Title: Examining the impact of manufactured import demand on national endowment sectors of African countries.

ABSTRACT

The article examines the impact of the importation in the productive and manufacturing sectors of trade on national endowments of African countries. Two models of estimates are used. Residual values of revealed comparative advantage of the productive sectors are regressed on national endowment variables. The estimation established that, increase real Gdp has a positive relationship with the importation in the productive sectors. Importations in the productive sectors affected positively the secondary sectors of national endowment of African countries. Further, importations in capital intensive sectors affected negatively the tertiary sectors of African countries. The results were however mixed with total factor productivity: the implication has been that the level of total factor productivity as measured is positively and negatively affected. Estimation of the traditional demand function with an inclusion of Net Barter terms of trade further strengthens our analysis. Such that Relative prices to import demand are inelastic, consumer preference for sophisticated imported goods is elastic as real income increases. Finally, estimations from the net barter terms of trade show imports are expensive for net importers.

Keywords: Productive and manufacturing sectors, National endowments, Trade intensity, and vector error correction.

INTRODUCTION

Africa has a long history for been very open and have pursued export substitution[[1]](#footnote-1) policies in international trade. Until recently import substitution policies have been more pronounced in the literature and government policies, even though import substitution policies has been in existence, the challenge been effective implementation. The strategy at present has been industrial transformation[[2]](#footnote-2) coupled with Non-tariff barriers which will allow the ease of goods “fro and into” Africa. Beginning 2000’s African countries have sought to diversify trade relationship towards the Global South. In 2017 Export shares to Asia in Africa’s total export increased to 27.9 percent from 26.3 percent in 2016 while the share of its export to European Union decreased from 31.7 percent in 2016 to 29.9 percent in 2017 (African trade report 2018). The Global South trade linkages is fundamentally based on an understanding of shared growth, with the South providing greater opportunity for the transformation of the productive and manufacturing sectors of African countries. Trade liberalization has an objective of boosting domestic trade, and international trade through integration: with emphasis on exporting products of comparative advantage and importing products with a scarce resource. In addition is the long run alignment of domestic nominal prices with international prices in tradable goods. Africa’s trade share with the rest of the world is only 2.7 percent in 2018 a decrease from 2.9 percent in 2015. This poor performance probably explains Africa’s pursuance of an aggressive diversification process and a more robust trade enhancing reforms and initiatives such as trade-facilitating infrastructure and addressing the trade finance gap and a more open trade policy. Grossman and Helpman(1991), Barro and Sala-i-Martin(1995) asserts that trade openness in the long-run may contribute to economic growth through a shared technological knowledge and transfer and also by less developed countries importing high tech products or items. However, Appleyard et al (2008) have argued that most developed countries have the tendency to impose excessive tariffs and with a corresponding heavier protectionist policy for manufactured products than intermediate goods and raw materials industries to the detriment of developing economies, preventing their efforts to develop their manufacturing sectors. However, trade with the Global south led by China and India has enabled a steady growth in trade driven by the rising share of exports to the Global South. China is by far the largest trading partner with Africa with a share export of 16.6 percent in 2017. India’s share of exports to Africa rose from 6.8 percent to 8 percent in 2017. Importations in the productive and manufacturing sectors can be explained by proponents of the Ricardian theory of comparative advantage. They argue that Africa should place much emphasis on developing its agriculture and mining where it has comparative advantage. This probably explains the under-developed industrial sector of African countries. Even though the continent has missed out on the first, second and third industrial revolution, Africa has chalked some importance successes in this regard after it embarked on industrial policies such as the structural adjustment program, West Africa common industrial policy, East Africa community industrial policy and Public private partnerships. With a struggle towards developing its infant industries and at the same time haven signed onto international free trade agreement which encourages a stiff competition and an open trade policies with great nations like China, India, united states of America among others, which enjoy not only economies of scale, but cheaper commodity prices.

It is worth mentioning that there is less a literature on examining the impact of such a trade on the factor intensities[[3]](#footnote-3) of African countries. With such an important aspect of African trade, giving the continent a new dimension it’s imperative to empirically examine the implications of manufactured import demand on national endowments of African countries.

The research article is organized as follows: macroeconomic outlook of the Global south and Africa. The third section includes trade policy evolution and trade development within and among Africa and the emerging markets (herein defined in the article). The fourth section comprises the existing literature and empirical studies. The fifth involves data sources, equation derivation, model specification and methodology. The final section presents analysis of the results, conclusions and recommendations.

Macroeconomic Outlook of the African markets

The African continent is the second-most populous (1,216,130,000) in the world. It is also the world’s second fastest growing region, with a Gross domestic product (Gdp) annual average growth rate of 4.6% between the period of 2000 and 2016. Real Gdp is projected to increase to 3.9 percent annually by 2022, African economic Outlook (2015). Within this sub-region are also countries like Somalia, Central African Republic, Burundi, Liberia, Niger, Mali, Malawi, Mozambique, Eritrea, South Sudan and Madagascar having consistently accrued the lowest Gdp per capita basically because most of these countries have either experience conflict or is a conflict zone. Recent years have seen a better macroeconomic performance among some African countries. Nigeria the continents largest economy is averaging a Gdp growth rate of 1.9 percent, South Africa 0.8 percent, Egypt 5.3 percent ( 1991-2018) compared to 5.7 percent within the 1980- 1990 respectively. Algeria is averaging a growth rate of 2.1 percent (1991-2018) an increase from 0.8 percent (1980-1990). Morocco is also averaging 3.0 percent growth rate (1980-1990) compared to 3.4 percent average growth rate in the 1980-1990 ( African development report, 2018). African economic countries are highly dependent on manufactured product and commodities from the international market, making it very responsive and sensitive to price shocks, economic downturns in the world market, a reflection of the slower growth rate on the continent in general.[[4]](#footnote-4) Other equally important macroeconomic indicators such as GDP per capita, FDI inflows, inflation rate, Net international reserves, and Gross capital formation have been illustrated in Table below,

Table 1.1: major macroeconomic indicators: selected African countries

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Countries | Nigeria | South Africa | Egypt | Algeria | Morroco |
|  | 1980- 1991-  1990 2018 | 1980- 1991-  1990 2018 | 1980- 1991-  1990 2018 | 1980- 1991-  1990 2018 | 1980- 1991-  1990 2018 |
| GDP growth rate | 11.8 1.9 | -0.3 0.8 | 5.7 5.3 | 0.8 2.1 | 3.4 3.0 |
| GDP per capita (annual %) | 8.9 -0.7 | -2.7 -0.6 | 3.1 3.2 | -1.8 0.1 | 1.5 1.6 |
| Agriculture, forestry and fishing, value added( % of GDP) | 21.6 21.2 | 4.2 2.2 | 18.5 11.2 | - 12.3 | 15.1 12.0 |
| Industry, value added(annual growth) | 18.1 1.9 | -1.4 29.0 | 6.1 6.4 | - 2.1 | 8.0 3.1 |
| Manufacturing, value added % of GDP) | 18 8 | 22 12 | 17 16 | * 35 | 19 16 |
| Services value added | 42.0 52.0 | 50.5 61.0 | 49.6 51.4 | - 45.6 | 45.0 50.5 |
| Gross capital formation (% of GDP) | 53 15 | 19 18 | 29 17 | 29 48 | 31 33 |
| Inflation rate(GDP deflator) | 6.7 10.2 | 15.5 3.9 | 17.7 21. 4 | 30.3 10.8 | 7.7 1.6 |
| Net FDI (inflows % of GDP) | 1.1 0.5 | -0.1 1.5 | 1.7 2.7 | 0.0 0.8 | 0.5 3.1 |

Source: World Development indicators (2018), World Bank data base.

Economic prospects

The table below illustrates selected, projected macroeconomic indicators by the year 2050 .

Table 1.2: Comparing projected macroeconomic indicators (2010-2025)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Gdp(Billion) constant(2005)  2010 2025 | Gdp per capita  constant(2005)  2010 2025 | Share of working age population  Tertiary education  2010 2025 | Share of working age population  secondary education  2010 2025 | Total factor productivity  2010 2025 |
| Brazil | 1090 1780 | 10034 14768 | 8 12 | 55 65 | 499 639 |
| India | 1211 3092 | 2973 6372 | 6 9 | 47 59 | 182 305 |
| China | 3686 10424 | 6531 17756 | 7 11 | 71 82 | 271 534 |
| Sub-saharan Africa | 790 1680 | 2163 3361 | 3 4 | 29 36 | 198 263 |

Source: The great shift: macroeconomic indicators for the world economy, at the 2050 horizon

Further figure 1 and 2 below illustrate output per share of countries under consideration in agricultural and industrial sectors of their economies. Due to missing values among some sub-Saharan African countries between 1960-1990, data values beginning 2000-2018 were are plotted in the graph below.

Figure 1: Industry (percentage share of GDP), 2000-2018

Source: World Development indicators (2018), World Bank data base.

Figure 2: Agriculture (percentage share of GDP), 2000-2018

Source: World Development indicators (2018), World Bank data base.

**Liberalization of trade**

Intra African trade[[5]](#footnote-5) over the past few decades has been a proliferation of various sub-regional agreements, such as the East African community (EAC), the common market for Eastern and Southern Africa (COMESA), the economic community of West African states (ECOWAS) and the southern African development community (SADC). This was mainly associated with high trade costs lowering trade performance with the sub-region. Governments of the African Union agreed to the establishment of the African free continental trade area by 2017 which will ensure the liberalization of trade in goods and services, with a further establishment of an African continental customs union with the goal of advancing regional economic integration in the continent. This will ensure it becoming one of the largest continental free trade agreements in the world hence boosting its attraction to foreign markets.

Partial liberalization as stated earlier which manifested in the proliferation of regional blocks as a first stage enable major foreign direct investments (FDI) inflows into the region which has contributed to massive infrastructural development. This ensured reduction in import tariffs, removal of quantitative restrictions and exchange rate reforms, currency devaluations and reforms towards easing trading activities especially with a reduced documentation. Though tariffs, on trade have shrunk in the region since the introduction of the regional trading blocks. It is worthwhile noting that multilateral and unilateral liberalization has played a major role in the declining of tariff restrictions, though the process stalled since 2008. Among developing countries import restrictiveness is highest in Sub Saharan Africa and South East Asia.[[6]](#footnote-6) On the contrary in terms of export restrictiveness, Transition economies and Sub-Saharan African countries were the most liberal market with access conditions with a (Market access counterpart- tariff trade restrictiveness index) MA-TTRI of about 1.5 percent in 2017(UNCTAD, 2018).

**Literature**

Studies on the determinants of trade have predominantly focused on the relation between distance and trade. Which is well established in the literature with the two been a strong determinant of trade intensity and trade flows between countries. ( see, eg. Hummels 2001; Anderson and Van wincoop 2004; Limao and Venables 2001; Berkerman 1956; bergstrand, J and Egger 2009). However, there is little empirical evidence that has focused on the the impact of factor intensities of trade between African countries and Emerging Economies trade development which has seen a sharp increases since the 1990’s. Qualitatively, a large, robust trade positively impacts on income ( Frankel and Romer, 1996). However, several factors explain the development of trade: such as trade frictions[[7]](#footnote-7), trade liberalization, convergence in economies of countries and the continuous increases in the demand of intermediate goods.

Past research has been Multivariate in nature. Linneman (1966) applied econometric model to examine factors that determined trade flows between 80 nations in 1959. GNP, population, distance, and a preferential trade factor were the independent variables. Linneman run his regression on both exports and imports separately and found that all variables were statistically significant in relation with the volume of imports and the volume of exports. Linneman showed that variables with greatest explanatory power were GNP for both importing and exporting countries and the distance between them. Other variables while statistically significant were of limited value. In explaining the variance that was not accounted for in his model, he specified the commodity composition of trade and political forces.

25 Baier and Bergstrand (2001) in explaining factors that account for trade growth showed that, income growth, tariff reductions, lower cost of transportation contributed significantly to the growth of trade. Their estimations revealed that, income growth explains 67 percent of trade, tariff reductions, explains percent, transport cost explained 8 percent growth in trade. Convergence in countries in terms of economic size explains the growth in world trade. (Hummels, Levinsohn 1995; Helpman, 1987). The level and quality of communications in and between countries play an enhancing role in explaining the growth of trade. Shepherd and Wilson (2009) found that bilateral trade flows in East Asia were pivotal on information and communication technology as well as transport and port infrastructure. (Mehmet, Peter and Poot, 2014) in a meta-analysis study of infrastructure and trade found that a 1 percent increase in a countries infrastructure increases exports by approximately 0.6 percent and imports by 0.3 percent. This emphasizes the role of efficient port and ports service systems. ( Bergstrand and Egger, 2009). (Markusen, 2002) suggest in his research that, if distance between two countries is high, then trading cost is high reducing exports, with Multinational firms replacing them with the resultant increases in Foreign Direct Investment accounting for the growth in trade.

Lai and Zhu (2004) in their analysis of the determinants of bilateral trade found that the elimination of tariffs would create more trade for poor countries(7.9%) than for richer countries (2.5%), diverting trade from continental preferred trading countries ( e.g., European and NAFTA) towards intercontinental trading partners. Thus, tariff liberalization shifts trade from rich to poor and from local to global. Krugman (1995) trade liberalization increases the volumes of trade and protectionism on the other hand reduces import of goods.

Rose (2004) on the other hand in comparing World trade organization and the General Agreement on Tariffs and trade found that both did not have a significant effect on trade. Subramanian and Wei (2005) however, in their study identified four asymmetries; developed versus developing countries, new versus old developing countries; imports of members from other members versus imports from non-members; liberalized versus highly protected sectors. They found a strong significant relation between WTO/GATT on world trade.

Green and Srivastava (1986) included product categories in their model to determine whether the identified factors are better at explaining trade flows. Data were collected from 45 exporting and 82 importing countries. They found a striking difference between manufactured goods (SITC 5, 6, 7 and 8) and the non-manufactured product categories. The independent variables did explain greater amounts of variance for manufactured goods than for Food, beverages, tobacco, raw materials, fuels, animal and vegetable fats. R-square values for manufactured goods were greater than 0.30, whiles R-square values for non-manufactured goods were less than 0.30. Green and Srivastava also found a negative relation between importer Gdp and trade intensity of sophisticated manufactures. They were of the view that less developed nations imports were from diverse set of sources than do nations of relatively higher Gdp per capita.

On exchange rate volatility and its impact on trade Guisan( 2005) analysis the evolution of exchange rates indexes and relative prices among OECD countries concluded that deviations of exchange rates from purchasing power parities do not have great impact on exports, due to the flexibility of export prices to adapt to international prices, However, the capacity to import is affected. Lee and Saucier (2005) in their analysis found a negative effect of exchange rate volatility on trade. Thus, lower exchange rate volatility increases trade (see e.g. Kasman and Kasman 2005; Arize et al. 2005; Hwang and Lee, 2005).

The level of financial development and access to capital within an economy contributes to the overall investment portfolio of that country and its influence on International trade. Hur, Raj and Riyanto (2006) in their analysis of a sample of 27 sectors and 42 countries, concluded that the level of financial development and access to credit was significant with exports and trade balances of those countries. However, (Menyah et al., 2014), in a study of financial development, trade openness, and economic growth in African countries: data was collected among 21 African countries. The findings did not find a strong relationship between financial development and trade development, and economic growth.

Data sources, Model specification and Methodology

The study is based on selected major economies of Africa. The initial sample included all 54 countries but was reduced to 42 African countries because of missing values. Imported data of trade were selected from China, Brazil, India, and Republic of Korea. China and India were selected because the former is the current largest trading partner with Africa and the latter second. Brazil and South Korea were selected based on trade relationships. Econometric techniques such as the unit root test, Johansen cointegration is used as pre diagnostic to check for the reliability or otherwise of data for further estimation. Data were collected from World development index, UNCOMTRADE data base, and CEPII data base. Annual figures from 1980 to 2018 were collected for this period. Since we employ measurement of commodities themselves, cluster of commodities were built. Table 1 illustrates the clusters of commodities. This was done based on Leamer(1984) whose classification have been employed by studies such as (Lederman and Xu 2001; Gourdon 2011), who used data from the NAPES classification on the basis of UNCTAD/WTO and ITC classification. Our classification though with some variation drew its inspiration from Leamer(1984) and Gourdon(2011). We adopt the categories of productive and manufactured import commodities of a 3-digit classification, varying our cluster from Leamer’s by human capital intensive products which was not allowed for. With this addition our cluster increases to 5 including manufactured products in; intensive natural resources, capital intensive in skilled labor, intensive in unskilled labor, intensive in capital and intensive in technology. We also estimate a second model using the Vector Error Correction Model purposely to ascertain effects or otherwise of relative price, Gdp per capita income, and Net Barter terms of trade on import demand.

Estimates will attempt to answer the following hypothesis

Ho: Trade in imported productive and manufacturing sectors is inelastic

H1: A real income increase influences the increased importation in the productive and manufacturing sectors.

H2: An Increase infrastructure has a positive effect on trade

H3: Increase importation in the productive and manufacturing sectors has a negative effect on secondary sectors.

H4: Increase importation in the productive and manufacturing sectors has a negative effect on tertiary sectors.

H5: Increase manufactured imports lowers total factor productivity

The table below illustrates the cluster of commodity. Here in this paper we define commodities as the imported commodities from the productive and manufacturing sectors as illustrated in table 1.4. The national endowments factors include real gross domestic product, population, infrastructure, secondary and tertiary sectors and total factor productivity.

Table 1.4: clusters of variables

|  |  |
| --- | --- |
| Clusters (Sectors) | Sitc Rev. 2 |
| Agriculture | 00,4, 041-045,056,057, |
| Processed food | 01,02,03,046-048,058,06,07,08,09,1,4 |
| Minerals | 3,5,6,8,23,24,27,28,32,33,34 |
| Natural resources | 61,63,68, 661,662,667, |
| Unskilled labour  Skilled labour | 65,664-666,81-85,894,895  52,53,55,59,896,897,899 |
| Capital intensive | 62,64,67,69,76(-764),78,791,892 |
| Technology intensive | 51,54,56-58,71,72,73,74,75,764,77,792,87,88 |

Methodology

First, the stationarity of the data is ascertained for the relevant variables. Estimated equation is as follows:

(1.)

Where i= 1,2, ………, T observed over periods t=1,2,…….,.

Where represents the exogenous variables, the terms is a determinant of whether to include fixed or time trend. We use lag length based on Hayashi(2000). Though an upper bound lag length is specified as and respectively[[8]](#footnote-8). We also use the variance inflation factor to test for multicollinearity.[[9]](#footnote-9)

Unit root test for estimating the impact of manufactured imports on national endowments is organized in the table below:

Table 1.5: Unit Root test for trade intensity variables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test | Null Ho | Statistics | p-value | 5% test |
| Levin, Lin & Chut\*(LLC) | Unit root | 0.439 | 0.67 | ✔ |
| Im, Peresan and Shin(IPS) | All unit root | -13.545 | 0.00 | × |
| Fischer-ADF(FA) | All unit root | 263.78 | 0.00 | × |

Source: Author’s estimation

Even though the results show an ambiguity and a contradiction between LLC, and IPS, FA. The alternative hypothesis of no unit root among all the variables is strongly rejected. We then proceed to estimate Pedroni panel cointegration test, which is illustrated below.

Table 1.6: Test of cointegration for trade intensity variables

|  |  |
| --- | --- |
| Panel statistics | With time dummies |
| Panel ADF-stat | -12.41\*\*\* |
| Group ADF-stat | -20.48\*\*\* |

Source: Author’s estimation

The null hypothesis of no cointegration is rejected in the panel ADF statistics and Group ADF statistics at a 1 percent significant level respectively.

Model specification

We estimate a long run relationship between net trade on the productive and manufacturing sectors using SITC REV 2 commodities and the selected endowments factors. The equations are as follows:

(2)

Further the Vector Error Correction Model is estimated to draw an empirical relationship between imports and the selected independent variables of Relative price, real Gdp and Net barter terms of trade. In its traditional form the traditional import demand equation is:

(3)

Where M is imports as a function of relative prices and real income. An additional variable is added to the traditional import demand function to take the form:

. (4)

And from equation (4) we derive the basic form of the vector error correction model

[[10]](#footnote-11) (5)

The expectation is a negative impact of Net Barter Terms of trade for net importers and a positive impact for net exporters of a commodity. Relative price sensitivity is also expected for net importers of a commodity. And real income Gdp is expected to be positive to stimulate trade as a result of consumer preferences for sophisticated products.

Results: (a)

Table 2.0: Impact of import demand of productive manufacturing sectors[[11]](#footnote-12) on national endowments

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| VARIABLES | TEC (1) | CIE (2) | USE (3) | SKE (4) | NRE (5) | PFE (6) | MNE (7) |
| GDPPC | 0.000013\*\*\*  (2.61e-06) | 0.00073  (0.00065) | 0.000075\*\*  (0.000029) | 0.000031\*\*\*  (7.36e-06) | 0.00028  (0.00026) | 0.000029\*\*\*  (4.77e-06) | 0.00016  (0.0001) |
| POPN | 0.2615\*\*\*  (0.0285) | 0.5576\*\*\*  (0.0902) | 0.1161\*\*\*  (0.0185) | 0.3518\*\*\*  (0.0714) | 0.5964\*\*\*  (0.0795) | 0.4455\*\*\*  (0.0561) | 0.4375\*\*\*  (0.0682) |
| INFRA | 0.4160\*\*\*  (0.0322) | -0.0026  (0.0971) | 0.4013\*\*\*  (0.0412) | 0.4872\*\*\*  (0.0992) | 0.4794\*\*\*  (0.0594) | 0.5199\*\*\*  (0.0609) | 0.2596\*\*\*  (0.0693) |
| SEC | 1.9058\*\*\*  (0.0688) | 2.28\*\*\*  (0.1565) | 0.7066\*\*\*  (0.0656) | 0.4360\*\*  (0.2014) | 1.72\*\*\*  (0.1261) | 0.6661\*\*\*  (0.1375) | 1.199\*\*\*  (0.1275) |
| TER | 0.3248\*\*\*  (0.0438) | -0.2528\*\*  (0.0875) | 0.1074\*\*  (0.0523) | 0.9102\*\*\*  (0.1406) | 0.2388\*\*  (0.0815) | 0.0910  (0.0852) | 0.0761  (0.0872) |
| TFP | -0.0700  (0.0581) | 0.4510\*\*  (0.1325) | -0.2906\*\*\*  (0.0432) | 0.1701  (0.1306) | 0.3554\*\*\*  (0.0984) | 0.3445\*\*\*  (0.0735) | -0.0092  (0.1065) |
| DIST | -0.1349\*\*  0.0629 | -0.1671  (0.2696) | -0.1057\*\*  (0.0465) | -0.0828  (0.2241) | -0.1647  (0.1064) | -0.1340\*\*  (0.0487) | 0.1972  (0.1589) |
| RD DUMMY | YES | YES | YES | YES | YES | YES | YES |
| CONSTANT | -22.45\*\*\*  (0.4319) | -27.39\*\*\*  (1.2975) | -16.43\*\*\*  (0.3536) | -20.34\*\*\*  (1.2879) | -25.80\*\*\*  (0.7309) | -23.61\*\*\*  (0.6115) | -22.65  (0.9684) |
| OBSERVATIONS | 56,001 | 30,262 | 35,875 | 6,439 | 14,835 | 22,735 | 13,327 |
| R-SQUARED | 0.21 | 0.21 | 0.10 | 0.22 | 0.18 | 0.12 | 0.13 |

Source: Author’s estimation

Estimates of real gross domestic product per capita is significant in all the productive sectors at a l percent significant level except for capital intensive and mineral resource sectors of trade. Population estimates show positive coefficients in all productive and manufacturing sectors at a significant level of 1 percentage points. This means market size plays a significant role in determining the importation of commodities from these productive and manufacturing sectors.

On infrastructure, coefficient estimates were positive and significant among the productive sectors except capital intensive sectors which recorded a negative coefficient at a 10 percent significant level. Estimates from Total factor productive show the importation from technology sector, unskilled sectors, and mineral resource sectors decreased total factor productivity by (-0.07), (-0.29) and (-0.0092) respectively. Contrary total factor productivity is affected positively by capital intensive sectors (0.45), natural resource sector (0.36) and processed food sector (0.35). Distance variable however, recorded the expected negative coefficient at a 5 percent level of significance. Capital intensive sectors show the expected negative sign but insignificant. However, mineral resource sectors show a positive coefficient and no level of significance.

(b)Vector Error correction model:

The pre estimations are performed to enable an estimation of the vector error correction model. First the unit root is estimated to check for the validity of data.

Table 3. ADF test statistics

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Level t-stat | First diff.test stat | Order of integration |
| import | -3.6624 | -17.18596 | I(1) |
| Gdppc | -5.8509 | -18.57701 | I(1) |
| Relative price | -3.4347 | -19.6704 | I(1) |
| Net barter terms of trade | -2.2154 | -15.7234 | I(1) |

Source: Author’s estimation

Note: variables at the first difference have a unit root.

A test of cointegration is performed to determine whether the unrestricted var or vector error correction model will be appropriate. From table 3.1 there is at least one cointegrating equation since trace value obtained is greater than the critical value. That is even though the individual data series are non-stationary, their linear combination is stationary.

Table 3.1 Johansen test of cointegration

|  |  |  |
| --- | --- | --- |
| Null Hypothesis | Trace statistics | Critical values |
| R=0\* | 62.39 | 47.85 |
| r≤1 | 21.70 | 29.79 |
| r≤2 | 12.52 | 15.49 |
| r≤3\* | 4.88 | 3.84 |

Source: Author’s estimation

To determine the optimal lag length, the lag order selection criteria is applied and illustrated in the table below.

Table 3.2: Lag order selection criteria

|  |  |  |  |
| --- | --- | --- | --- |
| Lag | AIC | SC | HQ |
| 1 | 67.12 | 67.48 | 67.27 |
| 2 | 66.68 | 67.40 | 66.97 |
| 3 | 65.94\* | 67.02\* | 66.38\* |

Source: Author’s estimation

Tables 4.0: Estimates for VECM for selected countries

|  |  |  |
| --- | --- | --- |
| variables | Short run Elasticities | Long run Elasticities |
| Import | -0.0677\*\*\* | -0.6865\*\*\* |
| Gddpc | 0.1679\*\*\* | 0.2320\*\*\* |
| Rp | -0.4129\*\* | -1.2778\*\*\* |
| ntot | -1.1872\*\* | -2.2963\*\*\* |
| constant | 2.6293 |  |
| ect | -0.6865 |  |
| R squared | 0.52 |  |

Source: Author’s estimation

Before interpreting the results from table 4.0 above, a Gauss-Newton least square estimate revealed a coefficient of -0.6865 at a 1 percent significant level establishing a long run association or causality between imports and the other variables. In addition a wald test estimate show a Chi-square of 58.847\*\*\* establishing a short run causality between relative prices, real Gdp, Net barter terms of trade and imports.

Short run elasticities show a positive coefficient of real gdp per capita at a 1 percent significant level. This was expected because as incomes increases demand increases for imported sophisticated products in the absence of domestic supply of similar commodities. Relative price show a negative coefficient at a 5 percent significant level. This implies inelastic demand for imported goods and services. Net barter terms of trade show a negative coefficient and a 5 percent significant level. The implication is that imports become expensive for an importer which is detrimental.

To test the validity of the results, the Lagrange multiplier test and Jarque-Bera test are illustrated in the table below,

Table 4.1: Stability tests

|  |  |  |
| --- | --- | --- |
| Tests | Chi square | P-value |
| Lagrange multiplier test | 1.6612 | 0.4358 |
| Jarque-Bera test | 1.3402 | 0.2470 |

From the table 4.1 above, we fail to reject the null hypothesis of no autocorrelation. Similarly we fail to reject the null hypothesis that the residual is normally distributed.

Conclusion

Comparing the above models of estimation, it is obvious that we fail to reject hypothesis: Ho and H1. Real Gdp has a positive relationship with the importation of the aforementioned productive and manufacturing sectors. The implication is that consumers prefer the consumption of imported sophisticated commodities in the absence of domestic substitute. A negative coefficient of relative price implies that demand for the importation of commodities is inelastic. In addition, the negative coefficient of net barter terms of trade implies expensive imports in the productive and manufacturing sectors of trade for importers

The level and quality of a countries infrastructure especially in communication contributes to growth of trade. This affirms the positive relationship between infrastructure and the importation in these sectors. We therefore fail to reject H2.

Importation in the productive and manufacturing sectors have a positive impact on secondary sectors of national endowment, hence we reject H3.

We reject H4: this is because manufactured imports in technology sectors, unskilled sectors, skilled sectors, natural resource sectors has a positive impact on tertiary sectors of national endowments. However, importations in capital intensive sectors have a negative impact on tertiary sectors of national endowment, whiles importations in mineral resource sectors even though with a positive coefficient was insignificant.

This finding is empirically vexing and hence the question why importations in the productive and manufacturing sectors have a positive impact on secondary and tertiary endowment sectors of African countries? We hope future researchers can offer better insights into this.

Results on H5: is also not clear. This is because importations in capital intensive sectors, natural resource sectors and processed food sectors had a positive impact on total factor productivity, on the contrary, importations in technology sectors, unskilled sectors, mineral resource sectors has a negative impact on the level of total factor productivity. The implication is that the level of total factor productivity among African countries as measured is positively and negatively affected. This perplexing finding explains the low level of total factor productivity among African countries.

With an inelastic demand for imports, a rising real Gdp and a growing market size it is important for African countries to pursue an aggressive industrial policy to solve the problem of inconsistent and declining total factor productivity.

APPENDIX

A1: Details of classifications

|  |  |
| --- | --- |
| Productive and manufacturing sectors | Classifications |
| Agriculture | Live animals chiefly for food, wheat and meslin, rice, barley-unmilled, maize(corn)-unmilled, cereals( unmilled, other rice, maize, barley), vegetables, roots and tubers prepared or preserved, fruits and nuts( not including oil nuts)-fresh or dried, animal and vegetable oil, |
| Processed food | Meat and meat preparations, dairy products and birds’ eggs, fish, crustacean and molluscs and preparations thereof, meal and flour of wheat and flour of meslin, other cereal meals and flour, preparations of flour or starch of fruits or vegetables, fruits, preserved and fruit preparations, sugar, sugar preparations and honey, coffee, tea, cocoa, spices and manufactured thereof, feeding stuff for animals, miscellaneous edible products and preparations, beverages and tobacco, fats and waxes |
| Minerals | mineral fuels, lubricants and related materials, crude fertilizer and crude minerals(excluding coal, petroleum and precious stones), metalliferous ores and metal scrap, coal and briquettes, petroleum, petroleum products and related materials, Gas, natural and manufactured, chemicals and related products |
| Natural resource | Leather, leather manufactures, cork and wood, cork manufactures(excluding furniture), Lime, cement and fabricated construction materials( except glass and clay materials), Clay construction materials and refractory construction materials, pearls, precious and semi-precious stones, worked or unworked, |
| Unskilled sectors | Textile yam, fabrics, made-up articles, glass, glassware, pottery, sanitary, plumbing,heating, lighting fixtures and fittings, furniture and parts thereof, travel goods, hand bags and similar containers, articles of apparel and clothing accessories, footwear, baby carriages, toys, games and sporting goods, office and stationary supplies. |
| Skilled labour sectors | Inorganic chemicals, dyeing, tanning and coloring materials, Oils and perfume materials; toilet and cleansing preparations, chemical materials and products, works of art, collectors’ pieces and antiques, jewellery, goldsmiths’ and silversmiths’ wares, other miscellaneous manufactured articles |
| Capital intensive | Rubber manufacturers, paper, paperboard, and articles of pulp, of paper or of paperboard, iron and steel, manufactures of metals, road vehicles(including air- cushion vehicles, railway vehicles(including hover trains) and associated equipment, printed matter, |
| Technology intensive | Organic chemicals, medicinal and pharmaceutical products, fertilizers(manufactured), explosives and pyrotechnic products, artificial resins and plastic materials, and cellulose and ethers, power generating machinery and equipment, machinery specialized for particular industries, metal working machinery, general industrial machinery and equipment and parts, office machines and automated data processing equipment, telecommunication equipment’s, electric machinery, apparatus and appliances, aircraft and associated equipment and parts thereof, professional, scientific and controlling instruments and apparatus, photographic equipment and supplies and optical goods. |

Source: Uncomtrade data base.

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1. Policies aim at facilitating a rapid industrialization to promote export in areas of comparative advantage. [↑](#footnote-ref-1)
2. A process of targeting specific sectors of an economy, by leveraging on cutting-edge technologies to create change through establishing industrial complexes. [↑](#footnote-ref-2)
3. Generally, defined as factors of production( land, labor, capital) [↑](#footnote-ref-3)
4. Decreasing supply shocks from its trading partner’s results in sharp increases in prices, making imports expensive, deteriorating consumption patterns. [↑](#footnote-ref-4)
5. Generally exchange of similar products in the same industry. [↑](#footnote-ref-5)
6. Imposing of tariff and non- tariff barriers by the importing country. [↑](#footnote-ref-6)
7. Natural and unnatural trading cost. [↑](#footnote-ref-7)
8. Where, if Pmax is not significantly different from 0. [↑](#footnote-ref-8)
9. The variance inflator factor for all variables were less than 3, hence no characteristics of multicollinearity. Occasions where such a phenomenon occurs variables were dropped in the second part of our estimations. [↑](#footnote-ref-9)
10. K-1 (lag length), (short run dynamic coefficient of adjustment to long run equilibrium, ( speed of adjustment) is the error correction term [↑](#footnote-ref-11)
11. TEC= Intensive in technology, CIE= Capital intensive sectors, USE= Intensive in unskilled sectors, SKE= Intensive in skilled sectors, NRE= intensive in natural resource sectors, PFE= Intensive in processed food sectors, MNE= Intensive in mineral resource sectors [↑](#footnote-ref-12)