172 in 1994, the first year included in the study, when exhibiting trade creation among UEMOA membership. Of note, is the fact that this initial period of trade diversion, the most significant through the next nine years was followed immediately by the least significant period of trade creation in the model (sig. = .991). This brief period of trade creation was followed by five years of trade diversion. Ultimately however, periods of trade creation are less frequent in the study than are periods of trade diversion.[35] It is important to remember when reviewing these periods of trade creation and diversion to remember that the positive signs refer to trade creation, and the negative signs to trade diversion not to the effects of each on

[35] This includes the results for 2000 in which gravity model results show neither trade creation nor trade diversion occurring during that year.

economic growth. While trade creation is welfare enhancing one hundred percent of the time, as discussed in Chapter III, trade diversion does not necessarily correspond with a lack of economic growth. This is especially true when we consider the short-term effects of trade diversion.

It is possible that the trade creation exhibited in the 1994 results is due to little more than the exuberance in the business community associated with creation of the UEMOA. This is likely because the mid-1990s were an economically tumultuous time for the CFA countries and the member states of the UEMOA. The founding of the UEMOA also occurred on the heals of the 1993/1994 devaluation of the CFAF (Central African Franc) led by Coté d'Ivoire under pressure from the IMF. From the time of the devaluation till the year 2000 a majority of UEMOA member states experienced steady growth rates in their GDP. For example, the 1994 post-devaluation GDP of Burkina Faso, at the onset of the UEMOA agreement was $2.46 billion (1995 U.S.). Growth in the economy was relatively steady in Burkina Faso (and other UEMOA member states) throughout the late 1990s recessing only once in 1997. By 1999 its GDP was valued at $2.81 billion. The next year, however, the economy of Burkina Faso lost half of its growth over the previous five years contracting to $2.6 billion. The most significant periods of economic growth in terms of percent increase in GDP, however, occurred in the final two years of the period covered by this study, both of which demonstrate trade creation, but at extremely insignificant levels. This pattern of slow steady growth, with a recession appearing in 1997 followed by a stronger economic contraction in 2000 is present in each of the UEMOA member states. In each of these states the period of 2000-2001 is a stronger period of economic growth than the preceding five years.

The general picture that emerges is that periods of the study marked by trade diversion correspond with periods of slower economic growth and recession. Periods of trade creation, of which there are fewer, correspond to periods of greater levels of economic growth. However, the significance of trade creation and trade diversion resulting from membership is only minimally significant when its effects are at a maximum. The strongest period of trade creation recorded from the results of gravity model analysis had only a .172 significance; the strongest period of trade diversion recorded a significance level of only .307.

Throughout the model the population and GDP of the exporting state in each bilateral pair were the most significant of the variables included. In each of the ten analyses performed, these two variables consistently showed a perfect correlation (sig. = .000) with the intensity of trade flows.

Language affinity, which was included among the resistance variables in the data set was consistently significant in the trading relations displaying only minimal variations. Significance scores for language affinity (L_{ij}) was reported at .000 for the 1994-2002 pool data set. Significance scores for this variable in each of the individual year results ranged from .000 to .953 in 1994, leading us to believe that language affinity is not an adequate predictor of the propensity of states to trade. In most instances however, the significance of the language variable remained below .3.

The distance between the economic centers of each state (measured in kilometers) was also included among the resistance variables in the study (*Dij*). The distance variable was also consistently significant as an impediment to the flow of trade. With respect to the export preferences of the UEMOA member states, the coefficient of the

distance variable was negative in all cases indicated that the greater the distance between states the weaker the impetus to trade. In all cases observed, the significance of the distance variable was .25 or below. In most cases, however, the distance variable was .014 or below. Results for adjacency (A_{ij}) were inconsistent, ranging from significant to non-significant and from positive coefficients to negative coefficients.

The results of the gravity model analysis return an R-square value of 0.531 for the 1994-2002 data set, which suggests that the model is successful in explaining roughly fifty percent of the variation in the dependent variable X_{ij} based on the variables included Results of the analyses of individual years return R-square values ranging .238 (1994) -- .674 (2001) indicating that the model explains between 23 and 67 percent of the variation in exports based on the variables included in the study. While some important insights can be gleaned from the information presented in the results, the most important conclusion that can be drawn from the analysis thus far is that there are more important factors not included in this model that are explanatory factors for predicting the volume of trade between UEMOA member states.

TABLE 3.3: R-Square values and Model Summaries for Gravity Model Analyses of UEMOA 1994-2002 *

1994-2002

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729(a)	.531	.528	1.258

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log Ni, log GDPj

1995

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724(a)	.525	.493	1.401

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

1997

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698(a)	.487	.452	1.373

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

1999

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.755(a)	.570	.541	1.192

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

2001

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821(a)	.674	.651	.961326348608901

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni

* R-Square values and the full results of each model tested are available in the appendix of this thesis.

Consequently, this study concludes from theses results that the membership is not a sufficient factor for generating trade and economic growth in UEMOA member states. Accepting this premise as true, we must look next to other variables that will better explain the impetus and ability of states to trade. The following two chapters address two different case studies that attempt to do just that. The first case study examines the

modernization levels of the UEMOA member states in terms of their energy consumption per capita statistics. The second evaluates the economic performance of UEMOA member states according to regime-type factors that may highly influence the effectiveness of trade and thus economic growth with in the UEMOA.

Chapter IV
Energy Consumption and Modernization In the UEMOA

Preceding chapters of this study have focused on the significance of membership in the UEMOA as a factor influencing trade-based economic growth or trade creation in the region. The results of the gravity model analysis described in Chapter III suggested that membership was not a significant or driving force in the generation of trade flows between and among member states. Furthermore, these results suggested that trade the level of trade created during the nine year period observed was minimal.

On the other hand, the analysis suggests that other variables included in the model are far more convincing in explaining the flow of trade originating from UEMOA states. These variables are found in both the state and resistance categories of the model and include such factors as GDP, distance, as well as adjacency. For the purposes of this chapter, however, I focus on the role of GDP and a correlated variable: economic modernization.

In each year observed in the study (1994-2002), GDP remained the most reliable predictor of both intra-regional and extra-regional trade. The significance of GDP*i,* which corresponds to the exporting state in each dyad, was .000 in all years observed. The significance of the variable GDP*j*, which corresponds to the GDP of the importing state in each dyad was also significant in all years included in the study, and ranged from .000 to .104.

The significance of these variables in the model is not surprising, however other variables, both from the state and resistance categories were also reported as variables far more significant than membership in the RTA. This leads us to believe that in this instance, despite its prevalence as a growth strategy, regional integration alone is not

sufficient to generate economic growth and development in the region. However, while regionally based strategies remain a popular means for promoting economic growth in Africa, it is necessary to take the present analysis one step further to ask not only if these types of agreements succeed in generating economic growth, but also what steps can be taken to improve the likelihood of their success.

To do this, the remainder of this study looks beyond, or below, the condition of membership in the UEMOA, and instead focuses on the conditions of individual member states that influence their willingness and capability to engage in both intra-regional and extra-regional trade.

This chapter presents an analysis of state modernization levels within the membership of the UEMOA and compares them to growth levels attained during the period of study. For the purposes of this study, modernization relates to the capabilities of states to trade in both the global economy as well as within the confines of the RTA. I identify energy consumption as the most informative and effective way of measuring this capability. Energy consumption, or more specifically energy consumption per capita, (ENCON/PC), serves as a measure of the level of economic modernization within a state or society.

This indicator was first used by Levy (1966), who explains the significance of this measure best in the observation that "modernization hinges on the uses of inanimate sources of power and the use of machine tools to multiply the effects of effort." A society then is more or less modern based on the amount of energy that its members consume.[36] This conception of modernization implicitly relates to the level of an economy's

[36] Marion Levy, "Modernization and the Structure of Societies," in *Organizational Contexts of Soceities* (New York: Transaction Publishers, 1996).

industrial and infrastructural development. The more complex the latter, the more likely a society is to have higher levels of energy consumption and thus, according to Levy, a greater degree of modernization. This concept of modernization, which examines only the kilowatt-hour consumption per capita rather than the outcomes to which that consumption is directed, minimizes, by its nature, problems of cultural judgment, as any sense of a prescription for energy use is not included.

Energy consumption statistics and energy prices have been frequently studied in terms of their relationship to economic growth. In many instances income levels and employment figures are used as proxy figures for economic growth.[37] This study however uses trade and GDP as variables representing economic growth. Regardless of the scope of the inquiry, however, the dynamics of this relationship remain a subject of intense scrutiny among economists. Asafu-Adjaye (2000) suggests that this is because of the variety of methodologies from which existing conclusions have been drawn. For example, recent research involving energy consumption statistics has suggested bidirectional causality between energy and GDP, while others have suggested no causality from GDP to energy. Others still have reported unidirectional causality from energy to economic growth.[38] The conclusions of Asafu-Adjaye suggest that the direction and nature of the causality (unidirectional from energy to growth, or bidirectional between variables) varies on a state-by-state basis.

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[37] John Asafu-Adjaye,"Energy Consumption, Energy Prices, and Economic Growth: Time Series Evidence from Asian Developing Countries," *Energy Economics.* 22,

[38] Asufu-Adjaye, and Yong Glasure and A.R. Lee "Cointegration, Error-correction, and the Relationship between GDP and energy: The case of South Korea and Singapore." *Resource and Energy Economics.* Vol. 20, (1997).

The analysis of modernization, measured in terms of energy consumption, helps to explain the reported coefficients of such resistance variables as distance and adjacency, both of which were reported among the more significant variables included in the gravity model analysis, especially with respect to the observed significance of UEMOA membership. This is because of two readily observable facets of the modernization variable. First, states with stronger industrial complexes are likely to consume more energy and generate more output. Second, states with more developed infrastructures, most notably transportation infrastructures, are likely to consume more energy and posses a greater capability to engage in trade. Though closely related, it is the second of these explanations that explains the significance of the distance and adjacency variables, as developments in infrastructural capability are likely to correspond to a decrease in the degree to which distance is an impediment to trade. In the results of the gravity model analysis discussed in Chapter III the coefficient of the distance variable was -0.382, the negative coefficient indicating that the variable served as an impediment to trade during the period of study. The distance variable also attained a significance of .000 in the pooled data set examining all years of this study. This information is also presented in the appendix of this study.

In other words, energy consumption serves as a potential indicator of the degree to which the distance between states or their economic centers will be an impediment to trade. Additionally, and in the same manner, energy consumption serves as a predictor of the degree to which a state is capable of engaging in international trade. The natural, and reasonable, expectation is that states with higher levels of modernization trade at higher levels and therefore will reap greater rewards through integration. This analysis is

important, however, as it relates to an important aspect of the debate over the value and wisdom of regional integration.

Africa occupies a unique place in the global energy equation. It's role as a major exporter of energy juxtaposed against its low rank as an energy consumer seems in many ways contradictory. All of Africa's regions are net exporters of energy, west Africa contributing to petroleum and petroleum processing to many other parts of the world. On the other hand, the entire continent of Africa accounts for only three percent of global energy consumption.[39]

This section of the study proceeds based on two hypotheses identified in Chapter I. The first assumption is that the higher the average level of energy consumption per capita within a state the greater the degree of trade creation likely to be observed through membership in the RTA.

The first step in evaluating the hypothesis is to determine the significance of ENCON/PC relative to the existing data. To accomplish this, I repeat the gravity model analysis from the previous chapter twice, using energy consumption statistics obtained from the International Atomic Energy Agency (IAEA).[40] The first time the ENCON/PC variable is added to the set of resistance variables already included in the model. The second time the ENCON/PC variable replaces the U variable for UEMOA membership.

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[39] UNECA: "Harnessing Energy for Development" www.uneca.org/awich/AWDR%202006/ Harnessing%20Energy%20for%20Development.pdf

[40] IAEA statistics express energy consumption per capita in terms of Kilowatt/hour or equivalent of consumption. Other sources for energy consumption statistics express the value in terms of Kg of oil or equivalent. However, these statistics were not included in the data used in this study.

Reliable ENCON/PC figures are not available for all UEMOA member states, which somewhat limits the findings of this case study.[41]

Gravity Model Analysis with ENCON/PC

Initial observation of the gravity model test including the ENCON/PC data shows a distinct difference in the R-square values. The R-square value for the primary gravity test reported in the previous chapter was .531, while the R-square values for the ENCON/PC test rose to .611 where UEMOA membership was included and .601 in cases omitting the U variable. This increase is normal due to the increase in the number of variables included in the model, thus indicating the need to consider the individual results assigned to each variable more carefully.

TABLE 4.1: Results of gravity analysis of ENCON/PC with and without UEMOA Membership (Model Summaries)

Model Summary A: ENCON/PC with UEMOA Membership Variable

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782(a)	.611	.494	.602429442296836

Model Summary B: ENCON/PC variable with U variable omitted

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.775(a)	.601	.496	.601070489732951

Model A: Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log U, log Dij, log Nj, log ENCONi, log GDPj, log Ni
Model B: Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log Dij, log Nj, log ENCONi, log GDPj, log Ni

[41] Guinea-Bissau and Togo are not included in the ENCON/PC data set, as reliable energy consumption statistics are not presently available for those states.

The most important result of both models (U variable included and U variable omitted) was the significance of the energy consumption variable for the exporting country *i*. In the *U* variable included model the significance of ENCON/PC$_i$ was 0.087; in the *U* variable omitted model the significance of ENCON/PC$_i$ was 0.085. The only other largely significant variable was distance (sig.=0.003), which also retained its negative coefficient indicating its function as an impediment to the flow of trade.

The most important result of both of these models stems from the changes in the significance of the GDP variables for both states *i* and *j*, and the lessons we can glean from those changes. In the original gravity model results of Chapter III, GDP for both states in each bilateral pair was highly significant. In the ENCON/PC variation of the model, the significance of GDP variables fell to between .500 and .600 depending on which of the two models considered. This change in significance relates to the bidirectional causality between energy and GDP explained by Asafu-Adjaye (2000) and Glasure and Lee (1997). In the present model, the two variables are highly correlated as well. Table 4.2 below displays the correlation analysis between ENCON/PC and GDP; Table 4.3 displays the coefficients for each of the models included in this portion of the study.

TABLE 4.2: Pearson Correlation Values for ENCON/PC and GDP in UEMOA states.

	GDP$_i$	GDP$_j$	ENCON$_i$	ENCON$_j$
GDP$_i$	1.00	.000	.985	-.001
GDP$_j$	.000	1.00	.000	.896
ENCON$_i$	.985	.000	1.00	-.001
ENCON$_j$	-.001	.896	-.001	1.00

*Shaded cells indicate instances of a strong positive correlation between the coefficients of ENCON/PC and GDP for states *i* and *j*.
States i and j refer to the exporting or importing state respectively for each pair of states.

Table 4.3: Coefficients for gravity analysis of ENCON/PC with and without UEMOA membership.

Model A Coefficients:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-15.293	19.626		-.779	.441
	GDP State i	-3.718	6.080	-1.535	-.612	.545
	GDP State J	.204	.419	.278	.488	.629
	Population I	6.764	10.696	1.641	.632	.531
	Population J	-.368	.601	-.222	-.612	.544
	Distance	-1.206	.388	-.661	-3.111	.004
	Adjacency	.434	.568	.108	.765	.450
	Language Affinity	-.251	.308	-.149	-.813	.422
	UEMOA Membership	.324	.352	.172	.920	.364
	Energy Consumption State I	9.582	5.426	.531	1.766	.087
	Energy Consumption s State J	.688	.678	.402	1.015	.317

a Dependent Variable: log Xij = exports from state I to state j in each state pair.
b. In each state pair State I is the exporter to state J.
c.. Observations included in this model = 1,153.

Model B Coefficients:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-15.630	19.578		-.798	.430
	GDP State i	-3.601	6.065	-1.486	-.594	.557
	GDP State J	.265	.413	.360	.642	.525
	Population I	6.569	10.670	1.593	.616	.542
	Population J	-.272	.590	-.165	-.461	.648
	Distance	-1.235	.385	-.677	-3.205	.003
	Adjacency	.515	.560	.128	.920	.364
	Language Affinity	-.151	.288	-.090	-.524	.603
	Energy Consumption State I	9.607	5.414	.533	1.775	.085
	Energy Consumption s State J	.620	.672	.362	.922	.363

a Dependent Variable: log Xij

Because of the strong positive association between energy consumption and GDP, we are unable to rely on this portion of the analysis to support the hypotheses proposed. While the analysis supports the idea that energy consumption plays an important part in the trade equation, we must consider other sources and data. In light of this fact, I use a more simple approach to examine the nature of the relationship between energy consumption and trade in the UEMOA.

The hypothesis offered in this chapter suggests that the higher the average level of energy consumption per capita within a state, the greater the intensity of trade creation is likely to be. The results of the initial gravity model analysis indicated that there was no overall trade creation observed in the UEMOA for the years 1994-2002, yet several of the individual states comprising the union experienced significant periods of increased trade and economic growth during the period of study.

Thus, the next step in this analysis of the UEMOA is to compare those growth individual state growth rates with the energy consumption levels of member states.

Table 4.4: Energy Consumption Values for selected UEMOA member states 2000-2002

State	2000	2001	2002
Benin	1140.01	1109.44	1156.16
Burkina Faso	408.08	405.3	403.6
Coté d'Ivoire	2434.14	1977.73	1950.56
Mali	258.71	274.19	317.7
Niger	413.76	402.93	401.26
Senegal	1964.29	1913.69	1859.57

*energy consumption values are presented in terms of kilowatt hours per capita.

Table 4.4 presents energy consumption figures for four UEMOA member states expressed in kilograms of oil (or equivalent) consumed per person per year. Comparing

these figures to the growth rates of these states, then, should paint a clearer picture of the relationship in question. These results are presented in table 4.5.

These results appear to fail to support the hypothesis that higher energy consumption levels correspond to higher levels of trade creation and ensuing economic growth. Coté d'Ivoire, for example, which boasts the highest level of energy consumption (and highest GDP) in the region experienced the lowest level of growth in this sampling of UEMOA member states. However, subsequent analysis indicates that other variables are overshadowing the relationship in question. That variable is regime type and stability, discussed in detail in the following chapter. Regime scores based on the Polity IV database are provided in Table 5.1 in Chapter V of this study. When we consider regime stability, we find that Benin, the most stable UEMOA government not only in this sampling, but also in the 1994-2002 period in its entirety, has both the highest level of energy consumption and strongest growth record observed.

Table 4.5: Growth* and Energy Consumption for selected UEMOA member states 2000-2002

2000

State	ENCON/PC	Growth Rate
Benin	1140.01	4.9%
Burkina Faso	408.08	2.2%
Coté d'Ivoire	2434.14	-2.3%
Mali	258.71	-3.2%
Niger	413.76	-0.3%
Senegal	1964.29	5.6%

2001

State	ENCON/PC	Growth Rate
Benin	1109.44	6.2%
Burkina Faso	405.3	6.8%
Coté d'Ivoire	1977.73	.1%
Mali	274.19	11.8%**
Niger	402.93	5.8%
Senegal	1913.69	5.6%

2002

State	ENCON/PC	Growth Rate
Benin	1156.16	4.4%
Burkina Faso	403.6	4.6%
Coté d'Ivoire	1950.56	-1.6%
Mali	317.7	4.3%
Niger	401.26	5.8%
Senegal	1859.57	1.1%

*Growth or Growth rate refers to the percent change in GDP from the previous year.
**The 11.8% growth rate in Mali is exceptional within the confines of the study and not adequately explained by any of the included variables.

Considering energy consumption alone, however, we cannot support the hypothesis that higher levels of energy consumption correspond with higher levels of trade creation and economic growth. This failure is further confirmed by gravity analysis of individual states in the UEMOA. These results, reported in Appendix C, show an average adjusted R^2 value around .300, far less than the value returned in other data sets used in this study. More importantly, these results suggest that energy consumption is a consistently insignificant variable in predicting changes in GDP or growth.

Chapter V
Case Study II: Regime Type and Trade in UEMOA

Scholars have consistently attempted to link democratization with economic growth and development. This endeavor, like the case study relating energy consumption and growth, has suggested nearly every possible direction of causality. Some suggest that economic development fosters greater levels of democracy. Others suggest that the presence of democratic institutions themselves is the prerequisite for economic growth and development.

The discussion of this relationship is far from new. In fact, our thinking about the relationship between democracy and economic development has evolved considerably and consistently during the course of the past two hundred years. Weber[42] believed that Protestantism, and its stereotypical work ethic, was prerequisite for democratic governance. Soboul and Moore believed that a strong middle class and bourgeoisie were necessary, as did Karl Marx. De Tocqueville, on the other hand, maintained that a vibrant civil society was necessary for democracy to be attained.[43]

Arat (1988) suggests that we now associate democratic governance (when truly effective) with a certain degree of capitalist industrialization, an economic and social condition that arguably arises out of the ideas put forth by previous scholars. Arat's suggestion that capitalist industrialization, to one degree or another is a prerequisite for democracy and democratization indicates that in her hypothesis economic development,

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[42] Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (New York: Rutledge, 1992).
[43] Alexis de Tocqueville, *Democracy in America* (New York: Library of America, 2004).

for which capitalist industrialization represents a proxy variable, is a prerequisite for democratization.

Arat suggests that this relationship seems to be curvilinear, however, rather than linear, as increases in the level of capitalist industrialization do not always result in a proportional increase in the level of democracy. This is truer in states and instances where a high level of both democracy and capitalist industrialization already exist, such as the United States. However, in the case of the economies of the UEMOA both the level of economic development and level of democracy should be at the point where the relationship appears to be more linear than curvilinear. This means that given the level of economic development at which we find UEMOA member states an increase in the democracy variable should result in a stronger increase in the development variable than in more advanced or developed economies.

This case study evaluates democratization and regional development in the UEMOA by examining trade in the UEMOA in the context of member states' level of democratization. The regime score assigned to each nation represents the level of democratization. The data used to calculate the regime type score of each UEMOA member state comes from the Polity IV database. Each regime type is represented by a value ranging from -10 to +10. A score of -10 represents the most autocratic regime; a score of +10 represents the most democratic regime. These scores are derived from a calculation consisting of a states democracy value and autocracy value. Each state in the data set is assigned a democracy score, ranging from 0 to 10 and an autocracy score ranging from 0 to -10. Subtracting the autocracy score from the democracy score yields

the total regime score for the state. Table 5.1 below provides the regime scores for each of the UEMOA member states.

Table 5.1: Regime Scores for UEMOA member states 1994-2002

	1994	1995	1996	1997	1998	1999	2000	2001	2002
State									
Benin	6	6	6	6	6	6	6	6	6
Burkina Faso	-5	-5	-5	-4	-4	-4	-3	-2	-2
Coté D'Ivoire	-6	-6	-6	-6	-6	-88	1	1	-77
Guinea-Bissau	5	5	5	5	-77	-88	5	5	5
Mali	7	7	7	6	6	6	6	6	6
Niger	8	-6	-6	-6	4	4	4	4	4
Senegal	-1	-1	-1	-1	-1	-1	8	8	8
Togo	-3	-3	-3	-3	-3	-3	-3	-3	-3

Source: Polity IV Database.

This case study uses the value of trade flows and the resultant increase in GDP as a proxy for economic development. It evaluates the relationship between democracy and economic performance in terms of the levels of democracy present within UEMOA member states. To accomplish this task this study once again utilizes a variation on the gravity model. In the same manner as in Chapter IV, regime scores for each state included in the study are added to the data set, and the gravity test is performed twice more. The first test includes the all of the standard resistance variables: distance, adjacency, language affinity, and membership, as well as the regime scores for each state. The second test includes all of the resistance variables, including regime score, however, the membership variable, U, is omitted from the model.

The values presented in table 5.1 above indicate the wide variety of regime ratings present in the UEMOA member states during the period of the study. During this nine-

year period, UEMOA member states experienced two transitional periods, one in Coté d'Ivoire and one in Guinea-Bissau, and two interregnum periods in the same states. Of the eight UEMOA member states, Benin was consistently the most democratic, maintaining a regime score of six throughout the period of study. Conversely, Togo was consistently the most autocratic state with a regime score of -3 throughout the period of study. Niger, Burkina Faso, and Coté d'Ivoire scored as being more autocratic than Togo, but each of these states experienced significant regime transitions during the period of study. The greatest transition occurred in Niger, which ranked strongly democratic in 1994 and significantly autocratic for the period of 1995-1997. Niger transitioned again in 1998 back to a democratic value, however its score of four through remainder of the time period never returned to its pre-1995 levels.

Senegal also experienced changes in the rating of its political regime. From 1994 to 1999 it scored a one on the autocracy scale. In 2000, however, that score rose to an eight. Major changes are also observed in Burkina Faso, which scored consistently in the autocratic range, but the degree of autocracy present in that regime decreased consistently during the period of study. Its 1994 score of five fell to two by 2001.

Gravity model analysis of all variables, membership and regime score included, reveal only a slight increase in the value of R-square and adjusted R-square. The regime type analysis returned an adjusted R-square value of .531 compared to a value of .528 for the full 1994-2002 data set discussed in Chapter III. The difference in these adjusted R-square values suggests that the inclusion of the regime score variable in the model is successful in explaining only four percent more of the variation in the dependent variable. The variation in the standard R-Square values, however, is also equivalent to a five

percent difference (.536 in the regime model and .531 in the original model). This tells us that that it is not likely that the additional variation explained is neither caused by chance nor is it highly correlated with another variable included in the data set.

Table 5.2: Gravity Model Results for analysis of Regime Type in the UEMOA 1994-2002 (membership variable included)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732(a)	.536	.532	1.258

a Predictors: (Constant), log Lij, Reg. I, Reg. J, log GDPi, log Aij, log GDPj, log Dij, log Ni, log Nj, log U

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.099	.610		-14.904	.000
	Regime Score I	-.003	.002	-.034	-1.631	.103
	Regime Score J	.004	.002	.047	1.862	.063
	GDP I	4.166	.213	1.037	19.605	.000
	GDP J	.838	.085	.554	9.867	.000
	Population State I	-3.300	.305	-.574	-10.813	.000
	Population State J	.001	.167	.000	.007	.994
	Distance	-1.701	.168	-.371	-10.145	.000
	Adjacency	-.187	.130	-.038	-1.433	.152
	Language Affinity	-.650	.091	-.175	-7.159	.000

a Dependent Variable: log Xij

b. State I is the exporting state in each dyad. State J is the importing state receiving shipments from state I.

Both of these models indicate that regime score is a significant variable in the UEMOA model. The regime score of the recipient or importing state in each pairing is found to be of greater significance. Its significance value of .063 is among the lowest (most significant) levels in all of the models included in this study, excepting GDP and Population. It is consistently more important a variable than either membership or energy consumption. The model also indicates that the regime score of the exporting state (state

i) is important though not as significant as that of the importing state. The coefficient of the regime score for state i, however, is negative indicating that at present the regimes of the UEMOA may in fact be acting as an impediment to trade. This result in the model is attributable to both the high percentage of UEMOA member states exhibiting autocratic regimes, and even more importantly the high frequency of either transitional regimes or interregnum periods during the years included in this study.

The hypotheses applied to this section suggest that states with similar regime-types are more likely to engage in regional economic integration and cooperation than those without; and that states with higher regime scores, indicating higher levels of democratization, are more likely to experience greater rewards from economic integration. The results of the gravity model analysis seem to support these hypotheses. This claim can be supported via the inferences we can make from the results presented above.

As discussed briefly in the preceding paragraphs the negative coefficient for the regime score of states in the "I" position indicate that the regime types of those states are acting as a barrier to furthered levels of trade. This is because in any given year during 1994-2002 half of the UEMOA member states (or four of eight) will have either authoritarian regimes (represented by a negative number) or transitional regimes (also represented by a negative number). In two instances there are UEMOA member states with no ruling government whatsoever. The coefficient of the regime score for state J, however, is positive indicating that with respect to the states included in the data set the regime score of state J is a factor aiding the flow of trade between states. States in this category include all of the UEMOA member states as well as the non-member states

randomly selected for inclusion in the study. While these states have a wide variety of regime type scores in both the democratic and autocratic ranges, those states that are democratic have a higher regime scores than the democracies within the UEMOA. Italy, the United States and France all have regime scores in the 9-10 point range. This fact combined with the strong coefficient and high significance of the regime type of the importing states (states J) indicates that states with higher regime scores, indicating higher levels of democratization, are more likely to experience greater rewards from economic integration, as experienced through trade. There is little evidence, however, to support the other hypothesis in this section that states with more similar regime types are more likely to experience the benefits of regional integration.

Chapter VI
Conclusions

The economic growth and development of Africa, particularly sub-Saharan Africa, has proven enigmatic when compared to the course taken by developing countries in other parts of the world. Langhammer and Hiemenz (1990) referred to the notion that the same path and lessons that applied to the growth and development of now modern industrial states should apply to currently developing ones as the "fallacy of transposition."

This, however, is anything but true. Growth in this region, for instance, has been consistently slower than in other parts of the world. More importantly, many of the relationships between factors such as democratization, modernization, foreign aid and others have all failed to perform as expected, or as they had in other parts of the world when employed or experienced in the developing countries of Africa. Recently, regional cooperation and integration have been a popular trend in the growth and development strategies of this region. More regional and preferential trade areas, monetary unions and customs unions exist in Africa than in any other part of the world.

This study reveals that among the dynamics affecting the performance of the UEMOA, and perhaps of similarly structured RTAs, modernization (energy consumption levels) and regime type (democracy) are important factors contributing to the relative success of development-oriented programs. From these findings we can divine both policy and social implications for UEMOA member states. First and foremost the path toward democratization must be adhered to. The track record of UEMOA member states in this category is mixed. Half of UEMOA member states have seen relative success in abandoning authoritarian rule in favor of democracy. The other half, however, remains

solidly autocratic, or even worse in a state of anarchy or baseless transitional rule. The results of this study suggest that the presence of democratic institutions is a strong indicator of increased levels of trade and consequently GDP growth.

Furthermore, this study shines additional light on the qualifications of successful regionalism suggested by Radelet (1997). Though this study does not include a specific sector by sector analysis of the exports of UEMOA member states, it does support the notion that the broader the sectoral coverage within the membership the more likely the RTA is to experience trade creation rather than trade diversion. We know, and have known since the beginning of this study that degree of similarity in the export products of UEMOA member states is strikingly similar. Most, seven of eight, UEMOA member states have their major exports in the agricultural sector, with most of them overlapping in the export of agricultural products such as cotton and coffee. This also bodes poorly for successful regional integration and growth in terms of the elasticity of substitution among member states. With such a high degree of similarity within the union, it is increasingly likely that the rules and preferences of the RTA will force the union to rely on higher cost producers within the membership thus resulting in trade diversion.

Transportation and Communication costs, which should be made as low as possible in order for regionalisms, such as the UEMOA to realize their greatest potential, are also problematic in this region. Data obtained in the results of the trade creation/trade diversion gravity analysis support this finding as the coefficient for the D (Distance) variable is consistently negative, indicating that distance has an adverse effect on the volume of exports originating in UEMOA states, even when those states are neighboring countries, as is the case for intra-union trade. The specific values of the coefficients for

distance are found in the appendix of this study, and table 6.1 indicates the infrastructural shortcomings of the UEMOA members. These figures support both Radelet and Birdsall & Suarez in their suggestions that either regional cooperative agreements intending to promote the construction of regional public goods, or a more radical approach of open regionalism, which promotes a similar goal are needed before true development can occur.

Table 6.1: Infrastructural Figures for UEMOA Member States

State	Kilometers of Roadways	% Of Roadways Paved	Number of Airports	Airports with Paved Runways
Benin	16,000	9.75	5	1
Burkina Faso	12,506	16.1	34	2
Coté d'Ivoire	80,000	8.1	35	7
Guinea-Bissau*	4,400	10.3	28	3
Mali	15,100	12	29	9
Niger	10,100	7.9	28	9
Senegal*	13,576	29.2	20	9
Togo	7,520	31.6	9	2

Source: U.S. Central Intelligence Agency World Factbook 2005
* Both Guinea-Bissau and Senegal have major port cities on the Atlantic Ocean as well.

This thesis is successfully demonstrates that while a popular strategy among the developing states of Sub-Saharan Africa, regional integration is not necessarily a sufficient strategy for promoting growth and development in member states. Rather it suggests that regionalism can be successful in stimulating growth and development when states take action to improve their political systems and raise their levels of performance in terms of modernization.

The results of this study show that for the period of 1994-2002 the UEMOA experienced a slight degree of trade diversion, a process by which member states switch from the consumption of lower cost goods imported from outside the RTA to higher cost

goods produced within the region. Within regional trade agreements these goods face lower tariffs after integration. Trade diversion, then, is generally welfare reducing, the loss resulting trade diversion stems from the reduction in government revenue as imports from outside the region (with high tariffs) are replaced by imports from within the region. The revenue lost from the loss of these tariffs can be particularly damaging to the fragile economies of developing countries and particularly LDCs. In the long-run trade creation is detrimental to the economic welfare of the state. The net trade diversion experienced by the UEMOA during the period of study, however, is of such a degree that we can say this RTA has done little but maintain the status quo in the trade/trade creation/trade diversion relationship.

This study also suggests, with respect to the member states of the UEMOA, all of which are among the poorest economies in the world (nearly half of UEMOA member states are identified by Van de Welle as stagnant low-income economies) GDP remains the single most influential factor in predicting the flow of trade between members. GDP is found to be more important than any other aspect of the trading relationship, such as distance, language affinity, population, or even political ideology and regime type.

With subsistence agriculture still playing a large part in the economic activity of many UEMOA states, such as Guinea-Bissau, which to this day remains one of ten poorest countries in the world, we conclude that necessity has outweighed the ideological aspects of the trade relationship that we would typically expect to find, i.e. greater degrees of trade between two democracies than between democratic and autocratic regimes. The case study on modernization, as measured in terms of energy consumption

per capita, however gives us the greatest insight into how states might potentially overcome their development lag.

Tests for the significance of energy consumption per capita (ENCON/PC) within the UEMOA conducted in Chapter IV of this study revealed a very strong correlation between GDP and ENCON/PC. Previous research on the relationship between energy and economic growth has suggested that the directionality of this correlation can be bidirectional or unidirectional in either direction. Understanding the direction of this causality in UEMOA states is an essential next step in the research toward understanding the growth potential, and impediments to growth for countries in that region.

Radelet (1997) suggested that regional cooperation on a variety of development projects was a better first step to regionally based development programs than full economic integration. His research suggested that states would be best served by cooperating on infrastructural development programs that would further enhance the ability of states of trade. The case study on modernization and energy consumption, and the resultant finding of its relationship to GDP supports this as infrastructural development programs, whether pursued on a domestic or regional level, would not only increase employment but spur on greater degrees of energy consumption in the states. Where individual state-level resources are limited, regional cooperation on such tasks seems a viable option for this type of growth strategy. Indeed such an approach would be in line with the objectives of the UEMOA, as set out in its charter.

Appendix A

The data presented in this appendix are not used in the quantitative methods employed by this study. However, they provide additional information referenced in the body of this report as to the growth rates of UEMOA member states. They also provide information on the variables used in the gravity model analyses performed in Chapters 3-5 of this study.

Variable: Distance D_{ij}

Distances are indicative of the distance (km) between capital cities of each state

State:	Benin	Burkina Faso	Ivory Coast	Senegal	Togo	Mali	Niger	Guinea Bissau
Benin	*	797	875	2,371	160	1,351	805	2,084
Burkina Faso	797	*	734	1,739	756	704	386	1,530
Ivory Coast	875	734	*	1,581	724	704	1,078	1,255
Senegal	2,371	1,739	1,581	*	2,248	1,043	2,073	372
Togo	160	2,248	724	2,248	*	1,244	841	1,951
Mali	1,351	704	704	1,043	1,244	*	1,065	828
Niger	805	386	1,078	2,073	841	1,065	*	1,893
Guinea Bissau	2,084	1,530	1,255	372	1,951	828	1,893	*

Variable: Adjacency A_{ij}

State	Adjacent member states
Benin	Burkina Faso, Togo and Niger
Burkina Faso	Benin, Togo, Niger, Ivory Coast, and Mali
Ivory Coast	Burkina Faso and Mali
Senegal	Mali and Guinea-Bissau
Togo	Burkina Faso and Benin
Mali	Senegal, Ivory Coast, Burkina Faso, Niger
Niger	Mali, Burkina Faso and Benin
Guinea-Bissau	borders Senegal

Variable: Language Affinity L_{ij}

State	Language
Benign	French
Burkina Faso	French
Ivory Coast	French
Senegal	French
Togo	French
Mali	French
Niger	French
Guinea-Bissau	Portuguese

Appendix B

This appendix contains the full results of each gravity model analysis performed in this thesis. This includes the test performed to determine the level of trade creation or trade diversion present in the UEMOA for the period of 1994-2002 as well as the tests for modernization and regime type as described in Chapters IV and V of this study. A key for each of the variables included in this study is provided below.

Key:
GDPi = GDP of exporting state
GDPj = GDP of importing state (exports from state I to state J)
Ni = Population of exporting state
Nj = Population of importing state
Dij = Distance between states I and J
Aij = Dummy variable representing adjacency
Lij = Dummy variable representing language affinity
U = Dummy variable representing UEMOA membership.

Additional Variables included in some models:
ENCON/Pci = Energy Consumption per capita in State I
ENCON/PCj = Energy Consumption per capita in State J
Reg I = Regime Type (Polity) Score for State I
Reg J = Regime Type (Polity) Score for State J

1994-2002 Data Set

Based on 1,153 observations of trade by UEMOA member states.

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log Ni, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729(a)	.531	.528	1.258

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log Ni, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2048.160	8	256.020	161.743	.000(a)
	Residual	1806.066	1141	1.583		
	Total	3854.227	1149			

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log Ni, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.222	.622		-14.816	.000
	log GDPi	4.251	.209	1.053	20.360	.000
	log GDPj	.812	.088	.539	9.186	.000
	log Ni	-3.431	.300	-.595	-11.432	.000
	log Nj	.163	.147	.053	1.108	.268
	log Dij	-1.738	.163	-.382	-10.693	.000
	log Aij	-.210	.131	-.043	-1.607	.108
	log Lij	-.647	.100	-.175	-6.488	.000
	log U	-.027	.144	-.007	-.186	.853

a Dependent Variable: log Xij

1994 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Year Code	128	1	1	1.00	.000
Xij	128	.001	499.000	13.69580	50.777063
GDPi	128	235.6	8313.6	2496.140	2387.3463
GDPj	128	235.6	6993299.9	556516.248	1699268.3412
Ni	128	1.155	13.457	7.46838	3.634318
Nj	128	1.155	261.412	45.75278	67.707124
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.535(a)	.286	.238	1.746

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	145.468	8	18.183	5.963	.000(a)
	Residual	362.850	119	3.049		
	Total	508.318	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8.190	2.685		-3.051	.003
	log GDPi	3.793	.917	.792	4.137	.000
	log GDPj	-.670	.409	-.396	-1.639	.104
	log Ni	-2.268	1.215	-.361	-1.866	.065
	log Nj	.883	.635	.266	1.391	.167
	log Dij	-.747	.687	-.151	-1.087	.279
	log Aij	.592	.546	.112	1.086	.280
	log Lij	-.026	.444	-.006	-.059	.953
	log U	.863	.628	.215	1.375	.172

a Dependent Variable: log Xij

1995 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.001	747.000	19.37540	74.730804
GDPi	128	254.0	11000.1	3232.304	3153.8767
GDPj	128	254.0	7338399.9	659479.773	1785173.2629
Ni	128	1.190	13.880	7.66913	3.744389
Nj	128	1.190	264.800	46.36068	68.574797

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724(a)	.525	.493	1.401

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	257.748	8	32.218	16.411	.000(a)
	Residual	233.624	119	1.963		
	Total	491.372	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-13.245	2.161		-6.128	.000
	log GDPi	5.391	.723	1.200	7.453	.000
	log GDPj	.863	.302	.539	2.856	.005
	log Ni	-4.796	1.004	-.776	-4.777	.000
	log Nj	-.019	.504	-.006	-.037	.970
	log Dij	-1.340	.539	-.275	-2.484	.014
	log Aij	-.515	.438	-.099	-1.177	.242
	log Lij	-.710	.331	-.180	-2.145	.034
	log U	.005	.484	.001	.011	.991

a Dependent Variable: log Xij

1996 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.001	721.000	22.25823	76.904895
GDPi	128	270.5	12139.3	3512.489	3473.3088
GDPj	128	270.5	7751100.0	695329.365	1884337.6358
Ni	128	1.225	14.294	7.88463	3.853641
Nj	128	1.225	268.220	47.01521	69.422838
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738(a)	.544	.513	1.423

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	287.367	8	35.921	17.752	.000(a)
	Residual	240.801	119	2.024		
	Total	528.168	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-12.496	2.204		-5.670	.000
	log GDPi	5.316	.729	1.145	7.296	.000
	log GDPj	.980	.305	.587	3.210	.002
	log Ni	-4.555	1.014	-.710	-4.492	.000
	log Nj	-.096	.506	-.028	-.189	.850
	log Dij	-1.733	.547	-.343	-3.166	.002
	log Aij	-.294	.444	-.055	-.662	.509
	log Lij	-.880	.336	-.215	-2.617	.010
	log U	-.092	.492	-.022	-.187	.852

a Dependent Variable: log Xij

1997 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.001	717.000	21.40140	76.067828
GDPi	128	268.5	11722.1	3368.003	3349.8752
GDPj	128	205.6	8256500.0	714708.302	1998908.4399
Ni	128	1.259	14.697	8.10475	3.960562
Nj	128	1.259	271.672	47.67458	70.280892
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698(a)	.487	.452	1.373

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	212.741	8	26.593	14.102	.000(a)
	Residual	224.399	119	1.886		
	Total	437.139	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8.756	2.081		-4.208	.000
	log GDPi	3.950	.677	.923	5.831	.000
	log GDPj	.943	.296	.624	3.186	.002
	log Ni	-3.085	.931	-.529	-3.313	.001
	log Nj	-.100	.488	-.032	-.205	.838
	log Dij	-1.716	.532	-.373	-3.225	.002
	log Aij	-.301	.429	-.061	-.700	.485
	log Lij	-.837	.324	-.225	-2.585	.011
	log U	-.080	.476	-.021	-.168	.867

a Dependent Variable: log Xij

1998 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.001	749.270	24.08188	84.026708
GDPi	128	205.6	12782.4	3595.164	3681.1323
GDPj	128	205.6	8720200.2	749146.664	2110369.5444
Ni	128	1.294	15.088	8.33201	4.064224
Nj	128	1.294	275.157	48.33207	71.139643
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752(a)	.566	.537	1.207

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	225.892	8	28.237	19.384	.000(a)
	Residual	173.349	119	1.457		
	Total	399.241	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.370	1.792		-5.228	.000
	log GDPi	4.184	.609	1.125	6.872	.000
	log GDPj	1.005	.261	.700	3.855	.000
	log Ni	-3.586	.918	-.643	-3.907	.000
	log Nj	-.115	.433	-.039	-.265	.791
	log Dij	-1.684	.466	-.383	-3.613	.000
	log Aij	-.504	.378	-.108	-1.335	.184
	log Lij	-.365	.286	-.103	-1.277	.204
	log U	-.167	.421	-.047	-.398	.692

a Dependent Variable: log Xij

1999 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	0	621	22.95	74.067
GDPi	128	224.4	12556.4	3592.491	3608.1748
GDPj	128	224.4	9212800.3	776263.386	2227933.9255
Ni	128	1.329	15.465	8.56275	4.163419
Nj	128	1.329	278.674	48.99317	72.003340
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.755(a)	.570	.541	1.192

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	224.114	8	28.014	19.713	.000(a)
	Residual	169.114	119	1.421		
	Total	393.227	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.454	1.758		-5.377	.000
	log GDPi	4.304	.588	1.139	7.320	.000
	log GDPj	1.076	.252	.751	4.271	.000
	log Ni	-3.815	.868	-.688	-4.397	.000
	log Nj	-.060	.419	-.020	-.144	.886
	log Dij	-1.845	.459	-.423	-4.023	.000
	log Aij	-.245	.372	-.053	-.659	.511
	log Lij	-.384	.282	-.109	-1.362	.176
	log U	-.425	.414	-.120	-1.025	.307

a Dependent Variable: log Xij

2000 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.00	543.09	19.5394	62.50175
GDPi	128	215.7	10577.5	3182.719	3021.2092
GDPj	128	215.7	9762100.0	796982.750	2355761.4906
Ni	128	1.367	15.827	8.79550	4.256668
N	128	1.286	282.224	49.61995	72.896971
Valid N (listwise)	128				

b Dependent Variable: log Xij

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778(a)	.605	.579	1.069594772519014

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	208.773	8	26.097	22.811	.000(a)
	Residual	136.140	119	1.144		
	Total	344.913	127			

a Predictors: (Constant), log U, log Ni, log Aij, log Lij, log Nj, log Dij, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-7.629	1.583		-4.820	.000
	log GDPi	4.007	.545	1.106	7.345	.000
	log GDPj	.760	.224	.570	3.384	.001
	log Ni	-3.122	.788	-.600	-3.962	.000
	log Nj	.334	.374	.122	.893	.373
	log Dij	-2.132	.421	-.522	-5.060	.000
	log Aij	.458	.335	.105	1.365	.175
	log Lij	-.483	.251	-.146	-1.924	.057
	log U	.001	.363	.000	.002	.998

a Dependent Variable: log Xij

2001 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.00	508.30	18.7347	59.11015
GDPi	128	200.4	10742.0	3317.625	3059.2334
GDPj	128	200.4	10019700.0	807502.666	2419786.4315
Ni	128	1.406	16.177	9.01725	4.357589
Nj	128	1.316	285.318	50.32979	73.651077
Valid N (listwise)	128				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821(a)	.674	.651	.961326348608901

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	224.949	8	28.119	30.427	.000(a)
	Residual	109.050	118	.924		
	Total	333.999	126			

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8.072	1.439		-5.608	.000
	log GDPi	4.563	.513	1.316	8.888	.000
	log GDPj	.657	.191	.484	3.439	.001
	log Ni	-4.050	.765	-.789	-5.295	.000
	log Nj	.408	.325	.145	1.256	.212
	log Dij	-2.081	.376	-.518	-5.540	.000
	log Aij	-.098	.301	-.023	-.326	.745
	log Lij	-.610	.230	-.187	-2.659	.009
	log U	.139	.325	.043	.428	.670

a Dependent Variable: log Xij

2002 Data Set:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	128	.00	518.10	20.1631	63.39564
GDPi	128	203.4	11682.3	3707.815	3308.5193
GDPj	128	203.4	10383100.0	847438.816	2507934.8587
Ni	128	1.447	16.513	9.23863	4.455242
Nj	128	1.345	288.369	50.92118	74.429985

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.813(a)	.660	.637	.993792045396566

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	226.490	8	28.311	28.666	.000(a)
	Residual	116.539	118	.988		
	Total	343.030	126			

a Predictors: (Constant), log U, log GDPi, log Aij, log Lij, log Nj, log Dij, log GDPj, log Ni
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-8.290	1.520		-5.454	.000
	log GDPi	4.752	.551	1.385	8.625	.000
	log GDPj	.818	.202	.597	4.043	.000
	log Ni	-4.607	.840	-.884	-5.482	.000
	log Nj	-.038	.344	-.013	-.111	.912
	log Dij	-2.152	.388	-.528	-5.553	.000
	log Aij	-.072	.310	-.017	-.232	.817
	log Lij	-.734	.238	-.222	-3.091	.002
	log U	.205	.337	.062	.608	.544

a Dependent Variable: log Xij

Appendix C
Energy Consumption in the UEMOA

ENCON Data Set with Membership:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	44	.18	508.30	39.3477	90.77561
GDPi	44	1258.7	10742.0	4745.760	3708.7287
GDPj	44	1259	10019700	1172069.48	2865599.833
Ni	44	4.660	16.177	9.24775	4.453231
Nj	44	4.660	285.318	69.57618	82.396783
ENCONi	44	305	402	337.50	38.363
ENCONj	44	305	7996	1963.05	2340.371
Valid N (listwise)	44				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log ENCONj, log GDPi, log Aij, log Lij, log U, log Dij, log Nj, log ENCONi, log GDPj, log Ni(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.782(a)	.611	.494	.602429442296836

a Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log U, log Dij, log Nj, log ENCONi, log GDPj, log Ni

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.836	10	1.884	5.190	.000(a)
	Residual	11.976	33	.363		
	Total	30.812	43			

a Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log U, log Dij, log Nj, log ENCONi, log GDPj, log Ni
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-15.293	19.626		-.779	.441
	log GDPi	-3.718	6.080	-1.535	-.612	.545
	log GDPj	.204	.419	.278	.488	.629
	log Ni	6.764	10.696	1.641	.632	.531
	log Nj	-.368	.601	-.222	-.612	.544
	log Dij	-1.206	.388	-.661	-3.111	.004
	log Aij	.434	.568	.108	.765	.450
	log Lij	-.251	.308	-.149	-.813	.422
	log U	.324	.352	.172	.920	.364
	log ENCONi	9.582	5.426	.531	1.766	.087
	log ENCONj	.688	.678	.402	1.015	.317

a Dependent Variable: log Xij

ENCON/PC -U
(membership variable not included)

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	44	.18	508.30	39.3477	90.77561
GDPi	44	1258.7	10742.0	4745.760	3708.7287
GDPj	44	1259	10019700	1172069.48	2865599.833
Ni	44	4.660	16.177	9.24775	4.453231
Nj	44	4.660	285.318	69.57618	82.396783
ENCONi	44	305	402	337.50	38.363
ENCONj	44	305	7996	1963.05	2340.371
Valid N (listwise)	44				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log ENCONj, log GDPi, log Aij, log Lij, log Dij, log Nj, log ENCONi, log GDPj, log Ni(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.775(a)	.601	.496	.601070489732951

a Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log Dij, log Nj, log ENCONi, log GDPj, log Ni

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.528	9	2.059	5.698	.000(a)
	Residual	12.284	34	.361		
	Total	30.812	43			

a Predictors: (Constant), log ENCONj, log GDPi, log Aij, log Lij, log Dij, log Nj, log ENCONi, log GDPj, log Ni
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-15.630	19.578		-.798	.430
	log GDPi	-3.601	6.065	-1.486	-.594	.557
	log GDPj	.265	.413	.360	.642	.525
	log Ni	6.569	10.670	1.593	.616	.542
	log Nj	-.272	.590	-.165	-.461	.648
	log Dij	-1.235	.385	-.677	-3.205	.003
	log Aij	.515	.560	.128	.920	.364
	log Lij	-.151	.288	-.090	-.524	.603
	log ENCONi	9.607	5.414	.533	1.775	.085
	log ENCONj	.620	.672	.362	.922	.363

a Dependent Variable: log Xij

ENCON Results for selected UEMOA members states

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Log ENCONj, LOG_NI, Log ENCONi, LOG_LIJ, LOG_AIJ, LOG_NJ, LOG_DIJ	.	Enter

a All requested variables entered.
b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.694	.482	.467	1.055319013165553

a Predictors: (Constant), Log ENCONj, LOG_NI, Log ENCONi, LOG_LIJ, LOG_AIJ, LOG_NJ, LOG_DIJ

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	253.170	7	36.167	32.475	.000
	Residual	271.742	244	1.114		
	Total	524.912	251			

a Predictors: (Constant), Log ENCONj, LOG_NI, Log ENCONi, LOG_LIJ, LOG_AIJ, LOG_NJ, LOG_DIJ
b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-4.690	1.094		-4.286	.000
	LOG_NI	2.275	.557	.189	4.083	.000
	LOG_NJ	1.060	.182	.375	5.810	.000
	LOG_DIJ	-2.448	.364	-.635	-6.733	.000
	LOG_AIJ	-.136	.239	-.037	-.570	.569
	LOG_LIJ	-6.996E-02	.019	-.218	-3.711	.000
	Log ENCONi	2.337	.201	.563	11.601	.000
	Log ENCONj	.797	.184	.435	4.333	.000

a Dependent Variable: LOG_XIJ

ENCON Results for Benin 2000-2002

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	LOG_LIJ, Log ENCONi, LOG_NI, LOG_AIJ, LOG_NJ, LOG_DIJ, Log ENCONj	.	Enter

a All requested variables entered.
b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698	.487	.382	.70733348 4655058

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NI, LOG_AIJ, LOG_NJ, LOG_DIJ, Log ENCONj

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.176	7	2.311	4.619	.001
	Residual	17.011	34	.500		
	Total	33.187	41			

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NI, LOG_AIJ, LOG_NJ, LOG_DIJ, Log ENCONj
b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	22.665	45.260		.501	.620
	LOG_NI	4.396	12.631	.045	.348	.730
	LOG_NJ	1.434	.307	.800	4.675	.000
	LOG_DIJ	-1.506	.437	-.692	-3.447	.002
	LOG_AIJ	-.313	.389	-.123	-.806	.426
	Log ENCONi	-7.853	15.580	-.066	-.504	.617
	Log ENCONj	.396	.290	.360	1.363	.182
	LOG_LIJ	-4.927E-02	.033	-.249	-1.488	.146

a Dependent Variable: LOG_XIJ
ENCON results for Burkina Faso 2000-2002

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI	.	Enter

a All requested variables entered.
b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.698	.487	.381	.996

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.955	7	4.565	4.605	.001
	Residual	33.706	34	.991		
	Total	65.661	41			

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI
b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	662.538	1030.846		.643	.525
	LOG_NI	-55.605	96.528	-.380	-.576	.568
	LOG_NJ	1.756	.423	.723	4.148	.000
	LOG_DIJ	-4.464	1.019	-1.487	-4.379	.000
	LOG_AIJ	1.007	.597	.364	1.689	.100
	Log ENCONi	-228.666	356.511	-.423	-.641	.526
	Log ENCONj	1.226	.527	.730	2.328	.026
	LOG_LIJ	-3.818E-02	.047	-.137	-.817	.420

a Dependent Variable: LOG_XIJ

ENCON results for Mali 2000-2002

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI	.	Enter

a All requested variables entered.

b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.572	.327	.189	1.238660703551222

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.381	7	3.626	2.363	.044
	Residual	52.166	34	1.534		
	Total	77.546	41			

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_AIJ, Log ENCONj, LOG_DIJ, LOG_NI

b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	23.066	48.690		.474	.639
	LOG_NI	-32.942	92.929	-.207	-.354	.725
	LOG_NJ	1.431	.526	.541	2.722	.010
	LOG_DIJ	.822	1.377	.213	.597	.555
	LOG_AIJ	-.735	.682	-.244	-1.078	.289
	Log ENCONi	2.774	21.093	.077	.131	.896
	Log ENCONj	.145	.558	.080	.259	.797
	LOG_LIJ	-.110	.066	-.365	-1.662	.106

a Dependent Variable: LOG_XIJ

ENCON results for Niger 2000-2002

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	LOG_LIJ, Log ENCONi, LOG_NJ, LOG_A_IJ, Log ENCONj, LOG_DIJ, LOG_NI	.	Enter

a All requested variables entered.

b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.838	.702	.640	.99568137 9362039

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_A_IJ, Log ENCONj, LOG_DIJ, LOG_NI

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.357	7	11.337	11.435	.000
	Residual	33.707	34	.991		
	Total	113.064	41			

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_NJ, LOG_A_IJ, Log ENCONj, LOG_DIJ, LOG_NI

b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-14.808	216.535		-.068	.946
	LOG_NI	2.281	37.243	.015	.061	.952
	LOG_NJ	1.231	.429	.383	2.871	.007
	LOG_DIJ	-4.853	.907	-1.123	-5.352	.000
	LOG_A_IJ	.686	.560	.172	1.226	.229
	Log ENCONi	7.908	69.004	.028	.115	.909
	Log ENCONj	1.651	.422	.776	3.910	.000
	LOG_LIJ	-.252	.047	-.685	-5.336	.000

a Dependent Variable: LOG_XIJ

ENCON Results for Senegal 2000-2002

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	LOG_LIJ, Log ENCONi, LOG_DIJ, LOG_AIJ, LOG_NJ, Log ENCONj, LOG_NI	.	Enter

a All requested variables entered.

b Dependent Variable: LOG_XIJ

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.857	.734	.679	.50378132 4995178

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_DIJ, LOG_AIJ, LOG_NJ, Log ENCONj, LOG_NI

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.827	7	3.404	13.412	.000
	Residual	8.629	34	.254		
	Total	32.456	41			

a Predictors: (Constant), LOG_LIJ, Log ENCONi, LOG_DIJ, LOG_AIJ, LOG_NJ, Log ENCONj, LOG_NI

b Dependent Variable: LOG_XIJ

Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-148.112	1061.425		-.140	.890
	LOG_NI	49.841	271.241	.491	.184	.855
	LOG_NJ	-.483	.213	-.280	-2.263	.030
	LOG_DIJ	-6.881	.833	-1.950	-8.261	.000
	LOG_AIJ	-.302	.378	-.089	-.800	.429
	Log ENCONi	35.520	241.701	.393	.147	.884
	Log ENCONj	2.166	.274	2.023	7.900	.000
	LOG_LIJ	-5.017E-02	.021	-.257	-2.356	.024

a Dependent Variable: LOG_XIJ

Appendix D
Regime Type

Regime Data Set With U

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	1152	.000	749.270	20.24418	69.601183
GDPi	1152	200.4	12782.4	3333.861	3254.3786
GDPj	1152	200.4	10383100.0	733707.552	2121658.1920
Ni	1152	1.155	16.513	8.34145	4.089826
Nj	1152	1.155	288.369	48.33327	70.928824
Reg. I	1152	-88	8	-3.26	19.815
Reg. J	1131	-88	10	-2.51	21.760
Valid N (listwise)	1131				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log U, log Ni, Reg. J, Reg. I, log Aij, log Lij, log Dij, log Nj, log GDPi, log GDPj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732(a)	.536	.531	1.258

a Predictors: (Constant), log U, log Ni, Reg. J, Reg. I, log Aij, log Lij, log Dij, log Nj, log GDPi, log GDPj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2042.416	10	204.242	129.037	.000(a)
	Residual	1771.164	1119	1.583		
	Total	3813.581	1129			

a Predictors: (Constant), log U, log Ni, Reg. J, Reg. I, log Aij, log Lij, log Dij, log Nj, log GDPi, log GDPj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.068	.629		-14.405	.000
	Reg. I	-.003	.002	-.034	-1.638	.102
	Reg. J	.004	.002	.049	1.846	.065
	log GDPi	4.166	.213	1.037	19.596	.000
	log GDPj	.832	.089	.551	9.333	.000
	log Ni	-3.305	.306	-.575	-10.791	.000
	log Nj	-.005	.170	-.002	-.029	.977
	log Dij	-1.702	.168	-.371	-10.143	.000
	log Aij	-.193	.134	-.039	-1.440	.150
	log Lij	-.658	.100	-.177	-6.564	.000
	log U	.031	.151	.008	.203	.839

a Dependent Variable: log Xij

Regime Set without U:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Xij	1152	.000	749.270	20.24418	69.601183
GDPi	1152	200.4	12782.4	3333.861	3254.3786
GDPj	1152	200.4	10383100.0	733707.552	2121658.1920
Ni	1152	1.155	16.513	8.34145	4.089826
Nj	1152	1.155	288.369	48.33327	70.928824
Reg. I	1152	-88	8	-3.26	19.815
Reg. J	1131	-88	10	-2.51	21.760
Valid N (listwise)	1131				

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	log Lij, Reg. I, Reg. J, log GDPi, log Aij, log GDPj, log Dij, log Ni, log Nj(a)	.	Enter

a All requested variables entered.
b Dependent Variable: log Xij

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.732(a)	.536	.532	1.258

a Predictors: (Constant), log Lij, Reg. I, Reg. J, log GDPi, log Aij, log GDPj, log Dij, log Ni, log Nj

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2042.351	9	226.928	143.493	.000(a)
	Residual	1771.230	1120	1.581		
	Total	3813.581	1129			

a Predictors: (Constant), log Lij, Reg. I, Reg. J, log GDPi, log Aij, log GDPj, log Dij, log Ni, log Nj
b Dependent Variable: log Xij

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.099	.610		-14.904	.000
	Reg. I	-.003	.002	-.034	-1.631	.103
	Reg. J	.004	.002	.047	1.862	.063
	log GDPi	4.166	.213	1.037	19.605	.000
	log GDPj	.838	.085	.554	9.867	.000
	log Ni	-3.300	.305	-.574	-10.813	.000
	log Nj	.001	.167	.000	.007	.994
	log Dij	-1.701	.168	-.371	-10.145	.000
	log Aij	-.187	.130	-.038	-1.433	.152
	log Lij	-.650	.091	-.175	-7.159	.000

a Dependent Variable: log Xij

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