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ANALYSIS OF THE IMPACT OF TOURISM ON THE WEST AFRICA ECONOMY: A PANEL DATA APPROACH

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Tourism and related recreation activities play a significant role in the generation of income / foreign exchange and provision of employment opportunities. Against this backdrop, this paper aims at ascertaining empirically the impact of tourism on the West African economy from 2000 – 2004. The relationship is analysed based on a panel data approach. While the study estimates the relationship between economic growth and growth in tourist arrivals conditional on main macroeconomic variables, it recommends that the role of tourism cannot be over-emphasized in the sustainable economic development in West Africa. In other words, economic performance in West Africa can be enhanced through sound tourism development policies that support economic openness with greater emphasis on liberalization policy since the region stands to gain from this policy stance.

Keywords: *Tourism, Economic growth, Panel data, West Africa.*

INTRODUCTION

Tourism is a major economic activity in terms of income generation, employment creation, foreign exchange earnings, and interchange of cultures and people. Being a number one global export earner, it is increasingly gaining prominence in the debate over how to move towards more sustainable patterns of development. It collectively comprises sub-industries such as airlines, airports, hotels, manufacturing, tour operations, travel agencies, credit card companies, car rental companies, convention and visitors business and other travel related services.



It is pertinent to note that tourism demand depends considerably on the prevailing economic conditions in major generating markets. As economies grow, and consequently, their levels of disposable income rise, a relatively large proportion of discretionary income will typically be spent on tourism, in particular, in the case of emerging economies. Contrarily, as the disposable income of economies fall, tourism spending will tend to decrease. In general, the increase in international tourism arrivals substantially outpaces the rise in economic output as measured in Gross Domestic Product (GDP). In years when world economic performance exceeds 4 per cent, the volume of tourism related activities tends to be greater. On the other hand, when GDP growth falls below 2 per cent, growth in tourism tends to be lower (WTO & IMF Study on Economic Growth (GDP) and International Tourist Arrivals, 2005). In fact, in 2003 international tourism receipts represented 6 per cent of worldwide exports of goods and services (as expressed in US\$). Furthermore, when considering services exports exclusively, the share of tourism exports is about 30 per cent.

Tourism represents around 35 per cent of the world's export of services and over 70 per cent in Least Developed Countries (LDCs). In fact, the 846 million international tourist arrivals in 2006 represent a 6.5 per cent growth per annum between 1950 and 2006. According to the UNWTO's Tourism 2020 Vision Forecasts, this will generate about 1.6 billion international tourist arrivals world wide by the year 2020. Of these worldwide arrivals in 2020, 1.2 billion will be intraregional and 378 million will be long-haul travelers.

The 846 million international arrivals recorded for the year 2006 represent an additional 43 million over 2005's level, marking a new record year for the industry. Of these 43 million, 22 million were from Europe, 12 million for Asia and the Pacific, and 3 million for each of the remaining regions – the Americas, Africa and the Middle East (UNWTO, 2007). It is pertinent to note that Africa (+9 per cent) was again the star performer in 2006, continuing to record growth at almost twice the global rate. Furthermore, the Sub-Saharan Africa (+10 per cent) was the major contribution to this increase, while North Africa (+7 per cent) ended the year 2006 at a level above the world average. By implication, the international tourism receipts totaled US\$733b; or US\$2 billion a day in 2006.

While empirically investigating the correlation between tourism and economic growth in West Africa from macroeconomic perspective, the study is organized as follows: as a way of introduction, section one emphasizes the increasing importance of tourism in terms of revenue

generation and employment opportunities. While the second section serves as the background to the study, discussing the main relevant tourism and growth issues in West Africa, the next section models the impact of tourism on economic growth. Section four concludes the study and presents some policy recommendations.

BACKGROUND TO THE STUDY

The West African Economy

West African countries have many similarities in terms of language, culture, history, weather and tourism resources to offer. However, their economies have evolved very differently during last century. Alternative governance structures and economic policies have produced very different paths for economic growth of the regions. Given that countries in West Africa possess similar tourist features but different paths of economic growth, it seems an interesting pursuit to analyse the relationship between tourism and economic growth.

The West African region that Economic Community of West African States (ECOWAS) covers comprises sixteen member countries. In terms of population size, it represents the biggest organization for regional integration on the African continent. These member countries are Cape Verde, The Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra-Leone (Non-CFA countries) and Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo (CFA countries). ECOWAS includes the distinct group of the eight countries of the West African Economic and Monetary Union (UEMOA), the eight constitute a monetary and customs union. The other seven non-UEMOA countries may be considered as a second group, each with its own national currency. This second group accounts for 65 per cent of the Gross Domestic Product (GDP) of the region, and 70 per cent of the total population. Within the ECOWAS context, Nigeria accounts for 45 per cent of the regional GDP, 66 per cent of total exports, and more than 51 per cent of the regional population (ECOWAS Annual Report, 2002).

For the year 2001, ECOWAS accounted for 14 per cent of total GDP for the African continent, and 29 per cent of the total African population, per capital income for West Africa, at \$345 is below the continental average of \$US673, below the \$US1170 figure for North Africa, and the \$US1, 500 figure for Southern Africa, although it is higher than the figure for East Africa which records \$US250 and Central Africa with \$US 280

(ECOWAS Annual Report, 2002). More than half of the population of ECOWAS, approximately 115 million persons, or 51 per cent lives in absolute poverty; that is, on less than one US dollar per day.

Table 1 reveals that the economic performance in the ECOWAS countries as a whole in 2001. Real GDP for all West African countries rose by 4 per cent in 2001, compared to 3.2 per cent in 2000, as a result of the exceptional performance recorded by the principal economy of the region, Nigeria. The 4 per cent real GDP growth in 2001 exceeds the growth rates of the preceding four years (1997 to 2000) and the continental average of 3.4 per cent for 2001.

Table 1. West Africa: Macro-economic Indicators, 1990 – 2001

Indicators	1990	1996	1997	1998	1999	2000	2001
Real GDP growth rate (%)	4.3	5.9	3.99	3.6	2.5	3.2	4
GDP per head (current US \$)	396	374	365	345	340	341	337
Inflation (%)	13.3	12.6	9.1	6.8	7	4.2	8
Budgetary rate (% of GDP)	-2.8	-1	-2.8	-6	-6	-0.8	-204
GDP Growth (%)	17.2	16.3	16	18	16	18	18
Gross Domestic Investment (% of GDP)	22	18.8	15	14	14	14	15
Volume of export growth(%)	10.5	15.2	3.3	0.1	-5	4.3	1.2
Trade Balance (% of GDP)	9.2	9.2	6.7	0.5	0	9.2	4
Current Account (% of GDP)	-0.9	0.9	-0.5	-6.6	-7	0.5	3.4
Evolution of Exchange Rate (%)	11.4	8.3	-0.9	-15.7	13	28	-4
Total Foreign Debt (% of GDP)	98	96.8	93.6	91.8	90	89.1	87.1
Debt Servicing (% of Exports)	22.4	19.5	17.1	19	16	13.5	NA

Source: ECOWAS Annual Report 2002, “Fostering Regional Integration through NEPAD Implementation”.

In spite of the strong recovery of the regional economy in recent times, West Africa countries still remains a visible victim of both structural and short-term problems. The most serious of these problems are high. Interest rates and the deterioration in terms of trade, failure to achieve economic diversification, frequent power shortages in several of the countries, which adversely affect industry.

Features of West African Tourism Industry

Tourism is a global phenomenon that is shaped locally and as such is primarily a matter of local and regional responsibility. By implication, the tourism sector supports the development of local facilities such as infrastructure, shops, and restaurants. It also creates jobs and income, and is considered a valuable driver of development goals in a broad sense.

Increasing importance of (sustainable) tourism has become imperative to West Africa as a regional economic community. In West Africa, tourism is an increasingly crucial activity contributing to both economic growth and social development. The tourism industry has grown considerably in the last few years (and so have its environmental impact). Since tourism is one of the major economic activities for some West African countries, a better understanding and management of tourism is not only necessary to mitigate the negative effects on the environment, but also to minimize the potential conflict with other economic activities such as agriculture, forestry and fisheries.

The impact of tourism development within regions and local communities may be measured in terms of economic development (GDP, GVA) and employment (demand for skilled jobs and seasonal workers). It also contributes to smooth regional disparities (territorial cohesion and, recently, it has booted the adoption of information and communication technologies. However, tourism features and peculiarities also put pressures on the environment, jeopardizing the availability of resources.)

Strengths and Weaknesses of the West African Tourism Industry

The *strengths* of WA as an attractive destination include:

- It offers one of the greatest diversity and density of tourism attractions in terms of landscapes, countryside and major historical cities. The rich heritage of West Africa and its great natural beauty assets allow the development of various destinations products such as cultural and historical, coastal or mountainous, sport or religious, thermal or gastronomic, business, and shopping tourism.
- The industry also renders a large number of tourism services and facilities such as hotels, bars and restaurants, leisure parts, sports centres, and museums all over the region. These services remain extremely diversified in each thematic area, from a luxurious hotel to a mountain refuge.
- The progressive introduction of a single currency (the ECO) being adopted by selected countries in the sub-region is making distance smaller and easier to be covered by both West African and foreign travelers.
- The combination of the above factors create a great environment for spending holidays, as demonstrated by the fact that in recent years, the Sub-Saharan Africa (+10 per cent) has been the major contribution to the annual increase in international tourist arrivals among other tourism destination regions of the world.

Weakness

- In general terms, the transport system is dense and rather inefficient when considering connections among main West African cities. Since, access to destinations is also a precondition for engagement in the tourism industry, but many regions within WA still lack transport networking or have low or scattered options of transport modes, this remains a major problem in the development of these tourism destinations. Furthermore, lack of adequate communication infrastructures undermine the capacity of the industry to blossom.
- West Africa (WA) also suffers from a good reputation in terms of the wealth level of its economy, quality of life and social / political living conditions. It has an inefficient health system, a nascent democracy seemingly lacking respect for human rights, and relatively unsafe places with respect to criminality.
- WA tourism is a highly fragmented industry (travel agencies, tour operators, carriers, hoteliers, restaurateurs) characterized by several vertical horizontal and transversal integrations, more frequent than in other economic sectors.

- The industry is composed of a large number of tourism enterprises, mostly of small and medium size, vertically integrated. Horizontally, tourism affects, and is affected by, diverse businesses with their representatives, destinations with their different activities, and public and private interests and priorities. Tourism also interacts transversally with other main policies such as transport, environment, spatial planning, sports and leisure, industry and trade, and consumer protection. The major problem in this light is that most of these enterprises are not well coordinated.
- Tourism is a very seasonal phenomenon. It is thus difficult to exclusively rely on this economic activity to tackle regional development problems. Moreover, visitor peaks imply great periodic pressures on the territory and the need to invest in all necessary infrastructures. In terms of human resources, the seasonal workers employed by the industry often lack the necessary skills, and on some occasions, do not enjoy fair working conditions, salaries and career opportunity.

Risks

- There are several risks faced by WA tourism industry, some driven by global events and on which control is limited or absent. These include the occurrence of dramatic events (natural disasters, crime, poverty, and insecurity). Economic depression, climate change side effects on the environment, or competition by cheap overseas destinations.
- At the WA level, other risks include the significant increase of environmental pollution and the consequent degradation of the natural environment, the physiological decline of some most popular mass destinations, the concentration of tourism business under the control of few, large operators.
- The growth in tourism demand may generate more environmental pollution. It has not been emphasized that there is no tourist activity that does not rely on environmental resources in some way. Tourism unavoidably affects the state of the environment and the growth in tourism demand may consequently lead to significant environmental impacts. The most relevant pressures come from transport, the use of water and land, and the use of energy by tourism building facilities, the generation of waste, the erosion of soils and the loss of biodiversity.

- Since tourism is a seasonal activity, the pressure on the environment exerted during the peak seasons may become unsustainable, leading to a decline of the resources in the long term or to a degradation of the environment of the destinations.
- Unbalances within the WA integration processes: wealthy countries are often more capable of profiting from tourism than less economically developed countries. Among the reasons are the large-scale transfer of tourism revenues of the host country and the exclusion of local businesses and products. The WA member states that depend primarily on the tourism activity for their economy and employment also face some risks in the sense that in places where tourism is not well managed by balancing the diverse interests, the economic benefits obtainable from the industry may compromise the social conditions, the cultural and natural assets of the receiving regions, as well as the quality of the environment.

THEORIZING AND MODELING THE IMPACT OF TOURISM ON ECONOMIC GROWTH

The model specification attempts to explain economic growth in West Africa by the number of international tourists flows to the region, given a set of covariates (X_i). The Gross Domestic Product (GDP) is one of the most widely used macroeconomic indicator for measuring output.

A review of relevant literature on this study focuses on the factors that explain growth. Thus, the Neo-classical model, developed by Solow-Cass-Koopmans the rate of growth in the economy depends on the initial level of income, later (Barro and Sala-i-Martin 1991) and (Mankiw, Romer and Weil, 1992) introduced the concept of “conditional convergence” that allows us to take into account differences among countries such as in the state of technology. Most of the empirical studies have used a cross-section analysis, although with a growing availability of panel data, and the development in econometric techniques has used widely to prove their hypothesis.

With X_i as the vector of determinants of the per capita income or output, following (Barro’s 1991) seminal work, we will use a proxy for the different steady states among countries some selected expenditures and social variables related to political instability.

A pooled panel data representation of the economic model will capture the unobservable differences across countries and will generate

consistent estimators. A fixed effect model is preferred as we assume that the unobservable variables (climate, preferences, etc) are correlated with the independent variables. Unobserved time-specific effects are controlled by using time period fixed effects. This also accounts for business cycle movements. The reduced form of the structural model can be expressed as:

$$y_{it} - y_{it-1} = a + \beta y_{it-1} + \varphi x_{it-1} + \alpha_i + \eta_t + u_{it} \quad (3.1.a)$$

Or

$$y_{it} = a + (1 + \beta)y_{it-1} + \varphi x_{it-1} + \alpha_i + \eta_t + u_{it} \quad (3.1.b)$$

Where α_i and η_t are respectively individual and temporal effects which influence the steady state of each country.

Also, the presence of an endogenous variable in the right hand side of the equation implies a more complicated estimation of the model due to collinearity with the error term. The equation for the general model is:

$$Z_{it} = \sum_{j=1}^p Z_{it-j} + W_{it}\lambda + v_i + \varepsilon_{it}$$

Where v_i is the error component correlated and the independent variable w does not change over time for each element in the panel. First differencing equation (3.1) removes the individual effects and produces an equation that is estimable by instrumental variables:

$$\Delta Z_{it} = \Delta \sum_{j=1}^p Z_{it-j} + \Delta W_{it}\lambda + \Delta \varepsilon_{it}$$

(Arellano and Bond 1991) developed a GMM dynamic panel data estimator that includes lags of both the dependent and independent variables as instruments such that one can obtain optimal coefficients provided that the T/N is negligible. We will calculate such an estimator from our data.

Hence the equation estimated is;

$$\log(RGDPp_{cit}) = c + (1 + \beta)\log(RGDPp_{cit-1}) + \psi_1 TOUARI_{it-1} + \psi_2 OPENNES_{it-1} + \psi_3 GOVSHARE_{it-1} + \psi_4 INVSHARE_{it-1} + \psi_5 CPI_{it-1} + \alpha_i + \eta_t + u_{it}$$

With $t = 1, \dots, 5$ (2000 - 2004); $i = 1, \dots, 10$ and $u_{it} \sim N(0, \sigma_i^2)$

A more detailed description of the variables :

- Tourist Arrivals (**TOUARD**);

- Gross domestic Investment (**INVSHARE**), measured as a percentage of GDP. It includes fixed assets such as land improvements (fences, ditches, drains and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like including commercial and industrial buildings, offices, schools, hospitals, and residential dwellings.
- Government spending (**GOVSHARE**): Public expenditure is a percentage of Gross National Product accounted for by public spending. It includes all current expenditures for purchases of goods and services by all levels of government, excluding most government enterprises. It also excludes capital expenditure on national defence and security and public spending n education.
- Social variables:
 - a) The quality of governance of the political system of the country (**CPI**) is approximated by a ranking of countries on a scale of 1 to 10. A ranking of 1 is allocated to the most corrupt countries. A ranking of 10 is allocated when a country is perceived to be corruption free.

The macroeconomic variables – GDP per capita, total gross domestic investment (GDI), and General government spending – are collected directly from the 2006 Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania. On the other hand, the CPI have been obtained from the website of the Transparency International. CPI scores relates to perceptions of the degree of corruption as seen by business people, risk analysts, and the general public. It ranges between 10 (highly clean) and 0 (highly corrupt). The data on the number of tourist arrivals is from World Tourism Organisation. The data used are presented in Table 2.

Table 2. Data Used and Sources

BENIN							
YEARS	RGDPPC	OPENNESS	GOV SHARE IN RGDPPC	INV SHARE IN RGDPPC	CPI	TOU ARRIVALS (’000)	
2000	1251.47	57.74	10.29	7.56	3.3	1068	
2001	1273.87	57.11	10.14	7.79	3.4	1155	
2002	1311.53	55.68	10.04	7.95	3.1	853	
2003	1345.42	53.29	9.97	8.17	3	850	

2004					3.2	845
BURKINA FASO						
2000	933.21	40.42	23.87	9.67	3	126
2001	945.36	54.27	32.69	11.67	3.2	128
2002	987.56	49.26	30.96	10.22	3.1	150
2003	1073.26	41.11	21.85	7.32	3	163
2004	1075.35	42.74	22.47	8.1		222
GAMBIA						
2000	953.86	106.9	15.73	8.33	2.1	79
2001	963.24	89.28	15.57	9.71	2.5	57
2002	890.64	116.06	15.26	10.57	2.3	81
2003	937.36	114.02	13.8	9.6	2.5	73
2004					2.8	90
GHANA						
2000	1392.2	95.86	30.17	5.05	3.5	399
2001	1372.61	100.07	30.77	6.24	3.4	439
2002	1449.28	89.97	27.41	4.79	3.9	483
2003	1440.34	90.98	27.8	5.96	3.3	531
2004					3.6	584
GUINEA						
2000	2546.12	52.32	3.79	7.86		33
2001	2720.62	52.55	4.29	5.28		38
2002	2853.02	50.04	4.63	4.44		43
2003	2887.81	43.04	4.49	3.28		44
2004	2933.59	45.64	3.3	3.48		45
MALI						
2000	1046.72	63.19	10.11	6.32	3.1	86
2001	1162.51	67.99	10.3	5.06	3.3	89
2002	1130.2	72.21	10.03	5.97	3.4	96
2003	1183.74	64.73	10.37	5.73	3	110
2004	1182.77	64.19	11.94	6.31	3.2	113

NIGERIA

2000	1073.93	77.46	5.28	3.87	1.2	1492
2001	1071.06	83.41	4.97	5.02	1	1753
2002	1088.62	83.22	4.51	5.59	1.6	2046
2003	1223.36	90.85	4.08	4.69	1.4	2253
2004	1209.92	92.39	4.47	4.5	1.6	2646

SENEGAL

2000	1571.37	69.25	20.65	4.91	3.5	400
2001	1389.94	111.15	24.53	10.01	2.9	409
2002	1371.5	113.28	21.25	9.12	3.1	434
2003	1406.6	110.76	22.16	10.75	3.2	360
2004					3	373

SIERRA
LEONE

2000	683.73	36.93	14.58	3.73	2.1	16
2001	666.46	22.16	15.64	2.06	2.2	24
2002	689.54	25.3	17.78	2.34	2.5	28
2003	712.77	28.43	17.31	5.9	2.2	38
2004					2.3	44

TOGO

2000	823.17	81.95	29.56	9.4		60
2001	784.04	84.41	26.19	9.55		57
2002	731.35	96.94	25.06	9.59		58
2003	788.52	107.14	27.18	10.27		61
2004	773.69	103.17	26.69	9.42		83

Sources:

- *Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September, 2006.*
- *CPI scores are gotten from website of the Transparency International (www.transparency.com). CPI scores relates to perceptions of the degree of corruption as seen by business*

people, risk analysts, and the general public. It ranges between 10 (highly clean) and 0 (highly corrupt).

- The data on the number of tourist arrivals is from World Tourism Organisation. (www.unwto.org)

The theoretical expectations for the proposed model are as follows:

- A positive sign in TOUARI, i.e. an increase in the number of tourists fosters economic performance.

- A less than one in $\log(\text{RGDP}_{pc\ it-1})$, i.e. β -convergence.

- A positive sign in GOVSHARE, OPENNESS, and INVSHARE.

As the theory predicts, we expect that more spending and investment will result in faster growth.

- A positive relationship between the growth rate and social variables (CPI) as we suppose that a country free of corruption and stable leads to greater efficiency in the economy and higher returns to capital.

A problem to tackle is the assumption of strict exogeneity of all independent variables in the model. Misspecification would lead to inconsistent estimation. A variable x_{it} is said to be strictly exogenous if $E(x_{it}, u_{is}) = 0$ for all t and s . If $E(x_{it}, u_{is}) = 0$ only for $t < s$ then x_{it} is said to be weakly exogenous or predetermined. It means that if the error term at time t has some feedback in the future realizations of x_{it} we have to model this variable as a predetermined one. In our research, although we can suspect that future realizations of some of the variables depend on past values of GDP, (i.e. this seems clear in the case of Gross Domestic Investment (GDI): an adverse economic condition may imply a reduction of the investment in future periods, and also the opposite is plausible. Moreover, a test for strict exogeneity of the tourist variable is needed.

This paper has used an estimator robust to heteroscedasticity. Using this robust estimation produces higher standard errors, thus lower t-statistics and a larger probability of not rejecting the null of parameters being different from zero. To mitigate this effect we have chosen in our t-test a significance level of 10%. As expected, the growth in the number of tourists per capita produces a positive effect on the economic growth of the countries. In this study, it is observed that growth in tourists per capita is associated with economic growth in the group of countries

RECOMMENDATIONS AND CONCLUSIONS

The study has investigated the impact of tourism on the West African economy, using pooled data on ten West African countries from 2000 to

2004. The findings indicate that tourism does matter in West Africa. This may have been induced by the fact that tourism destination in these economies are in the commercial nerve centres which contribute to the economic prosperity and thus makes the regression result not too surprising. whereas, the result suggests that the role of tourism cannot be over-emphasised in the sustainable management of tourism in order to reap maximum benefit of topical relevance to West African macroeconomic performance. In other words, economic performance in West Africa can be enhanced through sound tourism development policies that support economic openness with greater emphasis on liberalization policy since the region stands to gain from this policy stance. The result revealed that for West African countries, the growth in tourist arrivals has resulted in a significant economic growth during the period between 2000 and 2004. The model also explains a positively strong percentage of about 96 of the changes in the West African economic performance. This supports the World Tourism Organisation (WTO) reports which says that West Africa in particular and Sub-Saharan Africa in general have a lot to offer in terms of various types of tourism such as seaside, environmental, cultural, sports, and discovery. Thus, West Africa needs to strategically harness its tourism potentials in order to improve its economic performance.

Table 3. Result of the Pooled Regression Result

Variables	Coefficient	Standard Error	T-Statistics	Probability
LRGDPPC(-1)	0.72305	0.104437	6.923349	0.0000
OPENNESS (-1)	0.000745	0.000574	1.298019	0.2091
GOV_SHARE_RGDPPC (-1)	-0.000303	0.001425	-0.212545	0.8338
INV_SHARE_RGDPPC(-1)	0.003562	0.004125	0.863501	0.3981
CP(-1)	0.067362	0.031345	2.149030	0.0441
TOU_ARRIVALS (-1)	7.66E-05	3.00E-05	2.55513	0.0189
C	1.653981	0.620187	2.666906	0.0148
R ²				0.966
Adjusted R ²				0.956
Durbin Watson				2..312

The pooled regression result is more robust than the fixed effect panel regression, showing that lagged real GDP per capita, openness, quality of governance, and number of tourism arrivals are statistically significant. In other words, tourism as the main objective of this study does matter in West African economic performance. In view of this result, since tourism and openness were found to stimulate economic performance in West Africa, the policy measures that enhance the growth of tourism activities over time and promote open trade have the potential of significantly stimulating economic growth in West Africa.

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APPENDIX

Estimated Result (First Attempt)

Estimation 1. Panel least Squares

Dependent Variable:
LRGDPPPC

Method: Panel Least Squares

Date: 11/07/07 Time: 14:31

Sample (adjusted): 2001 2004

Periods included: 4

Cross-sections included: 8

Total panel (unbalanced)

observations: 27

	Coefficient	Std. Error	t-Statistic	Prob.
LRGDPPC(-1)	0.723051	0.104437	6.923349	0.0000
OPENNESS(-1)	0.000745	0.000574	1.298019	0.2091
GOV_SHARE_RGDPPC(-1)	-0.000303	0.001425	-0.212545	0.8338
INV_SHARE_RGDPPC(-1)	0.003562	0.004125	0.863501	0.3981
CPI(-1)	0.067362	0.031345	2.149030	0.0441
TOU_ARRIVALS(-1)	7.66E-05	3.00E-05	2.555513	0.0189
C	1.653981	0.620187	2.666906	0.0148
		Mean		
R-squared	0.966078	dependent var		7.009414
		S.D.		
Adjusted R-squared	0.955902	dependent var		0.221023
		Akaike info		
S.E. of regression	0.046414	criterion		-3.084030
		Schwarz		
Sum squared resid	0.043085	criterion		-2.748072
		Hannan-		
Log likelihood	48.63440	Quinn criter.		-2.984132
		Durbin-		
F-statistic	94.93254	Watson stat		2.311912
Prob(F-statistic)	0.000000			

Estimation 2. Panel least Squares With fixed effects

Dependent Variable:

LRGDPPC

Method: Panel Least Squares

Date: 11/07/07 Time: 14:32

Sample (adjusted): 2001 2004

Periods included: 4

Cross-sections included: 8

Total panel (unbalanced)

observations: 27

	Coefficient	Std. Error	t-Statistic	Prob.
LRGDPPC(-1)	0.250909	0.274862	0.912854	0.3779
OPENNESS(-1)	0.001739	0.001518	1.145347	0.2727
GOV_SHARE_RGDPPC(-1)	0.002720	0.005042	0.539569	0.5986
INV_SHARE_RGDPPC(-1)	-0.010595	0.014928	-0.709744	0.4904
CPI(-1)	0.017811	0.056082	0.317599	0.7558
TOU_ARRIVALS(-1)	0.000116	9.07E-05	1.279781	0.2230
C	5.044906	1.950738	2.586152	0.0226

Effects
Specification

Cross-section fixed (dummy variables)

	Mean		
R-squared	0.983659	dependent var	7.009414
Adjusted R-squared	0.967318	S.D. dependent var	0.221023
S.E. of regression	0.039957	Akaike info criterion	-3.295890
Sum squared resid	0.020755	Schwarz criterion	-2.623974
Log likelihood	58.49451	Hannan-Quinn criter.	-3.096094
F-statistic	60.19605	Durbin-Watson stat	2.619457
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled
 Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.998037	(7,13)	0.1334
Cross-section Chi-square	19.720221	7	0.0062

Estimated Result (Corrected Specification and Reported Result)

Estimation 1. Panel least Squares

Dependent Variable:

LRGDPPPC

Method: Panel Least Squares

Date: 11/07/07 Time: 14:31

Sample (adjusted): 2001 2004

Periods included: 4

Cross-sections included: 8

Total panel (unbalanced)

observations: 27

	Coefficient	Std. Error	t-Statistic	Prob.
LRGDPPPC(-1)	0.723051	0.104437	6.923349	0.0000
OPENNESS(-1)	0.000745	0.000574	1.298019	0.2091
GOV_SHARE_RGDPPC(-1)	-0.000303	0.001425	-0.212545	0.8338
INV_SHARE_RGDPPC(-1)	0.003562	0.004125	0.863501	0.3981
CPI(-1)	0.067362	0.031345	2.149030	0.0441
TOU_ARRIVALS(-1)	7.66E-05	3.00E-05	2.555513	0.0189
C	1.653981	0.620187	2.666906	0.0148
R-squared	0.966078	Mean dependent var		7.009414
Adjusted R-squared	0.955902	S.D. dependent var		0.221023
S.E. of regression	0.046414	Akaike info criterion		-3.084030
Sum squared resid	0.043085	Schwarz criterion		-2.748072
Log likelihood	48.63440	Hannan-Quinn criter.		-2.984132
F-statistic	94.93254	Durbin-Watson stat		2.311912
Prob(F-statistic)	0.000000			

Estimation 2: Panel least Squares With fixed effects

Dependent Variable:
 LRGDPPPC
 Method: Panel Least Squares
 Date: 11/07/07 Time: 14:32
 Sample (adjusted): 2001 2004
 Periods included: 4
 Cross-sections included: 8
 Total panel (unbalanced)
 observations: 27

	Coefficient	Std. Error	t-Statistic	Prob.
LRGDPPPC(-1)	0.250909	0.274862	0.912854	0.3779
OPENNESS(-1)	0.001739	0.001518	1.145347	0.2727
GOV_SHARE_RGDPPC(-1)	0.002720	0.005042	0.539569	0.5986
INV_SHARE_RGDPPC(-1)	-0.010595	0.014928	-0.709744	0.4904
CPI(-1)	0.017811	0.056082	0.317599	0.7558
TOU_ARRIVALS(-1)	0.000116	9.07E-05	1.279781	0.2230
C	5.044906	1.950738	2.586152	0.0226

Effects Specification n

Cross-section fixed (dummy variables)

	Mean		
R-squared	0.983659	dependent var S.D.	7.009414
Adjusted R-squared	0.967318	dependent var Akaïke info	0.221023
S.E. of regression	0.039957	criterion Schwarz	-3.295890
Sum squared resid	0.020755	criterion Hannan-	-2.623974
Log likelihood	58.49451	Quinn criter.	-3.096094
F-statistic	60.19605	Durbin-Watson stat	2.619457
Prob(F-statistic)	0.000000		

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.998037	(7,13)	0.1334
Cross-section Chi-square	19.720221	7	0.0062

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