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'Products mapping' and trade in agri-food products between Nigeria and the EU28

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Abstract: This paper investigates the dynamics of comparative advantage in agri-food products between Nigeria and the European Union (EU28). Using 'products mapping' approach based on trade balance index (TBI), Balassa index (BI), Lafay index (LFI) and other descriptive approaches, the findings show that Nigeria substantially recorded adverse TBI in trading both with the world and the EU28. The share of total Nigerian food exports and imports which the EU28 accounted for, declined from 72% and 40% to 37% and 27% between 1995 and 2017, respectively. The findings of both BI and LFI reveals that between 1995 and 2017, Nigeria's comparative advantages in trading in the world market declined from 12/46 to 8/46 food products. Similarly, Nigeria's trade with the EU28 comparative advantages reduced from 12/46 to 9/46 food products. Inversely, the food products that Nigeria has comparative disadvantages and negative TBI in trading with the EU28 rose from 31/46 to 35/46. For Nigeria, to boost its exports and competitiveness, especially in products that the country has natural advantages in producing, there is an urgent need for increasing investment and implementing policies on domestic agricultural and food value chains.

Keywords: agri-food; comparative advantage; competitiveness; food products

Undoubtedly, Nigeria is an agrarian country. Even though the country's agricultural GDP and employment declined from 47% and 61% in 2002 to 21% and 37% in 2017, respectively (World Bank 2019), the values are still relatively notable. Food production index (2004–2006 = 100) in Nigeria rose from 68 to 125 between 1995 and 2016 (FAO 2018) but achieving food self-sufficient, and food security have been an issue, scoring 38/100 (score 0–100 where 100 = best) in 2018 (EIU 2018). The growth of the country's economy and population presents enormous challenges and opportunities for its growing urbanisation and its agri-food related activities.

Recently, food production in Nigeria just as in west African countries has faced severe challenges, such as climate shocks, unstable rainfall, terrorism, herder-farmer crisis, market access, modern farm inputs (FAO 2018), government neglect and policy somersault (MBNP 2017). Agricultural related activities in the country have been neglected since Nigeria shifted its revenue base and attention to crude oil extraction and exports in the late 1960s (Verter 2016; MBNP 2017). Oil accounted for an average of over 95% of total merchandise exports for the past four decades while earnings from food exports have drastically declined and accounted for an average of 5% between 1995 and 2017 (ITC 2019a).

Consequently, Nigeria has heavily relied on the EU and other emerging economies for processed food products as postulated by dependency theories. Currently, the structure of the country has primarily remained food import-reliant, driven by consumption and oil mono-economy. Previous agricultural policies left Nigeria ill-prepared for external shocks and food security management and self-sufficiency (Verter 2016).

To diversify the country's economy and proactively reduce its vulnerability, the federal government of Ni-

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geria launched an economic policy document, called Economic Recovery and Growth Plan (ERGP) in 2017. Food production and exports are prominently mentioned in the policy document. Specifically, the ERGP focuses on the country's self-sufficiency in tomato paste, rice and wheat by 2019/2020. Thus, Nigeria plans to deepen investments in the agriculture and projects to become a net exporter of crucial food products, such as rice, groundnuts, cashew nuts, cassava and vegetable oil by 2020 (MBNP 2017).

The ERGP is based on the recent Nigerian agrarian policies, such as the Agricultural Transformation Agenda (ATA), which was implemented between 2011 and 2015; and the Agriculture Promotion Policy (APP) which was launched in 2015, implementing for the period 2016–2020. These policies aimed at stimulating investments in agricultural value chains, exports, and drastically reversing over-reliant on food imports (FMARD 2016). Against this background, this study focuses on the dynamics of bilateral agri-food trade between Nigeria and the European Union (EU).

Historically, Nigeria has been the EU's major trading partner in West Africa (WTO 2017; UNCTAD 2019a). The EU's ranking of the global leading agri-food trade partners shows that Nigeria was the number 32 top importing market (with EUR 859 million, or 0.6% share of extra-EU) for the agri-food exported by the EU28 in 2018. Also, Nigeria was the number 40 top global supplying market (with EUR 569 million, or 0.5% share of extra-EU) for the agri-food imported by the EU28 in 2018 (European Commission 2019a).

Nigeria's bilateral trade in agrarian products with the EU has brought both opportunities and challenges in the sector. For instance, Nigeria has been exposed to fierce competition from the EU regarding product quality, economies of scale and price (European Commission 2007; Verter 2016). To support the Economic Community of West African States (ECOWAS) in general, and Nigeria, in particular, harness and benefit from global economic integration, the EU and ECOWAS, made plausible efforts to build a resilient economic partnership, known as Economic Partnership Agreements (EPAs). The partnership meant to replace the original trade chapters of the Cotonou Agreement and consolidate the sub-region and Nigeria economically (European Commission 2007).

The EU constitutes a significant opportunity for boosting Nigerian agricultural exports and competitive advantages in several agri-food products. Although the EPAs between the EU and ECOWAS, is seen as a stepping stone for resilient capacity building, boosting investments, trade performance, ensuring specialisation and competitiveness in agri-food products (European Commission 2017; WTO 2017), Nigeria remains the only ECOWAS nation, that has not signed the EPAs (European Commission 2019b). This may have partially impeded agri-food trade between Nigeria and the EU. Nonetheless, the EU's commitment to spur trade is privileged market access for Nigerian agricultural products under the Generalised System of Preferences (GSP) (European Commission 2018) and its Aid For Trade (AFT) initiatives targeted for Nigeria and other West African countries.

LITERATURE REVIEW AND SOME EMPIRICAL EVIDENCE

Traditionally, agricultural trade patterns and specialisation are explained based on competitive or comparative advantages of countries and regions across the globe (Serrano and Pinilla 2014; Zdráhal and Bečvářová 2018). Recently, some scholars have used comparative advantage approach to analyse trade performance and competitiveness food products (Fertő 2008; Burianová and Belová 2012; Jambor and Babu 2016; Benesova et al. 2017; Esquivias 2017). For instance, Fertő (2008) analysis the development of agri-food trade patterns of Central European countries using the Balassa approach. The results reveal that the trade pattern has converged in Czechia, Hungary, Slovenia, Poland and Lithuania while it polarised in Slovakia, Latvia and Estonia over the period.

In the same direction, Bojnec and Fertő (2015) investigate trade competitiveness in the new and old EU member countries food trade. The results reveal that both the new and old EU member states have converged more in successful food competitiveness and comparative advantages.

Benesova et al. (2017) investigate trade performance in Russian agrarian sector. Their results reveal that the country has comparative advantages in bilateral food trade with Africa, Asia and the Commonwealth of Independent States (CIS). On the contrary, the country recorded comparative disadvantages in trading with the EU and the Americas. Esquivias (2017) assesses the performance of agrarian trade patterns in Indonesia and East Java *versus* six leading ASEAN (Association of Southeast Asian Nations) exporting economies. Using the revealed comparative advantage (RCA) approach, the agrarian product groups were mapped into four-different quadrants based on the level of comparative advantage and export specialisation. The re-

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sults reveal more significant comparative advantage and trade specialisation in ASEAN economies than in East Java and Indonesia.

Jambor and Babu (2016) investigate the competitiveness of different countries in global agriculture and food trade for the period between 1991 and 2014. Their Balassa index reveals that Nigeria and other countries such as Algeria, Cote d'Ivoire and Gabon have a comparative disadvantage in agricultural and food exports. Nevertheless, on a product-specific, Nwachukwu et al. (2010) assess the competitiveness of Nigeria in cocoa beans. The findings reveal Nigeria with an immense competitive advantage in cocoa beans.

Even though a few studies have assessed food trade performance and competitiveness in Nigeria, to the best of our knowledge, no study has used products mapping tool hinged on TBI, Balassa and Lafay indices in all food products between Nigeria and the EU28. Although policy trusts in recent years aimed at boosting food production and exports, the policies may not have adequately focused on all the food products that the country trades with the EU28 and the world market. Thus, this study attempts to bridge the gap.

MATERIALS AND METHODS

This paper assesses the agri-food trade performance and competitiveness between Nigeria and the EU28 as well as Nigeria and the world for the period 1995–2017. The statistical data for this are obtained from the United Nations Conference on Trade and Development (UNCTAD 2019a). The classification of agri-food products used in this article is adapted from UNCTAD based on the UN Standard International Trade Classification (SITC), revision 3 (UNCTAD 2019b). The data is supplied at the three-digit level of the SITC for 46 agri-food product groups [46 food products in Table S1; Table S1 in electronic supplementary material (ESM), for the supplementary material see the electronic version] as calculated (at current prices in US dollars (USD)). It is in line with the definition of all food items (SITC 0 + 1 + 22 + 4) used by the World Trade Organization (WTO).

In order to capture the degree of trade specialisation in specific products, it is essential to assess the revealed comparative advantages of the relevant sectors included. To achieve this, Balassa (1965, 1977) suggested the following index of revealed comparative advantage (RCA), also known as Balassa index (*BI*). The *BI* is mathematically presented as follows:

$$BI_{ij} = \frac{\frac{X_{ij}}{X_i}}{\frac{X_{wj}}{X_w}} \quad (1)$$

where: X – exports, i – a specific country, j – a specific product, and w – the world (or any set of exporting countries taken into account).

The *BI* varies between 0 and infinity. Values less than 1 signify that the economy does not have a comparative advantage. It implies that the economy does not specialise in exporting that given product; while values that exceed 1 signifies that the country has a comparative advantage in that given sector.

Because of the shortcomings of the *BI*, as described by Sanidas and Shin (2010), it is noteworthy to use another index to see if there is a staggering difference. Therefore, the Lafay index (*LFI*) is selected (Lafay 1992). In contrast to the *BI* that uses only export values, *LFI* uses both export and import values. The index is mathematically explained as follows:

$$LFI_j^i = 100\left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}\left(x_j^i - m_j^i\right)}{\sum_{j=1}^{N}\left(x_j^i + m_j^i\right)}\right)\frac{x_j^i + m_j^i}{\sum_{i=j}^{N}\left(x_j^i + m_j^i\right)} \quad (2)$$

Table 1. Product mapping scheme

	Trade balance index (*TBI*)	
	***TBI* < 0**	***TBI* > 0**
***LFI* > 0**	**Group B** comparative advantage no export-specialisation (net-importer) (*LFI* > 0) and (*TBI* < 0)	**Group A** comparative advantage have export-specialisation (net-exporter) (*LFI* > 0) and (*TBI* > 0)
***LFI* < 0**	**Group D** comparative disadvantage no export-specialisation (net-importer) (*LFI* < 0) and (*TBI* < 0)	**Group C** comparative disadvantage have export-specialisation (net-exporter) (*LFI* < 0) and (*TBI* > 0)

LFI – Lafay index

Source: Widodo 2008

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where: x and m – the export and import values of individual product group of food trade. Zero represents a neutral value regarding comparative advantage. A positive value signifies the existence of comparative

Table 2. Descriptive statistics (*BI*, *LFI* and *TBI* indexes)

	1995	1997	1999	2001	2003	2005	2007	2009	2011	2013	2015	2017
BI (Nigeria <–>World)												
Average	1.517	1.493	1.379	1.376	1.161	1.416	1.358	1.039	1.104	1.329	1.104	1.274
St. dev.	7.145	6.967	6.468	6.543	6.537	5.419	6.668	4.778	4.779	5.851	4.372	4.214
Median	0.108	0.081	0.064	0.061	0.032	0.046	0.052	0.035	0.048	0.123	0.108	0.054
Kurtosis	43.886	44.361	44.057	44.075	45.459	27.889	44.753	43.347	43.002	44.074	42.402	26.478
Skewness	6.566	6.610	6.580	6.583	6.726	5.158	6.651	6.508	6.471	6.582	6.410	4.984
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	48.921	47.836	44.335	44.831	44.890	33.341	45.800	32.649	32.663	40.188	29.877	25.804
LFI (Nigeria <–> World)												
Average	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
St. dev.	4.221	2.911	2.985	2.170	4.504	2.472	2.748	3.549	1.701	3.050	2.911	2.447
Median	–0.058	–0.008	–0.055	–0.051	–0.152	–0.052	–0.013	–0.105	–0.020	–0.068	–0.034	–0.059
Kurtosis	22.245	18.251	21.059	15.674	32.051	15.231	22.237	20.390	15.975	20.855	18.396	10.569
Skewness	3.668	2.862	3.409	2.913	5.139	2.980	3.294	3.293	2.046	3.478	2.893	1.363
Minimum	–9.054	–6.508	–7.202	–4.140	–6.606	–4.470	–7.835	–9.540	–5.575	–7.576	–7.565	–8.158
Maximum	23.645	15.503	16.580	11.204	27.584	12.757	15.345	19.354	8.557	16.856	15.545	10.991
TBI (Nigeria <–> World)												
Average	–0.481	–0.517	–0.620	–0.768	–0.720	–0.578	–0.577	–0.677	–0.638	–0.637	–0.647	–0.621
St. dev.	0.772	0.742	0.619	0.508	0.583	0.649	0.651	0.581	0.611	0.603	0.587	0.668
Median	–0.980	–0.968	–0.983	–0.997	–0.993	–0.971	–0.980	–0.967	–0.968	–0.897	–0.930	–0.993
Kurtosis	–0.683	–0.501	0.452	5.533	3.431	0.737	0.563	3.495	1.123	2.363	2.572	1.042
Skewness	1.076	1.137	1.391	2.494	2.180	1.467	1.423	2.161	1.623	1.938	1.931	1.619
Minimum	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000
Maximum	1.000	0.991	0.972	0.996	0.998	1.000	1.000	0.996	0.904	0.997	0.995	1.000
LFI (Nigeria <–> EU28)												
Average	0.296	0.287	0.184	0.125	0.317	0.115	0.165	0.166	0.113	0.240	0.219	0.069
St. dev.	3.377	2.010	2.337	1.705	3.705	1.679	1.998	1.996	0.917	2.246	2.030	1.210
Median	–0.024	–0.008	–0.014	–0.017	–0.020	–0.006	–0.003	–0.015	–0.002	–0.012	–0.011	–0.013
Kurtosis	30.936	33.571	35.110	30.629	39.405	35.078	37.532	40.530	40.997	41.600	42.650	29.721
Skewness	5.084	5.429	5.496	5.157	6.088	5.558	5.806	6.194	6.250	6.294	6.406	4.779
Minimum	–4.932	–2.371	–3.554	–2.205	–3.141	–1.964	–2.451	–1.669	–0.878	–1.749	–1.598	–2.084
Maximum	20.669	12.736	14.889	10.441	24.141	10.681	12.937	13.088	6.065	14.957	13.595	7.391
TBI (Nigeria <–> EU28)												
Average	–0.481	–0.517	–0.620	–0.768	–0.720	–0.578	–0.577	–0.677	–0.638	–0.637	–0.647	–0.621
St. dev.	0.772	0.742	0.619	0.508	0.583	0.649	0.651	0.581	0.611	0.603	0.587	0.668
Median	–0.980	–0.968	–0.983	–0.997	–0.993	–0.971	–0.980	–0.967	–0.968	–0.897	–0.930	–0.993
Kurtosis	–0.683	–0.501	0.452	5.533	3.431	0.737	0.563	3.495	1.123	2.363	2.572	1.042
Skewness	1.076	1.137	1.391	2.494	2.180	1.467	1.423	2.161	1.623	1.938	1.931	1.619
Minimum	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000	–1.000
Maximum	1.000	0.991	0.972	0.996	0.998	1.000	1.000	0.996	0.904	0.997	0.995	1.000

BI – Balassa index; *LFI* – Lafay index; *TBI* – trade balance index

Source: Computed based on UNCTAD (2019a)

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advantage for a specific sector, and a negative value signifies the existence of a comparative disadvantage for a food product. It means that a higher index value suggests a higher degree of comparative advantage and specialisation (Zaghini 2005).

Also, the trade balance index (*TBI*) is employed to analyse whether a nation has specialisation in export (as net-exporter) or import (as net-importer) for a specific group of products. *TBI* is mathematically presented as follows:

$$TBI_j^i = \frac{x_j^i - m_j^i}{x_j^i + m_j^i} \quad (3)$$

where: TBI_j^i – trade balance index of country *i* for product *j*; x_j^i and m_j^i – exports and imports of product products *j* by nation *i*, respectively.

The values of the index range from –1 to +1. Exceptionally, the *TBI* equals –1 if a nation only imports. On the other hand, the *TBI* equals +1 if a nation only exports. Nigeria is a net-exporter of a given food product if the value of *TBI* is positive. Inversely, Nigeria is a net-importer or consumer of a food product group if the value is negative.

In the same direction, domestic trade balance and global competitiveness are used to analysing trade balance and comparative advantage (Widodo 2008). Accordingly, the *LFI* and *TBI* are combined to create products mapping, which classifies a product and a nation into four categories (Table 1).

Products mapping approach has been used by Widodo (2008), Benesova et al. (2017), and Esquvias (2017) to analyse comparative advantage in food trade in recent years. It worth mentioning that the terms, such as agri-food and food product are used interchangeably in this paper. These concepts are all defined by the UN SITC code (revision 3) as all food items (SITC 0 + 1 + 22 + 4). The study spans the period 1995–2017 because the authors think it is necessary to show Nigeria's trade performance in agri-food products during the military rule (1995–1999) and current civilian administration (1999–2017).

Before the results are presented, some summary statistics (mean, median, range, skewness) of the *BI*, *LFI* and *TBI* are further investigated to assess the characteristics and stability of distribution of indices. There are year-on-year fluctuations in the distribution of indices. However, when assessing trends, it shows insights on the changes in the RCA and trade balance.

In a trade between Nigeria and the world market, both the *BI* and *LFI* signal substantial decrease in maximum values (*BI*: from 48.9 to 25.8; and *LFI*: from 23.6 to 11.0 in 1995–2017, respectively). It indicates a weakening comparative advantage of Nigeria's flagship agri-food products. The minimum scores of the *LFI* improved in the initial periods but have declined since 2000. These further weaken the products with comparative disadvantages (Table 2).

The distribution is highly skewed, with the tail on the right, and the distribution has tended to shift to the right (skewness has decreased). The mean value of *BI* decreased, thus signals a higher proportion of low values, but skewness and mean are generally sensitive to outlying values. The median values fluctuated but were generally very low for *BI* (on average, half of the values were equal or less than 0.06) and negative in the case of *LFI* (–0.05 on average). The median values have slightly decreased, but the *BI* has signalled an increase since 2010. The distribution is skewed, with the tail on the right and the distribution has tended to shift to the left (skewness has increased). The average *TBI* values decreased from –0.36 in 1995 to –0.61 in 2017. The main drop was between 1995 and 2000. Similarly, median values dropped from –0.79 to –0.92 between 1995 and 2017. Examining changes in the distribution of the *BI* and *LFI* indexes over the period reveals that the flagship products which Nigeria has comparative advantages have weakened (Table 2).

In a trade between Nigeria and EU28, the maximum value decreased from 20.67 to 7.39. Contrary, the minimum value improved from –4.93 to –2.08. The mean value decreases from 0.30 to 0.07, while the median value slightly improved, but generally is very low (–0.01). The distribution is highly skewed, with the tail on the right. Skewness has tended to shift slightly to the left. Assessment of summary statistics indicates that Nigeria's comparative advantages towards EU28 have weakened mainly among the products with ample comparative advantages. On the other hand, some of the products with comparative disadvantages have improved. Average values of *TBI* decreased from –0.48 in 1995 to –0.62 in 2017. Median values are very low, close to –1. The distribution is skewed, with the tail on the right, but tended to shift to the left (skewness has increased).

RESULTS AND DISCUSSION

Although agri-food exports in Nigeria fluctuated, it sluggishly rose from USD 378 million in 1995 to its peak in 2010 with USD 1.86 billion, before declining to USD 1.15 billion in 2016, and then slightly rose

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to USD 1.45 billion in 2017. Sadly, Nigeria substantially recorded negative *TBI* (declined from –42% to –63% between 1995 and 2017) in the overall food products throughout the period under study (Table 3) although the country is an agrarian nation. Nigeria's competitiveness in overall agri-food has reduced while over-reliance on food imports intensified over the years. FAO (2019) stress that Nigeria's food production has sluggishly improved while the country's population has substantially risen. Consequently, the demand for food import has grown.

The *BI* reveals that, on average, Nigeria has comparative advantages in 7 out of 46 (7/46) food products. On the other hand, the country had a comparative disadvantage in 39/46 products. In the same direction, the index reveals that the number of food products with comparative advantages declined from 18/46 in 1995 to 12/46 in 2017. Inversely, the products with comparative disadvantage increased from 27/46 to 34/46 (Table 3), suggesting that the country has sluggishly performed in some product groups.

The results of the products mapping in Group A based on *LFI* indicate that Nigeria's comparative advantages decreased from 12/46 in 1995 to 7/46 in 2016, before increasing to 8/46 product groups in 2017. These product groups accounted for over 85% and 3% share of total food exports and imports, respectively, in 2017 (Table 3). It suggests that Nigeria has spe-

Table 3. Dynamics of agri-food (SITC 0 + 1 + 22 + 4) trade in Nigeria

Indicator		1995	2000	2005	2010	2015	2016	2017
Number of food products		46	46	46	46	46	46	46
Export (million USD)		378	185	750	1 862	1 794	1 147	1 445
Import (million USD)		934	1 455	3 749	5 575	6 639	4 391	6 120
Balance (million USD)		–556	–1 270	–3 000	–3 713	–4 846	–3 244	–4 675
TBI (index)		–0.42	–0.64	–0.67	–0.50	–0.58	–0.59	–0.62
BI – comparative advantage		7	6	6	6	7	7	8
BI – comparative disadvantage		39	40	40	40	39	39	38
LFI – comparative advantage		18	10	14	11	12	8	12
LFI – comparative disadvantage		27	36	32	35	34	38	34
LFI								
A	Number of food products	12	7	9	8	7	7	8
	Export (million USD)	340	169	709	1 696	1 465	1 035	1 225
	Share on export (%)	90.0	91.4	94.6	91.1	81.7	90.3	84.8
	Import (million USD)	14	14	53	71	196	108	172
	Share on import (%)	1.5	1.0	1.4	1.3	3.0	2.5	2.8
	Balance (million USD)	327	155	656	1 625	1 269	927	1 053
B	Number of food products	6	4	5	3	5	1	4
	Export (million USD)	8	4	12	83	165	27	78
	Share on export (%)	2.2	2.3	1.6	4.4	9.2	2.4	5.4
	Import (million USD)	13	10	48	153	443	66	168
	Share on import (%)	1.4	0.7	1.3	2.7	6.7	1.5	2.8
	Balance (million USD)	–4	–6	–36	–70	–278	–39	–91
D	Number of food products	27	35	32	35	34	38	34
	Export (million USD)	29	12	29	84	163	85	142
	Share on export (%)	7.7	6.3	3.8	4.5	9.1	7.4	9.8
	Import (million USD)	907	1 431	3 648	5 350	6 000	4 216	5 779
	Share on import (%)	97.1	98.3	97.3	96.0	90.4	96.0	94.4
	Balance (million USD)	–878	–1 419	–3 620	–5 267	–5 837	–4 132	–5 637

BI – Balassa index; *LFI* – Lafay index; *TBI* – trade balance index

Source: Computed based on UNCTAD (2019a)

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cialised in exporting only a few food products. Similarly, the country substantially recorded a positive *TBI* in these food products. This result is in line with the findings by Nwachukwu et al. (2010), whose studies also reveal that Nigeria has a comparative advantage in cocoa beans (SITC 072). Correspondingly, Jambor and Babu (2016) confirm that Nigeria has a comparative disadvantage in agricultural and food exports.

Products in Group B show the food products, which Nigeria has comparative advantages despite being a net importer. The food products of sectors decreased from 6/46 in 1995 to 1/46 in 2016, before increasing to 4/46 in 2017 (Table 3). Some of these products moved from group B to group D. This indicates that the products performed poorly in the global markets.

Sadly, the results of the *LFI* in Group D reveals that Nigeria's comparative disadvantages in food products rose from 27/46 in 1995 to 38/46 in 2016, before reducing to 34/46 food products in 2017. These product groups accounted for over 90% and 9% of the total food imports and exports, respectively, in Nigeria (Table 3). The reduction of food product groups with comparative disadvantages in 2016 could be attributed to Nigeria's policy that led to import substitutions of some selected food commodities (especially rice) to stimulate high value-added products in the country. The measures may have started yielding concrete results (FAO 2018). For instance, the value of rice import (SITC 042) in Nigeria drastically decreased from USD 1.84 billion to USD 18 million between 2012 and 2017 (UNCTAD 2019a).

Notwithstanding, food imports have increased in neighbouring countries such as the Benin Republic. Substantial parts of the food products, such as rice have been reportedly smuggled into Nigeria (IMF 2019). Similarly, the import values of the major food products, such as wheat (SITC 041), fish (SITC 034), and milk and cream (SITC 022) that Nigeria records adverse *TBI* and comparative disadvantages have remained high.

STRUCTURE OF AGRI-FOOD TRADE BETWEEN NIGERIA AND THE EU28

The share of total Nigerian agri-food exports and exports, which the EU28 accounted for declined from 72% and 40% to 37% and 27% between 1995 and 2017, respectively (Table 4). The share of total EU28 agri-food exports, which Nigeria accounted for, declined from 0.31% (or 1.41% share of extra-EU) to 0.23% (or 0.89% share of extra-EU) between 2003 and 2017. Likewise, the share of total EU28 agri-food imports which Nigeria accounted for, declined from 0.20% (or 0.72% share of extra-EU) to 0.12% (or 0.5% share of extra-EU) between 2003 and 2017 (Eurostat 2019). The bilateral trade between the EU28 and Nigeria has dropped as both parties have diversified their markets base. Nevertheless, the EU's position in the Nigerian food trade is still notable.

The total turnover of agri-food trade between Nigeria and EU28 snowballed, from USD 650 million in 1995 to USD 2.17 billion in 2017. On the other hand, food exports from Nigeria to the EU28 fluctuated but grew from USD 273 million in 1995 to its peak in 2015 with USD 927 million, before declining to USD 505 million in 2016, and then slightly increased to USD 534 million in 2017. Sadly, Nigeria substantially recorded negative trade balance with the EU28 in the total food products throughout the period under study (Table 4) although the country is an agrarian nation. Similarly, the overall *TBI* in food products also declined between 1995 and 2017 [Table 4, Table S2; Table S2 in electronic supplementary material (ESM), for the supplementary material see the electronic version]. It suggests that the overall country's competitiveness in food products in trading with the EU has reduced, whereas over-reliant on food imports has drastically risen in recent decades.

Both *BI* and *LFI* are carried out following the idea of Balance et al. (1987) approach which the dichotomous test of consistency in the categorisation of food products into four groups is used to assess the similarity of data statistically. The results of the test indicate individual differences, but on average between 1995 and 2017, 84.7% of pairs are the same. On year by year bases, the similarity is between 80% and 90%. Both *BI* and *LFI* indexes indicate a similar and increasing number of products in Group D. The products mapping based on *LFI* indicates a slightly higher number of Group A than *BI*. Correspondingly, *BI* shows trade shares normalised towards the world market; *LFI* shows products trade balance normalised towards the overall trade balance. The *LFI* does not reveal any product in Group C, while *BI* reveals some decreasing products in the group. Similarly, both indexes indicate a small number of Group B products with comparative advantages but a negative trade balance [Figure 1, Figure S1; Figure S1 in electronic supplementary material (ESM), for the supplementary material see the electronic version].

The *LFI* results of the product mapping in Group A show that the number of food products which Nigeria

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Table 4. Dynamics of agri-food trade (SITC 0 + 1 + 22 + 4) between Nigeria and the EU28

Nigeria <–> EU28		1995	2000	2005	2010	2015	2016	2017
Export (million USD)		273	121	381	695	927	505	534
Import (million USD)		377	620	1 191	1 073	1 435	1 068	1 631
TBI (index)		–0.16	–0.67	–0.52	–0.21	–0.22	–0.36	–0.51
Export (% of total food exports)		72.1	65.6	50.8	37.3	51.7	44.0	36.9
Import (% of total food imports)		40.4	42.6	31.8	19.2	21.6	24.3	26.7
Products mapping (*LFI*)								
A	Number of food products	12	6	9	10	8	5	9
	Export (million USD)	268	110	367	673	847	488	516
	Share on export (%)	98.3	90.9	96.5	96.9	91.4	96.6	96.7
	Import (million USD)	9	2	11	19	26	4	14
	Share on import (%)	2.3	0.3	1.0	1.8	1.8	0.3	0.8
	Balance (million USD)	259	109	356	654	821	484	502
	TBI (index)	0.94	0.97	0.94	0.94	0.94	0.99	0.95
B	Number of food products	1	4	6	1	1	4	2
	Export (million USD)	1	8	10	1	1	9	1
	Share on export (%)	0.3	6.3	2.5	0.1	0.1	1.8	0.2
	Import (million USD)	2	11	29	1	1	17	3
	Share on import (%)	0.6	1.8	2.5	0.1	0.1	1.6	0.2
	TBI (index)	–0.40	–0.20	–0.51	–0.08	–0.01	–0.19	–0.33
D	Number of food products	31	35	31	35	37	37	35
	Export (million USD)	4	3	4	21	78	8	16
	Share on export (%)	1.4	2.9	1.0	3.0	8.5	1.6	3.0
	Import (million USD)	366	607	1 150	1 053	1 408	1 048	1 614
	Share on import (%)	97.1	97.9	96.6	98.1	98.1	98.1	99.0
	TBI (index)	–0.98	–0.99	–0.99	–0.96	–0.89	–0.99	–0.98

BI – Balassa index; *LFI* – Lafay index; *TBI* – trade balance index

Source: Computed based on UNCTAD (2019a)

has comparative advantages in trading with the EU28 decreased from 12/46 in 1995 to 5/46 in 2016, and then, rose to 9/46 products in 2017. Surprisingly, these few products accounted for about 96% and 1% of total food exports and imports respectively in 2017 (Table 4). Similarly, cocoa (SITC 072) substantially accounted for the contribution in Group A and the overall Nigerian agri-food exports to the EU28. Cocoa accounted for 70% in 1995, about 81% in 2010, and then reduced to 65% of total food exports in 2017. Similarly, a report of the European Commission (2019a) shows that cocoa and cocoa preparations accounted for 83.8% of total agri-food exported by Nigeria to the EU28 in 2018. It suggests that Nigeria has specialised in exporting only few agri-food product groups to the EU's markets.

Similarly, both *BI* and *LFI* reveal that Nigeria has comparative advantages throughout the period in SITC 036 (crustaceans and molluscs), SITC 072, and SITC 222 (oil seeds and oleaginous fruits, excluding flour). Also, products, such as SITC 057 (fruit, nuts excluding oil nuts), SITC 075 (spices) recorded comparative advantages in almost all the years. The *LFI* findings further reveal comparative advantages in product groups, such as SITC 037, SITC 054 (vegetables), SITC 122 (tobacco, manufactured), SITC 223 (oil seeds, oleaginous fruits, including flour), SITC 422 (fixed vegetables) in 2017 (Figure 1). Most of these products recorded positive *TBI* [Table S2; Table S2 in electronic supplementary material (ESM), for the supplementary material see the electronic version].

Sadly, 6 (SITC 045, SITC 047, SITC 071, SITC 081, SITC 121, SITC 421) out of 12 food products initially in Group A (with comparative advantages) moved to Group D (with comparative disadvantages) between

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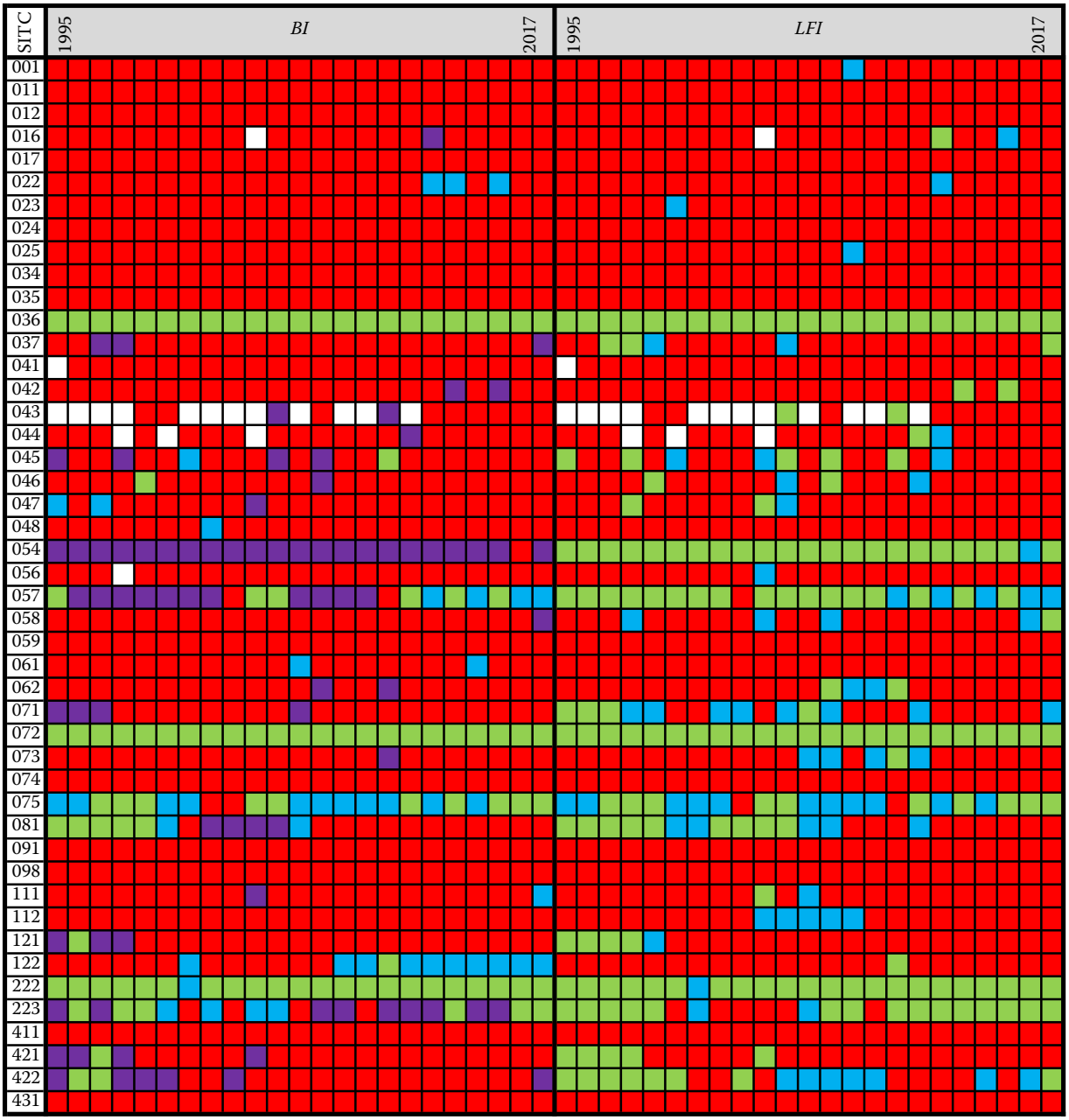

Figure 1. Products mapping (*BI* and *LFI*) between Nigeria and the EU28, 1995–2017

Group A – green (comparative advantage, net-exporter); Group B – blue (comparative advantage, net-importer); Group C – purple (comparative disadvantage, net exporter); Group D – red (comparative disadvantage, net-importer); white colour – no data; *BI* – Balassa index; *LFI* – Lafay index

Source: Computed based on UNCTAD (2019a)

1995 and 2017 [Figure 1, Table S3; Table S3 in electronic supplementary material (ESM), for the supplementary material see the electronic version]. The *LFI* results of the products mapping in Group B show the agri-food products that Nigeria has comparative advantages despite being a net importer in trading with the EU28. The number of these products fluctuated over time and rose from 1 (SITC 075)/46 in 1995 to 6/46 in 2005, and then, declined to 2 (SITC 057 and SITC 071)/46 in 2017.

The *LFI* findings in Group D suggest that the food products that Nigeria recorded comparative disadvantages in trading with the EU28 rose from 31/46 in 1995 to 37/46 in 2015, before declining to 35/46 in 2017.

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Likewise, the share of these food products in the country's total food imports and exports to the EU28 slightly increased from 97% and 1.4% in 1995 to 99% and 3% in 2017, respectively (Table 4). The country recorded comparative disadvantages [Figure 1, Table S3; Table S3 in electronic supplementary material (ESM), for the supplementary material see the electronic version] and negative *TBI* [Table S2; Table S2 in electronic supplementary material (ESM), for the supplementary material see the electronic version] throughout the period in 13/46 product groups: SITC 023 (butter, other fat of milk); SITC 024 (cheese and curd); SITC 034 (fish, fresh, chilled, frozen); SITC 035 (fish, dried, salted, smoked); SITC 037 (fish, aquatic invertebrates, prepared, preserved); SITC 041 (wheat, meslin, unmilled); SITC 042 (rice); SITC 059 (fruit, vegetable juices); SITC 074 (tea and mate); SITC 091 (margarine and shortening); SITC 098 (edible products and preparations); SITC 411; and SITC 431 (animal or vegetable oils and fats, processed) (Figure 1). These findings are in line with studies by Benesova et al. (2017), whose results reveal that most of the agri-food trade in Russia fall in Group D category.

It is worth mentioning that although the EU has 28 member countries, only a few import food products from Nigeria in tremendous dollar values.[1] Similarly, Nigeria also mostly imports food from a few EU members.[2] It implies that regarding food products, Nigeria trades with only a few EU member states. Generally, Nigeria has comparative advantages mainly (in tropical) primary food products, that the EU28 hardly produce in large quantities occasioned by nature. On the other hand, Nigeria mainly imports value-added food products as the country is yet to develop its food processing industries to meet domestic demand.

Also, the EU's trade policies, regarding non-tariff measures (NTMs), such as sanitary and phytosanitary measures (SPS)[3], and tariff escalation[4] in semi-processed and processed food products from Nigeria may have partially distorted trade signals and nullified the country's efforts to improve in producing and exporting value-added food products to the Union's markets. For instance, studies by the European Commission (2017) stresses that since 2008, Ghana and Côte d'Ivoire have benefited from duty-free quota-free market access and steadily improved their exports of semi-processed and processed cocoa products to the EU28 markets. On the contrary, Nigeria, which remained under the GSP regime, the country's semi-processed and processed cocoa products exported to the EU28 markets have stagnated and dwindled partially due to market access issue.

In the period investigated, Nigeria's competitiveness has improved a few food products, some products stagnated, while others decreased regarding export performance. The study can be concluded that the structure of Nigeria's trade in all food products has undergone some changes, albeit at a slow pace. The findings of this study suggest that recent agricultural policies on value chains and export diversification in Nigeria has not dramatically reduced food imports or spurred the exports of critical products, such as cocoa. Arguably, it is too early to con-

[1]Major Nigeria's exporting food products and destinations to the EU's market: SITC 072 Cocoa (the Netherlands, Belgium and Germany); SITC 036 Crustaceans (the Netherlands, Belgium and France); SITC 222 Oil seeds (Italy, Greece, Germany and the Netherlands); SITC 223 Oil seeds (Spain and France); SITC 422 Fixed vegetables (the Netherlands and Greece); SITC 054 Vegetables (the Netherlands and UK); SITC 075 Spices (the Netherlands and Germany) (UNCTAD 2019a; ITC 2019a).

[2]Major Nigeria's importing products from the EU's markets: SITC 098 Edible products (France, Germany, Ireland); SITC 022 Milk and cream (the Netherlands, Germany and Ireland); SITC 034 Fish, fresh, chilled, frozen (the Netherlands and Norway); SITC 041 Wheat (Germany, Poland and Latvia); SITC 048 Cereal preparations (Belgium, France and UK); SITC 112 Alcoholic beverages (UK, Ireland, France and Italy); SITC 081 Animal feed stuff (the Netherlands, Germany and Belgium) (UNCTAD 2019; ITC 2019a).

[3]In 2015, under a bilateral SPS measure, the EU blocked the importation of dried beans from Nigeria due to pesticide residues at levels exceeding the reference dose as stated by the European Food Safety Authority. The suspension was to apply until June 30, 2016 (European commission 2015). Between 2000 and 2012, Nigeria accounted for 9.71% of total number of food African food products that were rejected by the EU due to standard issues (Kareem 2016).

[4]Although there is market access for some tropical food products to the EU's markets, tax escalation exits in semi-processed and processed food products. For instance, the GSP (tariff preference) between Nigeria and the EU, import duties applied (AVE based on the WTP) on Nigeria products in 2018: Cocoa beans 0%; Cocoa paste 6.1%; Crustaceans 5.35%; Edible offal of bovine animals 43.90%; Orange, fresh 22.42%; Orange juice, unfermented 29.22%; Milk and cream 27.92%; Milk and cream, concentrated 33.68%; Aquatic invertebrates 35.0% (ITC 2019b).

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clude that the policies have not been implemented as it might take some time to record notable changes in Nigeria's agri-food sector.

CONCLUSION

This paper assesses the trade performance and competitiveness in all food products between Nigeria and the EU as well as the world. The findings show that Nigeria substantially recorded adverse *TBI* in total food products both with the world as well as the EU, implying that the country has relied on food imports for domestic consumption. The share of the bilateral food trade between Nigeria and the EU28 has drastically declined. The results of the products mapping show that Nigeria's comparative advantages in trading with the EU28 also decreased from 12/46 to 9/46 food products between 1995 and 2017. Inversely, food products that Nigeria has comparative disadvantages and negative *TBI* in trading with the EU28 rose from 31/46 to 35/46 between 1995 and 2017.

For Nigeria and to boost trade in food products with the EU and the world, domestic agricultural and food value chains should be promoted. Also, the Nigerian government should dramatically implement its agricultural production and trade policies for food self-sufficiency and foreign earnings in many food products to be improved and sustained. Finally, food products in Group B and C should be given priority attention by the Nigerian policymakers, as those products have potentials to move to Group A – comparative advantages and positive *TBI*.

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