A Comparative Study on the Export Determinants of Kenya and Korea: A Gravity Approach

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References

Abstract

This paper aims to empirically analyze Kenya’s and Korea’s export determinants and export performance by using an augmented gravity model. The augmented gravity model for Kenya and Korea was estimated for three different country groups: the 70, 50 and 30 country data sets. The major findings of this study are as follows. A product of exporter’s GDP and her trading partners’ GDP had a significant and positive effect on the export flows of both Kenya and Korea. For Kenya, the border also had a positive impact on her exports. For Korea, labor productivity had a significant and positive impact on her exports for the three data sets of country groups, while free trade agreements (FTAs) had a significant and positive impact on her exports only for the data set of 30 countries. For Kenya, GDP per capita and her trading partners’ GDP per capita had a significant and negative effect on her exports only for the 30 country data set. The exchange rate for Kenya had a significant and negative impact on her exports for all three country data sets, because of Kenya’s peculiar composition of exported goods such as raw coffee, tea, horticultural crops and raw minerals. For Korea, distance had a significant and negative effect on her export flows. For Korea, GDP per capita and her trading partners’ GDP per capita had a significant and negative impact on her exports for all three data sets of country groups. The exchange rate for Korea had mixed effects with the 70 country data set showing significant

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and positive effects, while the 50 and 30 country data set had a significant and negative effect on her export flows, which implies that exchange rate depreciation for Korea encouraged export with 70 countries, while it slowed export growth with 50 and 30 countries.

Keywords: Fixed Effect, Gravity Model, Pooled OLS, Random Effect, Trade Partners
JEL Classifications: C23, C51, F14

I. Introduction

Bilateral relations between Kenya and Korea began on the 7th of February, 1964, when Korea opened her embassy in Kenya. However, Kenya established her embassy in Korea in 2007, forty years later. Trade between Kenya and Korea improved marginally in 1993 after dismal performance between 1991 and 1992 (Odhiambo, 2013). Between 2005 and 2006, exports from Korea to Kenya increased sharply followed by a sharp decline in 2007. Global financial crisis and political instability in Kenya during 2007 and 2008 may be some of the main causes for the export decline. Kenya’s exports to Korea from 2003 to 2006 increased by 400% from US $ 50 million to US $ 200 million but declined to US $ 150 million in 2007, a 25% decline (Kitetu, 2015).

According to a study by Kitetu (2015), Kenya’s exports to Korea in 2010 were US$2.2277 million while imports were US$248.672 million. In 2013 Kenya’s exports to Korea where US$12.5039 million while imports from Korea were US$284.139 million. Therefore, Kenya has experienced a trade deficit during the period under study. This has a negative effect on the level of economic development, job creation and balance of payment. On the other hand, Korea experienced a trade surplus during the period under investigation. Furthermore, the difference between Korea’s imports to that of exports to Kenya was very insignificant during the period under investigation. Korea therefore experienced a trade surplus during the period under investigation. This is expected to have had a positive impact on Korea’s economic growth, balance of trade and job creation. Additionally, the two bilateral partners have their trading partners spread around the globe. Out of the ten major trading partners, they share five as their major trading partners which include China, Germany, Japan, United Arab Emirates and the United States. As expected, neighboring countries form part of their major trading partners. Korea was at the 26th position in Kenya’s trading list, while Kenya was at the 104th position in Korea’s trading list between 2010 and 2013 according to Kitetu (2015). Korea was Kenya’s 18th largest source of imports, while Kenya was one of Korea’s insignificant sources of imports (Kitetu, 2015). Kenya is now classified as a lower middle income country after rebasing her economy in 2014, while Korea is classified as a developed country. How can both bilateral trade partners exploit their bilateral trade potential in a mutually beneficial way?

This paper aims to empirically analyze Kenya’s and Korea’s export determinants and export performance by using an augmented
gravity model. The paper is structured as follows: after the introduction (Section I), Section II discusses bilateral relations between Kenya and Korea. Section III presents the literature review on the gravity trade model. Section IV shows empirical analysis results for Kenya’s and Korea’s export determinants. Section V presents a brief summary of the research outcomes and policy implications.

II. Literature Review

The gravity model has been described by many economists as a very useful tool in the analysis of international trade. Towards the end of the 19th century, Ravenstein (1889) initiated the application of the gravity model in the study of migration patterns in the United Kingdom. A Century later, Tinbergen (1962) and Poyhonen (1963) gestated the gravity model in the empirical study of bilateral trade. Its success has been prodigious and has been applied time and again in the empirical analysis of international trade (Salvatid, 2013).

According to Baltagi (2005) and Bruderl (2005), panel data helps eliminate many weaknesses of time series and cross-sectional data. It has the power to bring out the true connection between variables over time and has been proven to minimize co-linearity among independent variables, and controls for unobservable individual heterogeneity, thus, the estimated results are more reliable (Damodar, 2011).

A study by Do (2006), on bilateral trade between Vietnam and twenty three European countries applied gravity models with fixed effect, pool estimation and random effect. The study found pooled data to have bias while Hausman test results found the fixed effect method to be more reliable for use in the estimation. According to a study on the determinants of exports in developing countries by Majeed and Ahmad (2006), FDI was found to have a positive but insignificant effect on exports. They further argue that if the main aim of FDI is to capture domestic market, the so called “tariff jumping type investments”, it might not have any positive effect on exports. However, they found that GDP and labor productivity had significant and positive effect on export growth.

Uprasen (2014a) applied the fixed-effects Poisson Pseudo Maximum likelihood (PPML) approach to investigate Korea-Chile FTA for trade diversion. He argued that, there is an increase in trade between the two bilateral trade partners. However, diversion of trade within Korea’s major trade partners such as the USA and the UK was detected. Trade diversion between Korea’s and her minor trade partners who have similar trade structures to Chile such as the Philippines was also detected.

A study by Karamuriro and Karakuza (2015) using the gravity model to find determinants of Uganda’s export performance applied fixed effects, random effects and generalized methods of moment GDP for Uganda and for partners were found to have a statistically significant positive impact on Uganda’s export performance. Empirical results showed that GDP per capita income difference and real exchange rate also affected Uganda’s exports positively.

According to a research on the European region by Egger and Pfaffermayr (2011), they argued that there is a huge difference between dynamic and static gains from trade.
Furthermore, the study found that market size, productivity and trade liberalization were fundamental to successful bilateral trade. In essence, and specifically, the research found that labor productivity was the most significant determinant of bilateral exports quantitatively.

Deardoff (1998) found that, the degree of elasticity of substitution of goods is a fundamental factor for trade between distant partners. Whereby, he argues that the higher the elasticity of goods substitution the higher the trade no matter the distance. Furthermore, a reduction in logistical costs will lead to trade diversion from close neighbors to distant trade partners. Hence, trade with close neighbors will be bound to contract.

Many studies on the impacts of exchange rate variability have found mixed results. For instance, a study by Olufayo and Babafemi (2014) found that exchange rate variability had a negative impact on the export of oil and non-oil sectors in Nigeria while a literature review on the impacts of exchange rate fluctuation by Ozturk (2006) found that many empirical results had mixed outcomes ranging from significantly negative to significantly positive effects on exports.

According to De Grauwe (1988), exchange rate risks have a negative effect on welfare based on the supply of export under risk. Conversely, it is also capable of motivating the exporter to increase exports in order to counter expected decrease in income. Coric and Pugh (2006) applied Meta Regression Analysis (MRA) of the effects of exchange rate variability on International trade. They found that exchange regime effect, country effect, model specification, the degree of risk averseness by the exporter and the level of aggregation affects the weight and the sign of the estimated trade effects. De Grauwe (1988) and Baum and Schaffer (2003) found similar outcomes. Monetary policies to control exchange rate volatility and development of hedging markets have been found to reduce the exchange rate risk. International markets like any liberalized market operate under the market forces of demand and supply and therefore there are always two sides to consider in the interpretation of empirical signs and coefficient weights. It is worth noting that researchers are yet to reach a consensus on whether to use the exporters’ supply side or the importers’ demand side in the interpretation of the empirical results as applied in the current case (Coric and Pugh, 2006).

III. Methodology and Data

1. Methodology

To examine the determinants of exports for Kenya and Korea, this study has applied augmented gravity models of trade. Whereby a possibility of bilateral trade signifies that aggregate goods or production factors at the source are attracted by a demand for goods or production factors at the destination. However, the flow of bilateral trade is expected to be negatively affected by the distance between the source and the destination (Salvatici, 2013).

The initial gravity model can be presented as shown below.

\[ F_{ij} = \frac{G^{MM}M_i}{D_{ij}} \]  (1)
where $F_{ij}$ refers to trade flow from country i to country j, $M_i$ and $M_j$ represents country i’s and country j’s economic mass, $D_{ij}$ stands for the distance between the two countries, while $G$ is a constant. Traditionally, the natural logarithm “ln” in all variables is applied when carrying out empirical analysis using the gravity model. The new formula in a logarithmic form is rewritten as:

$$\ln F_{ij} = \alpha + \beta_1 \ln M_i + \beta_2 \ln M_j + \beta_3 \ln D_{ij}$$

(2)

where $\alpha$ denotes a constant value, while $\epsilon_{ij}$ refers to the error term. Economic mass may be represented by a country’s GDP, GDP per capita and/or population. Below are the gravity (econometric) models for Kenya and Korea and the applied variables respectively:

Kenya’s econometric model:

$$\ln(\text{EXP}_{ij}) = \beta_0 + \beta_1 \ln(DIST_{ij}) + \beta_2 \ln(GDP\times GDP_{ij}) + \beta_3 \ln(GDPPC_i) + \beta_4 \ln(GDPPC_j) + \beta_5 \ln(EXR_{ij}) + \beta_6 \ln(FDI) + \beta_7 \ln(BORDER_{ij}) + \beta_8 \ln(COMESA_{ij}) + \epsilon_{ij}$$

(3)

Korea’s econometric model:

$$\ln(\text{EXP}_{ij}) = \beta_0 + \beta_1 \ln(DIST_{ij}) + \beta_2 \ln(GDP\times GDP_{ij}) + \beta_3 \ln(GDPPC_i) + \beta_4 \ln(GDPPC_j) + \beta_5 \ln(EXR_{ij}) + \beta_6 \ln(LABPRDCTIV) + \beta_7 \ln(FDI) + \beta_8 \ln(FTA_{ij}) + \epsilon_{ij}$$

(4)

Dependent variable:

$\ln \text{EXP}_{ij}$: the logarithmic exports by country $i$ to her trading partner country $j$ at time $t$

Explanatory Variables:

$\ln DIST_{ij}$: the logarithmic distance between country $i$’s capital city and country $j$’s capital city

$\ln(GDP\times GDP_{ij})$: the logarithmic product of GDP for country $i$ and country $j$ at time $t$

$\ln \text{GDPPC}_i$: the logarithmic GDP per capita for country $i$ at time $t$

$\ln \text{GDPPC}_j$: the logarithmic GDP per capita for country $j$ at time $t$

$\ln \text{EXR}_{ij}$: the logarithmic real exchange rate between country $i$’s and country $j$’s currency at time $t$

$\ln LABPRDCTIV$: the logarithmic country $i$’s labor productivity at time $t$

$\ln FDI_i$: the logarithmic FDI inflow to country $i$ at time $t$

$FTA_{ij}$: binary for the effective FTA between country $i$ and country $j$ at time $t$

$BORDER_{ij}$: binary for the existence or non-existence of border between country $i$ and country $j$

$COMESA_{ij}$: binary for regional trading bloc between country $i$ and country $j$

$\epsilon_{ij}$: error terms

Pooled OLS regression, Fixed Effects regression (FE) and Random Effects (RE) regression models were applied to estimate
the gravity models, Eq 4.2 and Eq 4.3. Our models include dependent variables, independent variables and dummy variables. A pooled OLS data model has the capacity to simultaneously estimate changes of variables between different units over time as argued by Ramos and Rodrigues (2010). The FE model creates an intercept for each variable but a similar slope for all variables. However, the FE model lacks the capacity to estimate time invariant data as included in our models such as distance which is one of our major independent variables. Other time invariant data included is data for FTA, border and membership COMESA which are dummy (binary) variables. The RE model or the Error Components Model (ECM) is also employed in estimation. This model takes a mean value for all variables' intercepts to be the representative intercept. Additionally, the model holds that individual error terms are neither correlated nor auto-correlated among variables as well as over time. Furthermore, the RE Model has the power to remove heteroskedasticity, a major problem associated with cross-sectional data. It has an in-built capacity to also estimate time invariant variables which have been applied in our models.

The Hausman test was applied to the null hypothesis that there is no correlation between the independent variables and random effects, while the alternative hypothesis holds that there is correlation between independent variables and random effects. If the Hausman test p-value for the Chi-Sq. is statistically significant, then the null hypothesis is inconsistent, meaning that the fixed effects estimator is consistent and hence preferred. Furthermore, if the p-values for the Chi. Sq. are insignificant, it means that there is no correlation between the independent variables and the random effects. Thus, the Random Effects Model is a suitable model for the empirical analysis of estimated data. This section reports the empirical results for the 70, the 50, and the 30 trading partners from the year 1997 to 2010 for both Kenya and Korea. Guided by the gravity theory, the study employed econometric methods and Eviews version 8 as supporting software for the analysis of the data. The estimation results are presented below beginning with Kenya’s estimated results and then Korea’s estimated results, respectively. The Hausman test results showed that, the Random Effect Model was the most appropriate. The RE model is employed in the reporting of the empirical results for this research. The Fixed Effect and the Pooled OLS models are applied as reference models in reporting the outcome in this research.

2. Data

This study applied annual balanced panel data for Kenya and Korea and their trading partners for the period from 1997 to 2010. Exports by Kenya and Korea are the dependent variables and are in current US dollars. Export data was drawn from the World Bank database. Explanatory variables include: distance in kilometers and were drawn from www.distancefromto.net, GDP and GDP per capita data in current US dollars were retrieved from the World Bank. Labor force statistics and manufacturing value added data were from the World Development Indicators (WDI). Labor force statistics is in terms of number of persons, while manufacturing value added is a % of GDP. Real exchange rate is from the World Bank
database. The bilateral trading partners were selected based on total trade with the exporting countries for the period from 1997 to 2010. Three groups of 70, 50 and 30 country data sets for the major trading partners were selected for comparative purposes.

IV. Empirical Findings

1. Determinants of Kenya’s Exports

This section presents empirical results for the determinants of Kenya’s exports (EXP<sub>i,j</sub>) for three groups of her trading partners: the 70 country set, the 50 country set and the 30 country set, respectively. The 70 bilateral trading partners covered 93.5%, the 50 trading partners covered 90% and the 30 bilateral trading partners covered 81.3% of Kenya’s total trade during the period under study. As shown in Eq. (3), the gravity model for Kenya includes independent variables such as distance (DIST<sub>i,j</sub>) between the Kenyan capital and trading countries’ capitals, a product of Kenya’s GDP and her trading partner’s GDP (GDP<sub>i</sub>*GDP<sub>j</sub>), Kenya’s GDP per capita (GDP<sub>i</sub>/CAP<sub>i</sub>) and her trading partner’s GDP per capita (GDP<sub>j</sub>/CAP<sub>j</sub>), Kenya’s currency exchange rate relative to that of her trading partner (EXR<sub>i,j</sub>), Kenya’s foreign direct investment inflow (FDI), Border (BORDER<sub>i,j</sub>) and economic bloc (COMESA<sub>i</sub>) are dummy variables.

From the estimated results, a product of Kenya’s GDP and her trading partners’ GDP had a significant and positive effect on her export flows. For Kenya, the border also had a positive impact on her exports while her GDP per capita and the GDP per capita for her trading partners had a significant and negative effect on her exports only for the 50 country data set. The exchange rate had a negative impact on her exports for all three country data sets, because of Kenya’s peculiar composition of exported goods such as raw coffee, tea, horticultural crops and raw minerals. The standard error of regression is highest at the 70 country set at 0.944745, 0.833701 for the 50 country set and lowest at the 30 country set at 0.755125. F-stat follows the same trend: highest at the 70 partner set and lowest at the 30 partner set. F-stat for all sets is significant at the 1% level. Empirical outcomes for the 70, 50 and 30 country data sets are presented in <Table 1>, <Table 2> and <Table 3>, respectively.

Kenya has a very unique economy due to the following: a) the inability to capture all export data in real time especially trade with neighboring countries due to the porousness of its borders; b) reliance on domestic consumption as one of the main drivers of her economy and c) focus on the export of unprocessed goods as raw materials or intermediate goods.

P-value of Hausman test results for the three sets was 1.00, meaning that the alternative hypothesis was rejected, hence, the RE model was better suited for the current data analysis. Values for the 70, the 50 and the 30 country sets were 0.259008, 0.282642 and 0.357239, respectively. Standard Error (S.E) of regression was lowest for the 30 country data set.

As can be seen from the three tables <Table 1>, <Table 2> and <Table 3>, determinants of Kenya’s exports can be better explained by <Table 2>. R-Squared values for the 70, 50 and 30 country data sets are as follows:
### Table 1. Estimation of Kenya’s Exports for 70 Trading Partners (1997-2010)

| Variable | Pooled OLS | Fixed Effects | Random Effects |
|----------|------------|---------------|----------------|
| C        | -34.44668*** | -33.0013***  | -30.87363***   |
|          | (12.72471)  | (13.03103)    | (14.43333)     |
| Ln DISTij| 0.064433    | -             | -0.2927        |
|          | (0.09938)   | (-)           | (0.664647)     |
| Ln GDP/GDPj| 1.130661*** | 1.108094***  | 1.114936***    |
|          | (0.408414)  | (0.423886)    | (0.408505)     |
| Ln GDPPCi| -0.765895   | -0.696025     | -0.717208      |
|          | (0.779908)  | (0.819499)    | (0.785381)     |
| Ln GDPPCj| -0.70322    | -0.717811     | -0.713387      |
|          | (0.641766)  | (0.663059)    | (0.640635)     |
| Ln EXRij | -1.668914***| -1.593553***  | -1.616401***   |
|          | (0.457868)  | (0.482987)    | (0.465341)     |
| Ln FDli  | -0.028974   | -0.02606     | -0.026958      |
|          | (0.045751)  | (0.048319)    | (0.046437)     |
| BORDERij| 3.569266*** | -             | 3.209507***    |
|          | (0.178696)  | (-)           | (1.677069)     |
| COMESAij | 1.180522*** | -             | 0.357918***    |
|          | (0.101935)  | (-)           | (0.156308)     |
| Number of observations | 980 | 980 | 980 |
| R-Squared | 0.14713 | 0.868571 | 0.259008 |
| Adjusted R-squared | 0.140104 | 0.857824 | 0.252903 |
| S. E. of regression | 2.322585 | 0.944411 | 0.944745 |
| F-stat | 20.93964 | 80.82235 | 42.4256 |
| Prob (F-statistic) | 0 | 0 | 0 |

Notes: 1. ***, ** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.
2. Standard errors of the coefficients are in parenthesis.
3. Variables and their expected impact on export flows: Increase in distance is expected to have a positive impact on export flows since transportation costs increases with increase in distance. Increase in GDP for Kenya is expected to have a positive effect on her exports, because an increase in GDP increases the supply potential while, an increase in importers GDP increases the market size (large economies tend to consume more) hence, the increase in imports by the importing countries. Increase in Kenya’s GDP per capita is expected to have a positive impact on her exports. Since, an increase in GDP per capita increases productivity hence, a higher capacity to export more. However, an increase in GDP per capita may affect export flow negatively since a high per capita may mean increased demand or capacity to absorb domestic goods reducing goods available for export. Increase in importers’ GDP per capita may lead to an increase in productivity which implies an increased demand for imports, while at the same time it may result to an increase in demand for imported high value goods and hence, reduce the importation of low value goods. Depreciation of exporter’s currency (Real exchange rate) has been found to either promote or hinder exports. Exchange rate volatility reduces trade by creating uncertainty and risk about future profit from export trade and thereby destabilizing macroeconomic performance (Olufayo and Babafemi, 2014; Coric and Pugh, 2006). Improved labor productivity of exporter means ability to produce and supply more at less cost and therefore, it enhances export flow.

Source: Calculated by the authors.
Table 2. Estimation of Kenya’s Exports for 50 Trading Partners (1997-2010)

| Variable | Pooled OLS | Fixed Effects | Random Effects |
|----------|------------|---------------|----------------|
| C        | -48.36139*** | -51.48961***  | -47.28464***  |
|          | (11.15948)   | (11.7052)     | (11.42821)    |
| Ln DISTij | -0.435415*** | -0.535188*    | -0.35188*     |
|          | (0.063905)   | (0.407867)    | (0.769393)    |
| Ln GDP(GDPj) | 1.75589***  | 1.74282***    | 1.748796***   |
|          | (0.372264)   | (0.389222)    | (0.37368)     |
| Ln GDPPCi | -1.406917*   | -1.366452*    | -1.384955*    |
|          | (0.763342)   | (0.800183)    | (0.769393)    |
| Ln GDPPCj | -1.771868*** | -1.780319***  | -1.776456***  |
|          | (0.516816)   | (0.53525)     | (0.517972)    |
| Ln EXRij  | -2.179745*** | -2.1361***    | -2.156057***  |
|          | (0.52457)    | (0.549097)    | (0.532216)    |
| Ln FDII   | -0.01275     | -0.011074     | -0.01184      |
|          | (0.048792)   | (0.051086)    | (0.049322)    |
| BORDERij  | 1.713314***  | -              | 1.700757***   |
|          | (0.073194)   | (0.025588)    | (0.025588)    |
| COMESAij  | 0.488357***  | -              | 0.223311      |
|          | (0.148107)   | (0.193765)    | (0.193765)    |
| Number of observations | 700         | 700            | 700            |
| R-Squared | 0.212799     | 0.846993      | 0.282642      |
| Adjusted R-squared | 0.203686   | 0.834183      | 0.274337      |
| S.E. of regression  | 1.827087    | 0.833741      | 0.833701      |
| F-stat    | 23.34926     | 66.12029      | 34.03206      |
| Prob (F-statistic) | 0           | 0              | 0              |

Notes: 1. ***, ** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.  
2. Standard errors of the coefficients are in parenthesis.
3. Variables and their expected effect on export flows: An increase in exporters FDI inflow may lead to increase in capital stock and better technology (innovation). This may mean ability to produce more for the domestic and export market. Therefore, it is expected to have a positive impact on exports. However, if the government adopts an “inward FDI policy” or if it is a “Tariff jumping FDI” (producing for the foreign countries domestic market only to avoid paying duty), it may have a negative effect on exports. An effective FTA with trading partner reduces barriers to trade, hence, the possibility of increase in export trade volumes. Bordering states are bound to trade more since this reduces logistical costs, thus, lowering prices of exports (Busse and Groning, 2012). Membership to a trading bloc leads to the reduction of artificial trade barriers, hence, increasing the possibility of more trade (imports and exports) between member states.

Source: Calculated by the authors.

0.259008, 0.28642 and 0.357239, respectively. The F-stat was 42.4256, 34.03206 and 28.55364, all statistically significant at the 1% level of significance, for the 70, the 50 and the 30 country data sets, respectively.
Table 3. Estimation of Kenya’s Exports for 30 Trading Partners (1997-2010)

| Variable | Pooled OLS | Fixed Effects | Random Effects |
|----------|------------|---------------|----------------|
| C        | -10.3316   | -8.432718     | -7.206732      |
|          | (14.99662) | (14.99651)    | (15.55706)     |
| Ln DISTij| -0.152981***| -0.285156     | -0.123829      |
|          | (0.059057) | (-)           | (0.32578)      |
| Ln GDP(GDP)ij| 0.717294| 0.668632***  | 0.107299      |
|          | (0.819929) | (0.033003)    | (0.823862)     |
| Ln GDPPCi| -0.123829| 0.160233      | 0.057719      |
|          | (1.494903) | (1.525254)    | (1.503265)     |
| Ln GDPPCj| 0.007888 | 0.215268      | 0.057719      |
|          | (1.002099) | (1.011834)    | (1.005601)     |
| Ln EXRij| -1.986204* | -1.767313*    | -0.57719      |
|          | (1.023045) | (1.04423)     | (1.028165)     |
| Ln FDIi| -0.057719| -0.056703     | -0.056374*    |
|          | (0.035275) | (0.036369)    | (0.035219)     |
| BORDERSij| 1.427068***| -          | 1.482177*     |
|          | (0.150641) | (-)           | (0.891393)     |
| COMESAij| 0.688632***| (0.239244)    | 0.223834      |
|          | (0.239244) | (0.239244)    | (0.222967)     |

Number of observations: 420
R-Squared: 0.247461
Adjusted R-squared: 0.232813
S.E. of regression: 1.572903
F-stat: 16.89392
Prob (F-statistic): 0.000000
Chi-Sq. Statistic: 0.000000
Chi-Sq. d.f.: 6
Prob.: 1.00

Notes: 1. ***, ** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.
2. Standard errors of the coefficients are in parenthesis.
Source: Calculated by the authors.

Table 4. Hausman Test for Kenya’s 70, 50 and 30 Trading Partners

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|--------------|-------------------|--------------|-------|
| Cross-section random | 0.000000      | 6            | 1.00  |

2. Determinants of Korea’s Exports

This section presents empirical results for the determinants of Korea’s exports (EXPij) for three groups of her trading partners: the 70 country set, the 50 country set and the 30 country set, respectively. The 70 bilateral trading partners covered 92%, the 50 trading partners covered 88% and the 30 bilateral trading partners covered 81% of Korea’s total trade during the period under study. As shown in Eq. (4), the gravity model for Korea includes independent variables such as distance (DISTij), a product of Korea’s GDP and her trading partner’s GDP (GDPxGDPij), Korea’s GDP per capita (GDPPCi), Korea’s currency exchange rate relative to that of her trading partner (EXRij), Korea’s labor productivity (LABPRDCTIV) as a ratio of GDP to employed persons and Korea’s FDI inflow (FDI). Effective free trade agreements (FTAij) is the only dummy variable applied in Korea’s model. A product of Korea’s GDP
and her trading partners' GDP had a significant and positive effect on the export flows. For Korea, labor productivity had a significant and positive impact on her exports for the three data sets of country groups, while FTAs had a significant and positive impact on her exports only for the data set of 30 countries. For Korea, GDP per capita and her trading partners' GDP per capita had a significant and negative impact on her exports for all three data sets of country groups. The exchange rate for Korea had mixed effects with the 70 country data set showing a significant and positive effect, while the 50 and 30 country data sets had significant and negative effects on her export flows.

Hausman test results indicate that the Random Effect model was more appropriate compared to the Fixed Effect model in the analysis of the Korean model (Eq. 4). The value for 70 countries was the lowest at 0.486375, while those of the other two models (50 and 30) were 0.519521 and 0.730115, respectively. The empirical results show that Korea’s export trade can be better explained by the 30 country data set, as presented in Table 7, since it has the best R-Squared values.

Table 5. Estimation of Korea’s Exports for 70 Trading Partners (1997-2010)

| Variable       | Poole OLS         | Fixed Effects | Random Effects |
|----------------|-------------------|---------------|----------------|
| C              | -28.37739**       | -37.25041***  | -26.16337*     |
|                | (13.20292)        | (12.9052)     | (14.22875)     |
| Ln DiSTij      | -1.253133***      | -             | -1.255231***   |
|                | (0.027181)        | (-)           | (0.276994)     |
| Ln GDP/GDPj    | 0.930602***       | 0.872245**    | 0.875933**     |
|                | (0.354477)        | (0.348645)    | (0.345821)     |
| Ln GDPPCi      | -2.543785*        | -2.307615     | -2.322541*     |
|                | (1.36604)         | (1.478357)    | (1.393993)     |
| Ln GDPPCj      | -0.253126         | -0.208717     | -0.211524      |
|                | (0.473593)        | (0.475126)    | (0.464709)     |
| Ln EXRij       | 0.763684***       | 0.752402***   | 0.753115***    |
|                | (0.218811)        | (0.237402)    | (0.229304)     |
| Ln LABPRDCTIVI | 2.599305*         | 2.411372*     | 2.42325*       |
|                | (1.310787)        | (1.400901)    | (1.317078)     |
| Ln FDi         | 0.022995          | 0.030352      | 0.029887       |
|                | (0.026798)        | (0.030382)    | (0.028992)     |
| FTAij          | -0.140095**       | -              | -0.008854      |
|                | (0.082653)        | (-)           | (0.053377)     |
| Number of observations | 980 | 980 | 980 |
| R-Squared     | 0.225971          | 0.915577      | 0.486375       |
| Adjusted R-squared | 0.219594 | 0.908573 | 0.482143 |
| S.E. of regression | 1.649422 | 0.56456 | 0.564598 |
| F-stat         | 35.43447          | 130.7192      | 114.9353       |
| Prob (F-statistic) | 0 | 0 | 0 |

Notes: 1. ***, ** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.
2. Standard errors of the coefficients are in parenthesis.
Source: Calculated by the authors.
### Table 6. Estimation of Korea’s Exports for 50 Trading Partners (1997-2010)

| Variable       | Pooled OLS          | Fixed Effects         | Random Effects          |
|----------------|----------------------|-----------------------|-------------------------|
|                | C                    |                       |                         |
|                | -121.1086***         | -138.5545***          | -124.8659**             |
|                | (1.79E+01)           | (19.01177)            | (18.26892)              |
| Ln DISTij      | -1.35E+00***         | -1.347735***          |                         |
|                | (2.12E-02)           | (0.56167)             |                         |
| Ln GDPI/GDPj   | 3.797768***          | 3.946387***           | 3.894988***             |
|                | (4.78E-01)           | (0.528703)            | (0.512293)              |
| Ln GDPiGDPj    | -9.82225***          | -10.32237***          | -10.16458***            |
|                | (2.541629)           | (2.730405)            | (2.580833)              |
| Ln GDPPCj      | -2.66748***          | -2.800481***          | -2.767754***            |
|                | (5.03E-01)           | (0.526703)            | (0.511293)              |
| Ln EXRij       | -0.729119***         | -0.760552***          | -0.750635***            |
|                | (2.25E-01)           | (0.232607)            | (0.221565)              |
| Ln LABPRDCTIVi | 6.173768***          | 6.514184***           | 6.406784***             |
|                | (2.333833)           | (2.509290)            | (2.376073)              |
| Ln FDIi        | 0.02205              | 0.011546              | 0.01486                 |
|                | (4.93E-02)           | (0.053129)            | (0.050175)              |
| FTAij          | 0.231825***          | (-)                   | 0.073139                |
|                | (6.31E-02)           | (-)                   | (0.05999)               |
| Number of observations | 700                  | 700                   | 700                     |
| R-Squared      | 0.273766             | 0.273766              | 0.519521                |
| Adjusted R-squared | 0.265358         | 0.265358              | 0.513959                |
| S.E. of regression | 1.540591           | 1.540591              | 0.515677                |
| F-stat         | 32.56042             | 32.56042              | 93.39362                |
| Prob (F-statistic) | 0                   | 0                     | 0                       |

Notes: 1. *** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.
       2. Standard errors of the coefficients are in parenthesis.
       Source: Calculated by the authors.

### Table 7. Estimation of Korea’s Exports for 30 Trading Partners (1997-2010)

| Variable       | Pooled OLS          | Fixed Effects         | Random Effects          |
|----------------|----------------------|-----------------------|-------------------------|
|                | C                    |                       |                         |
|                | -99.48005***         | -110.9823***          | -97.5719**              |
|                | (11.25281)           | (11.95908)            | (11.79348)              |
| Ln DISTij      | -1.011269***         | -1.01336***           |                         |
|                | (0.200071)           | (-)                   |                         |
| Ln GDPI/GDPj   | 3.245377***          | 3.317596***           | 3.194122***             |
|                | (0.288078)           | (0.305311)            | (0.284245)              |
| Ln GDPiGDPj    | -7.311618***         | -7.46192***           | -7.180623***            |
|                | (1.8012)             | (2.007507)            | (1.704855)              |
| Ln GDPPCj      | -1.986899***         | -2.033416***          | -1.953885***            |
|                | (0.314173)           | (0.330283)            | (0.311278)              |
| Ln EXRij       | -0.880461***         | -0.885603***          | -0.876812***            |
|                | (0.185225)           | (0.194435)            | (0.184146)              |
| Ln LABPRDCTIVi | 3.970506**           | 4.074626**            | 3.896611**              |
|                | (1.71273)            | (1.916341)            | (1.615693)              |
| Ln FDIi        | -0.002478            | -0.007023             | 0.000748                |
|                | (0.032153)           | (0.035268)            | (0.0336)                |
| FTAij          | 0.147806***          | (-)                   | 0.252706***             |
|                | (0.042142)           | (-)                   | (0.056437)              |
| Number of observations | 420                  | 420                   | 420                     |
| R-Squared      | 0.273766             | 0.971376              | 0.730115                |
| Adjusted R-squared | 0.265358         | 0.988767              | 0.724862                |
| S.E. of regression | 1.540391           | 0.303091              | 0.299622                |
| F-stat         | 32.56042             | 372.35147             | 138.9842                |
| Prob (F-statistic) | 0                   | 0                     | 0                       |

Notes: 1. *** and * imply statistical significance at the 1%, 5% and 10% levels, respectively.
       2. Standard errors of the coefficients are in parenthesis.
       Source: Calculated by the authors.
Table 8. Hausman Test for Korea’s 70, 50 and 30 Trading Partners

| Test Summary            | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|-------------------------|-------------------|--------------|-------|
| Cross-section random    | 0.000000          | 7            | 1.000 |

V. Conclusion and Implications

The study accentuates Kenya’s and Korea’s international trade competitiveness as well as the constituents that manipulate Kenya’s and Korea’s export trade flows. More specifically, an augmented gravity model was employed whereby the Pooled OLS regression, FE regression and the RE regression models were applied. Data sets were from 1997 to 2010. Three data sets of 70, 50 and 30 countries comprised of major bilateral trading partners were applied for comparative purposes. The RE model was applied in our reporting after the Hausman test analysis, while Pooled OLS and FE regression models were applied for reference.

Empirical outcomes illustrate that a product of exporter’s GDP and her trading partners’ GDP had significant and positive effects on the export flows of both Kenya and Korea. For Kenya, the border also had a positive impact on her exports. For Korea, labor productivity had a significant and positive impact on her exports for the three data sets of country groups, while free trade agreements (FTAs) had a significant and positive impact on her exports only for the data set of 30 countries. For Kenya, GDP per capita and her trading partners’ GDP per capita had significant and negative effects on her exports only for the 50 country data set. The exchange rate for Kenya had a negative impact on her exports for all three country data sets, because of Kenya’s peculiar composition of exported goods such as raw coffee, tea, horticultural crops and raw minerals. For Korea, distance had a significant and negative effect on her export flows. Moreover, for Korea, GDP per capita and her trading partners’ GDP per capita had significant and negative impacts on her exports for all three data sets of country groups. The exchange rate for Korea had mixed effects with the 70 country data set showing significant and positive effects, while the 50 and 30 country data sets had significant and negative effects on her export flows. The components that have favorable effects on Kenya’s and Korea’s export growth should be adopted, while appropriate measures should be designed to neutralize the negative effects of factors unfavorable to both countries’ export flows.

Therefore, the study results suggest the following: First, increased economic integration will be a catalyst for export growth and thus, it will be beneficial if Kenya and Korea join regional economic blocs such as FTAs. Kenya can learn the best FTA engagement approach from Korea’s experience. Second, investment in infrastructure that can reduce the negative impact of distance on trade will help increase export flows. Third, maintenance of sustainable economic growth is paramount for continued growth of exports since GDP was found to have a significant positive impact on exports for both partners. Fourth, creation of monetary policy that guarantees exchange rate stability and the development of hedging markets would play a very crucial role in reducing exchange rate risk. Fifth, FDI was found to have a negative impact on Kenya,
suggesting that Kenya has to formulate outward FDI policies in order to promote investment abroad. Sixth, labor productivity was found to be one of the main determinants of export growth for Korea. Therefore, Kenya can borrow a leaf from Korea’s initiatives on how to improve her national labor productivity. Policy may include technological innovation (automation) and skills training.

The empirical outcomes of this study are important for trade policy formulation and bilateral trade engagement and can help Kenya and Korea exploit their economic potential by harnessing the benefits of globalization for the economic and social welfare of their people.

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