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Drivers of International Tourism Demand in Africa

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Abstract

Despite *Africa's potential for tourism, the continent's tourism endowments are still largely* underdeveloped and underutilized. The identification and enquiry into the drivers of international tourism demand in Africa is, therefore, key to any effort to understand and explain changes in tourism demand in Africa. This study, therefore, uses Poisson regression model to determine the key drivers of international tourism demand in 44 African countries, employing annual data over the period 1995-2015. The outcomes of the Poisson regression show that taste formation, real exchange rate, infrastructure, political stability and absence of violence, per capita income, FDI, and trade openness are significant drivers of international tourism into Africa. However, travel costs and domestic prices are not significant drivers of the decision to travel to Africa.

Key words: International Tourism Demand, Tourism Arrivals, Africa, Panel Poisson Regression

JEL Classification: L83, D12, O55, C33

Introduction

Tourism, a major world economic activity, is an important ingredient for the growth of an economy through its effects on employment generation, infrastructure provision, acceleration of income taxes and exports and promotion of global peace (Eilat and Einav, 2003). As a result, many African countries have started tapping into the potentials embedded in tourism. As an emerging industry in Africa, tourism has been identified with the boost of foreign exchange, enhancement of infrastructural facilities and promotion of international cooperation and understanding for the African continent (Kareem, 2008). Tourism has become a key means by which many African countries improve their income and export base (Kester, 2003; Christie and Crompton, 2001) as well as showcase their cultural heritage (Kareem, 2008).

Recent decades have therefore seen growing expansion in tourism demand in Africa, as international tourism gradually become key to Africa-wide economic development with both private and public sectors channeling substantial resources into the industry. Studies such as

Christie and Crompton (2001) have highlighted that Africa has remarkable tourism prospects and that tourism is gradually contributing to the continent's GDP and exports. Naude and Saayman (2004) contend that Africa's natural and cultural resource endowments are such that it ought to be profiting largely from international tourism, while Kester (2003) argues that tourism has the potentials to significantly accelerate Africa's economic growth and development.

However, empirical studies on international tourism demand has been largely on developed countries while Africa has remained under-researched (Xiao and Smith, 2006; Rogerson, 2007). This dearth of rigorous empirical studies has been attributed as the cause of inadequate policy guidance in the industry (Christie and Crompton, 2001) and the continent's largely underdeveloped and underutilized tourism endowments, despite its potentials for tourism. The few empirical studies on tourism demand on Africa have suggested several factors as the leading drivers of international tourism demand. Since the estimated demand elasticity of each driver of international tourism found in the empirical literature vary significantly, the estimates cannot be regarded as conclusive. The identification and enquiry into the drivers of international tourism demand in Africa is key to any effort to understand and explain changes in tourism demand in the past and to anticipate the potential pathways of future tourism development in Africa. This study is an attempt to fill these voids, taking into consideration typical factors present within the continent.

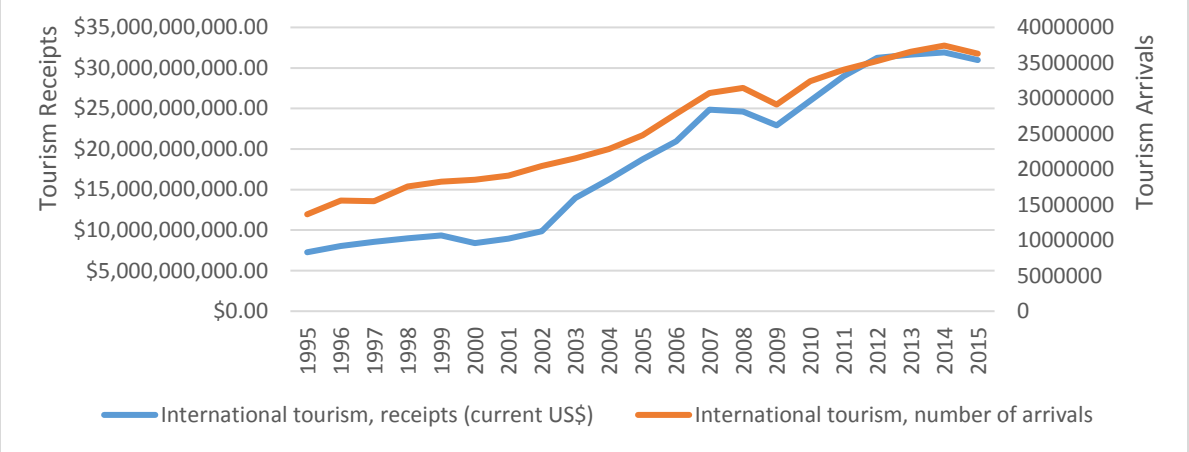
This study is important because it is a direct response to the number of important regional and national initiatives to enhance tourism in Africa. This study fosters evidence-based decision-making with respect to the drivers of international tourism demand in Africa, in order to reposition the continent for increased benefits from international tourism. A high-quality tourism demand analysis is essential for governments, policy makers and businesses to make good business decisions and develop efficient public policy. Through a comprehensive analysis of the drivers of international tourism demand in Africa, this study helps to advance the understanding of tourist behavior, and also helps in the development of more effective international tourism public policy and efforts towards developing and boosting Africa's competitiveness. This study therefore provides significant evidence for policymakers, researchers, analysts, investors and business leaders around Africa and the world on international tourism demand in Africa.

The rest of this study is organized as follows: the next section provides the stylized facts of international tourism in Africa. Section II presents the stylized facts. Section III provides the review of the theoretical and empirical literature of the drivers of international tourism demand. Section IV provides the empirical results. Section V concludes the paper.

Stylized facts

International tourism demand in Africa has grown rapidly (Figure 1), making the continent the second fastest growing tourist destination in the world (UNWTO, 2014). In 1995, the continent receives only 3.6% of world tourist arrivals; by 2010, the figure has increased to 5.2% (Christie et al, 2014). According to Africa Tourism Monitor (2016, para. 3-4), "In 2014, a total of 65.3 million international tourists visited the continent – around 200,000 more than in 2013. Back in 1990, Africa welcomed just 17.4 million visitors from abroad. The sector has therefore quadrupled in size in less than 15 years. Africa's strong performance in 2014 (up 4%) makes it one of the world's fastest-growing tourist destinations, second only to Southeast Asia (up 6%)".

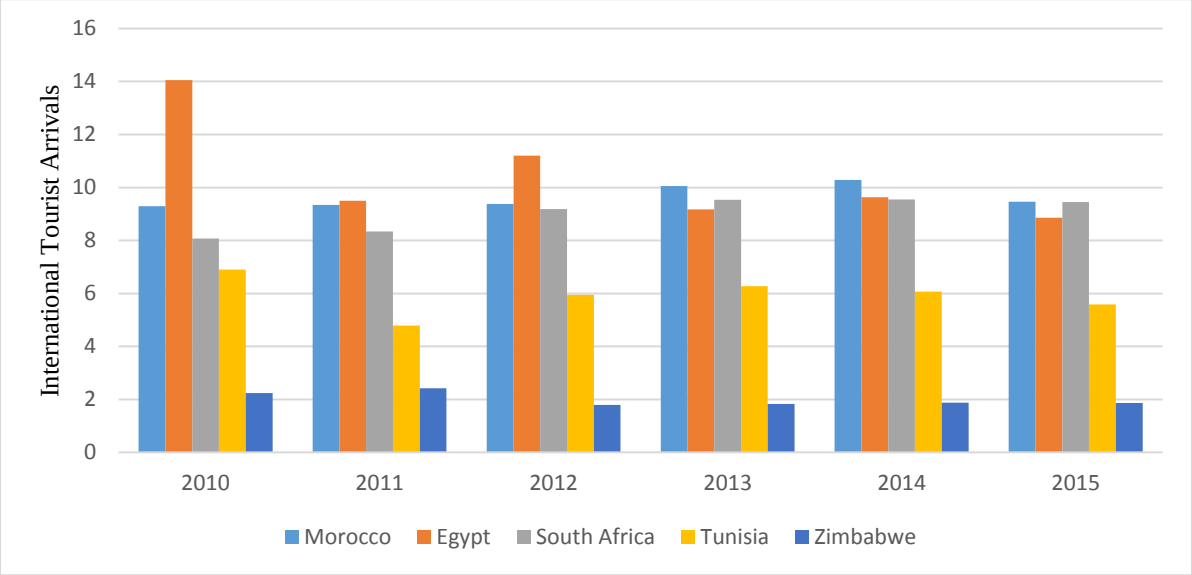
Figure 1: International Tourism Receipts ($) and Arrivals



Egypt and Morocco, two North African countries, are topmost in the list of African countries most-visited by international tourists (Figure 2). The double-digit growth provides yet further evidence of the continent's enormous tourism potential. The hospitality sector has grown rapidly and expanded into new African markets (i.e. Mauritania). Nigeria, in sub-Saharan Africa, tops

hospitality rankings, followed closely by Egypt and Morocco. One of largest hotel development projects is also found in Sub-Saharan Africa: the Grand Hotel Oyala Kempinski (in Equatorial Guinea) with 451 rooms capacity. With 20 million people employed in the tourism industry, the sector now constitutes 7.1% of jobs and 8.1% of Africa's total GDP. Through historic monuments such as the pyramids of Egypt, Robben Island in South Africa, cave churches in Ethiopia, cave paintings in Tassili N'Ajjer in Algeria and Tsodilo in Botswana, and Gorée Island in Senegal, Africa boasts a wealth of attractions for international tourists.

Figure 2. Top Five African Countries for International Tourist Arrivals (millions)

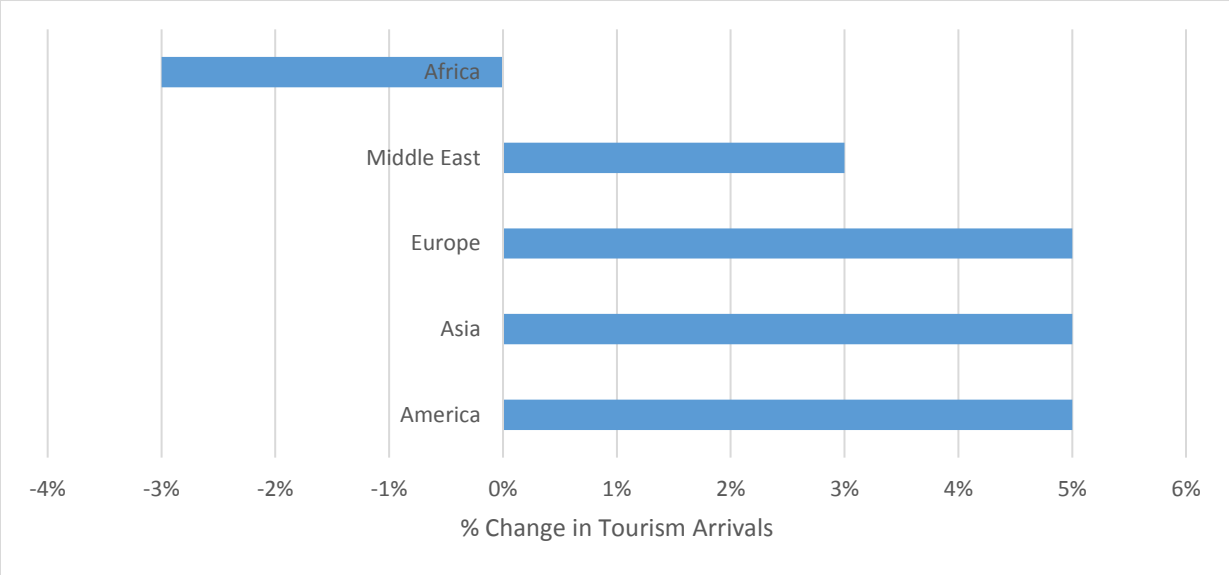


Data Source: World Development Indicators (2016)

Recently, many African countries have launched various tourism-enhancing initiatives such as the recent regional cooperation mechanisms and visa simplification schemes, including the launch of the single visa and e-visa scheme in Southern African Development Community member states; the single visa for the East African Community, the Kavango Zambezi single tourist visa in Zimbabwe and Zambia, and non-visa travel requirement for African Union nationals in Ghana. Notwithstanding the laudable initiatives and the seeming growth of international tourism in Africa, the continent accounts for only 5.8% of the world's incoming tourists and 3.5% of global tourism revenue.

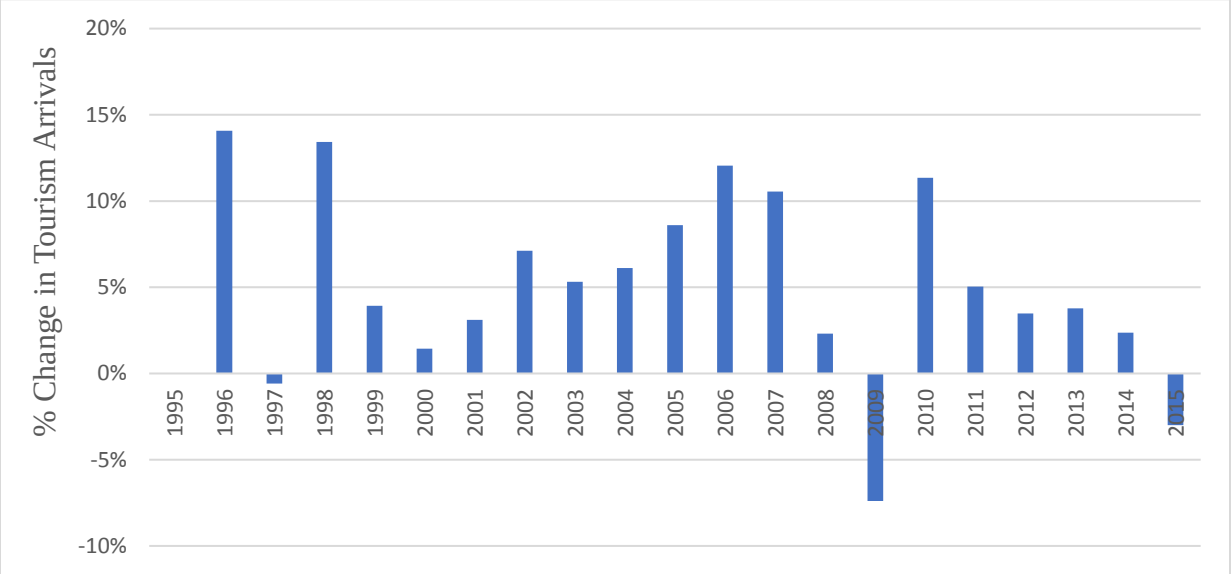
In fact, Africa saw a decrease in international tourist arrivals between 2014 and 2015 (Figure 3 and 4). While there is strong regional growth all over the world (Europe, the Americas and Asia and the Pacific all recorded around 5% growth and the Middle East 3% growth) between 2014 and 2015, Africa had an estimated 3% decrease, mainly as a result of low tourism arrivals in North Africa, which constitute more than one third of arrivals into Africa (Figure 1). In North Africa arrivals reduced by 8% and in Sub-Saharan Africa by 1%, reaching a total of 53 million for the entire continent. According to UNWTO (2016, para. 7), "2015 results were influenced by exchange rates, oil prices and natural and manmade crises in many parts of the world". Additionally, security concerns related to terrorism and political instability account for the reduction in international tourist arrivals, even though tourism resorts are not the most dangerous areas (Travel and Tourism Competitiveness Report, 2015).

Figure 3. Growth of International Tourism Arrivals (% Change between 2014 and 2015)



Data Source: UNWTO (2016)

Figure 4: Growth of International Tourism Arrivals in Africa (1995-2015)



Data Source: World Development Indicators (2016)

According the World Travel & Tourism Council (2014), the countries that rely most heavily on tourism are islands, including Cape Verde and the Seychelles in the Indian Ocean. In some of these African remote islands, about the only means of building up an economy is tourism. Their remoteness from mainlands and also because they are in temperate climate boosts tourism. These top tourism-dependent countries thus depend on the flow of tourists and the money they bring. Beyond the GDP contribution that the tourists bring, this is also the largest investment sector on these islands, as well as the largest sector for employment in these countries.

According to the same WTTC data, African countries with the least dependence on tourism as a share of GDP include Chad, Gabon and Niger: tourism makes up just 1.1 per cent of total income in each. Africa's island nations are typically the most reliant on income from tourism, along with destinations traditionally popular with European tourists, such as South Africa. South Africa, particularly, is leading the way, ranking 48th globally and toping the African region, thanks in part to its relatively good infrastructure compared to other African countries. The country ranks relatively high as a result of its efforts to lessen red tape and boost business development in the tourism sector. Moreover, the country is still reaping the benefits of the 2010 World Cup, with several sports stadiums capable of hosting major entertainment events.

Theory and Review of Literature

The standard consumer theory serves as the theoretical foundations for modelling international tourism demand (Muchapondwa and Pimhidzai, 2011). Just like the demand for any other commodity, international tourism demand is influenced by both positive and negative shocks, which have generally been identified and accepted in the literature as the key drivers of international tourism demand. With the expansion of the tourism demand literature over the years (i.e. Witt and Witt, 1995; Song and Li, 2008; Claveria and Torra, 2014; Zhou-Grundy and Turner, 2014; Peng et al., 2014), meta-analytic reviews of the tourism demand literature by Crouch (1994a, 1994b, 1995), Witt and Witt (1995), Lim (1997, 1999), Li et al (2005) and Peng et al. (2014) have suggested a consensus regarding tourism demand measures and the drivers explaining international tourism flows.

For example, economic theory suggests that income is a driver of tourism demand as international tourism is considered a luxury product (Peng et al. 2014). Income has been demonstrated as a dominant driver of international tourism demand (i.e. Greenidge 2001; Turner and Witt 2001; Dritsakis 2004). Turner and Witt (2001) show that the demand for visits to friends and relatives is linked to overall gross domestic product while Dritsakis (2004) show that tourism demand is linked to real consumption per capita. In contrast, Naude and Saayman (2005) show income in source countries has little impact on tourism demand in Africa.

Similarly, several studies have emphasized the importance of exchange rate in driving international tourism flow (Croes and Vanegas 2005). Several empirical studies have demonstrated that tourists may show different sensitivities to variations in exchange rates versus actual price changes (i.e. Webber 2001; Mangion, Durbarry, and Sinclair 2005). Peng et al. (2104) argue that tourists are inclined to be more cognizant of exchange rate variations before making a trip than they are of inflation in the destination country.

Other potentially significant drivers of international tourism demand that have been discussed in the literature are prices in alternative destinations (i.e. measured by domestic CPI) (Witt and Witt 1995; Song and Wong 2003); immigration trends (Seetaram and Dwyer 2009); changes in tourists' tastes and seasonal variations (Lim 2004); political instability (Naude and Saayman 2005; Dhariwal 2005); foreign direct investment (Tang, Selvanathan, and Selvanathan 2007); rates of

unemployment (Cho, 2001); the levels of income distribution (Morley 1998); terrorism or infection scares (Smeral 2010, Song and Lin 2010); and the lagged effects of the dependent variable itself, as a proxy of the strength of habit persistence in travel preferences (Peng et al. 2014).

Political risk and specific events are some of the widely studied drivers of international tourism demand. For example, Leiper and Hing (1998) find that the Asian financial crisis and outbreaks of forest fires have negative effects on Malaysia's international tourism. Additionally, Tan et al. (2002) find that the Asian financial crisis and the gulf war have negative effects on international tourism in Indonesia. Changes in political risk are also believed to contribute to tourism demand shocks, as high political risks discourage visits to high risk destinations. Eilat and Einav (2004) find that a one point reduction in the risk index increases incoming tourists by 4% and the size of this effect is equal for both high and low income destinations. This is especially important in the context of international tourism in Africa where risk perceptions are higher.

Some studies have investigated international tourism demand in Africa. For example, Naudé and Saayman (2005) identify the drivers of tourism arrivals in 43 African countries as political stability, marketing and information, tourism infrastructure and the level of development in the destination. They find that relative prices, cost of travel and level of income in the originating country are not significant in explaining tourism demand for Africa. In addition, Saayman & Saayman (2008) find that relative prices, income, travel cost, climate, and capacity are significant drivers of tourist arrivals. Ibrahim (2011) show that tourism demand in Egypt is very sensitive to the lagged real gross domestic product per capita, prices, real effective exchange rate, and trade openness, indicating that tourism demand in Egypt is consistent with the demand theory. Furthermore, Muchapondwa and Pimhidzai (2011), in a study of the determinants of international tourism demand in Zimbabwe, find that transport costs, taste formation, changes in global income and specific events have a significant impact on international tourism demand.

Further, numerous quantitative methods have been used to forecast tourism demand. Time series methods are one of the commonest in the literature. These methods uses historical trends in a data to predict the future values. Examples of time series models used in the literature include: Naïve method (Chan et al., 1999), SES model (Witt et al., 1994; Chen et al., 2008), Box-Jenkins model (Makridakis and Hibon, 1979), SMA model (Makridakis et al., 1998; Lim and McAleer, 2008),

ARIMA (Preez and Witt, 2003; Kim et al., 2011), BSM model (Gonzalez and Moral, 1995; Greenidge, 2001; Kulendran and Witt, 2003) and Holt's DES model (Lim and McAleer, 2001).

Another method used in the literature is causal econometric methods, based on cause and effect relationships (Frechtling, 1996) and on how the explanatory variables influence tourism demand over time. Examples are vector autoregressive models (Hu et al., 2004; Wong et al., 2006), time varying parameter models (Song et al., 1998; Song et al., 2000; Witt et al., 2003; Song and Wong, 2003; Li et al., 2004; Song et al., 2008), error correction models (Kulendran and Witt, 2001; Dritsakis, 2004; Veloce, 2004; Choyakh, 2008; Song et al., 2008; Ouerfelli, 2008; Halicioglu, 2010), dynamic AIDS model (Durbarry and Sinclair, 2003; De Mello and Fortuna, 2005), Gravity Model (Che, 2004; Guo, 2007) and Poisson regression model (Karimi, Faroughi & Rahim, 2015).

The current study uses Poisson regression model to determine the drivers of international tourism demand in Africa in line with Karimi et al. (2013) who found that the generalized Poisson regression model is the most appropriate for estimating international tourism demand.

Empirical Analysis

Econometric studies have shown that the omission of relevant variables in a regression model may lead to bias (Gujarati 2003, p. 508–9), the magnitude of which depends on the interaction between the omitted variable, the other explanatory variables and the dependent variable. In order to preclude the omitted variable bias, the model used in this study follows the empirical models in the literature, such as Karimi et al. (2015), which model international tourism demand in ASEAN countries using FDI, exchange rate, inflation and openness on tourism arrivals. In the current study, Karimi et al. (2015) model is modified in line with contemporary African realities. According to Kareem (2008), there are dimensions such as political instability and terrorism attacks in Africa. These are all included in the present model, as they are found to be consistent with the tourism demand literature on Africa (i.e. Naude and and Saayman, 2004; Odularu and Kareem, 2007). Infrastructural variable (i.e. the number of fixed and mobile telecommunication services) is also included in line with Kareem (2008).

Further, the literature identifies domestic prices, taste formation, and travel costs as important drivers of international tourism demand (Webber, 2001; Tan et al. 2002; Eilat and Einav, 2004). This study employs proxies to capture these variables. Lagged value of international tourism

arrivals, consumer price index (CPI) and oil prices serve as proxies for taste formation, domestic prices and transport costs respectively (See Kareem et al., 2008; Muchapondwa and Pimhidzai, 2011).

Thus, the model for this study is specified as follows:

$$\mathrm{TOR}_{it} = \kappa_0 + \kappa_1 \mathrm{TAF}_{it} + \kappa_2 \mathrm{FDI}_{it} + \kappa_3 \mathrm{OPEN}_{it} + \kappa_4 \mathrm{TRC}_{it} + \kappa_5 \mathrm{EXCR}_{it} + \kappa_6 \mathrm{POL}_{it}$$

$$+ \kappa_7 \mathrm{INFR}_{it} + \kappa_8 \mathrm{CPI}_{it} + \kappa_9 \mathrm{GDPC}_{it} + \xi_{it} \qquad (1)$$

Where, i = 1, 2, …, N, that is, the 43 countries chosen for the study. TOR is the total number of international tourist arrivals; TAF is taste formation; FDI is net inflows of foreign direct investment as a percentage of GDP; OPEN is trade openness; TRC is travel costs; EXCR is the real exchange rate; POL is political stability and absence of violence; INFR is infrastructure; CPI is domestic prices and GDPC is per capita income.

In modeling international tourism demand in Africa, a choice has to be made between multiple-equation and single-equation system estimation. While multiple-equation system estimation may be more appropriate for modeling the source country's outbound tourism demand to different destinations than a single destination's aggregated total tourism demand across various originating countries, there is no data disaggregated by both country of origin and purpose of visit for tourists to Africa. Single-equation estimation still provides valuable insights into the drivers of international tourism demand and continues to be the most widely used estimation technique for modeling international tourism demand. To investigate international tourism demand in Africa, this study, therefore, employs panel Poisson regression, generalized Poisson techniques and negative binomial regression. These are techniques widely used for count data in the literature (Greene, 2008). Individual fixed effects are used to estimate the Poisson regression model because the sample of African countries are heterogeneous with individual characteristics. The individual effects include three assumptions: two full distributional, fixed effect and random effect (Hausman, Hall and Griliches, 1984).

Table 1 shows the parameter estimates and t-ratio for the fitted Poisson regression models of the international tourism demand in Africa. According to the AIC results, generalized Poisson

regression model is the best model for the estimation among the three models, thus confirming the results of Karimi et al. (2015).

Table 1. Estimates of the Poisson, Generalized Poisson and Negative Binomial Regression Models Dependent Variable: (lnTOR)

	Poisson	Generalized Poisson	Negative binomial
Intercept	4.77**	1.40**	1.51***
Real exchange rate (lnEXR)	-0.18***	-0.37***	-0.81**
Net inflows of foreign direct investment as a percentage of GDP (lnFDI)	3.15**	5.19**	5.71**
Domestic prices (lnCPI)	-0.58***	-0.15	-0.47
Trade openness (lnOPEN)	-3.79*	4.72**	0.93**
Taste formation (lnTAF)	5.77*	2.84**	3.05*
Political stability and absence of violence (lnPOL)	1.78**	0.15**	2.43*
Infrastructure (lnINFR)	2.63*	3.71*	7.11**
Travel costs (lnTRC)	1.44	0.53***	2.07
Per capita income (lnGDPC)	0.91***	1.64**	0.78**
Dispersion parameter		0.03**	0.88***
Log likelihood	-1602428.35	-1644.08	-1232.47
AIC	386205.81	2649.21	3053.19

Note: *, ** and *** indicate 1%, 5% and 10% levels of significance.

The three outcomes of the Poisson regression show that taste formation is a significant driver of international tourism in Africa, meaning that the number of prospective tourists depends on previous treatment and hospitality. In other words, tourists are loyal to countries, their airplane travel and luxury hotels. As well, real exchange rate for the countries is negatively related to international tourism, with the tourists' degree of responsiveness to exchange rate appreciation elastic and statistically significant. Currency appreciation makes the tourists give more of their

local currencies to Africa, thus rendering their travels and adventures costlier and leading to a loss of welfare to the tourists. Thus, currency appreciation is consistent with a lower number of tourists. This finding confirms the results of Karimi et al. (2015) who showed that real exchange rate has significant negative relationship with international tourism demand in ASEAN countries. Other studies that have found negative and significant effects of exchange rate on international tourism are Blake et al. (2008), Becken et al., (2008), and Hanafiah and Harun (2010).

Infrastructure also is found to be a significant driver of international tourism in Africa, meaning the more infrastructural provisions in the continent, the more eager tourists are to come and explore the endowments and opportunities embedded in Africa. Political stability and absence of violence in different parts of Africa have significant effects on tourism demand, meaning that tourists are sensitive to events and trends in the continent before undertaking their trips. In recent years, the incidence of violence in Africa has become a risk factor for tourists. If African countries experience increased political stability and absence of violence, there will be a rise in tourists' inflows. Also, the estimated income elasticity of international tourism demand is significant, meaning that per capita income is a significant driver of tourism into Africa. A higher per capita income is consistent with more tourist arrivals, indicating that the tourists prefer more developed African countries. This finding confirms the results of Naude and Saayman (2005) who showed that the level of development in a country has a positive relation with arrivals from international markets.

The regression results demonstrate, as well, that FDI and trade openness, are significant drivers of the decision to travel to Africa. Numerous studies have provided empirical evidence in support of these findings. Karimi et al. (2015) show that a positive significant relationship between FDI, trade openness and international tourism demand in ASEAN countries. Siddique et al. (2012) showed a causal relation between FDI and tourism arrivals. Also, Tang et al. (2007) found a causal interaction between FDI, economic growth and tourism arrivals for China. As well studies such as Khan et al. (2005), Katircioglu (2009), Sarmidi and Saleh (2010), Santana-Gallego et al., (2010), Akinboade and Braimoh (2010) and Massidda and Mattana (2012) have found empirical relations between tourism, imports and exports.

However, and surprisingly domestic prices and travel costs are not significant drivers of international tourism in Africa, a result that confirms the findings of Crouch (1995), Eilat and Einav (2003) and Naude and Saayman (2004), who showed that tourism is less price-sensitive.

However, this finding is in contrast with Kareem (2008) who showed that domestic prices are key factors that tourists consider in their choice of destinations. Also, Chatziantoniou et al. (2013) found a reverse causality and negative effects between inflation and the tourism industry.

Discussion and Conclusion

Tourism is an important ingredient for the growth of an economy through its effects on employment generation, infrastructure provision, acceleration of income taxes and exports and promotion of global peace. As a result, many African countries have started tapping into the potentials embedded in tourism. International tourism into Africa has thus grown rapidly, making the continent the second fastest growing tourist destination in the world. Tourism has become a key means by which many African countries improve their income and export base as well as showcase their cultural heritage.

Africa's natural and cultural resource endowments are dominant attractions for international tourism demand. With historic monuments such as the pyramids of Egypt, Robben Island in South Africa, cave churches in Ethiopia, cave paintings in Tassili N'Ajjer in Algeria and Tsodilo in Botswana, and Gorée Island in Senegal, Africa boasts a wealth of attractions for tourists from all over the world. Tourism has the potentials to accelerate Africa's economic growth and development significantly.

The identification and enquiry into the drivers of international tourism demand in Africa are key to any effort to understand and explain changes in tourism demand in the past and to anticipate the potential pathways of future tourism development in Africa. This study, therefore, uses Poisson regression model to determine the drivers of international tourism demand in Africa in line with Karimi et al. (2013). This study employs annual data over the period 1995-2015 on a sample of 44 African countries. In contrast to the few studies in the literature on international tourism demand in Africa (e.g. Naudé and Saayman, 2005), this study has carefully tested for the cross-sectional dependence of the data series.

The outcomes of the Poisson regression show that taste formation is a significant and positive driver of international tourism in Africa. The number of prospective tourists depends on previous treatment and hospitality. As well, real exchange rate for the countries is also negatively related to

international tourism. Thus, currency appreciation is consistent with a lower number of tourists. Infrastructure also is a significant and positive driver of international tourism in Africa. The higher the scale of infrastructural provisions in the continent, the more eager tourists are to come and explore the endowments and opportunities in Africa. Political stability and absence of violence also have salutary effects on international tourism. The implication is that if African countries experience increased political stability and absence of violence, tourists will be more eager to visit Africa. As well, a higher per capita income is consistent with more tourist arrivals, indicating that the tourists prefer more developed African countries. FDI and trade openness are also significant drivers of international tourism in Africa. However, domestic prices and transport costs are not significant drivers of the decision to travel to Africa.

In line with the above, most countries in Africa realize tourism's potentials as an economic opportunity and development catalyst, and have therefore drafted strategic plans. While Africa has enormous potentials with its rich cultural and natural resources, yet it is still, for the most part, in the early stages of travel and tourism development. As shown by the findings of this study, Africa's challenges may not be linked to its incredible resources, but rather to broader issues confronting the continent such as weak infrastructure, low purchasing power, political stability, violence and security. Even though Africa has been receiving an increasing number of tourists, the continent should keep infrastructural development and political stability as central elements as they develop their travel and tourism sectors. By tackling their challenges head on and building on their competitive advantages, African countries will hopefully be able to attain their travel and tourism potentials.

In sum, the study found evidence that taste formation, real exchange rate, infrastructure, political stability and absence of violence, per capita income, FDI, and trade openness are significant drivers of international tourism demand in Africa. Nevertheless, it must be stressed that the evidence is not picture-perfect. There are some cases where these factors may not drive international tourism demand. As a result of the intrinsic cross-country heterogeneities, the drivers of international tourism demand may be country-specific, and estimation of a panel model based on the pooling of observations across the countries might not be informative to investors interested in a particular country, and their use could even be misleading. While it is possible in some dimensions to do the estimation for a specific country, the estimation for a specific company demands larger time series

data than are currently available. It is suggested that future research takes the findings reported in this study further to examine how the drivers influence international tourism demands in individual African countries.

References

AKINBOADE, O.A. and BRAIMOH L.A. (2010). International tourism and economic development in South Africa: A Granger causality test. Int. J. Tourism Res., 12: 149-163. DOI: 10.1002/jtr.743 Al-Mulali, U., H.G.

BECKEN, S., A. CARBONI, S. VULETICH and SCHIFF, A. (2008). Analysis of tourist consumption, expenditure and prices for key international visitor segments: Technical report. Lincoln University.

BLAKE, A., J.S. ARBACHE, M.T. SINCLAIR and V. TELES (2008). Tourism and poverty relief. Ann. Tourism Res., 35: 107-126. DOI: 10.1016/j.annals.2007.06.013

CAMERON, C.A. and P.K. TRIVEDI (1998). Regression Analysis of Count Data (Econometric Society Monographs). 1st Edn., Cambridge University Press, ISBN-10: 0521632013, pp: 436.

CHAN, Y., T. HUI and E. YUEN (1999). Modeling the impact of sudden environmental changes on visitor arrival forecasts: The case of the gulf war. J. Travel Res., 37: 391-394 DOI: 10.1177/004728759903700409

CHANG, C. and M. MCALEER (2012). Aggregation, heterogeneous autoregression and volatility of daily international tourist arrivals and exchange rates. Japanese Economic Rev., 63: 397-419. DOI: 10.1111/j.1468-5876.2011.00563.x

CHATZIANTONIOU, I., G. FILIS, B. EECKELS and A. APOSTOLAKIS (2013). Oil prices, tourism income and economic growth: A structural VAR approach for European Mediterranean countries. Tourism Manage., 36: 331-341. DOI: 10.1016/j.tourman.2012.10.012

CHE, Y.B. (2004). An approach to modeling regional tourist attraction. Resource Develop. Market, 20: 163-165.

CHEN, R.J.C., P. BLOOMFIELD AND F.W. CUBBAGE, (2008). Comparing forecasting models in tourism. Journal of Hospitality & Tourism Research, 32(1), 3-21.

CHO, V. (2001). "Tourism Forecasting and Its Relationship with Leading Economic Indicators." Journal of Hospitality and Tourism, 25 (4): 399-420.

CHOYAKH, H., (2008). A model of tourism demand for Tunisia: Inclusion of the tourism investment variable. Tourism Econom., 14: 819-838. DOI: 10.5367/000000008786440238

CHRISTIE, I.T. AND D.E., CROMPTON (2001), "Tourism in Africa", Africa Region Working Paper, Series No.12, The World Bank Washington DC.

CROES, R. R., AND M. VANEGAS. (2005). "An Econometric Study of Tourist Arrivals in Aruba and Its Implications." Tourism Management, 26 (6): 879-90.

CROUCH, G. (1994a), "The Study of International Tourism Demand: A Survey of Practice", Journal of Travel Research, Vol. 32, pp. 41-55.

CROUCH, G. (1994b), "The Study of International Tourism Demand: A Review of Findings", Journal of Travel Research, Vol. 33, pp. 12-23.

CROUCH, G.I. (1995), "A Meta-analysis of Tourism Demand", Annas of Tourism Research, Vol. 22 (1), pp 103-118

DE MELLO, M.M. and N. FORTUNA, (2005). Testing alternative dynamic systems for modelling tourism demand. Tourism Econom., 11: 517-537.509-521. DOI: 10.5367/0000005775108719

DHARIWAL, R. (2005). "Tourist Arrivals in India: How Important Are Domestic Disorders?" Tourism Economics, 11 (2): 185-205.

DIAMOND, J. (1977). "Tourism's Role in Economic Development: The Case Reexamined." Economic Development and Cultural Change, 25 (3): 539-53.

DRITSAKIS, N. (2004). "Cointegration Analysis of German and British Tourism Demand for Greece." Tourism Management, 25 (1): 111-19.

DURBARRY, R. and M.T. SINCLAIR, (2003). Market shares analysis: The case of French tourism demand. Ann. Tourism Res., 30: 927-941. DOI: 10.1016/S0160-7383(03)00058-6

EILAT, Y., and EINAV, L. (2004). Determinants of international tourism: A three-dimensional panel data analysis. Applied Economics, 36, 1315-1327.

FRECHTLING, D.C., (1996). Practical Tourism Forecasting. 1st Edn., Butterworth-Heinemann, Oxford, ISBN-10: 0750608773, pp: 245.

GREENE, W.H., (2008). Econometric Analysis. 7th Edn., Granite Hill Publishers.

GREENIDGE, K. (2001). "Forecasting Tourism Demand: An STM Approach." Annals of Tourism Research, 28 (1): 98-112.

GUJARATI, D. N. (2003). Basic Econometrics, 4th edition. Boston: McGraw-Hill.

GULOGLU, B. and R.B. TEKIN, (2012). A panel causality analysis of the relationship among research and development, innovation and economic growth in high-income OECD countries. Eurasian Economic Rev., 2: 32-47. DOI: 10.14208/BF03353831

GUO, W., (2007). Inbound tourism, an empirical research based on gravity model of international trade. Tourism Tribune, 22: 30-34.

HALICIOGLU, F., (2010). An econometric analysis of the aggregate outbound tourism demand of Turkey. Tourism Econom., 16: 83-97. DOI: 10.5367/000000010790872196

HANAFIAH, M.H.M. and M.F.M. HARUN, (2010). Tourism demand in Malaysia: A cross-sectional pool time series analysis. Int. J. Trade, Econom. Finance, 1: 80-83. DOI: 10.7763/IJTEF.2010.V1.15 Hausman, J.A.,

HU, C., M. CHEN and S.C. MCCHAIN (2004). Forecasting in short-term planning and management for a casino buffet restaurant. J. Travel Tourism Market., 16: 79-98. DOI: 10.1300/J073v16n02_07

IBRAHIM, M. A. (2011). The determinants of international tourism demand for Egypt: panel data evidence. European Journal of Economics, Finance and Administrative Sciences, 30, 50-58.

IM, K.S., M.H. PESARAN and Y. SHIN, (2003). Testing for unit roots in heterogeneous panels. J. Econometr., 115: 53-74. DOI: 10.1016/S0304-4076(03)00092-7

KAREEM, O. I. (2008). A panel data analysis of demand for tourism in Africa. Ibadan Journal of Social Sciences, 4(1).

KARIMI, A., FAROUGHI, P., & RAHIM, K. A. (2015). Modeling and Forecasting of International Tourism Demand in ASEAN Countries. American Journal of Applied Sciences, 12(7), 479.

KATIRCIOGLU, S.T., (2009). Revisiting the tourism-ledgrowth hypothesis for Turkey using the bounds test and Johansen approach for cointegration. Tourism Manage., 30: 17-20. DOI 10.1016/j.tourman.2008.04.004

KESTER, I.G.C. (2003), "International Tourism in Africa", Tourism Economics, Vol. 9, pp. 203-221.

KHAN, H., R.S. TOH and L. CHUA, (2005). Tourism and trade: Cointegration and granger causality tests. J. Travel Res., 44: 171-176. DOI: 10.1177/0047287505276607

KULENDRAN, N. and S.F. WITT, (2001). Cointegration versus least squares regression. Ann. Tourism Res., 28: 291-311. DOI: 10.1016/S0160-7383(00)00031-1

KULENDRAN, N. and S.F. WITT, (2003). Forecasting the demand for international business tourism. J. Travel Res., 41: 265-271. DOI: 10.1177/0047287502239034

LEIPER, N., and HING, N. (1998). Trends in Asia-Paci c tourism in 1997-98: from optimism to uncertainty. International Journal of Contemporary Hospitality Management, 10 (7), 245-251.

LI, C., SONG, H. and S.F., WITT (2005), "Recent Developments in Econometric Modelling and Forecasting", Journal of Travel Research, Vol. 44, pp. 82-99.

LI, G., H. SONG AND S.F. WITT, (2004). Modeling tourism demand: A dynamic linear AIDS approach. J.

LIM, C. (1997), "Review of International Tourism Demand Models", Annals of Tourism Research, Vol. 24(4), pp. 835-849.

LIM, C. (1999), "A Metal-Analytic Review of International Tourism Demand", Journal of Travel Research, Vol. 37, pp. 407-428.

LIM, C. (2004). "The Major Determinants of Korean Outbound Travel to Australia." Mathematics and Computers in Simulation, 64 (3-4): 477-85.

LIM, C. and M. MCALEER, (2001). Forecasting tourist arrivals. Ann. Tourism Res., 28: 965-977. DOI: 10.1016/S0160-7383(01)00006-8

LIM, C. and M. MCALEER, (2008). Analysing seasonal changes in New Zealand's largest inbound market. Tourism Recreat. Res., 33: 83-91. DOI: 10.1080/02508281.2008.11081292

MAKRIDAKIS, S. and M. HIBON, (1979). Accuracy of forecasting: An empirical investigation. J. Royal Stati. Society A, 142: 97-145. DOI: 10.2307/2345077

MAKRIDAKIS, S., S.C. WHEELWRIGHT and R.J. HYNDMAN, (1998). Forecasting, methods and applications. 2nd Edn., Wiley, New York, ISBN-10: 047108610X, pp: 923.

MANGION, M. L., R. DURBARRY, and M. T. SINCLAIR. (2005). "Tourism Competitiveness: Price and Quality." Tourism Economics, 11 (1): 45-68.

MORLEY, C. L. (1998). "A Dynamic International Demand Model." Annals of Tourism Research, 25 (1): 70-84.

MUCHAPONDWA, E., & PIMHIDZAI, O. (2011). Modelling international tourism demand for Zimbabwe. International Journal of Business and Social Science, 2(2).

NAUDÉ, W. A., & SAAYMAN, A. (2005). Determinants of tourist arrivals in Africa: a panel data regression analysis. Tourism Economics, 11(3), 365-391.

OUERFELLI, C., (2008). Co-integration analysis of quarterly European tourism demand in Tunisia. Tourism Manage., 29: 127-137. DOI: 10.1016/j.tourman.2007.03.022

PEDRONI, P., (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. Oxford Bulletin Econom. Statist., 61: 653-670. DOI: 10.1111/1468-0084.0610s1653

PEDRONI, P., (2004). Panel cointegration: Asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. Econometric Theory, 20: 597-625. DOI: 10+10170S0266466604203073

PENG, B., SONG, H., CROUCH, G. I., & WITT, S. F. (2014). A meta-analysis of international tourism demand elasticities. Journal of Travel Research, 0047287514528283.

PREEZ, J. and S.F. WITT, (2003). Univariate versus multivariate time series forecasting: An application to international tourism demand. Int. J. Forecast., 19: 435-451. DOI: 10.1016/S0169-2070(02)00057-2

SAAYMAN, A., & SAAYMAN, M. (2008). Determinants of inbound tourism to South Africa. Tourism Economics, 14(1), 81-96.

SANTANA-GALLEGO, M., F.J. LEDESMA-RODRيGUEZ, J.V. PÉREZ-RODRيGUEZ and I. CORTÉS-JIMÉNEZ, (2010). Does a common currency promote countries' growth via trade and tourism? World Economy, 33: 1811-1835. DOI: 10.1111/j.1467-9701.2010.01305.x

Sarmidi, T. and N.H. Salleh, (2010). Dynamic Interrelationship between Trade, economic growth and Tourism in Malaysia. Munich University Library.

SIDDIQUE, A., E.A. SELVANATHAN and S. SELVANATHAN, (2012). Remittances and economic growth: Empirical evidence from Bangladesh, India and Sri Lanka. J. Develop. Studies, 48: 1045-1062. DOI: 10.1080/00220388.2012.663904

SMERAL, E. (2010). "Impacts of the World Recession and Economic Crisis on Tourism: Forecasts and Potential Risks." Journal of Travel Research, 49 (1): 31-38.

SONG, H. and G. LI, (2008). Tourism demand modelling and forecasting-A review of recent research. Tourism Manage., 29: 203-220. DOI: 10.1016/j.tourman.2007.07.016

SONG, H. and S.F. WITT, (2003). Tourism forecasting: The general-to-specific approach. J. Travel Res., 42: 65-74. DOI: 10.1177/0047287503253939

SONG, H., and K. K. F. WONG. (2003). "Tourism Demand Modelling: A Time-Varying Parameter Approach." Journal of Travel Research, 42 (1): 57-64.

SONG, H., P. ROMILLY and X. LIU, (1998). The UK consumption function and structural instability: Improving forecasting performance using a timevarying parameter approach. Applied Econom., 30: 975-983. DOI: 10.1080/000368498325408

TAN, A. Y., MCCAHON, C., and MILLER, J. (2002). Modeling tourist ows to Indonesia and Malaysia. Journal of Travel and Tourism Marketing, 13(1/2), 63-84.

TANG, S., E.A. SELVANATHAN and S. SELVANATHAN, (2007). The relationship between foreign direct investment and tourism: Empirical evidence from China. Tourism Econom., 13: 25-39. DOI: 10.5367/000000007779784498

TRAVEL AND TOURISM COMPETITIVENESS REPORT (2015). Travel and Tourism Competitiveness Report 2015 - Reports - World Economic Forum. [ONLINE] Available at: http://reports.weforum.org/travel-and-tourism-competitiveness-report-2015/index-results-the-travel-tourism-competitiveness-index-ranking-2015/. [Accessed 25 May 2016].

TURNER, L. W., and S. F. WITT. (2001). "Factors Influencing Demand for International Tourism: Tourism Demand Analysis Using Structural Equation Modeling, Revisited." Tourism Economics, 7 (1): 21-38.

VELOCE, W., (2004). Forecasting inbound Canadian tourism: An evaluation of error corrections model forecasts. Tourism Econom., 10: 262-280. DOI: 10.5367/0000000041895049

WEBBER, A. G. (2001). "Exchange Rate Volatility and Cointegration in Tourism Demand." Journal of Travel Research, 39 (4): 398-405.

WITT, C.A., S.F. WITT and N. WILSON, (1994). Forecasting international tourist flows. Ann. Tourism Res., 21: 612-628. DOI: 10.1016/0160-7383(94)90123-6

WITT, S.F. and C.A., WITT (1995), "Forecasting Tourism Demand", A Review of Empirical Research", International Journal of Forecasting, Vol. 11, pp.

WITT, S.F., H. SONG and P. LOUVIERIS, (2003). Statistical testing in forecasting model selection. J. Travel Res., 42: 151-158. DOI: 10.1177/0047287503253941

WONG, K.K.F., H. SONG and K.S. CHON, (2006). Bayesian models for tourism demand forecasting. Tourism Manage., 27: 773-780. DOI: 10.1016/j.tourman.2005.05.017

WOOLDRIDGE, J.M., (2010). Econometric Analysis of Cross Section and Panel Data. 1st Edn., MIT Press, ISBN-10: 0262232588, pp: 1064.

World Tourism Organization UNWTO. (2016). International tourist arrivals up 4% reach a record 1.2 billion in 2015 | World Tourism Organization UNWTO. [ONLINE] Available at: http://media.unwto.org/press-release/2016-01-18/international-tourist-arrivals-4-reach-record-12-billion-2015. [Accessed 25 May 2016].

XIAO, H., and SMITH, S. (2006). Case Studies in Tourism Research: A State of-the-Art Analysis, Tourism Management 27, 738 749.

ZHOU-GRUNDY, Y. and TURNER, L.W. (2014). The challenge of regional tourism demand forecasting the case of China. J. Travel Res., 53: 6 747-759. DOI: 10.1177/0047287513516197

APPENDIX

Data and Methodology

This study employs annual data over the period 1995-2015 on a sample of 44 African countries. The data are collected from the World Development Indicators and the Worldwide Governance Indicators database made available by the World Bank. Africa is selected for this study because of its importance as an emerging tourism destination in the world. A total of 10 African countries are exempted because of data non-availability. The African countries included in this study are: Algeria, Angola, Benin, Botswana, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Democratic Republic of the Congo, Egypt, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Ivory Coast, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of the Congo (Brazzaville), Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe.

Test for Cross Section Dependence

Prior to estimation, this study checks for cross-sectional dependence among the variables using Pesaran's (2004) cross-sectional dependence test. The test is applicable when N > T, which is the case in the present study (i.e. 44 countries (N) > 21 years (T)). Thus, cross-sectional dependence test is appropriate for this study. The test statistic can be defined as,

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right) \sim N(0,1) \qquad (1)$$

Where $\hat{\rho}_{ij}$ is the sample estimate of the pair-wise correlation of the residuals, $\hat{\rho}_{ij} = \hat{\rho}_{ji} = \frac{\sum_{t=1}^{T} \varepsilon_{it} \varepsilon_{jt}}{(\sum_{t=1}^{T} \varepsilon_{it}^2)^{1/2} (\sum_{t=1}^{T} \varepsilon_{jt}^2)^{1/2}}$, where ε_{it} and ε_{jt} are the residuals obtained from equation (1).

Cross-Sectional Augmented Dickey-Fuller Test

In the presence of cross-sectional dependence, traditional panel unit root tests become invalid. To overcome this problem, this study uses Pesaran's (2007) Cross-Sectional Augmented Dickey-Fuller test. This test is a variation of Pesaran and Shin's (2003) unit root test. It includes the lagged cross-sectional mean and its first difference in order to capture the resulting cross-sectional dependence with a single factor model. The test equation is given as follows:

$$\Delta y_{it} = a_i + b_i y_{it-1} + c_i \bar{y}_{it-1} + \sum_{j=0}^{p} d_{j+1} \Delta \bar{y}_{it-1} + \sum_{k=1}^{p} c_k \Delta y_{it-1} + e_{it} \qquad (2)$$

Where $\bar{y}_t = N^{-1} \sum_{j=1}^{N} y_{jt}$ and the mean y_{it} of all cross-sectional observations at time t. p is the lagged order of the model. The null hypothesis is $H_0 : b_i = 0$ for all i against the alternative hypothesis $H_1 : b_i < 0$ for some i.

The Pesaran (2007) Cross-Sectional Augmented Dickey-Fuller test is

$$t_i(N,T) = N^{-1} \sum_{i=1}^{N} t_i(N,T) \qquad (3)$$

Where $t_i(N,T)$ is the t-statistic of b_i in equation (1) and the cross-sectional augmented Dickey-Fuller statistics for the country i. In order to avoid the extreme statistic problem of a small sample, the truncated version of the equation (3) is given as,

$$t_i^*(N,T) = N^{-1} \sum_{i=1}^{N} t_i^*(N,T) \qquad (4)$$

Where

$$t_i^*(N,T) = \begin{cases} t_i(N,T), & \text{if } -K_1 < t_i(N,T) < -K_2 \\ -K_1, & \text{if } -t_i(N,T) \le K_1 \\ -K_2, & \text{if } -t_i(N,T) \ge K_2 \end{cases}$$

The parameters K_1 and K_2 are positive constants, based on Pesaran's (2007) simulations. Pesaran (2007) suggests using $K_1 = 6.42$ and $K_2 = 1.71$ for models with intercept and trend respectively. The critical values can be obtained from Table I and Table II of Pesaran (2007).

Poisson, Generalized Poisson and Negative binomial regression models

If X_i is distributed as Poisson, the panel Poisson regression model with fixed effects is defined as:

$$\Pr(X_I = y_i) = \frac{\exp(-\lambda_i)\lambda_i^{x_i}}{x_i!}, x_i = 0, 1, 2, \ldots$$

Where $X = (X_1, X_2, X_3, \ldots, X_n)^T$ is the response vector; n is the sample size; and X_i, and X_j are independent for any $i \neq j$.

Using the log link function, the covariates of $\lambda_I = E(X_i)$ for the Poisson regression model is,

$$\log \lambda_i = a_{it}^T \delta + \xi_i$$

Where a_i is the vector of covariates and δ is the vector of regression parameters with mean and variance, $E(X_i) = Var(X_i) = \lambda_i$. ξ_i is individual effects.

One of the assumptions of the Poisson regression model that the conditional mean and the conditional variance functions are equal limits the applicability of the model. Count data is often over-dispersed. According to Guloglu and Tekin (2012), over-dispersion arises from the unobserved heterogeneity of cross-section units. While negative binomial regression is appropriate for handling over-dispersion, generalized Poisson regression is useful for over- or under-dispersed count data. Poisson model is nested within the generalized Poisson and negative binomial regression. A two-sided Likelihood Ratio Test is (2LRT) used to test the dispersion in the panel Poisson regression against the generalized Poisson and negative binomial regression (Cameron and Trivedi, 1998) where the hypotheses are: H_0: Dispersion Parameter = 0, and H_1: Dispersion Parameter $\neq 0$. The 2LRT statistic is asymptotically distributed as a chi-square with one degree of freedom.

The 2LRT statistic is,

$T = 2(\ln L_1 - \ln L_0)$

Where $\ln L_1$ and $\ln L_0$ are the log likelihoods. The estimates of the Poisson model serve as initial values for fitting the generalized Poisson and negative binomial regression models. In order to compare the models, this study employs the Akaike Information Criteria (AIC).

The AIC is given by:

$$AIC = 2\dim(\theta) - 2\ln(L)$$

Where L refers to the maximum likelihood function.

The model with the least AIC is the one that best fit the data.

The Empirical Tests

The cross-sectional dependence test rejects the null hypothesis of no cross-sectional dependence among the variables (Table 1). The statistics is 41.10 (p-value = 0.01). This result strongly indicates the existence of cross-sectional dependence among the variables.

Table 1. Pesaran (2004) cross-sectional Dependence Test

Statistics	**P-value**
41.10**	0.01

Note: ** indicate 5% level of significance.

Having established the existence of cross-sectional dependence among the variables, Pesaran (2004) Cross sectional Augmented Dickey-Fuller unit root test is used to determine the unit root properties of the variables. The test results show that the variables had unit root problems and had to be differenced. Once differenced, the time series were integrated of order one and showed no unit root problems.

Table 2. *Pesaran's Cross*-Sectional Augmented Dickey-Fuller Test

	Intercept		**Intercept and Trend**	
Variable	T bar	P-Value	T bar	P-Value

	Levels			
lnTOR	-1.38	0.86	-1.84	0.21
lnTAF	-1.25	0.74	-1.77	0.19
lnFDI	-1.14	0.50	-1.65	0.42
lnOPEN	-1.44	0.28	-2.66***	0.09
lnTRC	-1.02	0.49	-1.99	0.14
lnPOL	-1.24	0.15	-1.45	0.18
lnEXR	-2.10***	0.09	-2.08***	0.09
lnINFR	-2.05	0.11	1.47	1.02
lnCPI	-2.18**	0.04	-2.71**	0.04
lnGDPC	-1.90	0.18	-2.05	0.16
	First difference			
ΔlnTOR	-4.14*	0.00	-4.57*	0.00
ΔlnTAF	-2.23**	0.02	-2.71*	0.04
ΔlnFDI	-2.19**	0.04	-2.76**	0.03
ΔlnEXR	-2.96*	0.00	-3.11*	0.02
ΔlnOPEN	-5.09*	0.00	-4.49*	0.00
ΔlnTRC	-2.23*	0.03	-3.53*	0.00
ΔlnPOL	-2.39*	0.00	-2.78*	0.03
ΔlnEXR	-3.10*	0.00	-2.89**	0.04
ΔlnINFR	-2.27**	0.01	-3.06*	0.00
ΔlnCPI	-2.95*	0.00	-3.82*	0.00

ΔlnGDPC	-3.04*	0.00	-3.82*	0.00
	Critical Values			
1%	-2.34		-2.88	
5%	-2.17		-2.69	
10%	-2.07		-2.59	

Note: *, ** and *** indicate 1%, 5% and 10% levels of significance.

Having established that all the variables are integrated of order one, panel co-integration test is used to determine the co-integrating relations among the variables (Table 3). The results indicate the presence of long-run relationships among the set of variables.

Table 3. Panel co-integration test results

	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF	Kao test
Individual intercept	2.89**	-1.62**	-3.79***	-3.84***	0.95	-3.12***	-3.33***	
Deterministic intercept and trend	2.65*	0.28	-1.70***	-1.42*	2.79	-2.65***	-0.41	1.65**

Note: *, ** and *** rejects the null of no co-integration at the 1%, 5% and 10% levels of significance respectively. For the formulas used in the panel co-integration test statistics, see Kao et al. (1999) and Pedroni (1999; 2004).