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Panel Data Analysis of African's Trade: The Gravity Model Approach

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Abstract
The theoretical justification of the gravity model in the analysis of bilateral trade was applied in the generalized gravity model to analyze the African's trade with China and its major trading partners using the panel data estimation technique. Estimate of the gravity model of trade (sum of exports and imports), the export and import gravity model. Data for the period 1980-2015. The empirical results show that African's trade is positively determined by the size of the economies, GDP, per capita GDP, FDI, a differential of the countries involved and openness of the trading countries. The major impacts of African's exports are the exchange rate, partner countries' total import demand and openness of the Africa economy. All three factors affect the African's exports were found positive. The exchange rate, on the other hand, indicated no effect on the African's import; rather than the imports were affected by inflation rates, per capita income differentials and openness of the countries involved in the trade. Transportation cost is found a significant factor in influencing African's trade negatively. Also, Africans imports are found to be influenced to a great extent by the distance between China and African. The country-specific effects show that African would do better by trading more with its neighboring countries. The indication of trade sector effects matter and that potential product vary considerably in their sensitivity to distance and country factors which have prominent revealed comparative advantage. African should diversify its exports and improve its trade diplomacy.
Keywords: Panel data, gravity model. potentials, export, China, and Africa.

1. Introduction

Trade is an integral part of the total developmental effort, national and international growth of an economy. This is, in fact, a crucial instrument for industrialization while access to foreign exchange is essential for sustained economic development. According to (Yi 2003). Trade is measured on a gross sales basis while GDP is measured on a value-added basis. For the first decades of the postwar period, this distinction was relatively unimportant. Trade in Intermediates was always important, but it was quite proportional to trade in final goods. The rapid internationalization of supply chains in the last two decades has changed this. Besides foreign direct investment, exports have been one of the determinants of upholding higher economic growth. From a large and life expectancy, due to their assimilation in the world economy. in the developing countries like Africa can enlarge their markets by allowing firms exporting and achieving economies of scale. An exporting is when you trade something out of the country. In economics, an export is any good or commodity, channels of technology transfer from one to other nations. A country in a legitimate fashion, typically for use in trade. (Pack, 1993) Export goods or services are provided to foreign consumers by domestic producers, is an important part of international trade.

Gravity model has been a widely-applied model while analyzing bilateral trade flows. Its basic form has been drawn from Newton's law of gravitation. Reviewed the gravity model wherein the movement of goods or labor between two destinations could be explained by the distance between them and the mass of goods supplied and demanded. Anderson (2011). Fratianni.M (2007). mentioned on Empirical applications of Gravity Equation expanded to cover a variety of issues, such as the impact of regional trade agreements, national borders and currency unions on trade, as well as the use of the equation to sort out the relative merit of alternative trade theories.

But the bilateral trade has been one of the major drivers of economic development and an important contributor to economic integration. The objective is to explain the trade flows between China and Africa continents in terms of the gravity equation, the reason for focusing on gravity was that the Gravity model, unlike other frameworks, has had great empirical success in explaining bilateral trade flows and very useful an international trade. In its simplest form, the gravity equation explains flows of a good between pairs of countries.

In this study, GDP, FDI, industry, population, exchange rate, inflation and distance between the countries are used as the independent variables and trade volume imports and exports volume as dependent variables, by using multiple regression techniques. The study focused on the impact of bilateral trade between Africa and Chinese, observing the exchange in African continents trading partner of China on African exports. Using panel data during the short period, we present significant evidence on the existence of a displacement effect at different levels: sector, product, region, and market.

A new trait of China-Africa Cooperation a surge in trade, China has been Africa's largest trade partner since 2009, with the trade volume between them reaching a record high US$198.4 billion in 2012, a 19.3% rise from the previous year. Export and import also increased 6.7% and 21.4% at US$85.4 billion and US$113.2 billion, respectively, during the same year. Africa's significance in China's trade has also steadily grown. China's total trade volume with, export to, and import from Africa rose from 2.1%, 2.3% and 2.0% in 2001 to 5.1%, 4.2% and 6.2% in 2012, respectively. See figure 1 bellow

According to the (NBS 2014), Economic ties with Africa are one source of growth for China. China–Africa trade reached almost US$200 billion in 2013 up from about US$10 billion in 2000 (IMF 2015a). Realized annual foreign direct investment (FDI) in Africa in 2013 surpassed US$3 billion—up from US$317 million a decade earlier (NBS 2014). Total Chinese investment stock in Africa exceeded US$26 billion in 2013.

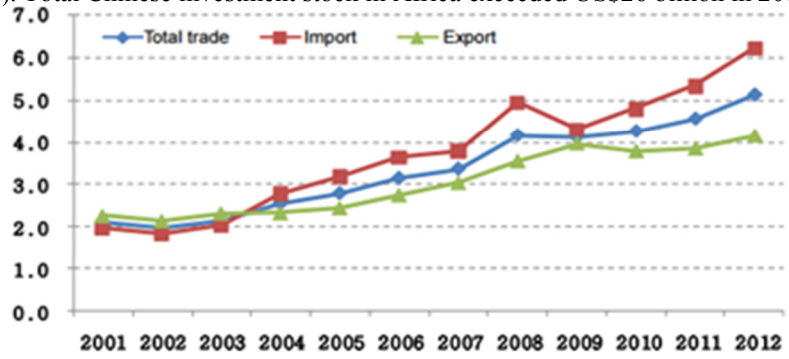

Figure 1. China's Trade with Africa from Total Overseas Trade (%)

In 1980, the total Sino-African trade volume was US$1 billion. Peter, w (2011). In 1999, it was US$6.5 billion and in 2000, US$10 billion. By 2005, the total Sino-African trade had reached US$39.7 billion before it jumped to US$55 billion in 2006, making China the second largest trading partner of Africa after the United States, which had a trade worth US$91 billion with African nations. China also passed the traditional African economic partner and France, which had a trade worth US$47 billion. D Harman (2009), Peter, w (2011). According to Cao Jiachang in 2010, trade between Africa and China was worth US$114 billion Peter, w (2011). And in 2011, US$166.3 billion. In the first 10 months of 2012, it was US$163.9 billion. Therefore, China's trade with Africa concentration level is relatively high. China imports mostly crude oil and mineral resources from Africa; the share of the top 10 import items from the total amounted to 97.1% in 2012 from which the share of mineral fuel and mining resources took up 59.6%. China imports the largest volume of its crude oil from Africa; crude oil from Angola, Sudan, the Republic of Congo, Libya, Algeria, Equatorial Guinea and Nigeria; iron ore from the Republic of South Africa; and copper from the Republic of Congo and Zambia. Meantime, the country's main export items to Africa include electric machinery, mechanical equipment, vehicles and wool (top 10 export items = 60.7% of 2012 total).

Table 2. China's Oil Import Bases in 2012

Rang	Country	Import Volume (US$ 1 billion)	Share of Total Import (%)	Year-on-year Increase Rate (%)
1	Africa	53.8	24.4	14.5
2	Russia	20.46	9.3	34.6
3	Venezuela	10.39	4.7	45.1
4	Kazakhstan	8.72	4.0	-1.6
5	Iran	8.1	-18.0	
6	Saudi Arabia	44.12	20.0	13.1
7	Oman	15.80	7.2	14.4
8	Iraq	12.64	5.7	21.4
9	Kuwait	8.40	3.8	14.8

Source: General Administration of Customs of China Authors own compilations

2 International empirically estimated literature

Trade is the second phase in the China-Africa relations started since the 1980s and 1990s. China has been the largest trading partner of Africa since 2009 and the trade volume continues to rise. The Second, cooperation in energy and mineral resources has expanded. China's share of Africa's oil and mineral exports has grown and participation in Africa's development projects has also increased under the auspices of the Chinese government. And Third, China's private sector has become a more active investor in Africa. Relations between China and Africa are expected to develop further due to President XiJinping's keen interest in the region and its high

growth potential. Chinese companies should seek opportunities in Africa's pharmaceutical market and the relocation of certain industries should be considered. Exports are one of the oldest forms of economic transfer and occur on a large scale between nations that have fewer restrictions on trade, such as tariffs or subsidies. A. Jayakumar (2014), Along with exports, imports form the backbone of international trade. Sino–African trade is proportionately more important to Africa than to China. made up 14 per cent of total African reported trade in 2013. According to (IMF 2015) their trade ties, however, point out just 4.6 % of total reported Chinese trade that year. In 2013, African data point to a trade deficit with China of US$15.2 billion. Oil makes Chinese imports larger than exports in a trade with Africa (Ademola et al. 2009; Thomson and Horii 2009). Oil imports have risen significantly. In 1990, China imported no oil from Africa. By 2010, roughly one-quarter of its foreign oil supply was being sourced from the continent (Thompson and Horii 2009).

Bilaterally China is now the largest export destination of African's countries, and others largest economy, and also of Angola, Benin, Congo (Democratic Republic), Mauritania, Sudan, and Zambia, among others (IMF, 2010). This growing China and Africa trade relationship is the culmination of changes that gained momentum in the mid-1990s. Our gravity model analysis of China's imports from Africa between 1980 and 2015 explores the potential for trade to generate positive development opportunities for Africa. Multiple that factors influence the notion of most favorable trade, both by level and composition. In the field of economic geography trade levels and prospects have been linked to establishment level and geographic position. Empirically, over and under trading have been estimated using gravity models. First applied empirically to international economics by Tinbergen (1962) and Pöyhönen (1963), the gravity model links trade levels to distance (costs of trade) and mass (GDP, population, and so on).

To provide a theoretical justification for using the gravity model in applied research of bilateral trade between two countries. to apply this model in analyzing the trade pattern and trade relation of Africa with its major partner countries using panel data and the gravity model. These trade tendencies are congruent with old trade theory. model is that trade should arise between two countries that differ with respect to their relative factor endowments-primarily labor, capital and natural resources. The model demonstrates that the gains to trade around specialization are greatest when the country with abundant capital and scarce labor specializes in the production of goods that utilize capital most intensively, and vice versa. According to Chinese government statistics, trade with Africa has been increasing over the years, albeit with a relatively limited number of trading partners see (Table 2). overall rose from $10.6 billion in 2000 to $40 billion in 2009 and continues to increase. And the share of Africa's trade with China has increased from 1.4% of China's total trade to 4.1% in the period 1995 to 2009.The major African trading partners with China for 2009 were Angola (19%), South Africa (17%), Sudan (7%), and Nigeria (7%) in terms of China–Africa total trade.

These account for 51% of total trade. Accordingly, China is not alone in having imports from Africa dominated by fuels and minerals. Even where oil and gas-rich North African countries are excluded, imports to the European Union and the United States from sub-Saharan Africa are still dominated by minerals and fuels (see Gualberti et al.2014). According to the study by Gualberti et al. (2014), in 2012 fuel represented some 76 percent of the United States' imports from SSA more than China's72 percent. Africa's imports from China, in contrast, are driven mainly by machinery, chemicals, and manufactured goods, though patterns vary somewhat among importers (Drummond and Liu 2013). Furthermore, China -Africa trade is skewed with China supplying value-added manufactured goods to Africa while the latter supplies mainly primary based resource products.

China's exports to SSA have increased from 1.2% to 2.8% of China's total exports, which mainly consists of value-added manufacturing products, whose composition has changed between years. On the other hand, China's total imports from SSA have increased from 0.9% to 3.7% of China's imports; this has been due to high growth rate recorded. Imports by China from Africa have mainly consisted of mineral resources, which account for about 82% of China imports from SSA (World Trade Atlas,2010). Economic ties with Africa are one source of growth for China. China and Africa trade reached almost US$200 billion in 2013 up from about US$10 billion in 2000 (IMF 2015). Realized annual foreign direct investment (FDI) in Africa in 2013, surpassed US$3 billion up from US$317 million a decade earlier (NBS 2014). Total Chinese investment stock in Africa exceeded US$26 billion in 2013.

(NBS 2014). Brautigam (2011) and Brandt (2013), mentioned that in China and African economic ties run in three interconnected channels: aid, investment, and trade. This section provides an overview of those flows and also outlines their interlaced structure. China's aid data are presented using a different methodology to that of the Organization for Economic Cooperation and Development (OECD). This makes it difficult to draw international comparisons. Despite the slowing of China's own growth, China and Africa growth prospects remain steadfast. By 2020, intra-developing country trade is forecast to have increased tenfold over a decade, with their trade leading the way (Fletcher and Ahmed 2012). China's investment in Africa is also set to expand dramatically.

Table 2 China Trade with Africa:

	1995	2000	2006	2007	2008	2009
China trade with Africa	3,921.1	10,598.1	55,472.5	73,543.4	106,752.7	90,006.6
US million % of china trade	1.4	2.2	3.1	3.4	4.2	4.1
China imports from Africa US million % of China imports	1,427.4 1.1	5,540.7 2.5	28,767.6 3.6	36,229. 3.86	55,883.4 4.9	42,282.1 4.2
China exports to Africa US million% of China exports	2,493.7 1.7	5,057.4 2.0	26,704.9 2.8	37,313.7 3.1	50,869.3 3.6	47,724.6 4.0
Percent of China trade with Africa						
Angola	4.0	17.7	21.3	19.2	23.7	18.9
South Africa	2.5	19.4	17.8	19.1	16.7	16.8
Sudan	4.6	8.1	5.6	5.9	6.8	7.1
Nigeria	3.2	8.4	6.1	7.7	7.6	7.1
Congo	5.5	4.1	2.3	2.4	2.4	1.6
Equatorial Guinea	4.4	33.7	5.4	3.0	0.2	0.4
Percent of China imports from Africa						
Angola	9.59	33.26	38.00	35.56	40.03	34.67
South Africa	48.22	18.72	14.24	18.24	16.47	18.39
Sudan	4.18	5.29	0.97	1.48	0.91	2.12
Nigeria	5.22	13.21	6.75	11.35	11.28	11.02
Congo	0.24	5.84	9.68	7.81	6.66	4.11
Equatorial Guinea	**0.89**	**4.73**	**8.82**	**4.68**	**4.06**	**2.49**
Percent of China exports to Africa						
Angola	0.85	0.67	3.35	3.32	5.76	5.00
South Africa	25.40	20.04	21.60	19.91	16.90	15.43
Sudan	6.12	11.15	10.69	10.18	13.29	11.47
Nigeria	1.67	3.13	5.31	4.12	3.64	3.57
Congo	0.24	0.36	0.91	1.13	1.20	0.77
Equatorial Guinea	0.09	0.07	0.15	0.25	0.54	0.75

Source. World Trade Atlas (2010) and authors' computation

2.1. Trade and Between China and Africa investments

In 2003-2010, over half of China's foreign direct investment (FDI) in Africa was directed towards the oil sector. Nigeria, Sudan, Angola, Egypt, Chad and Niger were the major recipients. Over 90 percent of the FDI came from China's large SOEs (Sinopec, China National Petroleum Corp., China State Construction Engineering Corporation, and China Metallurgical Group.

Corporation) which formed partnerships with African state oil companies and large multinationals imported from Africa in 2011, $275.6 billion of oil in 2011, product (GDP) and a negative effect with exchange rate, which is not in tandem with Elawady and Abdulkheir (2015) who opposed the fact that GDP of both importing and exporting countries are less important but just like Hailu (2015). also, accepts that exchange rate can have a negative influence on export. Such is the argument in research as each scholar tries to justify peculiar economic situations in relation to bilateral trade.

Chinese state media announced in late 2013 a national decision to provide US$1 trillion in financing to Africa by 2025 (Xinhuanet 2013). As a result of economics and of Chinese policy, China's FDI stock in Africa has risen rapidly in the past decade from US$900 million in 2004 to US$3.37 billion by 2013 as shown (Figure 3). Until 2013, the largest single investment made by China in Africa took place in 2008, a year in which China's FDI flow, stock, and single largest investment item were comparable in level. FDI stock has since accumulated to vastly exceed any single project or annual flow.

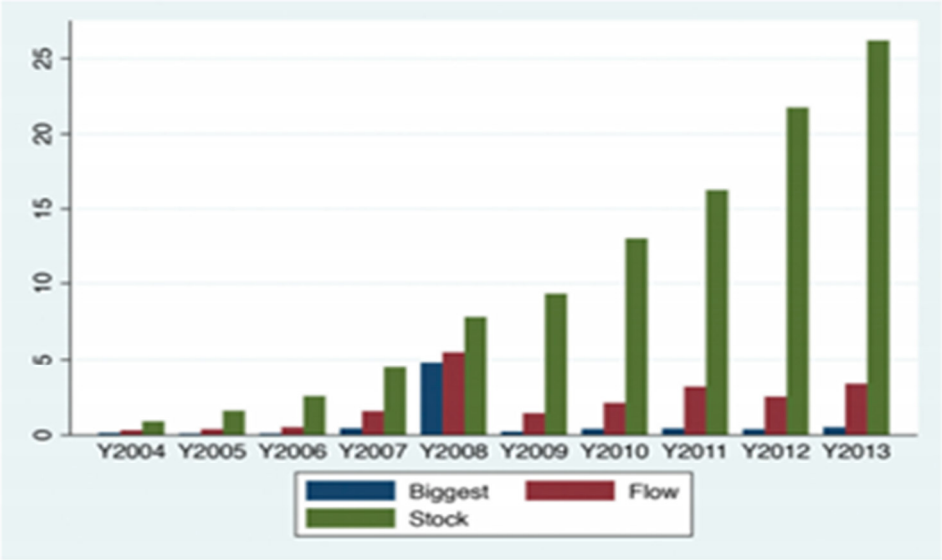

Figure2 China's FDI stock in Africa (US$ billion) Sources: NBS (2013, 2014).

Shen (2015), noted that the size of outward FDI and the actual flow and stock levels are probably significantly higher than these official statistics. However, the majority of all such Chinese FDI into Africa is loan financed (MOFCOM 2013). This growth orbit will not only shape China's international integration and Africa's economic development prospects but also come to shape features of the world economy. The competitive impact on Africa from China is more indirect, mainly through a reduction in global prices and market share (Kaplinsky & Morris, 2008). In this relationship, the consumers and importers gain while the infant industries are worse off (Geda, 2008). For taking example on the case is a little bit better in a natural resource-rich country; at least they have commodities to export and with which to negotiate. As in Sudan, oil contributes significantly to the GDP growth and is the main export from Sudan to China. The implication of this structure is that the development of the oil sector has led to a decline in agricultural production, thus impacting negatively on the livelihood of the populace, especially people living in rural areas (Maglad, 2008). It is assumed that China and Africa relations will continue to grow with the development of strategic alliance through FDI, which is already happening. Even so, the impact of Chinese FDI on exports, imports, and economic growth in Nigeria indicates that the bilateral trade is not favorable in the short run, but there is a possibility that the relationship might amplify economic growth in the long term (Nabine, 2009). Kandiero and Chitiga (2003) also indicate a positive relationship between openness and FDI in Africa, though Magnus and Fosu (2006) state that the impact of FDI on growth is negative while it is positive for trade in Ghana. Moreover, trade and liberalization through the reduction of tariffs and nontariff barriers (NTBs) will enhance the welfare of consumers and reduce poverty (Nabine, 2009). Since 1980, China has followed an active policy of its exchange rate. The policy was reflected until 1993 by a sharp depreciation of its Real effective exchange rate (calculated with respect to its main Countries of which no African country is a member),1994 to 2010 by a real appreciation, due to the appreciation of the Renminbi in US dollars. But over the last decade the Real exchange rate of China reciprocally. Africa south of the Sahara in Its share depreciated by 42%, while it appreciated by 9.5% inversely of its major global partners. It is also pertinent to state that a stable exchange rate will create an incentive that is consistent over time as two countries or regions engage in bilateral trade (Dollar, 1992). This stability and successful trade implementation are even better when the two countries share the same language and culture (Peschel, 1998). The variables mentioned here are some of the variables that determine the trade flow between any two countries involved in a bilateral trade. Hausman-Taylor (1981) estimator overcomes these drawbacks by instrumenting the endogenous variables in a random effects model. In the present estimation, several variables are suspected to be endogenous: real bilateral exchange rate, real GDP of African countries, China's economic cooperation, and direct investments, but not the governance of African countries, distance from China, or landlocked countries.

This, allows us to combine some of the basic assumptions of the different approaches re-examined. On the one side, the empirical analysis allows us to see how many products exported by African countries and China are in direct competition. On the other side, adopting a dynamic specification of the model allows us to see whether an increase in Chinese exports corresponded to a reduction of African ones on a year to year basis. This can be considered to some extent a good substitute to analyze the evolution of market shares of African countries under the direct competition with China and see whether China has crowded-out any African countries in any sector per country.

3. Methodology

3.1Application of the Gravity Model in Analyzing Africa Trade

3.1.1 Theoretical Framework of Gravity Model of Trade

To explain the bilateral trade between China and the African countries, Reference should be made to models of gravity, which have Taken into account trade transaction costs Anderson (2011) for A review of literature).

The gravity model has been referred as a workhorse in world trade studies. According to (Yoto et al., 2016), structural model of trade has solid theoretical foundations. it's one model of the great historical successes of economic analysis, as it has become a serious empirical instrument for exploring trade flows between partners. It is a normative model that determines the potential level of exchanges between the partners. For a long time weaned from theoretical foundations, it is today and since the 1990s, a crucible of theoretical justifications. But the first attempt at theoretical justification dates back to the 1970s (Agbodji, 2007). Several works reinforce this intuition but add other foundations such as imperfect competition that generate economies of scale and transport costs (Bergstrand, 1989, Oguledo and MacPhee 1994, Deardorff 1995, Hummels and Levinsohn 1995, Anderson and Wincoop, 2001 and Evenett and Keller, 2002). Regarding the economic literature, there are a lot of empirical approaches which have used the gravity model to explain the influence factors of trade volume. As Tinbergen in (1962), used at first the gravity model in economics side. proposed to apply Newton's law to the international trade, which analyzed bilateral trade flows and concluded that the size of bilateral trade between the two countries is proportional to their economic aggregate and inversely proportional to the distance between the two countries.

Since then, the gravity model has gradually become a popular tool for the study of foreign trade empirical, especially trade flow direction, and trade potential forecast. In the follow-up study, scholars have gradually introduced various other variables, such as population factors, per capita income, exchange rate and so on, in order to better explain the influence factors of trade volume. In addition, a number of dummy variables are introduced: whether they belong to an economic organization, whether they have common borders, whether they have a common language or culture, and beliefs. Gravity models are widely used in international trade studies to measure the potential trade capacity of a country, estimate the costs of tariff and non-tariff barriers, and predict the trade effects of a country's accession to a regional economic integration organization or a free trade agreement. Thus, the trade gravity model has become an effective way to study bilateral trade flows and trade potentials. Using a gravity model applied to panel data, it is supposed that the gravity model relates bilateral trade to the economic mass of the two economic sizes, the distance between them, and other possible influences such as dummy variables.

$$F_{ij}= f\frac{GDPi^{\beta}*GDPj^{\alpha}}{Dij}\varepsilon_{ij} \qquad (1)$$

Trade: Where: Fij =volume of trade between country i to j and Fji is the volume of trade between country j and i. In the context of this article, is China and j is an African country. Specifically,

Fij = volume of trade from China to Africa

GDPiβ = GDP China

GDPjα = GDP Africain countries

Dij (Dji) =Distance between China and Africa or vice versa

β, α, σ, are parameter estimates that will turn to elasticities once the natural log of both sides is taken. And Ɛij is the error factor.

As the gravity model is originally formulated in multiplicative form, we can linearize the model by taking the natural logarithm of all variables.

The transformation is presented in Equation 2.

Ln (tradeijt) =β0+β1lnGDPi+αlnGPDj + σ2 lnDi j+ εij (2）

We extended this equation further to include important variables such as FDI, exchange rate (ER), GDP per capita (GDPC) and others macroeconomics data's. The inclusion of both GDP and GDP per capita is consistent with the specification by Haq, Meilke, and Cranfield (2011, 2013):

lnFij=(lnFij)=β0+β1ln(GDPi)+αln(GDPj)+σln(Dij)+σ1ln(FDI)+σ2lnER+σ3ln(pop)+σ4ln(GDP)pc+σ5ln(inds)+σ6ln(inflt)+ ∑ δhPij Dummies variables+ εij (3)

Variables used in the model Explained variables

Where： σ1, σ2， σ3 ，σ4, etc….. are the regression coefficients, and εij is the random error Name Variable Meaning Theory Description Expected symbol the bilateral trade volume, the logarithm of the bilateral trade volume between country i and country j. at the end $\sum\delta hP_{ij}$, are preferential dummies variables

Table3 Explanatory variables

Variable name	Variable meaning	Theoretical Explanation	Expected Symbol
ln F_{ij} =	Bilateral trade volume export / import	-	-
$lnGDP_i$	**The GDP of a country i in j period by GDP deflator revisited GDP** value of logarithms	A country's economic scale and its export supply capacity, and its demand capacity proportional to	**positive**
$lnGDP_j$	**j country in the t period by the GDP deflator revised GDP value of the logarithms**	A country's economic scale and its export supply capacity, and its demand capacity proportional to	**positive**
ln pop	Pop ij, pop jt =populations of the country i and *j*, respectively, at time *t*	-	**negative**
Ln ER	t period between the two countries is the tariff rate between a	The higher the tariff, the greater trade-to-trade	**negative**
Distance	commodity geographical distance between two countries	- negative	

3.1.2 Model Specification

The gravity models generally use cross-section data to estimate impacts of trade and trade relationships for a particular time period, for example, one year. In reality, however, cross-section data observed over several time periods (panel data methodology) result in more useful information than cross-section data alone. The advantages of this method are: first, panels can capture the relevant relationships among variables over time; second, panels can monitor unobservable trading-partner-pairs' individual effects. If individual effects are correlated with the regressors, OLS estimates omitting individual effects will be biased. Therefore, we have used panel data methodology for our empirical gravity model of trade.

The generalized gravity model of trade states that the volume of trade/exports/imports between pairs of countries, Xij, is a function of their incomes (GDPor GDPc), their populations, their distance (transportation costs) and a set of dummy variables either facilitating or restricting trade between pairs of countries. That is,

Xij = β0 GDPiβ1 GPDjβ2Piβ3 Pjβ4Dij β5 Aij β6 Ɛij (4)

For the gravity model of African's exports, the following model is considered

Ln EXijt = β0 + β1lnGDP it + β2lnGDPjt + β3lnDijt + β4ln ERijt + β5lnInfijt+
β7lnInfit+ β8lnInfjt+β9Indijt +β11Mit + ΣδhPijht + Ɛijt (5)

Where, EX= exports, GDP, y = per capita GDP, D= distance,

ER = exchange rate, In = inflation rate, M = Import, P =preferential dummies. Dummies are: D1= language, D2=j-cultural, others and D7= borderij, l= natural log.

For the gravity model of African's imports, the following model is considered:

LnMijt = β0 + β1lnGDP it + β2lnGDPjt + β3lnGDPcit + β4lnGDPcjt + β5lnDijt + β6ln ERijt + β7lnInfijt+β8lnInfit+ β9lnInfjt+β10Indijt +β11lnEXit + ΣδhPijht + Ɛijt (6)

Where, EX= Exports, M= Import, and other variables are the same as defined in the Import model.

In our estimation, we used unbalanced panel data with individual effects. We also used the Hausman test to determine which of the models, fixed or random model is the most appropriate.

3.1.3 Data collection

This article analyzed the trade flow between China and Africa covers a panel of 54 countries for the period 1980-2015, Data from several different sources were compiled together to create the dataset used in the paper. The data for bilateral trade flows comes from (WITS, UN Comtrade, and UNCTADSTAT). All data was measured in current prices of US dollars where necessary. Data on exchange rate are available in（WDI） were based on national currency per US$. FDI from (MOFCOM, UNCTSTAT). The data for GDP and GDP per capita (at constant 2005 prices) comes from the World Bank's World Development Indicators report. The data for other gravity model variables, as distance was from time and dates website (www. Mapdevelop.com.), which measures the distance between cities in kilometers. More recently, Gravity models generally use cross-sectional data to estimate trade effects and trade relationships for a particular time period, such as 1 year. The panel data (cross-sectional cum time series) methodology was used in this article.

4. Results and Discussions

The results of our panel data analysis of Africa -China trade is presented in Table 4 through 5. For each table, the variables are estimated as the pooled-, fixed-, and random-effects models were presented. pooled model assumes that countries are homogeneous, and it is restricted, unlike fixed and random models that are unrestricted models. The fixed-effects model is desirable when there is a need to control for omitted variables that differ between countries but are constant over time. It gives better estimates than the pooled model because it considers heterogeneity and common country effects. The random-effects model assumes no individual country effects. In order to decide on the best fit for the objectives of our article, we used the Hausman test to choose between fixed or random effects. This established that the model with consistent results was selected. The test is used to examine whether the null hypothesis that the coefficients of the random effects are the same with the consistent fixed estimator. If the p-value (prob>v2) is significant, <.05, then fixed effects were used. If it is >.05, then the random-effects model will be the most appropriate model.

Table 4. Determinants of exports from China to Africa

Variables	pooled model	Radom effects model	fixed effects model
ln GDP	-.028(.0065) ***	-.028 (.0065) ***	-.0072 (.0064)
ln fid	.92648(.0075927) **	926572 (.0076182) **	.9435416 （.0082702) **
ln import	.0609424 （.0077386 ）	.0608473 (.0077841)	-.0023 (.0085)
ln Exchange rate ***	.0408615 (.0056461) ***	.0408175 (.005653) ** *	.0113303 (.0056583)
ln Population	-.050232 (.0066021 ）	-.0503384 (.0066132 ）	.0027574 (.0080464)
ln Industry	2.020865 (.0769983)	2.019888 (.0770988)	3.496195 (.0896873)
ln Inflation	-2.004334 (.0769983)	-2.003351 (.0764218)	-3.4982 (.0896881)
ln Distance	-2.004334 (.0763219)	.0429862 (.0136889) ***	.0191326 (.014366)
Ethinq	.0425606 (.0136363)	.0049103 (.0148697)	-.0022759 (.0161802)
Constant	.1522432 (.0388579)	1453738(.04203)	0287754(.0414398)
Contiguity		-.0002159 (.1685309)	.0038256 (.0127624)
Landlocked		.0047501 (.0189923)	-.0022759 (.0161802)
Adjusted R*	0.9327		
N	1945		
Hausman test	= 381.07 Prob>chi2 = 0.0000		

Notes. Dependent variable: Exports

The regress and, ln (lnxijt) is log real export. Standard errors are in parentheses. at ***, **, *: statistically significant at 1%, 5% and 10% levels respectively.

Table 4, displays the trade exchange between China and African countries. For the first step in this article, the regression results showed that Africa export to China on a number of macroeconomic variables. As seen, the random-effects model was the favored model and only three variables, FDI of African countries and exchange rate, and industry was significant with positive signs. The implication of these results is that if the GDP of African countries decrease by a unit, the volume of commodities exported to China increases by -0.28 units. Moreover, the positive relationship of exchange rate indicates that if the local currency unit per $US goes up by 1 unit, trade in terms of export to China will improve by 0.40. The increase, in this case, means a depreciation of the local currency against the dollar. This will make African products less expensive abroad, and it shows the indispensable role that exchange rate can play in the export of Africa commodities to China. And industry 2.01 by units statistically significant.

Table5: Determinants of Imports from China by Africa.

Variables	pooled model	random effects model	fixed effects model
Export	-.17439(.0899)	-.1743(.0899)	-.0250(.0931)
GDP	- 028(006) ***	.0529(.0210) ***	.045824(.0211) ***
exchange rate	.0409 (0056) ***	1632(.08863	.006701 (.0920) **
population	-0502(0056)	.0676(.0183)	.068644 (.0186)
fid	9264 (.0075) **	.0551(.0254**	.06112(.02643) **
Indus	-.0609(.0077)	-1.0660(.4005)	-.43589(2.036)
Inflation	.0409(.0056)	1.1753(.4001)	2.1507(.4355)
Distance	-.0502(.0066) ***	-.4208(.0453)	-.40081(.0460)
Contiguity	2.0208(.0769)	.0920(.04225	.0909 (.0419)
Landlocked	-2.0043(.0763)	-.1895(.4863)	-.2191(.4819)
Constant	.152242(.0388579) .0287754(.0414398)	1453738(.04203)	
Adjusted R*	= 0.9380	0.1445	0.1483
N=	1945		
Hausman test=	45.53 Prob>chi2 = 0.0000		

Notes. Dependent variable: Imports.
Standard errors are in parentheses.
***, **, *: statistically significant at 1%, 5% and 10% levels respectively.

Import from China is might be due to the fact that the middle class grows (as a result of an increase in GDP), the populace might prefer better-quality products to Chinese imports perceived as substandard. In this table 5, the fixed model was also the preferred model, and variables such as GDP, and exchange rates were predictors of the volume of imports from China by Africa countries had negative impacts. After a thorough analysis of the predictors of imports from China to Africa, we analyzed the variables that predict the import of commodities from China by countries in Africa. In the random-effects model, the desired model based on the Hausman test, the impact GDP African countries, still positive impact, and statistically significant .and the distance is statistically significant with a conventionally (negative) coefficient and had significant effects on the imports from China to these countries.

Table 6. Hausman Test Results for table 4

---- Coefficients ----

	(b)	) (B)	(b-B)	sqrt(diag (V_bV_B))
	fixed	random	Difference	
GDP	-.0072599	-.0284987	.0212388	.
FDI	.9435416	.926572	.0169695	.0032188
IMPORT	-.0023084	-.0608473	.0585389	.0036396
EXCHANGERATE	.0113303	.0408175	-.0294872	.000226
POPULATION	-.0027574	-.0503384	.047581	.000226
INDUSTRY	3.496195	2.019888	1.476307	.0458213
INFLATION	-3.4982	-2.003351	-1.494849	.0469432
DISTANCE	.0191326	.0429862	.0043584	.0043584
Contiguity	-.0022759	.0047501	-.007026	
Landlocked	.0091639	-.0002159	.0093798.	
Ethinq	.0038256	.0049103	-.0010847	
b = consistent under Ho and Ha; obtained from xtreg				
B = Ha, efficient under Ho; obtained from xtreg	Inconsistent under			
Test: Ho:	difference in coefficients not systematic		chi2(11) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B)	= 381.07
Prob>chi2 = 0.0000	(V_b-V_B is not positive definite)			

Hausman Test Results For Table 5

---- Coefficients ----

	(b)	) (B)	(b-B)	sqrt(diag(V_bV_B))
	fixed	random	Difference	S.E.
EXPORT	-.0250284	-.1743948	1493665	0244322
GDP	.0458243	.0529097	-.0070854	.0011789
FDI	.006701	.1632432	-.1565422	.0247844
EXCHANGERATE	.0686444	.0676283	.0010161	.0024562
POPULATION	.0611225	.0551122	.0060102	.0071032
INDUSTRY	2.150798	-1.066091	-.9701666	.171885
INFLATION	2.150798	1.175358	.9754395	.172178
DISTANCE	-.4008109	-.4207829	.019972	
Contiguity	-.127713	-.1372342	0095212	
Landlocked	-.2191045	-.1372342	-.0295962	
ethinq	.0909542	.0920325	-.0010783	
b = consistent under Ho and Ha; obtained from xtreg				
B = inconsistent under Ha, efficient under Ho; obtained from xtreg				
Test: Ho:	difference in coefficients not systematic			
	chi2(11) = (b-B)'[(V_b-V_B) ^(-1)] (b-B)	= 45.53		
Prob>chi2 = 0.0000				
(V_b-V_B is not positive definite)				

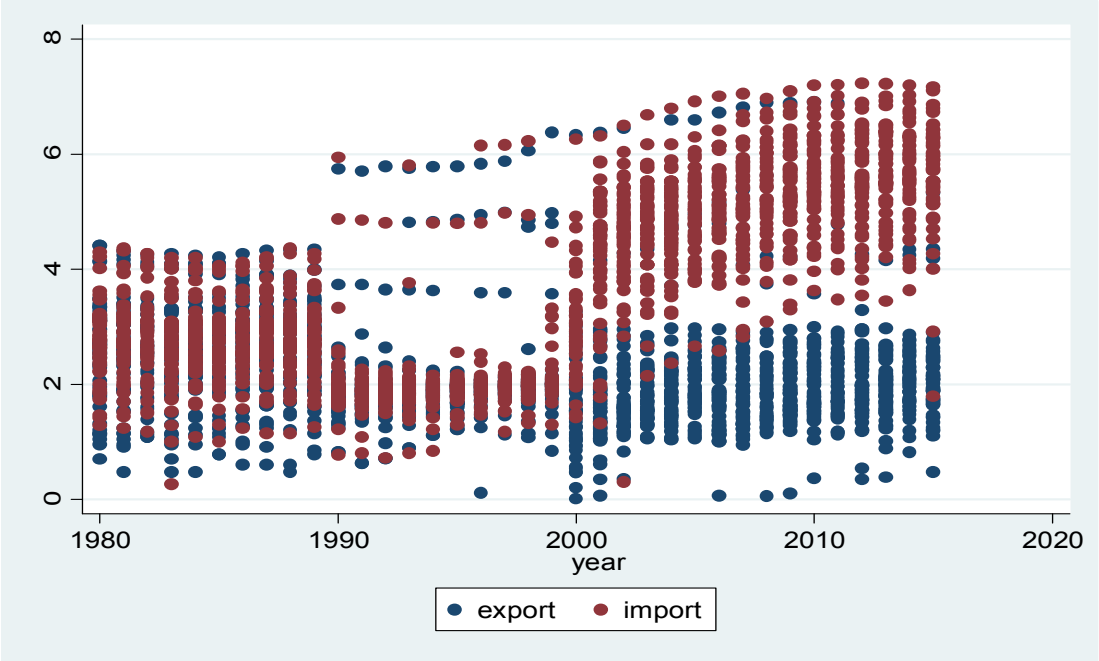

Figure3: China -Africa trade flows predicted to 2020.

Figure 3 is the summary of export-imports it displays the multiplicity of the trade growth influences, evolution and monitoring, data Analysis was limited to quantifying the influence factors that affect China -Africa trade flows. establishing the relative weight of each of factor. the analysis emphases the Large growth, and increasing the fluctuations of exchange economics. It was observed that the impacts on the duration of an average economic cycle (1980 to 2015 years), As well as in the longer, short to medium term, an increase of 1 percentage point of GDP growth leads to cumulative variation of the growth resulted in 0. 4 percentage point, shows from 1980 to 1990. After a few years it increased from 0.4 to 0.6 percentage points from 1990 to 2000 .and after fifty years (fig. 3) presents the analysis result shows, initially the effect is almost Entirely through commercial channels, but that the other routes become important over time.

The scatter plot line red indicate import, and blue represented export between them. While, that predict to 2020 has to control the relationship between export and import. The effect of Chinese trade growth is transmitted to 60% by the Exchanges and 40% by other means, such as import (which is very important for some African countries). The reason is that China. From 1980 to 1990, trade flows were stable that mean were for the beginning for most of the African countries country started trading relationship with China, After sign trade agreements. and the fluctuations as well as the confidence of trading and consumers. Second, from 1990 to 2000 the trade flows were not equitable with some sub-Sahara countries as Liberia, Sierra Leone, Somalia, was not economically stable and the partners can't be trading whit them. On the other hand, the exchange rate issues in that period, the export is less than import. The third, from 2000 to 2015 these period 's economy relationship was significant displayed in the figure, the red color that represent import is higher than the blue one that indicate export. However, the reason is African countries import more than export from China; in Africa, we need the manufactured goods in cheaper from china for the population demand as poor areas, and china's export the raw materials for industrialization, as fuels and mining products. And assessed the effect of longer-term changes in Chinese growth on African's trade out the short-term variations related to the traditional economic cycle and focusing on longer-term fluctuations. It was analyzed that the variables have a significant effect on GDP growth, such as investment, exchange rate, inflation, industry, population and distance. Like other studies, it should have concluded that growth is positively correlated with investment, industry, exchange rate and import, and negatively with initial GDP, export, distance, population, and inflation. It was done several tests to eliminate the effect of factors that could simultaneously affect China and as a global economy shock. In the long run, just as in the short and medium term, growth Of China has an effect on Africa. As we have noted, the magnitude and scope of the phenomenon have Strengthened in recent decades: China's growth had initially a noticeable effect only on Africa, but it now affects the entire world. In addition, which was negligible which is still some twenty years ago, is now considerable. On the basis of data for the past 20 years, it seems:

A 1-point increase in Chinese growth Five years is accompanied by a change in Africa growth by 0.4 percentage points (the result is the same in the short and medium term). In addition, an analysis over a longer period (1980-2015) seems to indicate that this effect increases with time. The distance seems to influence the intensity of this effect: the closer a country is Of China, the greater effect. Our estimates indicate and the

distance is less and less important.

5 Conclusions and Discussions

This article investigated the major influencing factors in African's Exports value. A gravity panel model was estimated using pooled OLS regression, a fixed effects model, and random effects GLS regression. The study was separated into two aspects: Analyzing China's-Africa trade flows with special consideration for the exporting and the importing covering the period between 1980–2015. In General, the results from the instrumental variables Panel data model indicated that African's GDP, importer's GDP, Distance reduction and participation in China had a positive and statistically significant effect on African's exports. However, the substantial preference to export to China, meant further, more shoot -up, analysis needed to be done with specific industries in Africa .and the coefficients related to FDI, exchange rate were significant predictors of export to China, which is in line with gravity model proposition.

In the case of imports, the results from the random effect GLS showed that the economics effects of Africa's GDP are consistent. The negative effect of the common languages may suggest geographical features' impact on export value can be undetermined in case of certain goods which are related to natural resources. It demonstrated that in African countries with a few very dominating trade partners, the GDP of the importer can be an insufficient explanatory variable to depict the demand.it is an increased not sure that is fast becoming a reality with which we have to assert. In this case, additional variables should be introduced as supplement. In this article, abnormally high/low demand was depicted by assigning each country with a dummy variable. As Babri et al (2015) mentioned in his study, at a given time point, trade flows may also be affected by long-term contracts or cultural/national trading tendencies. Therefore, they extended the traditional gravity model such that a fixed amount is separated from observed trade flows and residuals are subject to discrete choice Babri et al, (2015).

For the Exports, the result from the Panel model showed that when analyzing African's export performance in a rather lowest way, taking into account only trade partners, certain effects covered by general analysis in the first aspect can be revealed. China's participation in Africa was therefore founded to have positive effect on its exports. This conclusion is also applicable to the effect of common language and others dummies variables. The influence of African's GDP in this aspect suggests a different pattern of trading goods when trading with African countries compared to the rest of the world. The only way Africa can benefit from the trade relationship is through fair programs that will improve GDP and increase local production of products where these countries have a competitive advantage and proper management of the exchange rates. Besides, we recommended that Africa countries should practice tariff scaling, charging a higher tariff on processed products than on primary products. There should also be market price support that benefits producers and consumers in Africa. deficit payment can also be used to complement price support if the governments of Africa can afford the program. at least, African countries should claim compensation principle, which specify that the conqueror from trade should offset the underdog.

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