Nigeria and the BRICS: Current and Potential Trade Relations and their Implications for the Nigerian Economy

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ABSTRACT

This paper analyses Nigeria's trade relations with Brazil, Russia, India, China and South Africa (the BRICS countries), focusing on the patterns, intensity and complementarity of trade as well as its impact on economic performance. While Nigeria's export structure does not closely complement the imports of BRICS countries, the intensity of Nigerian exports to South Africa (SA) in particular has risen in recent years. Trading patterns reveal the preponderance of crude oil, which constituted 97% of exports to BRICS countries in 2011. On the import side, China is the major supplier in Nigeria's top three import categories.

An analysis of the potential growth effects of trade shows that imports from China contribute significantly to Nigeria's growth, while exports to SA are also growth-inducing. This finding is consistent with the recent growth experience of the Nigerian economy, which is driven predominantly by sectors that are heavily dependent on the importation of manufactures, equipment and chemicals. Although oil dominates exports to SA, the rising intensity of exports to that country and its status as a leading destination for non-oil exports that has grown considerably in recent years (machinery and transport equipment) may explain the export effect.

The results suggest the need for trade policies to ensure the unconstrained supply of the top import products that are pertinent to Nigeria's continued economic growth and structural transformation, and the cultivation of bilateral trade relations on the basis of an analysis of their growth effects.

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ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
BRIC	Brazil, Russia, India, China
BRICS	Brazil, Russia, India, China, South Africa
CSEA	Centre for the Study of the Economies of Africa
DfID	British Department for International Development
GDP	gross domestic product
PPP	purchasing power parity
SA	South Africa

INTRODUCTION

The BRICS (Brazil, Russia, India, China, South Africa) countries have played a progressive role in global economic and political affairs since their recognition as global centres of growth. Based on their similar growth trajectories, these countries have the potential to reshape global economic governance in the near future. In 2012, BRICS accounted for 25% of global gross domestic product (GDP), 50% of global economic growth, 14% of world trade and 40% of global foreign reserves.[1] Thus the emergence of BRICS is deemed to diminish the dominance of Western countries in global affairs since the end of World War Two.[2]

The recent deliberations on establishing a BRICS-initiated development bank with funds rivalling those of the World Bank and International Monetary Fund attest to the growing global influence of the BRICS countries, especially in terms of reaching out to other developing countries. However, their ability to bring about a shift in global governance will depend on their collaboration with other emerging markets in the G20 and 'Next 11' groupings.[3] The recent surge in the engagement of BRICS countries with Africa, especially in terms of trade and investment, is highly significant. In fact, BRICS is gradually displacing the established engagement of Western countries with the continent.

Between 2002 and 2012, trade between BRIC/S and Africa increased tenfold to $340 billion, surpassing intra-BRICS trade of $230 billion by the end of that period.[4] This dramatic rise in economic relations with African countries has sparked the interest of researchers and policymakers, and generated some important debates in the literature. While critics describe this as the result of a 'scramble for resources' or an 'invasion of the continent', proponents project it as a 'win-win partnership'.[5] It is not surprising that the presence of BRICS countries in Africa is concentrated in countries with abundant natural resources, considering their rising demand for crude oil and natural gas as their economies expand. For example, resource-rich countries such as Angola, the Democratic Republic of Congo, Nigeria, and Sudan are leading destinations of BRICS investment and trade.

BRIC–Africa relations have also been of interest to key stakeholders, especially given the recent inclusion of an African country, SA, in the original BRIC grouping. It is argued that the strategic relationship between SA and major economies in Africa such as Nigeria, Kenya and Ethiopia will be key to the further expansion of relations between BRICS and the continent. Thus there is a growing concern among analysts that the BRICS engagement with Africa should not be restricted to resource exploitation, but should be extended to advance the continent's long-term economic growth and development trajectory.[6] For their part, African countries need to strategically position themselves in order to benefit from relations with BRICS. This would require an analysis of the benefits of their trade and investment relations with BRICS countries, as well as the potential for future economic relations. Nigeria is an important BRICS trade and investment partner, and this relationship is therefore worth examining in greater detail.

This study seeks to shed light on the economic relationship between Nigeria and the BRICS as there is a dearth of empirical literature on this subject, despite its importance. An ideal approach would be to investigate the flow of goods and services (trade) as well as capital (investment) between Nigeria and BRICS. However, disaggregated data on the latter is absent, and thus the study focuses only on trade. Specifically, this paper investigates the intensity and complementarity of trade between Nigeria and individual BRICS countries

as well as the effects of such trade on the Nigerian economy. Section two describes trade between Nigeria and the BRICS; section three presents some econometric findings about the welfare effects of trade; and section four concludes with policy recommendations.

NIGERIA AND THE BRICS

Nigeria is the 30th largest economy in the world, with GDP in purchasing power parity (PPP) terms of $411 billion in 2012, and an average growth rate of 6.5% between 2000 and 2012. Like Brazil, Russia and SA, it is endowed with abundant natural resources. While Russia is a world energy superpower – being one of the largest producers of crude oil, and owning the largest proven reserves of natural gas – Nigeria is the largest crude oil producer in Africa, and the 13th largest crude oil producer in the world.[7] Also, like most BRICS countries, Nigeria has a huge population (about 170 million – the largest in Africa). Except for China, which recorded average GDP growth (in PPP terms) of about 9.9% between 2008 and 2012, the growth of the Nigerian economy (about 7% in the same period) surpassed those of the other BRICS countries.[8] However, the BRICS countries are all economic giants in their respective regions and, except for SA, rank among the top ten economies in the world (SA ranks 25th).[9] Trade relations between Nigeria and BRICS are particularly important, as the former is regarded as a contender for membership of an expanded BRICS bloc.

PATTERNS OF TRADE

This section examines the relative importance of trade between Nigeria and BRICS countries (as reflected by trade intensity figures), Nigeria's gains from trade (as reflected by the balance of trade), products traded (as reflected by the structure of trade) and the degree to which Nigeria's exports complement BRICS import needs (as reflected by complementarity calculations).
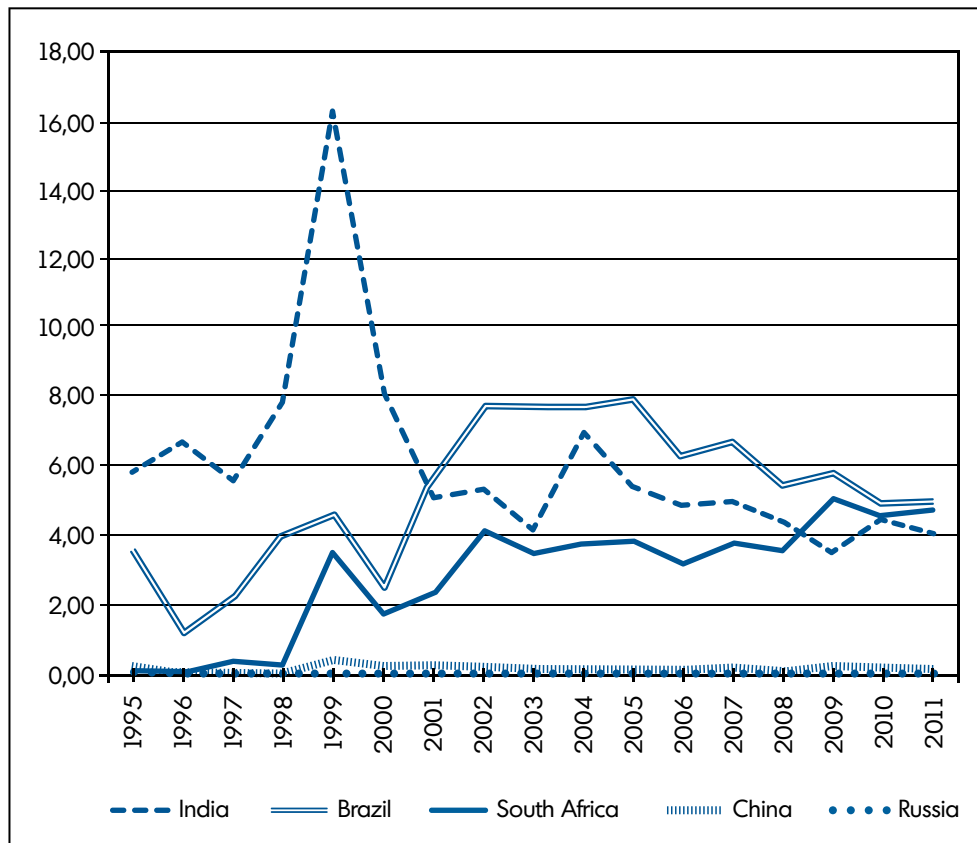
Trade intensity

Export intensity measures the relative importance of exports from a given country to a trading partner. More specifically, it compares a country's share of exports to a specific trading partner to that trading partner's share of global exports. The resultant values range from zero upwards. Values greater than one indicate an 'intense' trade relationship, and vice versa. In the case of Nigeria and BRICS countries, export intensity is calculated as:

$$EI_{NJ} = \frac{X_{NJ}}{X_N} \Big/ \frac{X_{WJ}}{X_W}$$

Where X_{NJ} is Nigeria's exports to country J (a BRICS member), X_N is Nigeria's total exports, X_{WJ} is total world exports to country J, and X_W is total world exports. A score greater than one implies that Nigeria exports more to country J in relative terms than the rest of the world. This indicates the relative importance of country J to Nigeria in terms

of foreign demand for Nigerian goods, and the relative importance of Nigeria to country *J* in terms of meeting that country's import needs. The intensity of Nigerian exports to the various BRICS countries is shown in Figure 1.
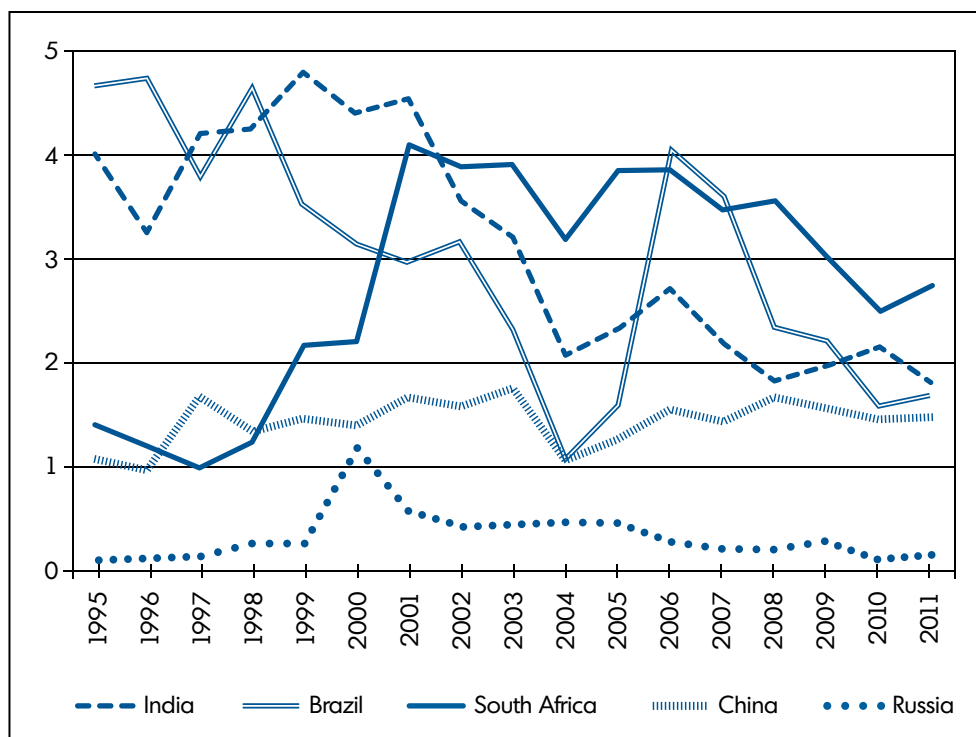
Figure 1: Intensity of Nigerian exports to BRIC/S countries, 1995–2011

Source: Compiled by authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ ReportFolders/reportFolders.aspx

This shows that Nigeria's exports to India, Brazil and SA over this period were significantly more substantial than its exports to Russia and China. This confirms that Nigerian exports are not particularly relevant to the last two countries. It also shows that, since the early 2000s, export intensity has only risen in respect of SA. This indicates that bilateral exports from Nigeria to SA have strengthened more than exports from Nigeria to other BRICS countries.

Similar to export intensity, import intensity measures the relative importance to a given country of imports from a trading partner. More specifically, it compares a given country's share of imports from a trading partner to its share of global imports. Figure 2 reflects the intensity of Nigerian imports from the various BRICS countries.

Figure 2: Intensity of Nigerian imports from BRIC/S countries, 1995–2011

Source: Compiled by authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

This shows that import intensities are generally lower than export intensities, for the obvious reason that Nigeria is a major world supplier of its main export product, namely crude oil. However, import intensities are higher than export intensities in respect of Russia and China, and lower than export intensities in respect of India, Brazil and SA.[10] This reflects disparities in trade relations, notably China's and Russia's recent emergence as world manufacturing and energy superpowers, and Nigeria's longer-standing trade relations with Brazil and India, which are rooted in petroleum exports.

The lowest import and export intensities are those in respect of Russia. This reflects the fact that both countries largely export similar primary products, namely crude oil and natural gas. However, Russia is a more advanced and efficient producer. Nigeria also lacks efficiency in other export sectors, which limits its trade with Russia on the basis of comparative advantage.
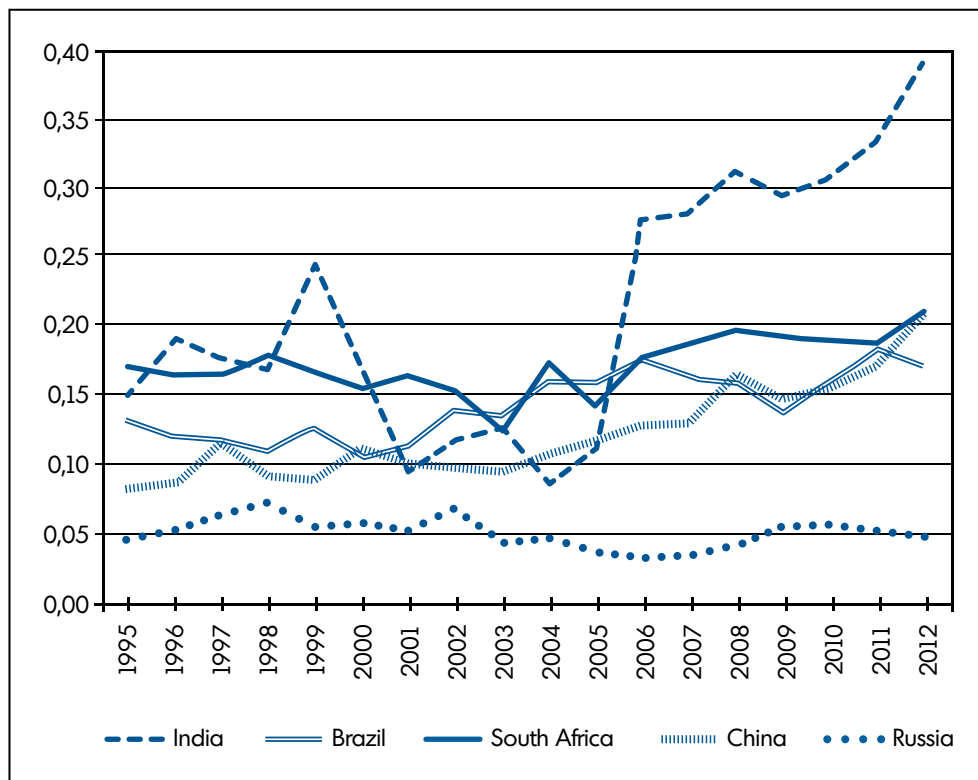
Trade complementarity

Trade complementarity measures the extent to which two countries are 'natural partners', in the sense of the degree to which the sectoral composition of a country's exports overlaps (or correlates) with the sectoral composition of imports by its trading partner. In the case of Nigeria and the BRICS countries, the export complementarity index is calculated as:

$$EC_{NJ} = 1 - 0.5 \sum_{k=1}^{K} \left| e_k^N - m_k^J \right|$$

where e_K^N is sector K's share of Nigeria's total exports to the world, and m_K^J is the sector's share in country J's total imports from the world. A perfect positive correlation between the two sectoral shares yields an index of one, while a perfect negative correlation yields an index of zero.

Figure 3 shows the trade complementarity indices between Nigeria and the BRICS countries. While the indices are low (generally below 0.5) for all BRICS countries, they have risen for all except for Russia, rising sharply in respect of India, and more gradually in respect of the rest. This is not surprising, as India's share of Nigeria's crude oil exports increased from about 4.6% in 2001–2004 to about 12% in 2009–2012.[11] Crude oil accounts for more than 35% of India's total imports, and the country remains the second largest destination for Nigeria's crude oil, next to the US. These developments suggest that Nigeria–India trade ties are perhaps the strongest and most traditional among the BRICS countries.

Figure 3: Trade complementarity between Nigeria and the BRIC/S countries, 1995–2012

Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

Balance of trade

We also examine whether Nigeria's trade with the various BRICS countries has been favourable on average. To this end, balance of trade figures are shown in Figure 4.

**Figure 4: Nigeria's balance of trade with BRIC/S countries, 1995–2011**

Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx
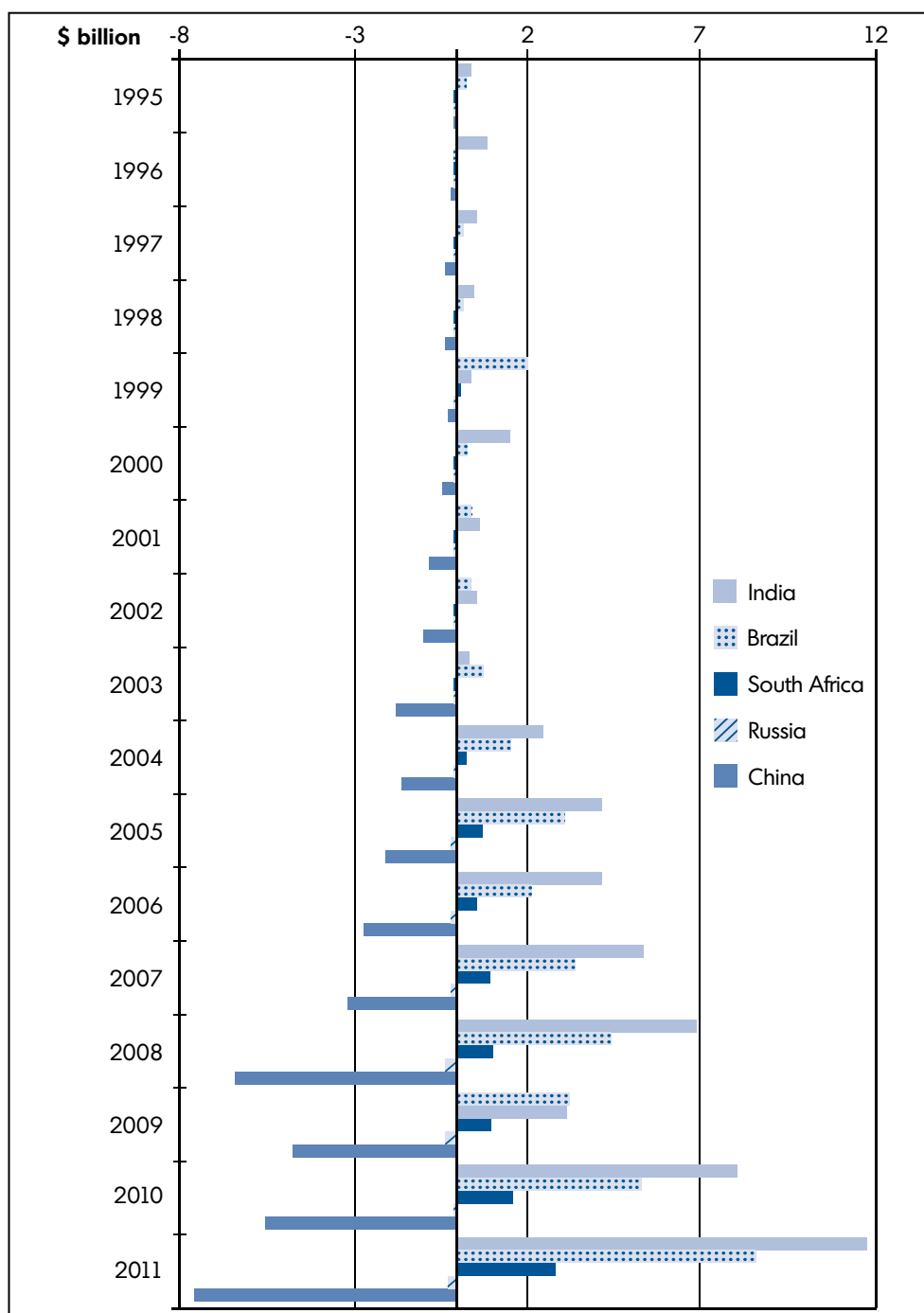
This shows that Nigeria recorded increasing trade surpluses over time with India, Brazil and SA, and a growing deficit with China and, to a smaller extent, Russia. The large and growing trade deficit observed in the case of China is not surprising, given extremely low export intensities in the face of growing import volumes.

Structure of trade

The structure of trade between Nigeria and BRICS as a whole is shown in Figure 5.

**Figure 5: Nigerian exports to BRICS, 2011**
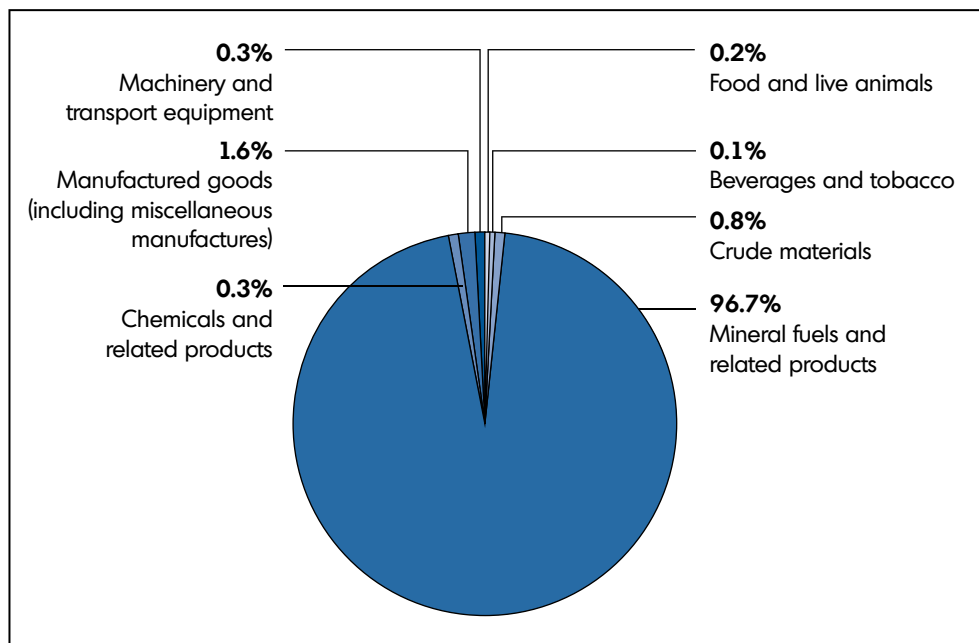
Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ ReportFolders/reportFolders.aspx

This shows that Nigeria's total exports to BRICS in 2011 was dominated by mineral fuels and related products (accounting for 97%), while less than 2% of exports were manufactured goods. This reflects the low level of diversification of Nigeria's exports to the world at large, and also implies that the trade surplus witnessed is derived from petroleum exports.

Table A1 (in the appendix) shows that, in 2011, India was the major destination for Nigeria's exports as it accounted for the biggest share of the country's total exports of mineral fuels and chemicals (about 12% of each product category). Although China's share of Nigeria's exports in other product categories was very small, it was the leading BRICS destination for Nigeria's manufactured goods (about 17% of exports in this category). Brazil and SA (in ascending order) were also destinations for significant shares of Nigeria's exports of mineral fuels.

Figure 6 reflects Nigeria's imports from BRICS as a whole.

Figure 6: Nigeria's imports from BRICS, 2011
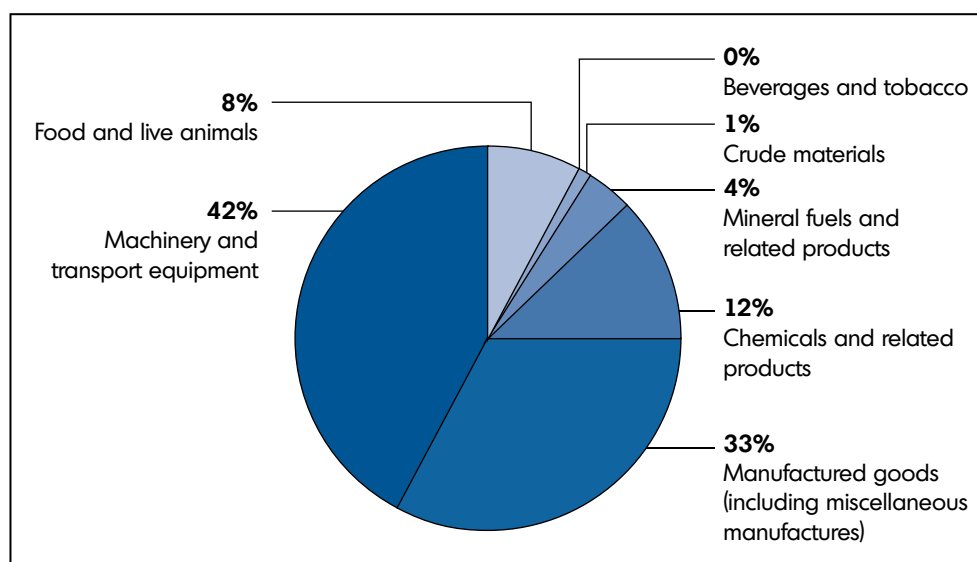
Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

This shows that Nigeria's imports from BRICS are more diverse than its exports, although they remain dominated by a few product categories (notably machinery and transport equipment, and manufactured goods and chemicals). Table A2 (in the appendix) shows that China is the main source of Nigeria's imports of manufactured goods, chemicals, and machinery and transport equipment (accounting for about 15%, 33% and 25% respectively of total imports in these product categories) in 2011. Nigeria also imports a significant amount of chemicals and manufactured goods from India and SA, while Brazil remains its dominant source of food and live animals.

This descriptive analysis reveals the following points. First, the intensity of exports from Nigeria to BRICS has risen significantly in recent years only in the case of SA. While exports to India have been the most complementary, SA comes next in the complementarity ranking. While exports to SA are dominated by oil products (accounting for 3.1% of Nigeria's total oil exports in this period), it ranks next to China in respect of machinery and transport equipment (1.8% versus 3.3%). Given that this is the main non-oil export category that has shown significant growth in recent years (see Figure A1 in the appendix), rising from 5% of non-oil exports during 1995–1999 to 10% during 2007–2012, it would seem that trade with SA, particularly on the export side, may be profitable for the Nigerian economy to the extent that export demand has a meaningful impact on the economy.

Second, recent economic growth in Nigeria has been driven by commerce, communications and agriculture, accounting for a combined 86% of economic growth in 2011. Given the limited size of the Nigerian manufacturing sector (only 4% of GDP in

recent years) and the dependence of these sectors on imported machinery, manufactured goods and fertilisers, it would seem that trading partners that supply these products would make the most meaningful impact on the Nigerian economy. This is where China plays a major role as the leading supplier to Nigeria of manufactured goods, chemicals, and machinery and transport equipment.

Third, even though Nigeria has recorded trade surpluses with most of the BRICS countries, its exports to BRICS are dominated by raw materials (notably crude oil), while its imports are mainly manufactured goods and machinery and transport equipment.

THE IMPACT OF BRICS TRADE ON THE NIGERIAN ECONOMY

The second objective of the study is to examine the effects of trade between Nigeria and BRICS on the Nigerian economy. Many time-varying factors, including levels of trade integration with the rest of the world, have been identified as major drivers of the Nigerian economy. The present empirical exercise does not pretend to add to these drivers, or to identify new ones; rather, it seeks to examine the extent to which Nigerian exports to and imports from BRICS affect its economy. Conventionally, this can be done by estimating an unrestricted model that contains all the possible drivers of growth (already identified in the literature) or by estimating a restricted model that captures only the effects of the variables of interest while excluding but making provision for the effects of other variables. In this analysis, we adopt the restricted model.

The challenge of this approach is to derive consistent coefficient estimates for the variables of interest, especially where the other growth drivers may be correlated with such variables. In the present analysis, we deal with this problem by including year dummies (an equivalent of year fixed effects) to isolate the potential correlation between excluded determinants and the included ones. For each member country, the estimated model is specified as:

$$LGDP_t = \partial_0 + \partial_1 LIMPT_t + \partial_2 LEXPT_t + \partial_3 LRER_t + \partial_4 INF_t + \partial_{i=5}^{18} YEAR_t + \varepsilon_t$$

where $LGDP_t$ is log of Nigeria's nominal GDP; $LIMPT_t$ is log of Nigeria's imports from the country; $LEXPT_t$ is log of Nigeria's exports to the BRICS member; $LRER_t$ is log of real exchange rate between Nigeria and the BRICS country; and INF_t represents Nigeria's inflation rate. Both real exchange rate and inflation rates have been included in the analysis because of their importance to the relationship between trade and growth. $YEAR_t$ is the dummy representing years, while ε_t is the independently and identically distributed residual of the model.

Diagnostics tests conducted to ensure that the regression results are not spurious include a multiple correlation test and stationarity tests. While the correlation coefficients are modest, some of the variables are found to be non-stationary. Therefore, we proceed to conduct cointegration tests which reveal that a long-run relationship exists between the variables. The results of these analyses are summarised in the appendix.

The analysis was conducted with quarterly data for the period 2000:Q1 to 2012:Q4 in order to derive estimates with large-sample properties. For this purpose, bilateral trade data was sourced from the National Bureau of Statistics, while quarterly GDP and inflation rates were sourced from the Central Bank of Nigeria. Real exchange rate data was computed from nominal exchange rates sourced from the UNCTAD statistical database.[12] We exclude Russia from the analysis due to a lack of sufficient data.

The results of the analysis for all the members of the BRICS except Russia are presented in Table 1.

Table 1: Regression results for Nigeria–BRICS trade (excluding Russia)

Variables	Brazil	India	China	South Africa
LIMPT	-0.024 (0.59)	0.087 (0.23)	0.206 (0.00)***	0.086 (0.22)
LEXPT	0.012 (0.63)	0.012 (0.63)	0.009 (0.54)	0.102 (0.02)**
LRER	2.671 (0.00)***	12.160 (0.00)***	6.570 (0.00)***	2.799 (0.00)***
INF	-0.002 (0.33)	-0.002 (0.27)	-0.002 (0.281)	-0.002 (0.273)

Notes: The dependent variable is LGDP; the T-statistics for the coefficients are in italics and in brackets; two asterisks (**) and three asterisks (***) denote significance at 5% and 1% levels of significance respectively; years fixed effects were included in each of the estimations.

Two important observations can be made about the results presented in Table 1. First, of the four BRICS countries examined, the Nigerian economy only responds significantly to changes in imports from China. In other words, the import coefficient of about 0.2 implies that a percentage increase in Nigeria's imports from China would only increase its GDP by about 0.2%. This positive and significant relationship can be explained by the nature and volume of Nigeria's imports from China. Manufactured goods, machinery, and transport equipment are undoubtedly significant inputs for propelling economic growth.

Second, as regards exports, the Nigerian economy only responds significantly to changes in exports to SA. In particular, the results show that an increase of one percentage point in Nigeria's exports to SA is associated with an increase of about 0.1% in Nigeria's GDP. Crude oil accounts for more than 90% of Nigeria's exports to SA, and did not drive economic growth during the past decade. Rather, growth was driven by non-oil sectors, and machinery and transport equipment was one of the fastest growing components of non-oil exports. Given that SA was the destination of a notable share of Nigeria's exports of these products, the positive coefficient estimate may reflect the positive multiplier effects of this subsector on the domestic economy (perhaps through its impact on the services sector, which includes transportation). However, the exact channels being reflected in the estimate may require further investigation. Finally, the results confirm that the Nigerian economy is dependent only on imports from China, and that negative shocks to such imports might affect it negatively.

In all the regressions, real exchange rates resonate as an important determinant of growth in the Nigerian economy. Although it is an equilibrating variable rather than a

policy variable, exchange rate policies that are sensitive to the trade effects identified in this paper should be promoted.

CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper has identified differential patterns of trade between Nigeria and the BRICS countries in terms of the intensity and complementarity of trade as well as its impact on the Nigerian economy. Nigeria's exports are dominated by petroleum products, yielding very low levels of complementarity with demand in the BRICS countries. The results show that imports from China, particularly products relevant to recent growth experience, have a substantial impact on Nigeria's economic performance, while exports to SA, which are becoming more intensive, are also growth-inducing.

Four main recommendations arise from this analysis. First, it reveals that Nigerian exports are mono-cultural, and that levels of complementarity with imports by BRICS countries are very low. This implies that present trade with BRICS is not delivering optimal gains. Therefore, the study reiterates the need to diversify the Nigerian economy, and its exports in particular. Such diversification could yield good results, especially given the expanding economies and populations of the various BRICS countries, which constitute large markets for Nigerian exports.

Second, Nigeria's main imports are manufactured goods and plant and machinery. Undoubtedly, these products are needed to increase productivity, either through the capital accumulation effect or through the imitation of imported technology effect, among others. However, the latter effect is absent in the Nigerian economy, thereby leading to the importation of even basic manufactured products. To make the most of these imports, and achieve higher gains from trade, policymakers should take advantage of existing trade relations with China to emphasise knowledge transfer through the imitation effect in order to develop value chains in agriculture and promote the manufacturing sector.

Third, it is pertinent for the Nigerian authorities to address tariff and non-tariff barriers to the importation of those categories of goods relevant to the structural transformation of the Nigerian economy, especially machinery and equipment. This will ensure that these goods enter the country at the lowest possible prices.

Finally, according to all the indicators, Nigeria's level of trade integration with Russia is the lowest of all the BRICS countries. This implies that the Nigerian government should seek ways of promoting trade and sharing knowledge with Russia, especially as it is an energy superpower.

APPENDIX

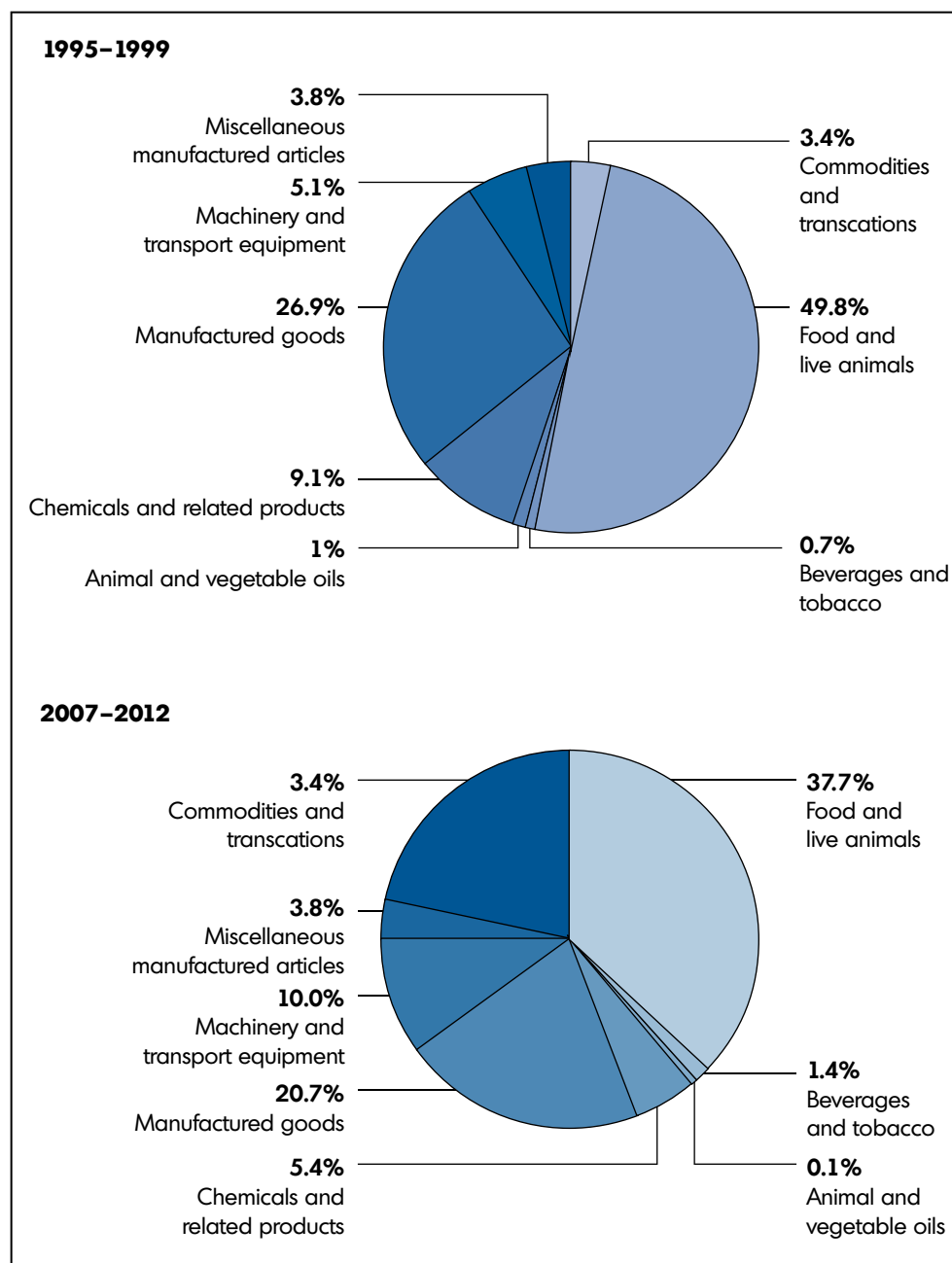**Table A1: BRICS countries' shares of Nigerian exports by product, 2011**

	Product categories	Food and live animals	Beverages and tobacco	Crude materials	Mineral fuels and related products	Chemicals and related products	Manufactured goods (including miscellaneous manufactures)	Machinery and transport equipment
India	Value ($'000)	30,158	278	65,024	14,058,721	52,568	204,193	20,005
	Share of total Nigerian exports (%)	2.0	0.1	3.4	11.9	12.0	15.0	1.7
Brazil	Value ($'000)	7,063	13,132	29,635	9,748,197	3,570	45,650	3,536
	Share of total Nigerian exports (%)	0.5	6.0	1.6	8.2	0.8	3.3	0.3
South Africa	Value ($'000)	4,662	191	27,787	3,689,143	2,762	3,267	21,088
	Share of total Nigerian exports (%)	0.3	0.1	1.5	3.1	0.6	0.2	1.8
Russia	Value ($'000)	1,297	na	3,937	na	na	1,102	25
	Share of total Nigerian exports (%)	0.1	0.0	0.2	0.0	0.0	0.1	0.0
China	Value ($'000)	13,367	2,344	98,483	1,239,898	42,561	234,245	38,688
	Share of total Nigerian exports (%)	0.9	1.1	5.2	1.0	9.7	17.2	3.3

Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

Table A2: BRICS countries' shares of Nigerian imports by product, 2011

	Product categories	Food and live animals	Beverages and tobacco	Crude materials	Mineral fuels and related products	Chemicals and related products	Manufactured goods (including miscellaneous manufactures)	Machinery and transport equipment
India	Value ($'000)	73,019	15,892	26,318	190,214	536,012	742,449	992,421
	Share of total Nigerian imports (%)	0.8	5.9	1.7	2.8	10.1	7.3	5.2
Brazil	Value ($'000)	607,403	18,899	16,046	255,488	157,581	184,404	258,144
	Share of total Nigerian imports (%)	7.0	7.0	1.0	3.8	3.0	1.8	1.4
South Africa	Value ($'000)	53,888	13,700	18,716	29,324	158,795	374,608	317,619
	Share of total Nigerian imports (%)	0.6	5.0	1.2	0.4	3.0	3.7	1.8
Russia	Value ($'000)	19,142	1,069	4,679	40,896	45,595	92,822	14,025
	Share of total Nigerian imports (%)	0.2	0.4	0.3	0.6	0.9	0.9	0.1
China	Value ($'000)	316,500	6,981	39,675	20,211	820,258	3,371,164	4,514,063
	Share of total Nigerian imports (%)	3.6	2.6	2.5	0.3	15.5	33.1	25.3

Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx

Figure A1: Evolution of Nigeria's non-oil exports, 1995–1999, 2007–2012

1995–1999

3.8%
Miscellaneous
manufactured articles

5.1%
Machinery and
transport equipment

26.9%
Manufactured goods

9.1%
Chemicals and related products

1%
Animal and vegetable oils

3.4%
Commodities
and
transcations

49.8%
Food and
live animals

0.7%
Beverages and
tobacco

2007–2012

3.4%
Commodities and
transcations

3.8%
Miscellaneous
manufactured articles

10.0%
Machinery and
transport equipment

20.7%
Manufactured goods

5.4%
Chemicals and
related products

37.7%
Food and
live animals

1.4%
Beverages
and tobacco

0.1%
Animal and
vegetable oils

Source: Compiled by the authors from UNCTAD statistics, drawn from http://unctadstat.unctad.org/
ReportFolders/reportFolders.asp

Table A4: Correlation analysis for Nigeria–Brazil analysis

	GDP	INF	NEXPTBR	NIMFBR
GDP	1.00	-0.17	0.81	0.55
INF	-0.17	1.00	-0.09	-0.14
NEXPTBR	0.81	-0.09	1.00	0.63
NIMFBR	0.55	-0.14	0.63	1.00

Source: Authors' calculations

Table A5: Correlation analysis for Nigeria–China analysis

	GDP	INF	NIMFCH	NEXPTCH
GDP	1.00	-0.17	0.87	0.60
INF	-0.17	1.00	-0.18	-0.06
NIMFCH	0.87	-0.18	1.00	0.47
NEXPTCH	0.60	-0.06	0.47	1.00

Source: Authors' calculations

Table A6: Correlation analysis for Nigeria–India analysis

	GDP	INF	NIMFIND	NEXPTIND
GDP	1.00	-0.17	0.78	0.76
INF	-0.17	1.00	-0.17	-0.14
NIMFIND	0.78	-0.17	1.00	0.80
NEXPTIND	0.76	-0.14	0.80	1.00

Source: Authors' calculations

Table A7: Correlation analysis for Nigeria–SA analysis

	GDP	INF	NIMFSA	NEXPTSA
GDP	1.00	-0.17	0.77	0.78
INF	-0.17	1.00	-0.16	-0.12
NIMFSA	0.77	-0.16	1.00	0.65
NEXPTSA	0.78	-0.12	0.65	1.00

Source: Authors' calculations

Table A8: Results of unit root tests

Variables	At level		First difference		Order of Integration
	ADF test	PP test	ADF test	PP Test	
INF	-4.33 (0.00)	-4.40 (0.00)			I(0)
GDP	-1.94 (0.62)	-6.29 (0.00)	-5.03 (0.00)	-13.90 (0.00)	I(1)
NEXPTBR	-1.49 (0.82)	-3.46 (0.05)	-8.32 (0.00)	-10.02 (0.00)	I(1)
NIMFBR	-5.35 (0.00)	-5.38 (0.00)			I(0)
NEXPTCH	4.36 (1.00)	4.62 (1.00)	-2.94 (0.00)	-4.71 (0.00)	I(1)
NIMFCH	-1.32 (0.61)	-1.09 (0.71)	-9.62 (0.00)	-10.84 (0.00)	I(1)
NEXPTID	-0.02 (0.95)	-0.75 (0.82)	-12.34 (0.00)	-13.64 (0.00)	I(1)
NIMFIND	0.06 (0.96)	-1.79 (0.38)	-9.57 (0.00)	-17.28 (0.00)	I(1)
NEXPTSA	-0.07 (0.96)	-1.65 (0.45)	-8.10 (0.00)	-15.03 (0.00)	I(1)
NIMFSA	-1.40 (0.58)	-3.15 (0.03)	-17.73 (0.00)	-25.33 (0.00)	I(1)

Notes: P-values are in brackets.

ADF = Augmented Dickey Fuller Test.

PP = Phillip Perron Test.

NEXPTBR = Nigeria's exports to Brazil.

IMFBR = Nigeria's imports from Brazil.

Similar definition applies to other variables where CH = China, IND = India and SA = SA.

Source: Authors' calculations

Table A9: Results of Johansen System Cointegration Test (Nigeria–Brazil)

No. of cointegrating equations	Eigen value	Trace statistics	Critical value
0	–	99.284	68.52
1	0.587	55.106	47.21
2	0.355	33.201	29.68
3	0.333	12.985*	15.41

Note: * = the least number of cointegrating vectors in the equation.

Source: Authors' calculations

Table A10: Results of Johansen System Cointegration Test (Nigeria–China)

No. of cointegrating equations	Eigen value	Trace statistics	Critical value
0	–	83.664	68.52
1	0.561	42.584*	47.21
2	0.328	22.663	29.68
3	0.192	12.012	15.41

Notes: * = the least number of cointegrating vectors in the equation.

Source: Authors' calculations

Table A11: Results of Johansen System Cointegration Test (Nigeria–India)

No. of cointegrating equations	Eigen value	Trace statistics	Critical value
0	–	75.093	68.52
1	0.509	39.473*	47.21
2	0.292	22.168	29.68
3	0.200	10.987	15.41

Notes: * = the least number of cointegrating vectors in the equation.

Source: Authors' calculations

Table A12: Results of Johansen System Cointegration Test (Nigeria–SA)

No. of cointegrating equations	Eigen value	Trace statistics	Critical value
0	–	90.317	68.52
1	0.515	54.053	47.21
2	0.404	28.101*	29.68
3	0.288	11.099	15.41

Notes: * = the least number of cointegrating vectors in the equation.

Source: Authors' calculations

ENDNOTES

1   De Castro T, 'Trade Cooperation Indicators: Development of BRIC Bilateral Trade Flows', *International Review of Business Research Papers*, 8, 1, 2012, pp. 211–223; John L, 'Engaging BRICS: Challenges and Opportunities for Civil Society', Oxfam India Working Paper Series, September 2012, p. 30.

2   Çakır M & A Kabundi, 'Trade shocks from BRIC to SA: A global VAR analysis', *Economic Modelling*, 32, 2013, pp. 190–202.

3   Like BRICS, the 'Next 11' countries were identified by the Goldman Sachs economist Jim O'Neill as countries on a rapid growth trajectory, and likely to emerge as the world's largest economies in the 21st century. They are Bangladesh, Egypt, Indonesia, Iran, Korea, Mexico, Nigeria, Pakistan, Philippines, Turkey and Vietnam. See O'Neill J & A Stupnytska, 'The Rise of the BRICs and N-11 Consumer', Strategy Series. Goldman Sachs, 3 December 2010.

4   Trade between China and Africa accounts for more than half ($190 billion) of the volume of BRICS–Africa trade. See Çakır M & A Kabundi, *op. cit*.

5   For more details, see Kimenyi MS & Z Lewis, 'The BRICS and the new scramble for Africa', in *Africa Growth Initiative at Brookings, Foresight Africa: The Continent's Greatest Challenges and Opportunities for 2011*. New York: Brookings, 2011.

6   See, for example, *ibid*.

7   International Energy Statistics, 2012, see www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=5&pid=53&aid=1.

8   World Bank, World Development Indicators, http://data.worldbank.org/products/wdi.

9   *Ibid.*

10 The exception is SA, in whose case export intensity was near zero and lower than import intensity up to 1998, but then rose substantially (particularly after 2000) as the SA economy expanded and demand for crude oil intensified. Beside this, SA trade with Nigeria may have been restricted during the apartheid era, either as a result of embargoes or simply because SA bought crude oil from friends of the regime without restricting Nigeria's purchase of SA products.

11 Authors' calculations from UNCTAD statistics, drawn from http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx.

12 UNCTADSTAT, at http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx.