

Original Research Article

The Role of Services Trade in Economic Development

ABSTRACT

This paper is an attempt to investigate the impact of services trade on economic development of Sub-Sahara African (SSA) countries. Our analysis is based on a panel data framework over the period 1990 to 2010 covering thirty-three countries. The paper employs the endogenous growth model to examine the nonlinearities associated with services exports and services imports in the economic development process of SSA countries under consideration. The trade data was disaggregated into travel, transport and other services. The panel data constructed was estimated using ordinary pooled, fixed effects and random effects model techniques and the efficient model was selected based on the Hausman test. The paper finds that both services exports and services imports enhance economic development process. The study also indicates that labour and capital play an important role in the SSA economies.

Key words: Economic Development, Services Trade, Panel Data Analysis,

Jel Classification: O1, N7, C23

1. Introduction

To what extent can international trade in goods and services drive economic growth and development in less developed countries (LDCs)? This question has been subject of intense research over the decades. In particular, international trade in goods has taken the central stage in this endeavour. However, as the world economy is becoming increasingly service-oriented, the role of services trade has taken an upward trend. The importance of services trade in the total trade led to the General Agreement on Trade in Services (GATS) in 1995. According to Walsh (2006), GATS governs the rights and obligations of World Trade Organization (WTO) member countries in the area of services trade. The consecutive world trade negotiations under the WTO, including the Doha Round, were designed to encourage the process of liberalization in services trade. The goal of the negotiations is to keep reducing the barriers that restrict service trade.

Available statistics show that African countries account for meager proportion of the total world services trade. The observed data is in line with those of trade in goods. However, the importance of services trade in the overall economic development cannot be overemphasized. Just as trade in goods, services trade affect allocation of resources and welfare of nationals who are participants in such trade. The literature provides evidence that services play major role in production, distribution and marketing. Nordas (2010) asserts there are several areas in which service can help grow an economy. First, services provide direct inputs to the manufacturing process and help customers comply with government regulations in the domestic and foreign markets. Second, services in the area of transport, logistics, wholesale and retail trade facilitate the flow of products between different stages of production and to the final consumers globally. Third, R&D as a form of service helps to improve the quality of products and processes and ensure products match the taste of the consumers. Four, health and education services improve human capital. Five, financial services facilitate transactions within and across international borders and channel funds to investment to sectors of comparative advantage. Finally, adequate information and communication technology (ICT) and reliable electricity supply are necessary in order to maximize modern services trade.

The emergence of modern services has challenged the conventional development path towards advancing an economy. The conventional development path involves shifting workforce from low productivity subsistence sector to the high productivity manufacturing sector; which lends to specialization, economies of scale essential for raising output per worker. Economies such as Japan, Taiwan, South Korea and China demonstrated that manufacturing does accelerate development. Services were viewed as possessing no potential for growth due to its inability to exploit economies of scale, deliverable only in person and not exportable. According to Baumol (1960) as countries grow richer and the demand for services expands, productivity would utterly slow. Contrarily, Ghani, Goswani and Kharas (2011) argued that technology and outsourcing are enabling services to overcome its constraints. Though traditional services such as trade, hotels, restaurants and public administration remain largely constrained, but modern services such as software development, call centres, and outsourced business processes (including insurance claims to transcribing medical records) use skilled workers, exploit economies of scale and can be exported. This hereby creates more opportunities for poor countries to grow faster.

62 In most poor countries, services have contributed more to growth since 1980 than has industry.
 63 India, Pakistan and Sri Lanka are clear examples where productivity growth in services has
 64 outpaced that of industry. The level of productivity in these countries (measured at purchasing-
 65 power parities) is higher in services than in industry. In Nepal, productivity is three times higher
 66 in services. Services have widely become an engine for, rather than product of, development.
 67 Exports have swelled from roughly 6 percent of services output in poor countries in 1985 to
 68 almost 10 percent in 2005. Developing African economies are as well not left out of the services
 69 trade boom. Kenya exports professional services such as accounting to its neighbours. Burundi,
 70 Swaziland and Rwanda have all recorded growth of more than 25 percent a year in services
 71 exports between 1995 and 2008.

72 Therefore, for the Sub-Saharan Africa (SSA) to integrate successfully and benefit from the
 73 global trading system there was the need to increase her participations in world services trade.
 74 Thus, promoting services trade in SSA will require the “ability to strengthen their capacity to
 75 produce internationally competitive services and on the extent of liberalization in the service
 76 sectors of export interest to them” (UNCTAD, 1999). How do we ensure that this onerous task
 77 does not become another herculean task for the LDCs in general and in particular, the SSA?

78 Although, the literature is replete with studies on international trade combining trade in goods
 79 and services, there are few studies that specifically examine the implications of services trade for
 80 growth and development in the LDCs. This paper will be filling this gap. The paper makes
 81 contribution to knowledge by examining how the different modes of services trade can engender
 82 economic development. In achieving this, the paper adopts the extended growth model. The
 83 paper adopts a panel method of empirical analysis in order to elicit awareness on the key role of
 84 services in development and draw coherent policies that could engender greater services trade.
 85 The latter will encourage more foreign participation in services trade in the SSA.

86 This paper is structured as follows: In Section 2, the paper presents some stylized facts and
 87 barriers to international services trade. Section 3 reviews the literature given adequate
 88 considerations to the state of knowledge on barriers to trade in services, methods of analysis and
 89 empirical results. In Section 4, the paper highlights the theoretical background and the method of
 90 analysis. This includes the model specification, the method of estimation and some statistical

91 tests as well as data sources and measurements. Section 5 presents the results and discussions.
92 The conclusions and recommendations follow in Section 6.

93 **2. Some Stylized Facts and Barriers to International Trade in Services**

94 Following the widespread global financial crisis that debuted in 2007 and culminated in global
95 depression, the global economy rebounded in 2010. Domestic demand in the developing
96 countries accounted for 46 percent of global growth in 2010. According to the World
97 Development Indicator (2011), the contributions of developing countries to world economic
98 growth has been rising since 2000 and was more stable than that of the high-income economies.
99 Estimates indicate that the world economy grew at about 3.9 percent while high-income and
100 developing economies grew at 2.8 percent and 7 percent, respectively. Table 1 below provides
101 more details. Growth rates in developing Africa are higher than in the developed world. Growth
102 in countries like Nigeria, Egypt and South Africa is higher than in Japan and the USA.

103 **Insert table 1**

104 The importance of the service sector is increasing in many developing countries. Figure 1 shows
105 that services value added is growing faster in developing African countries than in the other
106 geographical groups. This fact can also be observed in terms of service value added in Table 2.
107 In the period 2000-2009, the average annual growth rate of services sector was 2.9 percent
108 globally while it was 2.2 percent, 6.6 percent and 4.8 percent in the high-income, lower income
109 and SSA, respectively. (WDI, 2011). In terms of proportion of service to the GDP, table 3 shows

110 **Insert table 2**

111 **Insert Figure 1**

112 similar trend. The table, however, indicates that service sector is still the largest economic sector
113 in the developed world and stood at about 46 percent in developing Africa in 2010. This
114 underscores the fact that efficient services sector is crucial for production, employment, trade
115 and overall economic development.

116 Services trade has also been on the increasing trend over the years. In 1995, global export trade
117 in services stood at US\$ 1,228.9 trillion and by 2009 it was US\$ 3,418 trillion. Developing

countries services export was US\$ 180.8 billion and US\$ 650.9 billion in 1995 and 2009, respectively. In the same period, SSA countries figures in services export stood at US\$ 12.1 billion and US\$ 35.6 billion. In the case of services imports, world total stood at US\$ 1,221.7 trillion in 1995 as against US\$ 3,144.7 trillion in 2009. Of these figures, developing countries stood at US\$ 228.4 billion and US\$ 777.282 billion in 1995 and 2009, respectively. Similarly, SSA countries total services import in the periods stood at US\$ 24.6 billion and US\$ 88.5 billion. WDI (2011).

Insert table 3

There is lopsidedness in the distribution of global services trade in favour of developed countries. Tables 4 and 5 show the proportions of world trade in services by geographical distributions showing the relative positions of each region in global services trade. Table 4 which depicts services trade in export, shows that the proportion of services export of developing Africa is the lowest over the period considered. In 1980, it was 6.6 percent and 5.2 percent in 1985. Since then, it has not gone beyond the 4.1 percent mark. In case of SSA, it was 4.5 percent in 1980 and 5.2 percent in 1985. There was a decline in this indicator between 1985 and 2000 but has since risen to stand at about 3.0 percent by 2011.

In the case of services imports, table 5, the developed world still has the lion share of about 79 percent in 1980 and 67.3 percent in 2011. The proportions due to developing African countries remain the lowest of all regions standing at 3.4 percent in 1980 and only 2.2 percent in 2011. Out of these SSA accounted for 2.2 percent in 1980 and only 1.2 percent in 2011. It follows that services exports are relatively higher compared with figures on services import. It is evident, therefore, that while developed countries are net importers in services trade, SSA countries are net exporters in the trade.

Insert table 4

Insert table 5

The lessons from the above include the fact that SSA countries can develop their comparative advantage in services in order to benefit from the growing global services trade. However, this desired goal is not without constraint emanating from existing barriers to trade in services. Hoekman and Braga (1977) identified four types of barriers to services trade. This include the

following: (1) quantity-based restrictions such as quotas or any other quantity limitations, (2) price based restrictions, (3) direct government involvement in certain service sectors and (4) restrictions imposed on importers of services' to access secondary services.

The nature of services trade makes their tradability of special interest. Some of the characteristics of services trade, according to Hoekman and Mattoo (2008), include the following: (1) intangibility in the sense that international transactions in them are often difficult to measure, monitor and tax; (2) non-storability so that production and consumption must occur at the same place and time; (3) differentiation in the sense that services are often tailored to the needs of the consumers; and (4) joint production to the extent that the consumer participate in the production process.

To date, there are proliferations of trade agreements in the form of bilateral, multilateral, regional and cross-regional culminating in what has been described as "Spaghetti Bowl" designed to improve the trade relations between the different groups. In spite of this, there are still evidences of weak links of the existing trade arrangements. In policy formulations designed to turn services trade to engine of growth, therefore, these apparent barriers and limitations must be addressed.

3. Brief Review of the Literature

The literature has given more attention to trade in goods than services trade. However, the importance of the latter in economic growth, employment generation, welfare improvement, financial and seine environment has been brought to the fore. Since the seminar work of Goldsmith (1969) a lot of researches have been conducted in the area of services trade. His work emphasised the role of financial services in increasing incomes and output growth via appropriate financial intermediation. Likewise, Levine 1997 has shown that financial services can enhance growth through reduction of transaction cost and improvement in the allocation of real resources.

Baumol (1967), Fuchs (1968, 1981), Inman (1985) show that increasing expansion in the service-intensity of economies has intuitively enhanced the influence of other services activities on growth. Low cost and high quality telecommunications would widely benefit the economy, as communication network facilitates information services and helps in diffusion of knowledge. They also indicated other benefits of services as follow: transport services affect the cost of

176 shipping goods and movement across borders. Business services such as accounting, consulting
177 engineering and legal services reduce transaction costs associated with enforcement of contracts
178 are channels through which innovations are transmitted across industries. Retail and wholesale
179 distribution services enhance effective producer-consumer relations hereby creating margins that
180 influence the competitiveness of firms. Health and education services are major inputs and
181 determinants of growth in human capital stock.

182 Nordas (2010) examines the interrelationship between goods and services in production and
183 trade in the OECD countries using the input-output model of 2000. The author's objective was to
184 describe the role of services in production and trade in goods. He proposes two versions of a
185 general equilibrium model that captures the linkages between goods and services in order to
186 investigate the impact of services trade liberalization on industrial structure. The model analyzes
187 the interactions between goods and services both when they are substitutes and complements.
188 The results indicate that trade in tasks may strengthen comparative advantage in high-tech
189 industries in rich countries provided they have superior organization technology or are relatively
190 capital abundant. The results may be restrictive in applications since it is based on computable
191 general equilibrium model that depends on the Social Accounting Matrix (SAM) as well as the
192 parameters for the calibrations.

193 Kikutchi and Iwasa (2010) propose a theoretical two-country monopolistic competition model of
194 service trade that captures the role of time zone differences as a determinant of trade patterns.
195 Their results show that the utilization of communications networks induces dramatic change in
196 industrial structure due to firms taking advantage of time zone differences: services firms move
197 away from larger countries in favour of small countries. Although the analysis is tentative, it
198 provides a useful paradigm for considering how time zone differences affect both the structure of
199 service provision and international trade patterns.

200 UNCTAD (2003) examines the quantitative nexus between GDP growth and exports of services
201 in developing countries and transition economies. The paper uses the Export-Led Growth (ELG)
202 hypothesis to test the causal relation between export and GDP growth. The paper is based on a
203 cross section of 114 countries. There are six groups of countries in the study as follow:
204 developed countries (24); Latin America (21); Africa (21); Near East and Mediterranean (10);
205 East Asia and Pacific (19); and Transition countries (19).the period of analysis is 1990-2000.

206 Based on extensive statistics and econometric analysis, the results of the study show that export
207 oriented activities in developing countries are often under the control of a foreign economic
208 agent and tend to be poorly integrated into the domestic economy. Consequently, the potential
209 for services export to become engine of growth is substantially dampened. The paper opines that
210 there was misallocation of resources in favour of exports as a goal in itself rather in the
211 framework of a comprehensive long-term growth strategy. It concluded that such liberalization
212 policy have ended up facing diminishing returns.

213 Hoekman and Mattoo (2008) discusses the role of services in economic growth, focusing in
214 particular on channels through which openness to trade in services may increase productivity at
215 the level of the economy as a whole, industries and the firm. Using descriptive approach and few
216 statistics to drive home its arguments, the paper contends that the competitiveness of firms in
217 open economies is increasingly determined by access to low-cost and high quality producer
218 services in telecommunications, transport and distribution services, financial intermediation, etc.
219 The paper concludes that enhancing comparative advantage in the production and export of
220 services will ensure greater efficiency and greater equity in the less developed economies.

221 Authors have also used other empirical methods to investigate the role of services on economic
222 growth. Walsh (2006) employs the gravity model approach to examine the determinants and
223 barriers to services trade. The data used in the paper is sourced from the OECD database in
224 which the breakdown of total exports and total imports were decomposed into travel, transport,
225 government and other commercial. The panel data is constituted by twenty-seven OECD
226 countries, fifty-five non-OECD partner countries over of three years: 1999-2001. A number of
227 econometric estimators are tested. The paper, however, found the Hausman-Taylor method to be
228 the best estimator.

229 The paper found out, amongst others, the following: that (1) gravity model fits services trade
230 flows in the same way as trade in goods; (2) wealth of countries and a common language are the
231 most important determinants of services trade; (3) distance is generally found to be insignificant;
232 and (4) the variable designed to capture barrier to services trade is found to be weakly
233 significant.

Kimura and Lee (2004) using the gravity equation assess the impact of various factors on bilateral services trade relative to bilateral goods trade. They run regressions on bilateral services trade and goods trade on ten OECD members and other OECD and non-OECD countries for the period 1999-2000. The paper show that the gravity model could even be more robust for services trade than it is for goods trade. Specifically, the results indicate that geographical distance is consistently more important for services trade than for goods trade. It also finds out that membership of the same regional trade arrangement has a significant impact on both services trade and goods trade. In addition, the paper suggests that both goods trade and services trade are positively affected by economic freedom but the effect is much stronger for services trade than for goods trade.

4. Theoretical Framework and Methodology

4.1 Theoretical Framework

A number of authors have examined the determinants of economic growth most of them drawing from the standard neoclassical growth model *a la* Solow (1956) in what is also termed exogenous growth model. (Aghion and Howitt (2009), Barro and Sala-i-Martin (2004)). According to a variant of this school of thought, trade does not affect the equilibrium or steady state rate of output growth since growth is determined by exogenous factor identified as technological progress. The Export-Led Growth (ELG) hypothesis, much as the neoclassical growth model, has provided a theoretical standpoint for analysis of trade, in general. On the bases of the hypothesis, some authors associate the positive impact of exports on growth to production efficiency gains resulting from improved allocation of resources (Beckerman, 1965). Some others emphasize the dynamic effects of such factors as availability of foreign capital and technology (Haberlar, 1959).

More recently, attention has been concentrated on what is now known as augmented Solow model or the endogenous growth model. In this case, the growth of an economy is determined not only by labour and capital but by other variables including investment, education, health and population growth Mankiw, Romer and Weil (1992). Under this variant, trade variables or trade liberalization can have positive or negative impact on output growth. Hoekman and Mattoo (2008) asserts that if trade liberalization shifts resources into manufacturing and away from agriculture, there will be a positive impact on the long-run growth provided the manufacturing

sector generates greater positive externalities or creates knowledge. This idea can be extended to services sector. In this respect, certain services sector can engender endogenous growth. Such sectors include telecommunication, software, financial services and transport. Although, the growth-enhancing potential of exports in contrast to other variables has been subject of controversy in the literature, services trade can be seen as an instrument of overall economic growth and development.

In the context of African economy, several studies have tried to explain the recent growth experience in the continent particularly in the last two decades (Guerguil et al, 2011; Johnson, Ostry and Subramanian 2007; and Patillo, Gupta and Carey, 2006). Though few studies have examined the growth-enhancing potential of services trade in the SSA countries, the experiences of the East Asian Tigers and the Latin America could be reproduced in the sub-region. This paper recognizes that are other theories of economic growth including the classical, the energy and energy efficiency, theory of cognitive wealth, the big push, the Schumpeterian and the endogenous. This paper, however, employs the endogenous growth model to investigate services trade as engine of growth and development.

4.2 Methodology

4.2.1 Model Specification

The empirical framework of this paper draws from the endogenous growth adduced to in the last paragraph. In that context, the paper postulates that aggregate growth is determined by changes in quantity and productivity of capital and labour inputs as well as technological progress as the control variables. The primary variable of interest here is the service sector and particular, the services trade. Although, this sector is heterogeneous in nature, its role as inputs in production activities cannot be hidden. One dimension of services is that it facilitates transactions through space and time. Another important dimension is that it is a direct input into economic activities and thus a determinant of “fundamental” factors of production. Immediate examples are services such as R&D, health and education which are inputs into production of human capital.

In this paper, therefore, services trade variables of primary interest follow the World Trade Organization (WTO) Classification namely transport services (TS) and travel services (VS). The third variable is an aggregation of financial services, communication, construction, computer and

information as well as those classified as “others”. This variable is denoted aggregated services (AS). This is to ensure that all variables across the different countries in the paper have the same dimension. In this paper, the GDP per capita (YPC) instead of growth rate of real GDP is used as the dependent variable. This study employs YPC since our intention is to capture economic development and not economic growth (See Lucas (1988) for a justification). In line with these postulations, the model can be specified as follows:

$$YPC = f(K, L, TS, VS, AS; Z) \quad (1)$$

where YPC, TS, VS, and AS are as defined above. K is the stock of capital proxied by gross fixed capital formation, L is labour force and Z is a vector of other variables not explicitly specified including the stochastic error term in the model. As the standard is in growth model, the paper assumes a nonlinear relationship between YPC and the set of explanatory variables. Consequently, equation (1) is nonlinear in its explicit form and therefore it is transformed into its linear form using double logarithm in order to satisfy the assumptions of Ordinary Least Squares (OLS) technique of estimation. Thus, equation (1) becomes the following:

$$\log(YPC) = \beta_0 + \beta_1 \log(K) + \beta_2 \log(L) + \beta_3 \log(TS) + \beta_4 \log(VS) + \beta_5 \log(AS) + \varepsilon \quad (2)$$

The apriori signs and magnitudes of equation (2) need not be specified since the parameters, $\beta_i, i=1, \dots, 5$ are elasticities with the conventional values of < 1 for inelastic; $= 1$ for unit elasticity and > 1 for elastic.

In what follows, we introduce the panel framework into the model by introducing the country index and incorporating countries' unobservable individual effects in equations (2), the equations to be estimated can be rewritten as follow:

$$\log(YPC_{it}) = \theta_0 + \theta_1 \log(K_{it}) + \theta_2 \log(L_{it}) + \theta_3 \log(ETS_{it}) + \theta_4 \log(EVS_{it}) + \theta_5 \log(EAS_{it}) + \mu_{xi} + \omega_{xt} + \epsilon_{xit} \quad (3)$$

$$\log(YPC_{it}) = \theta_0 + \theta_1 \log(K_{it}) + \theta_2 \log(L_{it}) + \theta_3 \log(ITS_{it}) + \theta_4 \log(IVS_{it}) + \theta_5 \log(IAS_{it}) + \mu_{xi} + \omega_{xt} + \epsilon_{xit} \quad (4)$$

where i denotes country i , t denotes time and μ_{xi} (μ_{mi}) is country i unobservable individual effects on export (import) equation. ω_{xt} and ω_{mt} are unobservable time effect for export and

import respectively. ϵ_{Xit} and ϵ_{Mit} are stochastic disturbance terms such that $\epsilon_{Xit} \approx i.i.d(0, \sigma_X^2)$ and $\epsilon_{Mit} \approx iid(0, \sigma_M^2)$ for export and import equations respectively. The specifications in equations (3) and (4) in which individual effects are incorporated are particularly justified in developing economies of SSA. In effect, those equations allow us to account for individual heterogeneity that if not taken into consideration can lead to biased estimates (Tiwari and Mutascu, 2010).

4.2.2 Technique of Estimation

The main objective of this paper is to examine the relationship between YPC and services trade variables. Since the scope of the paper is SSA countries, it employs the panel data in view of its advantages (See Alege and Osabouhien (forthcoming)). We commence with the pooled Ordinary Least Square regression, and then proceed to Panel Least Square Dummy Variable (PLSDV) regressions, fixed effects and random effects methods of estimation. This is to enable us choose the most efficient and consistent technique given the possibility of the presence of correlation between countries' unobservable individual effects and the services trade predictors.

To begin with, these methods are briefly described in the following paragraphs:

a. Least Square Dummy Variable Approach

The Least square dummy variable (LSDV) approach simply include the countries binary dummy into the pooled OLS in order to ascertain the effect of the country specific intercept in our estimation. In this case, equation 3 can be rewritten as follows:

Export Model:

$$LYPC_{it} = \beta_0 + \sum_{i=1}^{33} \beta_i X_{it} + \sum_{i=1}^{33} \varphi_i \epsilon_i + U_{it} \quad (5)$$

where $X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Levs_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}$, ϵ_i is the country i ; since they are binary (dummies), $i = 1$

countries are included in the model, φ_i is the coefficient for the binary repressor (countries)

Import Model:

$$LYPC_{it} = \beta_0 + \sum_{i=1}^{33} \beta_i X_{it} + \sum_{i=1}^{33} \varphi_i \epsilon_i + U_{it} \quad (6)$$

$$\text{where } X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Livs_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}, \epsilon_i \text{ is the country } i; \text{ since they are binary (dummies), } i = 1$$

countries are included in the model, φ_i is the coefficient for the binary regressor (countries)

346

347 b. Fixed Effects Approach

348 The choice of the fixed effect model is considered due to its appropriateness in analyzing the
 349 impact of variables overtime. It explores the relationship between services variables and GDP
 350 per capita among SSA countries assuming that each country has a unique attributes which are
 351 likely to influence the outcome of the model. The fixed effect model is more appropriate than the
 352 pooled regression because it controls for the influence of cross-sectional bias on the outcome
 353 variables, i.e. it removes the effect of time invariant characteristics from the predictor variables.

354 In this case, the export and import model can be written as follow:

355

356 *Export Model:*

$$LYPC_{it} = \beta_0 + \sum_{j=1}^5 \beta_j X_{it} + \sum_{i=1}^{33} \alpha_i + U_{it} \quad (7)$$

$$\text{where } X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Levs_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}, \alpha_i (i = 1 \dots 33) \text{ is the unknown intercept for each country}$$

358 *Import Model:*

$$LYPC_{it} = \beta_0 + \sum_{j=1}^5 \beta_j X_{it} + \sum_{i=1}^{33} \alpha_i + U_{it} \quad (8)$$

$$\text{where } X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Livs_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}, \alpha_i (i = 1 \dots 33) \text{ is the unknown intercept for each country}$$

360

361 The fixed effect model is relevant as it enables us to sieve-out the unobserved effect (using fixed)
 362 across entities; hereby making changes in dependent variables absolutely explained by influences
 363 from the observed services predictor.

364

365 c. Random Effect Approach

366 Unlike the fixed effect model, the random effect model assumes that variations across countries
367 are random and uncorrelated with the independent variables.

368 **Export Model:**

$$369 \text{LYPC}_{it} = \beta_0 + \sum_{j=1}^5 \beta_j X_{it} + \alpha + U_{it} + \varepsilon_{it} \quad (9)$$

$$370 \text{ where } X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ LevS_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}$$

371

372 **Import Model:**

$$373 \text{LYPC}_{it} = \beta_0 + \sum_{j=1}^5 \beta_j X_{it} + \alpha_i + U_{it} + \varepsilon_{it} \quad (10)$$

$$374 \text{ where } X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ LivS_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}$$

375 In the presence of correlation between individual country unobservable individual effects and
376 services trade predictors, the appropriate method is the fixed effect. If however, there is no
377 correlation between individual country effects and trade determinants, then random effects
378 method on the panel data will be the most appropriate. The choice of which one to use depends
379 on the outcome of Hausman Test. This statistic tests the null hypothesis of non-existence of
380 correlation between unobservable individual effects and services determinants against the
381 alternative hypothesis of existence of correlation. If the null hypothesis is not rejected we can
382 conclude as in Tiwani and Mutascu (2010), that correlation is not relevant and therefore a panel
383 model of random effects being the most correct way of carrying out the analysis. On the
384 contrary, if the null hypothesis is rejected we can conclude that correlation is relevant and
385 therefore a panel model of fixed effects being the most appropriate way of carrying out our
386 analysis of the effect of services trade on GDP per capita of SSA countries.

387 4.2.3 Data Sources and Measurements

388 The sources and measurement of the variables used in this model is presented in Table 6. All
389 variables, in levels, are in US\$ million at 2000 prices. The scope of this research is limited by the
390 availability of data on the variables considered. In effect, the paper is limited to aggregate time
391 series data on YPC and the services trade variables. Bilateral trade figures are not available.

Hence, our analysis could not use, for now, the Gravity model to capture extent of trade in services between SSA countries. We carry out panel data analysis on thirty-three (33) countries¹ within the SSA sub-region. Data are collected on both exports and imports along the reclassification presented earlier in this paper. The real GDP and population per country were obtained from World Development Indicators (2012) while services trade variables (both exports and imports) were sourced from UNCTAD (2012). The paper covers the period of 1990-2010.

Insert table 6

5. Estimation and Discussion

5.1 Introduction

In this section, we present the summary descriptive statistics of all the variables in the model, the correlation coefficient matrix, the least square dummy variable regression, fixed and random effects regression results. The paper then finally discusses the results.

5.2 Preliminary Data analysis

Table 7 reports the summary statistics for both the dependent and the independent variables in the export and import models. It reports the overall mean, standard deviation, and the minimum and maximum values for all the variables in the model for all the countries combined. The mean of the GDP per capital, is calculated at US\$1,076.64 for all countries combined. This figure contrasts very sharply with what is the actual income per capital in the different countries of the SSA. In effect, the region is made up of some very rich countries (Botswana, Nigeria, South Africa) and low income countries (Mali, Guinea Bissau, Ethiopia). The mean of all other variables can be interpreted in the same manner. In the cases of services variables, it could be seen that these values will certainly be lower than other region of the world.

Insert table 7

In this paper, it is recognised that the issue of strong correlation between the independent variables may violate the working assumptions of the estimation technique. We, therefore, examine the possibility of the presence of multi-collinearity among the independent variables in

¹ include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo, Cote d'Ivoire, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Uganda, Tanzania, Zambia, Zimbabwe

the model by examining the pair-wise correlation matrix as contained in Table 8. The table indicates that there exists a significant positive correlation between EAS and K; EAS and EVS as indicated in the upper panel and between ETS and EVS. In case of the import model, there is a significant positive correlation between K and IVS; K and ITS, K and IAS, ITS and IVS; IAS and IVS as well as IAS and ITS. Overall, it can be established that the magnitude of the correlation coefficients indicate that multi-collinearity is not a potential problem in the models. Thus, the data set in conjunction with the variables are appropriate for the study.

Insert table 7

5.3 Discussion of Results

Table 9 and 10 contain results of import and export model estimations using the four techniques of panel data estimation. In each case model 1 stands for POLS, model 2 stands for LSDV, model 3 stands for FE and model 4 stands for RE. In case of the import model the POLS regression result show a very high R-squared indicating a ‘good fit’ and the F-test show that the variables in the model are jointly significant. In addition, all the variables are statistically significant at one percent; similar results are obtained for LSDV technique except that the coefficient of travel services is not statistically significant. From theoretical underpinning, the POLS is expected to produce a larger magnitude due to the inclusion of the country time invariant effects.

In order to choice between FE and RE the Hausman test was adopted. Here, we fit both the fixed effect model and random effect model, and compare their common coefficient estimates in a probabilistic sense (See C.F Baum 2006). The null hypothesis of Hausman test states that random effect estimator is consistent. Since the Hausman test was found to be significant, we therefore, failed to accept the null hypothesis and conclude that the country specific effects appear to be correlated with the regressors. The fixed effect (FE) model is, thus, appropriate in explaining the relationship between the services variable in the import sector and GDP per capita in the selected Sub-Saharan Africa. Table 9, column 4 thus indicates that all the estimated parameters are statistically significant at the level of 1 percent. It then follows that import travel services, transport services and other services have significant impact on economic development. The results also show inelastic relation between the variables. In effect, a proportional change in the variables brings about a less than proportionate change in the dependent variable (GDP per

capita). This implies that services import diffuse knowledge and technical know-how into the services of the developing countries, though the impact is potentially greater in rich countries than in poor countries. This evidence supports the empirical claims made by Walsh (2006) for OECD countries.

Table 10 can be interpreted in the same manner for services export. Therefore, in the same manner, the FE technique is preferred to the RE technique based on the Hausman test. It then follows that FE results are considered. In the results, as shown in Table 10 column 4, only export of transport services was found to be insignificant while others were found to be statistically significant at least at the level of 5 percent. It then follows that export of travel services and other services contribute very significantly to the economic development of SSA countries. This is consistent with Li *et al.*, (2003) who evaluated the impact of service on economic growth for 20 developed and 62 developing countries. Similarly, the results are inelastic indicating that a proportional change in the export variables brings about a less than proportionate change in the dependent variable (GDP per capita). The case of transport services that happens to be statistically insignificant and therefore not contributing to economic development of SSA is not surprising. It follows that, SSA countries have comparative disadvantage in transport services.

5.4 Robustness Test

This paper examines some few robustness tests for both import and export model, the combination of these tests are necessary to check the reliability of our model for the purpose of policy inferences (see table 11). In case of the import model, the time fixed effects test, Breusch and Pagan Lagrangian Multiplier (LM) test, Modified Wald test for group wise heteroskedasticity and the Wooldridge test for autocorrelation were conducted. The significance of the time-fixed effects test indicates that the coefficients of the time dummies are not significantly different from zero. Therefore, there is no need to apply time fixed effects. The LM test, heteroskedasticity test and Wooldridge autocorrelation test show an evidence of significant

477 differences across unit (panel effect), presence of homoskedasticity and no serial correlation,
478 respectively.

479 The test for the export model can be interpreted in this same manner. The significance of the
480 time-fixed effect and the LM test indicate there was no need for the inclusion of time-fixed effect
481 and there exist an evidence for panel effect thereby emphasizing the preference for the random
482 regression to the Ordinary Least Square. Similarly, the Modified Wald and Wooldridge test
483 results show the presence of homoskedasticity and no serial correlation in panel data,
484 respectively.

485

486 **6. Summary and Conclusion**

487 The role of trade in economic growth and development remains at the front burner of research.
488 Most of the literatures have concentrated on trade in goods. However, since the WTO in 1995,
489 there has been growing interest in services trade. In this paper we attempt to assess the
490 relationship between economic development and services trade. An empirical analysis is carried
491 out based on the endogenous growth theory in a panel of 33 SSA countries employing data set
492 from 1990 to 2010. GDP per capita is employed to proxy economic development. The paper uses
493 the static panel data models to capture both the intertemporal dynamics and the individual
494 characteristics of the phenomenon under investigation. In this paper, we employ the three basic
495 types of panel data models namely, a Least Square Dummy Variable (LSDV) regression, panel
496 model with random effects and panel model with fixed effects in order to attain a most efficient
497 and reliable model estimation results.

498 From various statistical facts, the paper establishes that services sector is increasing in
499 importance in the developing world, particularly the SSA countries, through its contribution to
500 production, output and employment. Global trade has been on the increase and has benefited the
501 developing countries although the distribution of services trade is lopsided in favour of
502 developed economy. Statistics also indicates that services export and import of SSA are the
503 lowest in the world. However, while the developed countries are net importers of services, SSA
504 countries are net exporters in services trade.

505 Based on the fixed effect regressions, the paper finds that services trade in export and import
506 enhance economic development of SSA countries. In particular, from the export model, it finds

out that travels and other services contributed significantly to economic development of SSA. Similarly, from the import model, it finds out that transport and other services contribute also significantly to economic development of the region. However, further studies should be conducted using gravity model to capture bilateral services trade.

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Appendix

Table 1: GDP Growth Rates (%)

	1980	1985	1990	1995	2000	2005	2010	2011
Developed world	0.3	3.7	2.7	2.6	3.9	2.4	2.7	1.4
USA	-0.3	4.1	1.9	2.5	4.2	3.1	3.0	1.7
Japan	-3.1	6.3	5.6	1.9	2.8	1.9	4.0	-0.7
China	7.8	13.5	3.8	10.9	8.4	11.3	10.4	9.2
Developing Asia	3.6	4.2	6.5	7.5	6.8	7.9	8.4	6.9
Eastern Asia	5.0	8.9	5.8	9.0	8.1	8.6	9.5	7.7
Southern Asia	1.0	4.6	6.5	6.4	4.0	8.2	7.1	5.6
Western Asia	2.9	-0.1	6.5	4.5	6.4	6.9	6.4	7.4
Developing America	6.3	3.3	0.5	0.7	4.4	4.6	6.0	4.3
Caribbean	1.5	0.1	-1.3	3.4	4.5	7.6	2.9	2.6
Central America	7.7	2.6	4.9	-5.2	6.3	3.4	5.6	4.0

South America	6.0	4.0	-1.7	3.9	3.3	5.0	6.4	4.5
Developing Africa	3.9	3.2	2.6	2.6	3.5	5.4	4.0	0.7
SSA	3.9	2.0	2.2	3.5	3.6	5.6	4.0	4.1
Northern Africa	2.8	5.7	3.7	1.4	3.7	5.2	4.1	-5.8
Southern Africa	6.6	-1.0		3.3	4.2	5.0	3.0	3.2
Western Africa	1.2	7.0	6.9	2.0	3.3	4.0	3.7	6.2
Nigeria	4.2	8.3	12.8	-0.3	5.3	3.4	2.8	7.4
Egypt	10	6.8	5.8	4.6	5.4	4.5	5.1	1.8
South Africa	6.6	-1.2	-0.3	3.1	4.2	5.3	2.8	3.1

Source: Computed from UNCTAD Handbook of Statistics

Table 2: Service Value-Added (US\$ billion)

	1980	1985	1990	1995	2000	2005	2010
Developed world	4.765	5.816	10.937	15.44	17.185	23.667	28.808
USA	1.783	2.83	4.063	5.345	7.573	9.77	11.48
Japan	0.634	0.828	1.84	3.526	3.26	3.29	3.988
China	0.65	0.92	0.129	0.238	0.468	0.914	2.557
Developing Asia	0.485	0.611	0.996	1.636	2.069	3.377	6.634
Eastern Asia	0.133	0.193	0.404	0.791	1.101	1.767	3.587
Southern Asia	0.143	0.157	0.215	0.266	0.338	0.612	1.238
Western Asia	0.132	0.155	0.211	0.257	0.346	0.574	0.968
Developing America	0.395	0.385	0.573	1.085	1.24	1.512	2.804
Caribbean	0.24	0.28	0.38	0.48	0.57	0.82	0.114
Central America	0.141	0.134	0.189	0.239	0.419	0.572	0.722
South America	0.23	0.223	0.346	0.803	0.765	0.859	1.968
Developing Africa	0.158	0.161	0.22	0.257	0.28	0.436	0.742
SSA	0.111	0.103	0.141	0.161	0.161	0.295	0.494
Northern Africa	0.5	0.61	0.85	0.102	0.124	0.155	0.277
Southern Africa	0.36	0.28	0.59	0.89	0.84	0.156	0.235
Western Africa	0.38	0.37	0.3	0.26	0.28	0.57	0.104
Nigeria	0.24	0.24	0.77	0.64	0.98	0.26	0.53
Egypt	0.8	0.11	0.17	0.31	0.51	0.46	0.99
South Africa	0.34	0.27	0.56	0.85	0.78	0.146	0.219

Source: Computed from UNCTAD Handbook of Statistics

Table 3: Ratio of Service Value-Added to GDP (%)

	1980	1985	1990	1995	2000	2005	2010
Developed world	60.1	63.4	65.4	68.5	71.6	73.2	74.4
USA	64.6	67.7	70.6	72.6	76.0	77.1	78.1
Japan	57.2	58.9	59.1	64.9	67.2	69.4	71.3
China	21.6	29.5	32.4	32.7	39.0	40.5	43.1
Developing Asia	36.1	43.7	45.9	48.3	49.8	49.1	48.6
Eastern Asia	30.4	37.9	45.3	48.7	50.7	49.5	47.8
Southern Asia	44.7	45.6	45.5	46.6	50.2	51.6	53.1
Western Asia	34.3	49.8	46.8	48.8	48.7	47.3	49.7
Developing America	51.4	50.7	55.0	63.3	62.6	60.9	61.7
Caribbean	58.6	63.1	64.4	65.8	65.2	67.4	67.9
Central America	53.1	50.2	56.7	61.6	60.7	62.6	62.7
South America	49.7	49.7	53.3	63.6	63.6	59.3	61.1
Developing Africa	38.7	42.8	47.1	50.8	49.2	45.7	45.6

SSA	39.1	42.2	46.6	50.6	49.2	47.2	46.8
Northern Africa	38.2	44.3	47.9	51.4	49.2	42.9	42.9
Southern Africa	45.1	50.8	54.4	60.6	63.8	65.0	65.6
Western Africa	32.5	35.5	37.7	36.6	33.5	32.4	34.5
Nigeria	27.9	30.9	23.2	21.9	21.8	23.7	27.5
Egypt	42.7	49.9	50.9	50.9	54.1	49.8	48.5
South Africa	45.4	51.2	55.3	61.3	64.9	66.2	66.7

Source: Computed from UNCTAD Handbook of Statistics

Table 4: Share of Services Export in World Services Export (%)

	1980	1985	1990	1995	2000	2005	2010	2011
DEVELOPED WORLD	66.1	68.5	74.4	70.7	70.7	68.8	61.4	60.1
U.S.A	9.2	16.2	13.4	11.4	14.5	12.3	11.0	10.5
Japan	7.2	7.0	9.6	9.1	7.0	5.0	4.3	4.1
China		0.6	0.5	2.3	2.4	3.4	5.6	5.8
DEVELOPING ASIA	17.8	18.6	14.2	19.3	19.7	21.2	26.4	27.2
Eastern Asia	2.9	3.9	4.9	8.0	8.0	8.6	10.5	11.0
Southern Asia	2.3	2.2	1.6	1.5	1.9	2.9	4.2	4.1
Western Asia	9.6	9.0	4.5	3.7	4.0	4.1	5.6	5.6
DEVELOPING AMERICA	6.7	5.3	4.3	4.6	4.9	3.9	4.6	4.8
Caribbean	0.6	0.7	0.6	0.5	0.5	0.4	0.3	0.3
Central America	1.9	1.6	1.4	1.1	1.5	1.1	1.0	1.0
South America	4.2	2.9	2.3	3.0	2.9	2.3	3.3	3.5
DEVELOPING AFRICA	6.6	5.2	3.5	3.1	2.7	3.1	4.1	4.1
SSA	4.5	3.1	2.5	2.2	1.8	2.2	3.0	3.0
Northern Africa	2.2	2.1	1.0	0.9	1.0	1.0	1.2	1.1
Southern Africa	0.9	0.6	0.5	0.6	0.5	0.6	0.6	0.6
Western Africa	2.0	1.0	0.7	0.7	0.5	0.6	0.9	1.0
Nigeria	1.2	0.4	0.2	0.4	0.2	0.3	0.6	0.6
Egypt	0.5	0.7	0.4	0.4	0.5	0.4	0.4	0.3
South Africa	0.7	0.5	0.4	0.5	0.4	0.5	0.5	0.4

Source: Computed from UNCTAD Handbook of statistics

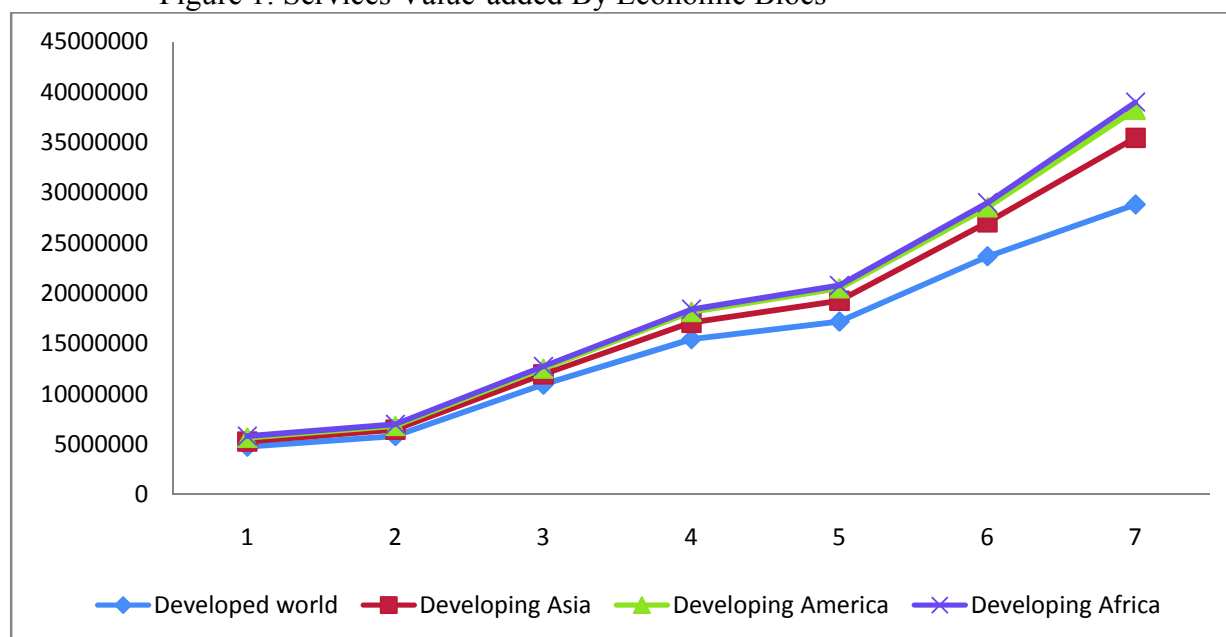
Table 5: Share of Services Import in World Services Import (%)

	1980	1985	1990	1995	2000	2005	2010	2011
DEVELOPED WORLD	79.0	78.4	79.9	76.1	75.3	73.2	67.6	67.3
U.S.A	12.0	17.8	17.8	17.9	19.0	14.7	14.4	14.1
Japan	5.1	5.3	5.0	5.4	4.6	4.1	3.6	3.4
China		0.7	0.7	1.6	2.0	2.9	4.5	4.3
DEVELOPING ASIA	10.3	11.8	11.6	16.2	16.8	18.7	23.7	24.1
Eastern Asia	3.8	4.7	5.2	7.7	8.3	8.7	11.3	11.4
Southern Asia	1.3	1.3	0.9	1.0	1.5	2.5	3.8	3.7
Western Asia	2.7	2.8	2.0	2.3	2.5	2.8	2.9	2.9
DEVELOPING AMERICA	4.8	4.7	3.8	3.7	4.0	3.4	3.5	3.5
Caribbean	1.0	1.2	0.9	0.9	1.0	0.9	0.8	0.7
Central America	1.6	1.6	1.3	1.1	1.3	1.0	0.8	0.8
South America	2.3	1.9	1.6	1.7	1.7	1.6	1.9	2.0
DEVELOPING AFRICA	3.4	3.0	2.6	2.3	2.2	2.3	2.3	2.2
SSA	2.2	1.6	1.4	1.2	1.1	1.2	1.2	1.2

Northern Africa	1.3	1.4	1.3	1.2	1.1	1.2	1.2	1.0
Southern Africa	0.7	0.5	0.5	0.4	0.4	0.5	0.4	0.4
Western Africa	0.7	0.4	0.4	0.2	0.3	0.2	0.2	0.2
Nigeria	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Egypt	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.5
South Africa	0.6	0.4	0.4	0.4	0.3	0.4	0.3	0.4

Source: Computed from UNCTAD Handbook of Statistics

Figure 1: Services Value-added By Economic Blocs



Source: Computed from UNCTAD Handbook of Statistics

Table6: Data Sources and measurement

Variable	Description	Source	Measurement
YPC	GDP Per Capita Income	World Development Indicators of World Bank	Constant US\$ 2000
K	Capital Stock	World Development Indicators of World Bank	Constant US\$ 2000
L	Labourforce	World Development Indicators (WDI) of World Bank	Number
EVS	Export of travel services	UNCTAD Handbook of Statistics, 2012	US\$ Million
ETS	Export of transport services	UNCTAD Handbook of Statistics, 2012	US\$ Million
EAS	Export of other services	UNCTAD Handbook of Statistics, 2012	US\$ Million
IVS	Import of travel services	UNCTAD Handbook of Statistics, 2012	US\$ Million
ITA	Import of transport services	UNCTAD Handbook of Statistics, 2012	US\$ Million
IAS	Import of other services	UNCTAD Handbook of Statistics, 2012	US\$ Million

630 Source: Computed by authors

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634 Table 7: Summary Statistics of Variables: Export Model

Variable	YPC	K	L	EVS	ETS	EAS
<i>Mean</i>	1076.64	1.77e+09	5914401	305.8883	159.9459	225.1596
<i>Std. Dev.</i>	1555.953	4.73e+09	7458988	913.1793	307.6753	414.7742
<i>Min</i>	126.1884	2.33e+07	250597.8	0.82	0.378239	0
<i>Max</i>	8739.787	4.38e+10	5.03e+07	9085.04	1969.8	3303.27
<i>Period (T)</i>	21	21	21	21	21	21
<i>No. of Observations (N)</i>	693	633	672	657	657	663
Summary Statistics of Variable: Import Model						
				IVS	ITS	IAS
<i>Mean</i>	1076.64	1.77e+09	5914401	255.8565	418.1585	549.6665
<i>Std. Dev.</i>	1555.952	4.73e+09	7458988	735.7926	920.1414	1475.845
<i>Min</i>	126.1884	2.33e+07	250597.8	1.888	8.286	1.606
<i>Max</i>	8739.787	4.38e+10	5.03e+07	9777.41	8492.66	18164.31
<i>Period (T)</i>	21	21	21	21	21	21
<i>No. of Observations (N)</i>	693	633	672	655	672	664

635 Source: Computed by authors

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643 Table 8: Correlation Matrix: Export Model

Variable	Lk	LI	Levs	Lets	Leas
<i>Lk</i>	1.0000				
<i>LI</i>	0.4562	1.0000			
<i>Levs</i>	0.5668	0.1913	1.0000		
<i>Lets</i>	0.5543	0.2178	0.6926	1.0000	
<i>Leas</i>	0.6546	0.3338	0.5824	0.7702	1.0000
Correlation Matrix: Import Model					
		Livs	Lits	Lias	
<i>Lk</i>	1.0000				
<i>LI</i>	0.4562	1.0000			
<i>Livs</i>	0.7856	0.4344	1.0000		
<i>Lits</i>	0.8485	0.5435	0.7309	1.0000	

<i>Lias</i>	<i>0.7857</i>	<i>0.3835</i>	<i>0.7230</i>	<i>0.8017</i>	<i>1.0000</i>
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Source: Computed by authors

Table 9: Import Model Estimations

	Model 1	Model 2	Model 3	Model 4
	POLS	LSVM	FE	RE
lk	0.333*** (12.61)	0.106*** (8.96)	0.106*** (8.96)	0.142*** (10.44)
ll	-0.796*** (-50.02)	0.0975** (3.03)	0.0975** (3.03)	- 0.124*** (-3.77)
lives	0.161*** (8.86)	0.0137 (1.77)	0.0137 (1.77)	0.0206* (2.26)
lits	0.183*** (6.83)	0.0696*** (6.29)	0.0696*** (6.29)	0.0779*** (5.97)
lias	0.0786*** (4.03)	0.0387*** (3.83)	0.0387*** (3.83)	0.0474*** (3.99)

c	9.314 ^{***} (22.05)	2.071 ^{***} (5.00)	2.071 ^{***} (5.00)	4.459 ^{***} (10.20)
N	571	571	571	571
R ²	0.873	0.990	0.528	
AdjR ²	0.872	0.990	0.498	
wald Chi ²				480.55 ^{***}
F-test	779.33 ^{***}	119.92 ^{***}	119.92 ^{***}	
H-test				1499.06 ^{***}
FE-test			214.02	
Countries Included	33	33	33	33

Notes: 1.the Hausman test (H-test) has χ^2 distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the alternative hypothesis of correlation unobservable individual effects and the explanatory variables.
2. The Wald test has χ^2 distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.
3. The F test has normal distribution N(0, 1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.
4. ^{***}, ^{**} and ^{*} denote significance at 1, 5 and 10% level of significance respectively
5. POLS, LSDVM, FE and RE denotes pooled ordinary Least Square, Least Square Dummy Variable Model, Fixed Effect and Random Effect respectively

Source: Computed by authors

Table 10: Export Model Estimations

	Model 1	Model 2	Model 3	Model 4
	POLS	LSDVM	FE	RE
lk	0.559 ^{***} (28.76)	0.152 ^{***} (11.62)	0.152 ^{***} (11.62)	0.178 ^{***} (12.19)
ll	-0.770 ^{***} (-45.11)	0.0993 ^{**} (2.73)	0.0993 ^{**} (2.73)	-0.0993 ^{**} (-2.77)
levs	0.0257 (1.91)	0.0231 ^{**} (3.08)	0.0231 ^{**} (3.08)	0.0335 ^{***} (4.02)
lets	0.0515 ^{**} (2.93)	-0.0073 (-0.89)	-0.0073 (-0.89)	0.0020 (0.22)
lias	0.0489 [*] (2.38)	0.0249 ^{**} (3.00)	0.0387 ^{**} (3.00)	0.0329 ^{***} (3.52)

c	5.834 ^{***} (17.70)	1.499 ^{**} (3.02)	1.499 ^{**} (3.02)	3.814 ^{***} (7.57)
	549	549	549	549
R ²	0.848	0.989	0.497	
AdjR ²	0.846	0.989	0.462	
wald Chi ²				430.75 ^{***}
F-test	604.35 ^{***}	101.29 ^{***}	101.29 ^{***}	
H-test				880.89 ^{***}
FE-test			230.93	
Countries Included	33	33	33	33

Notes: 1.the Hausman test (H-test) has χ^2 distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the alternative hypothesis of correlation unobservable individual effects and the explanatory variables.

2. The wald test has χ^2 distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.

3. The F test has normal distribution N(0, 1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.

4. ^{***}, ^{**} and ^{*} denote significance at 1, 5 and 10% level of significance respectively

5. POLS, LSDVM, FE and RE denotes pooled ordinary Least Square, Least Square Dummy Variable Model, Fixed Effect and Random Effect respectively

Source: Computed by authors

Table 11: Robustness Tests Import Model

Tests	Statistics	Remark
Time fixed effects test	f(20, 515)=2.36 Prob > f =0.0008	The coefficient of the time dummies are not significantly different from Zero; therefore, no need to include Time fixed effects
Breusch and Pagan Lagrangian Multiplier test	Chi2(1)=2059.57 Prob > chi2 =0.0000	There is evidences of significance Differences across units (panel effect) Random regression preferred to OLS
Modified wald test for groupwise heteroskedasticity	Chi2 (31)= 2649.68 Prob > Chi2 = 0.3162	Presence of homoskedasticity
Wooldridge test for	f(1, 30)=59.895	No serial Correlation

Autocorrelation in panel data	Prof> f =0.20000	
Robustness Test: Export Model		
Time fixed effects test	f(20, 493)=3.78 Prof > f =0.0000	The coefficient of the time dummies are not significantly different from Zero; therefore, no need to include Time fixed effects
Breusch and Pagan Lagrangian Multiplier test	Chi2(1)=2593.69 Prob >chi2 =0.0000	There is evidences of significance Differences across units (panel effect) Random regression preferred to OLS
Modified wald test for groupwise heteroskedasticity	Chi2 (31)= 2541.55 Prob > Chi2 = 0.3162	Presence of homoskedasticity
Wooldridge test for Autocorrelation in panel data	f(1, 30)=33.085 Prof> f =0.4045	No serial Correlation

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